A practical treatise on midwifery / translated by T. F. Betton and edited by P. B. Goddard.

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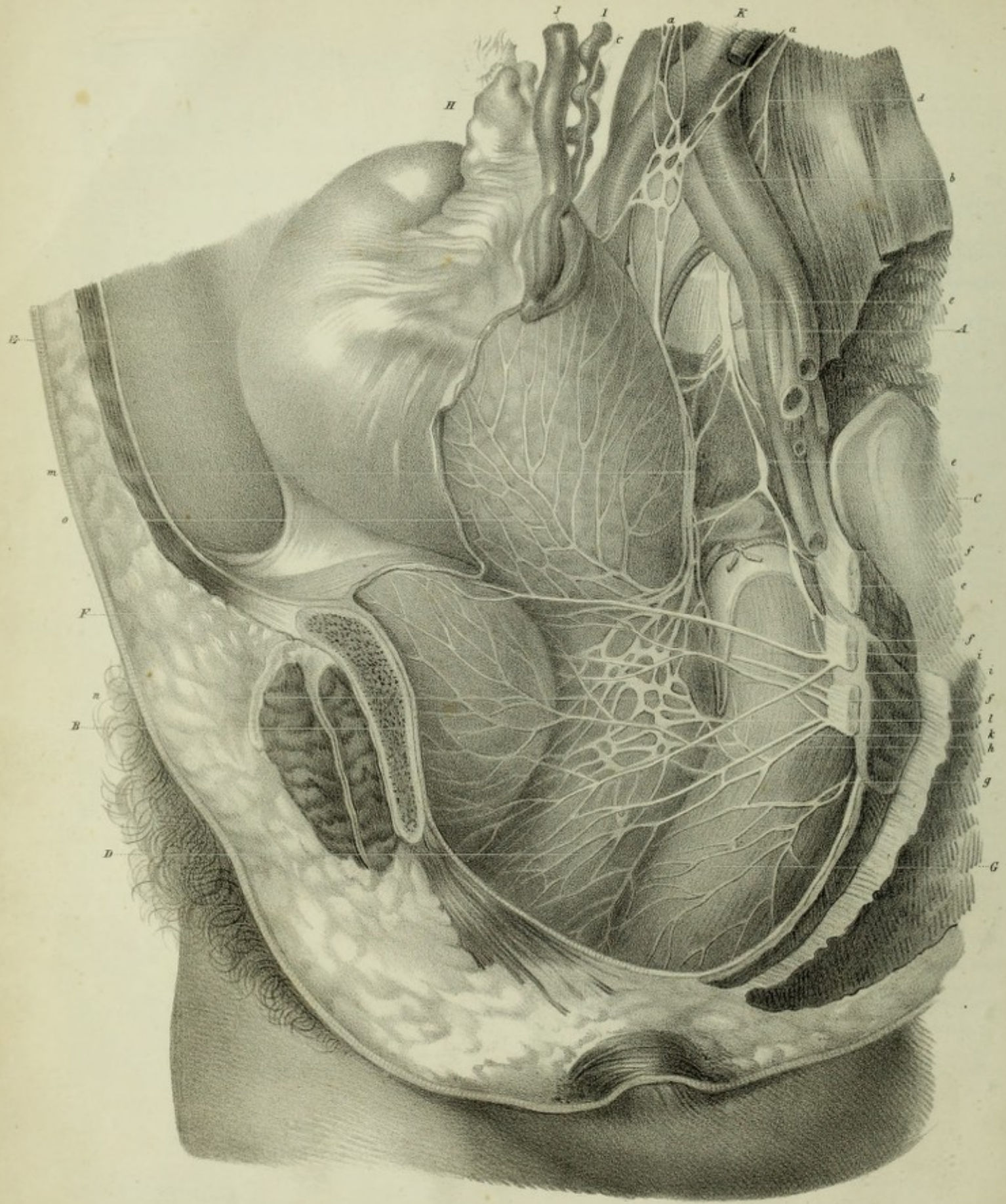

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INTRODUCTION.

The art of Midwifery is a limited but essential portion of the knowledge that must be acquired by him who intends to devote his life to the practice of the science of medicine. In order to be able to say in what this art consists, and indicate with precision the course which should be followed in its study, it is necessary to fix the boundaries which circumscribe it. It will therefore be useful to cast a rapid glance over the conditions imposed on us by nature, at the time that she gave us life.

All organized beings, vegetable or animal, must be born, developed, reproduced, decay and die. Such are the stages and the phases of life! The period of reproduction may be regarded as the culminating point of existence, the apogee of life. Its result is the end toward which all the efforts of nature are directed, and that intended by the Author of all. So long as this goal is not attained, the individual has not accomplished his task, and if overtaken by death before this period, life is, for him, incomplete.

Among these stages of life, some belong more particularly to the domain of physiology and pathology, others to that of morals and philosophy; lastly, two belong essentially to the art, the principles of which we are about to lay down. We will occupy time with the first. We will not examine the admirable mechanism by which our organs are nourished and grow; how they repair the losses occasioned by the motions of life, how they decay and die. We shall not inquire how man disposes of surrounding objects; why he commands the animals; by what changes, what modifications, and what irregularity in the exercise of his functions, various diseases are developed, which produce alterations, and more or less numerous organic transformations, cause the death of the individual at the period fixed by nature, and sometimes, also, before he has passed through the various stages of life.

To the domain of the art of midwifery, belong reproduction and birth; these we are about to investigate, and beyond these limits we shall not pass.

Regarded in this point of view, the art of midwifery may be considered as the commencement of the science of man, and as its completion; for it begins with his formation, accompanies him, as it were, in his development, guides him at the moment of birth, and abandons him only when nature has attained her object, that is, when the preservation of the species is secured.

Reproduction being the principal, we may even say the only object of life, the means employed by nature in its attainment are as numerous and various as the species to which they are applied. The subject of our consideration shall be man alone; and we shall not stop to investigate the methods she adopts to perpetuate the species, the care with which she watches over the development and preservation of the individuals of those species; the wondrous mechanism of the generative apparatus; the instinct and pleasure that preside over sexual congress, and the neglect in which she leaves them when they have fulfilled the designed end of their existence. We shall see that, placed at the summit of the animal scale, or, more correctly speaking, being, as regards his organization, the centre of attraction of all inferior organisms, the system of organs intended, in man, to perform this important function, is more numerous and complex than that of the majority of animals. As regards his reproduction, we may observe that nearly two-thirds of his existence are, as it were, ignorant of it: but a small portion of his life is set apart for this purpose; by virtue of a general law of all organized creatures, this portion is the most beautiful of his being, during which man enjoys the full development of his strength and faculties, during which he is capable of the greatest deeds, of the loftiest conceptions, as well as of the wildest extravagances.

We see that, in man, by an arrangement common to him and animals of an elevated rank, the sexes are distinct and separate, that is to say, that in the human species, hermaphrodism does not exist, as is found in certain inferior classes of animals, as, for example, in the mollusca, worms, and the greater part of vegetables. The male organs are in one individual, the female organs in another; it follows from this arrangement, that a part only, and that a very small one, of the functions of reproduction belong to man, properly so called, whilst a much greater, and perhaps much more important share falls to the lot of his companion. This part of the functions of reproduction, the exclusive province of the female sex, should be the subject of a treatise on midwifery.

An examination of the functions which belong exclusively to woman, shows us that to her are entrusted 1st, Conception; 2d, Pregnancy; 3d, Parturition; 4th, lastly, Lactation.

There are some preliminary observations necessary to the exposition of these various functions. These functions are quite complicated; each one requires for its accomplishment, the concurrence of more or less numerous organs, the disposition, structure, and mode of action of which it is important to study. Some of these functions produce a result which enters, in its turn, as an element, into the consequent function. Therefore, previously to commencing the study of the ensemble of the functions, this result must be known and studied in all its phases. Hence, in order to be able to explain correctly the phenomena of pregnancy and parturition, it is not sufficient to understand perfectly the generative organs of the female, the dimensions of the pelvis, the various muscles which assist the uterus in the expulsion of the fœtus; we must also have studied the product of conception as a whole; at the various periods of its development, at its maturity; we must know precisely the relations which should exist between the fœtus at full term and the cavities through which it is to pass: in a word, we must be ignorant of none of the numerous conditions which are indispensable to the correct performance of the function.

From these considerations, in the exposition of the subjects of which we propose to treat, we have thought fit to adopt the following order:

The first part of the work will be devoted to the explanation of the organs which concur, in any manner, in the accomplishment of the various functions of reproduction, pertaining to the domain of woman alone. These organs will be studied,

1st. In their physiological state, and in a state of rest.

2d. In their physiological state and during the performance of their functions.

3d. In the anomalies which they may present, whenever only, however, these anomalies can modify, oppose, or prevent the execution of the functions peculiar to these organs.

We shall study in the same order the products of these functions, that is, the various parts which enter into the composition of the human ovum.

When, on the one hand, we know the organs, and on the other their products, we shall examine the functions collectively.

The second part will include the study of these functions.

We shall commence by indicating the conditions which denote the aptitude for their accomplishment, which will furnish us an opportunity of writing the history of the catamenia and its varieties. The subject of generation is left to treatises on physiology: we shall say a word or two on conception, and begin immediately the history of pregnancy. We shall establish its divisions, explain its regular course, the signs which characterize it, the means of appreciating the correct value of each one of them; and shall then treat of its duration and termination.

The third part will be particularly confined to the study of the various terminations of pregnancy, that is, to labour. We shall establish a distinction between labours, and indicate the numerous varieties they may offer, either as terminating by the efforts of nature alone, or as requiring the interposition of art.

In the fourth part we shall examine the anomalies of pregnancy in its progress, development, product, location, and termination: when we shall treat of abortion, moles, or false conception, extra-uterine pregnancies, and ruptures of the uterus.

In a fifth part we shall treat of the natural phenomena which supervene in the woman after delivery, and in the child at birth, then the peculiar cares required by both. To this will be limited the task we have undertaken.

In order to render this treatise as useful as possible, and remedy, as far as was in our power, any incorrectness or want of clearness in our descriptions, we have thought best to subject to the reader's eyes the subjects spoken of. We have had engraved, under our own supervision, and from nature, an Atlas,* in which we have endeavoured to represent faithfully, objects not always within the reach of every one, and a knowledge of which is absolutely necessary. Our thanks are due to the collaborators who assisted us by their talents, in the perfection of this difficult part of our labour. We cannot give too much praise to M. Emile Beau, for the fidelity and correctness of his drawings; to Dr. Jacquemier, formerly resident pupil of the Maison d'Accouchement of Paris; and to Dr. Brierre de Boismont, for his kind assistance in bibliographical research and in correcting the proofs.

Should time permit us, we shall, perhaps, compose a sixth part, which will complete this Treatise on Midwifery. It would comprise the anomalies which might occur during lying-in, and those presented by children in early infancy. This important part would constitute a separate treatise, comprising the whole history of lying-in women, and new-born children.

* In this edition the Atlas is incorporated with the work.—Ed.

PREFACE.

Diverted from the labours of the closet by the care of a large hospital, and the not less imperious and constantly new duties of an extensive practice, we had long since formed the determination never to write, and to confine ourselves to the discharge of those duties and that imposed on us by lecturing; but the anxiety of students to attend our course, and their repeated requests to us to publish our experience, have induced us to forego our resolve. With deep hesitation, and a true feeling of fear, do we enter on a path we had determined never to follow.

Two things are to be considered in the work now presented to the public—the dogmatical and the practical portions. The first is the *exposé*, as faithfully made as possible, of the reigning theories. To effect this, we have availed ourselves of the knowledge of our predecessors and contemporaries. We have endeavoured to render both the justice to which they were entitled. If accidentally we have failed in so doing, it must be attributed to our head, and not our heart, which has always been free from partiality or bias. We have exactly named the works from which we quoted, in order, as far as is in our power, to bring back students to the old authors, in our opinion too much neglected, and to prove to them that science does not date from to-day, as some appear to think, and, by repetition, at last seem to believe.

In the practical part, we have followed the same course: we have permitted ourselves to express more freely our own opinion, and support it by facts which have occurred under our own notice.

Some ideas long ago promulgated in our lectures, have found a place in works published a few years since. In claiming them as our own, we believe we are exercising a right which belongs to us, for oral teaching is a mode of publication which, as well as the press, should have some value; and we would rather believe that, if authors have presented them as the fruit of their own reflections, they have probably forgotten the source from which they drew them, or from which they had been first transmitted.

We must throw ourselves upon the indulgence of the reader, as regards the style of a book composed in haste, the greater part of which was digested at the bed-side of suffering women, in the short intervals afforded by the pains of labour and the cries of new-born children.

If this work can induce pupils to study more attentively an important part of the healing art; if it serves as a guide to the young physician just embarking on the thorny paths of practice; if the experienced practitioner finds in it what he has himself observed; if it can spare women some suffering, or prevent some of the diseases and maladies which threaten or attack them at that painful moment, when, struggling with agony, they are about to give birth to a new being; lastly, if the means which have succeeded in our hands in some difficult cases, can contribute to the restoration of one mother, or the preservation of one child, our highest ambition is amply gratified.

PRACTICAL TREATISE

ON

MIDWIFERY.

PART FIRST.

The art of Midwifery is that part of Medicine which treats of all that concerns the birth of man, and embraces the knowledge relating to it, in all its various circumstances.

The name of Parturition is given to that act by which man is introduced into this state of being.

It is a complex operation, peculiar to the female sex, and composed of a series or succession of phenomena, of which some are purely mechanical, and others essentially vital. Parturition constitutes an actual function. This function, generally slow in its progress, always difficult and painful in its execution, sometimes attended or followed by accidents more or less serious, is, from these very accidents, generally considered as a morbid condition. Parturition requires for its completion the simultaneous or successive concurrence of numerous organs and parts differing in their arrangement, their texture, their vitality, and their mode of action.

In order to understand properly the phenomena composing this function, it is indispensably necessary to possess an accurate knowledge of the parts and organs which are concerned in its performance.

CHAPTER I.

OF THE ORGANS CONCERNED IN PARTURITION.

Some of the female organs concerned in parturition are purely passive; others, on the contrary, play a more or less active part. To the former class belong the parts composing the pelvis; to the latter, the soft parts which cover it, or are inserted into it, and likewise some of the organs contained by it.

SECTION I.

OF THE PELVIS.

The pelvis is a curved canal, with osseous parietes, situated at the lower part of the body, to which it acts as a base, above the lower extremities, which, in the vertical position, are its points of support, and to which it transmits the weight of the superimposed parts.

The older anatomists did not examine the pelvis as a unity; they were satisfied with describing the bones composing it, some as making a part of the spinal column, of which they are evidently the continuation, the others as belonging to the lower extremities, bearing to these the same relation as the scapula and clavicle to the upper extremities. This method of the ancients is very philosophical, since it describes the bones from their analogy of structure and functions: it also appears to us to be the most correct for an anatomical course: but in midwifery our attention should be directed less to the bones which enter into the composition of the pelvis, than to the totality of the parts, which, by their union, form that species of tunnel or canal through which the fœtus must pass in order to reach the external air. Hence, the majority of modern anatomists, and especially accoucheurs, have found the importance of considering the pelvis as a unity, and of isolating it, in order to study it, from the spine and lower extremities.

Exact ideas of a whole cannot, however, be acquired, without having analysed in detail the parts which compose it, and we shall, therefore, describe separately, 1st, the parts which by their solidity serve, in some manner, as a foundation for the edifice; 2dly, the soft

parts, which, by their disposition, soften and diminish the asperities of the former, and modify the form of the cavities which they circumscribe.

ARTICLE I.—COMPOSITION OF THE PELVIS.

In a natural skeleton, the pelvis is composed of bones, of fibro-cartilage, and of ligaments.

The bones are four in number, viz: behind and on the median line of the body, the sacrum and coccyx: in front and laterally the two ossa innominata.

§ I.—OF THE SACRUM.

This is a single, symmetrical, triangular bone, curved longitudinally, flattened antero-posteriorly, situated on the posterior superior part of the pelvis, below the spinal column, above the coccyx, and between the two ossa innominata.

The name of sacrum was given it, according to Palfin,* because the Greeks, and indeed all the Orientals, distinguished by the appellation of *sacred* any individual remarkable in its species for excessive size. The sacrum, therefore, compared with the rest of the vertebræ, is undoubtedly the largest of all.

This origin of the word *sacrum* appears to us more satisfactory than that which supposes it to be so called on account of its vicinity to the organs of generation, which were considered as sacred, or because it was the portion offered by the ancients as a sacrifice to the gods.

The sacrum is divided into two surfaces, anterior or internal, and posterior or external, and into two edges, a base and a summit or apex.

The *anterior surface* is concave from above downward. This concavity is such that, in a well formed pelvis a perpendicular let fall from a line drawn from the apex to the base of the bone, upon the deepest point of the concave, will measure ten or twelve lines.

On the median line are found five surfaces nearly quadrilateral, formed by the bodies of the false vertebræ which compose it. The surfaces are separated by lines which project more or less, and which are the points of junction of the false vertebræ with each other. On the lateral portions is perceived a series of foramina, generally four in number, terminating, outwardly, in large grooves converging to each other, and called *anterior sacral foramina* and *grooves*, which transmit and serve to lodge the nerves of the same name. Externally to these foramina, and on the projecting cristæ which separate the grooves, arise the asperities which give attachment to the fibres of the pyriform muscles.

The *posterior surface*, unequal, convex from above downwards, presents on the median line a series of spinous processes, which diminish successively as they descend; below, the termination of the sacral canal and the two cornua of the sacrum. On each side of this projecting line is seen a groove, which lodges a portion of the mass common to the sacro-lumbalis and longissimus dorsi muscles. Without these grooves we find two series of foramina, smaller than those on the anterior surface, and called *posterior sacral foramina;* they transmit the posterior branches of the sacral nerves.

The edges, thick above, diminish as they descend. They present, in front and superiorly, for an extent of eighteen to twenty lines, an articular surface, closely resembling the external ear, by which this bone is united to the corresponding iliac bone. Behind this surface are perceived eminences and depressions which afford attachments to very strong ligamentous fasciculi, which are inserted into the iliac bones. The inferior portion of these edges, thin and almost sharp, is enveloped by the fibrous tissue which assists in the formation of the greater and less sacro-ischiatic ligaments. Below they form a notch, which in the recent state is converted into a foramen by a fibrous expansion, and gives passage to the last sacral nerve.

The base is about two and a half inches in thickness, and four inches and some lines in breadth. On the median line is seen a large articular surface, directed obliquely from before backward, and from above downward, which serves to unite the sacrum with the last lumbar vertebra; behind this surface, a triangular aperture exists which is the commencement of a canal traversing the whole extent of the bone, and lodging the sacral nerves: lastly, we discover the spinous process of the first false vertebra of the sacrum. On the lateral portions of this aperture are found two articular surfaces directed inward and backward, for the union of these parts with two other articular surfaces of the same shape and extent, directed in the opposite way, which are seen beneath the transverse processes of the last lumbar vertebra.

On each side of the parts just described, the base of the sacrum presents a smooth, triangular surface, slightly inclined to the front, bounded in this direction by a rounded edge, which assists in forming the line of demarcation between the greater and lesser pelvis.

The *apex*, quite small, has an oval surface to articulate with the base of the coccyx.

The sacrum is formed, like all the thick bones, of a spongy texture, covered by a very thin lamina of compact tissue. Hence arises its want of weight compared to its size. In woman, this bone is larger, more curved, and consequently a little shorter than in man. It is first developed by thirty-five points of ossification, which, at birth, are reduced to fifteen, afterwards to five, and these in their turn unite, so as to form, before puberty arrives, but a single bone.

§ II.—OF THE COCCYX.

The coccyx is so called from its supposed resemblance to the bill of the cuckoo. It is a small, single, symmetrical, triangular, flattened bone, curved from behind forward, situated on the posterior and inferior part of the pelvis, below the sacrum, which it resembles in form and structure, but from which it differs essentially in possessing no spinal canal.

* *Anatomie Chirurgicale*, tome I. page 129, édit. de Paris, 1753.

The coccyx has two surfaces, two edges, a base, and an apex.

The *anterior* or internal surface, slightly concave and rough, supports the lower extremity of the rectum; the *posterior* or external surface, convex and unequal, serves for the insertion of some of the fibres of the glutæus magnus muscle, and is separated from the skin only by the posterior sacro-coccygeal ligament. The *lateral edges*, denticulated and rough, give attachment to the small sciatic ligaments and the ischio-coccygeus muscle. The *base*, directed upwards, presents in front an elliptical surface articulated with the sacrum: behind are the *cornua* of the coccyx, resembling those of the sacrum, and frequently reaching to and slipping over the latter. On the sides, we see the small, transverse grooved processes for the passage of the fifth pair of sacral nerves.

The *apex*, formed by a bony tubercle, sometimes rounded, inclined to one side or slightly backward, but generally projecting in front, gives attachment to the fibres of the external sphincter ani muscle.

The coccyx is formed by the union of three, sometimes of four bony pieces, which are merely the rudiments of the caudal vertebræ, found in such variable numbers in different animals. These pieces, for a long time distinct and movable, are at last united to each other: but the coccyx in women, during the whole period in which they are liable to become pregnant, retains a great mobility on the sacrum. It is only in advanced age, that it is sometimes found consolidated with that bone. The coccyx is developed by four or five points of ossification: it is composed almost entirely of cellular tissue, covered by a very delicate lamina of compact texture.

§ III.—OF THE OS INNOMINATUM.

Known by the name of *coxal*, *iliac* or *haunch* bone, it is the largest and most irregular of all the bones of the pelvis; quadrilateral in form, and contracted in its middle portion, it seems to have experienced a severe twist, which has given to the superior and inferior portions contrary directions.

Situated on each side, on the lateral and anterior parts of the pelvis, this bone presents to our consideration two surfaces and a circumference.

The *external* or *femoral* surface comprises, in its superior half, the *external iliac fossa*, filled by the three glutæi muscles; beneath the *obturator foramen*, rounded in man, triangular in woman, closed by a fibrous membrane inserted into its circumference, except at the upper part, where we find a groove from within outwards, through which pass the obturator vessels and nerves; at the inner side of this foramen, we see a surface larger above than below, to which are attached the adductors and the obturator externus; at the outer side of the same foramen, a small channel occupied by the tendon of the external obturator muscle. In the middle of the external surface is the *acetabulum* or *cotyloid cavity*, the common centre in which are united the three portions, which, in infancy, compose the bone.

The *internal* or *pelvic* surface is concave, and divided into two portions, one superior, and one inferior, by a curve line, which forms a part of the outline of the superior strait of the pelvis.

The name of *internal iliac fossa* is given to the superior or abdominal portion. It is large, smooth, concave, filled, in the recent state, by the iliacus internus muscle, and supports the large intestine. At the lower part of this excavation there is a nutritious foramen, and posteriorly the *articular surface*, for uniting with the sacrum.

The inferior or pelvic portion beneath the curve line, presents, on examining it from behind forward, a quadrilateral surface, almost even, inclined downward and inward, of which the superior portion answers to the bottom of the cotyloid cavity; this surface, in affinity with adipose cellular tissue, gives also attachment to the obturator internus and levator ani muscles; within, we find the *obturator foramen* (or *sub-pubic*) presenting at its superior part the origin of the groove for the vessels of the same name. At the inner side of this foramen, there is a quadrilateral surface, larger above than below, formed by the posterior surface of the pubes, covered by the posterior pubic ligaments in relation with the bladder; lower down this surface is formed by the ascending ramus of the ischium. The outline of the obturator foramen gives origin to the internal obturator muscle.

The circumference of the coxal bone is very irregular, presenting four edges, a superior, inferior, anterior, and posterior. The *superior edge*, or crista of the ilium, thicker behind and in front than in the middle, and shaped like the italic letter *S*, offers to our consideration two lips, one external and one internal, with an intervening interstice; to its internal lip are attached the transversalis and quadratus muscles; to its external lip, the obliquus externus, the latissimus dorsi muscles, and femoral aponeurosis are attached; into the interstice, the obliquus internus is inserted: it is terminated in front by the *anterior superior*, and behind by the *posterior superior spinous processes*. The *inferior edge* much shorter, commences by a very thick, rugose eminence, called *tuberosity* of the *ischium*, from which arise, on the outside, the quadratus and adductor magnus muscles; on the inside, the inferior geminus muscle and the great sacro-sciatic ligament; in the middle, the biceps flexor cruris, semi-tendinosus and semi-membranosus muscles. In the sitting posture, the body rests on this tuberosity. Starting from this eminence, the inferior edge ascends toward the pubes, directed obliquely from without inward, and from below upward, and assists in forming the pubic arch, occupied by the organs of generation in both sexes. The articulation of this edge with its fellow opposite, effected by means of a vertical elliptical facet, is denominated the *symphisis pubis*. By its external lip, the pubic arch gives attachment to the tendon of the gracilis muscle; by its internal lip to the transversalis perinæi and to the pelvic fascia; by its interstice above, to the corpus cavernosum, and the erector muscles of both sexes; below, to the prolongation of the great sacro-sciatic ligament, and to the tendon of the adductor magnus of the thigh.

The *anterior edge* commences above, at the *anterior superior spinous process*, which terminates in front the crest of the ilium. This process, easily felt beneath the skin, gives origin to the tensor vaginæ femoris, the sartorius, the crural arch, and the iliacus. Below, a groove is seen, through which pass nervous filaments, and the *anterior inferior spinous process* gives attachment to one of the tendons of the rectus femoris. Still lower, we remark the groove destined for the passage of the psoas and iliacus muscles; on a level with this canal, the anterior edge, from a vertical position, becomes nearly horizontal. The shape of this edge then resembles a triangle, whose base is turned outward, and covered by the pectinalis muscle. The anterior edge of this species of triangle is continuous with the anterior lip of the sub-pubic groove: its posterior edge, sharp, and called *crista* of the *pubes*, is continuous with the projecting line which forms the

inferior limit of the internal iliac fossa. From this triangular surface arises the *ilio-pectineal* protuberance, into which is inserted the psoas parvus muscle, when it exists. At the apex of the triangle is the *spine* of the *pubes*, projecting under the skin in persons who are not very corpulent; it gives origin to the rectus abdominis, as well as to the pyramidalis muscle, and receives the external column of the inguinal ring. The horizontal portion of the anterior edge is terminated by the *angle* of the *pubes*, nearly straight, formed by the union of the anterior and inferior edges, and which we must be careful not to confound with the spine.

The *posterior edge*, arising from the posterior superior spinous process of the ilium, presents, beneath this process, a notch which separates it from another eminence called *posterior inferior spinous process:* the latter gives externally attachment to ligaments, and forms internally the small extremity of the sacro-iliac symphysis. Below is the great *ischiatic notch*, two inches in depth, covered by a ligamentous and aponeurotic expansion; it terminates inferiorly by an acute and sharp spine, known by the name of *spine* of the *ischium*. Between this spine and the tuberosity of the ischium, is found the *lesser ischiatic notch*, in which the tendon of the obturator internus plays.

Like all the broad bones, the innominatum is composed of spongy and compact tissue, and varies in size in different portions of its extent; it is very thick at the crest of the ilium, the tuberosity of the ischium, the posterior and superior part of the acetabulum, and thin in the concave part of the iliac fossa and at the bottom of the cotyloid cavity.

This bone is articulated with the sacrum by the sacro-iliac symphysis, with the femur by the cotyloid cavity, and with its fellow by the symphysis pubis.

The development of the coxal bone presents some curious peculiarities, which have only lately been well understood. Its existence is indicated by three primitive points of ossification, to which are added five other secondary points. Of the primitive points, the first is seen in the ilium, fifty days after conception; the second in the ischium, at the end of the third month; and the third in the pubes, during the fifth month. From this original separation of the bone into three parts, it has been considered as being formed by three bones called ilium, ischium, and pubes. The *ilium* constitutes the flat part of the bone and the superior portion of the cotyloid cavity. The *pubes* comprises, 1st, the internal part of the cotyloid cavity; 2d, the horizontal part called *body* of the *pubes*, which limits above the obturator foramen; 3d, the *descending ramus* of the *pubes*, which bounds this same foramen inwardly: this ramus does not descend vertically, but, on the contrary, departs from its opposite fellow, leaving a space resembling an inverted V. This arrangement, much more remarkable in the female than in the male, is well calculated to assist the passage of the child. Lastly, the *ischium* is composed, 1st, of the *body* of the *ischium*, almost vertical, thick, prismatic, triangular, bounding outwardly the obturator foramen, and of which the inferior portion is formed by the tuberosity of the ischium; 2d, of the *ascending ramus* of the *ischium*, oblique, limiting internally the sub-pubic hole, and extending toward the descending ramus of the pubes; 3d, of the inferior portion of the acetabulum.

In the fœtus, at full term, we find only three parts ossified, the ilium, the horizontal branch of the pubes, and the sub-acetabular portion of the ischium; all the rest is cartilaginous. The limits of these parts are marked in the base of the cotyloid cavity by an intermediate cartilage in the shape of the letter Y. From thirteen to fifteen years of age, the ossification of the cavity is completed. The secondary points appear also at that period, viz: the marginal epiphysis, constituting the crest of the ilium, the epiphysis of the tuberosity of the ischium, the two epiphyses of the anterior inferior spinous processes of the ilium, and of the angle of the pubes; lastly, the edge of the cotyloid cavity, pointed out by M. Serres. These different epiphyses are not permanently consolidated with the body of the bone, until the age of eighteen or twenty years. We must likewise except the crista of the ilium, which does not unite until the twenty-second, twenty-fourth, and even the twenty-fifth year.

ARTICLE II.—OF THE SYMPHYSES, OR ARTICULATIONS OF THE BONES OF THE PELVIS.

The bones of the pelvis are united together by means of articulations and ligaments.

The articulations, four in number, are designated by the generic term of symphyses: each symphysis has a peculiar name derived from the bones which form it, and they are hence called pubic—sacro-iliac—sacro-coccygeal.

The ligaments—of which there are six, three on each side—are the great and small sacro-sciatic, and the obturator.

The articulations of the pelvis may be the seat of more or less serious alterations and lesions, either during pregnancy or during the progress of a natural labour, or in cases of artificial delivery: they therefore deserve a most careful study.

§ I.—OF THE SYMPHYSIS PUBIS.

The *pubic* articulation or *symphysis* is formed by the approximation of the two articular facets of the pubes, by an intermediate fibro-cartilage, and by ligamentous fasculi surrounding these parts.

Each articular surface of the pubes is clothed with a fibro-cartilage, which, united to its opposite fellow, forms a species of wedge, of which the edge, directed toward the posterior part of the articulation, sometimes projects on that side, whilst the base is turned to the front: whence it follows that the bones of the pubes, which, when seen from the pelvic cavity, appear to touch each other, are separated in front to the distance of several lines.

At the middle of the symphysis and towards the posterior third of the fibro-cartilage, are seen two articular surfaces, smooth, polished, oblong, covered by cartilage, and apparently lined by a synovial membrane. In order to perceive this structure, we should examine the body of a woman who has died in the last stage of utero-gestation, or soon after delivery: at other times, and for a still stronger reason, in man it is more difficult to discover.

From the fibro-cartilage which covers each one of the pubes, proceed transverse, short, thick fibres, situated the nearer to each other as we approach the superior and inferior parts of the symphysis: these fibres, numerous in the male, diminish as they approach the centre of the articulation, and in many women are wanting at the posterior part of the symphysis.

This articulation is further strengthened by other means, viz:

1. The *anterior pubic ligament*, composed of two sets of fibres; the former superficial, vertical, interwoven with the fibres of the recti muscles, and divided into two bands which extend over the descending rami of the pubes: the latter deep-seated, transverse, interlaced, extending from one pubes to the other, and lost in the inter-articular fibro-cartilage.

2. The *posterior pubic ligament*, a delicate membrane with transverse fibres, is, correctly speaking, only an expansion of the periosteum.

3. The *superior pubic ligament* (*supra pubic*), which supports the superior edge of the pubes, and effaces all its inequalities.

4. The *inferior pubic ligament* (*sub-pubic, triangular*), considered by some anatomists as a continuation of the inter-pubic ligament, is a very thick, resisting, triangular band, with strong fibres directed transversely, longer at the inferior part, inserted on the right and left into the internal and superior parts of the descending rami of the pubes. This ligament removes the acuteness of the angle of the pubic arch, and serves to form the regular curve under which the fœtus passes during delivery.

§ II.—OF THE SACRO-ILIAC SYMPHYSES.

The sacrum, in contact with the two iliac bones, between which it is inserted like a double wedge, offers a very great resistance to the weight of the super-incumbent parts, and to the effort of the bodies destined to traverse the pelvis. It forms with these two bones two articulations, called *sacro-iliac symphyses*. They are composed, 1, of the articular faces, which are seen on the one side on the inner surface of the coxal bones near their posterior edge, and on the other on the anterior superior part of the edges of the sacrum; 2, of an intervening fibro-cartilage; 3, of numerous, thick, and very powerful ligaments, found especially on the posterior part of these articulations. The articular faces have been described: each of them is covered by a cartilage moulded on the asperities of the bone, and thicker on the sacrum than on the ilia. In children, and in women during pregnancy, there is apparently in each joint a synovial membrane.

The very strong ligamentous bands which assist in strengthening this articulation, are,

1. The *posterior sacro-iliac ligament* (*inter-osseous* of Cruveilhier) formed of numerous oblique, horizontal, superimposed fasciculi, with small intervals between them, and by their union constituting a pyramidal ligament, capable of immense resistance. These ligamentous fasciculi fill nearly the whole of the deep excavation comprised between the sacrum and the two posterior spinous processes of the coxal bone. They are inserted, on both sides, into the rough points, which, at this point, cover the surfaces of these bones. One of the fasciculi, more isolated from the rest, extends from the posterior superior spinous process to a thick tubercle, belonging to the third false vertebra of the sacrum.

2. The *anterior sacro-iliac ligament*, a simple fibrous lamella, extended transversely from the sacrum to the ilium, is an expansion of the periosteum of the pelvis, which passes in front of the articulation, and adheres to it but feebly.

3. The *superior sacro-iliac ligament*, a very thick band, passing transversely from the base of the sacrum to the ilium.

4. The *inferior sacro-iliac ligament*, (the *sacro-spinous* of Boyer and *vertical sacro-iliac* of Cruveilhier,) arising from the posterior superior spinous process of the ilium; it is strengthened below by a fasciculus coming from the posterior inferior spinous process. Its superior fibres are inserted below the third sacral foramen; the lower portion, which is the layer, adheres in front to the tubercle of the extremity of the edge of the sacrum, and posteriorly to the great sacro-sciatic ligament.

§ III.—OF THE SACRO-COCCYGEAL SYMPHYSIS.

The *Sacro-coccygeal symphisis*, like the articulation of the vertebræ, is composed of a *fibrous disc*, similar to those which separate the bodies of the vertebræ; of an *anterior sacro-coccygeal ligament* with parallel fibres, passing from the anterior face of the sacrum to that of the coccyx, presenting frequently, on each side, a band extended into a triangular shape; and lastly of a *posterior sacro-coccygeal ligament*, inserted above into the edges of the notch which terminates the canal of the sacrum, and becoming narrower to be implanted into the posterior face of the coccyx. This ligament completes the sacral canal below.

The use of these ligaments is to maintain the connection of the sacrum and coccyx. They oppose all displacement.

In addition to the sacro-coccygeal symphysis, there are coccygeal articulations, properly so called, which unite the pieces of the coccyx with each other. In the male, these articulations exist only in youth, and are soon ossified, except that of the first piece with the second, which remains for a long time immovable. In the female, on the contrary, where the tissues are more lax, their consolidation takes place at a more advanced period of life.

§ IV.—LIGAMENTS OF THE PELVIS.

We include in the history of the articulations of the pelvis, the description of the sacro-sciatic ligaments and the sub-pubic membrane. Their use is equally to strengthen the articulations and to complete the parietes of the pelvic cavity.

Great sacro-sciatic, or posterior sacro-sciatic ligament. Arising from the internal lip of the tuber of the ischium, and from its ascending ramus, situated obliquely in the posterior inferior part of the pelvis, contracted in its middle, and expanded at its extremities, it extends upward and backward to be inserted into the edges of the coccyx and sacrum, and at the posterior extremity of the crista ilii. This ligament, by its inferior extremity and the internal face of the tuberosity, forms a groove which protects the internal pudic vessels and nerves.

Lesser sacro-sciatic, or anterior sacro-sciatic ligament. Placed in front of the preceding, which it crosses, this ligament, much smaller than the former, is inserted into the summit of the spine of the ischium, and terminates within the anterior lip of the edge of the sacrum and of a part of that of the coccyx.

The sacro-sciatic ligaments divide the great sciatic notch into two openings of unequal dimensions. The first, large and irregularly oval, affords passage for the pyriformis muscle, the great sciatic nerve, gluteal, ischiatic, internal pudic vessels and nerves, and a quantity of cellular tissue. The second, smaller, resembling in shape a long triangle, gives passage to the internal obturator muscle, and internal pudic vessels and nerves.

Sub-pubic or obturator ligament. This closes the obturator foramen, except at its upper part, where it leaves an opening for the exit of the obturator vessels and nerves. Composed of aponeurotic fibres interwoven in every direction, it is inserted by its internal semi-circumference to the posterior face of the ascending ramus of the ischium, and by its external semi-circumference to the outline of the obturator foramen. To the two surfaces of this membrane are attached the obturator muscles.

§ V.—ARTICULATIONS OF THE PELVIS WITH OTHER BONES.

In addition to the articulations peculiar to it, the pelvis has others common to it and to other parts: thus it is united posteriorly and superiorly with the vertebral column: outwardly and downwardly with the inferior extremities.

Sacro-vertebral articulation. This is an amphiarthorosis. Like that of the other vertebræ, it takes place between the inferior face of the last lumbar vertebra and the base of the sacrum. The ligaments which maintain it are the anterior and posterior vertebral, the yellow, the intervertebral fibrous substance, the interspinous, and two synovial capsules which cover the corresponding parts of the articular processes of the sacrum and last lumbar vertebra. The intervertebral substance possesses considerable thickness, especially in front. Besides these parts, there is a peculiar ligament called by Bichat, *sacro-vertebral,* extending obliquely from the transverse process of the last lumbar vertebra to the bone of the sacrum.

In order to complete the description of this articulation, we should mention the *ilio-lumbar* ligament, which extends from the summit of the transverse process of the fifth lumbar vertebra to the thickest part of the crista ilii: and the *ilio-vertebral* ligament formed by two fibrous fasciculi of which the upper one arises from the lateral and middle part of the body of the last lumbar vertebra, and the lower one from the inter-sacro-vertebral space. Both are spread over the ilium, in front of the anterior sacro-iliac and sacro-vertebral ligaments, in which they are lost.

Ilio-femoral articulations. As the articulations of the pelvis with the inferior extremities have no direct agency in parturition, and are interesting only as regards motion, station or progression, and pathological affections which may be located in them, we think it sufficient merely to mention, without minutely describing them.

ARTICLE III.—OF THE PELVIS CONSIDERED AS A WHOLE.

§ I.—FORM OF THE PELVIS.

The pelvis presents an irregular form, offering to our sight alternately, projections, notches, and cavities of greater or less depth; it can be compared to no other part of the skeleton: but if, according to the advice of Chaussier, we remove with a saw directed transversely and from before backward as far as the base of the sacrum, the projecting and widened portion of the iliac bones, the irregularity disappears. It then represents an osseous canal with unequal parietes, whose truncated summit is directed downward and backward, and whose base is upward and forward.

§ II.—DIVISION OF THE PELVIS.

We remark in it an *external,* an *internal surface,* a *base,* and an *apex.*

The external surface is divided into four regions. The *anterior* presents on the median line the symphysis pubis; beneath, the arch of the pubes; laterally, the obturator foramina. The *posterior* exhibits to us on the median line, the projection of the spinous processes of the false vertebræ of the sacrum; outwardly, the two sacral grooves and the posterior part of the sacro-iliac junction. The *lateral* regions show us the external surfaces of the iliac bones, and the articulations of these with the inferior extremities.

The internal surface, much more important to our subject, is divided into two distinct portions—one superior, called the *greater pelvis;* the other inferior, called the *lesser pelvis.* The curve line or projecting ledge which separates them, commences at the level of the pubes, extends along the iliac bones, the base of the sacrum, and terminates at the sacro-vertebral angle. It is called the *brim of the pelvis* (*linea ilio-pectinea*).

The *greater pelvis* has an irregular form, and three parietes—one *posterior* and two *lateral.* The *anterior* wall is wanting in the skeleton—it is supplied in the recent state by the muscles constituting the anterior part of the abdomen. The *posterior,* formed by the end of the vertebral column, presents in front and beneath the projection caused by the *sacro-vertebral angle.* The internal iliac fossæ compose the two *lateral* walls. The *smaller pelvis,* situated beneath the former and the curve line just spoken of, has the shape of a truncated cone; its apertures and middle portion require attention. Its apertures, narrower than the intermediate part, have received the name of *straits;* the middle part is called the *pelvic excavation,* or cavity of the lesser pelvis. The straits are two in number—one *superior* or *abdominal,* the other *inferior* or *perineal.*

The *abdominal strait* has been successively compared to an ellipsis, an oval, and the heart on playing cards, but these comparisons are not exact. Chaussier imagined it to resemble a curvilinear triangle with rounded angles, and whose base rested on the sacrum. It partakes, accurately speaking, of the form of the ellipsis and of the circle. It is about fourteen inches* in circumference. Obstetricians assign four diameters to this strait:—1. *Antero-posterior* or *sacro-pubic,* represented by a line drawn from the sacro-vertebral angle to

* It must be observed that *French* inches are meant here. At the commencement of the work, the reader will find a comparison between the French and English inch.

the superior part of the symphysis pubis, and, in a well-formed woman, four inches in length. 2. *Transverse* or *bis-iliac*, measured by a line supposed to be drawn from the most superior concave point of one ilium to a corresponding point in the other, and generally five inches long. 3. The two *oblique diameters* indicated by two lines extending from the sacro-iliac symphysis of one side to the ilio-pectineal protuberance of the other; their length is four and a half inches.

The *inferior* or *perineal strait* presents three tuberosities, separated by three notches. At first sight nothing can be more irregular than its conformation; but if, following the example of Chaussier, we apply a sheet of flexible pasteboard to this strait, and trace its outline with a pencil, we will find that it has an oval form, whose large extremity, directed backward, is interrupted by the projection of the coccyx. Its circumference is four or six lines smaller than that of the superior strait, that is to say, thirteen inches and six or eight lines.

This strait offers for our consideration four diameters:—1. *Antero-posterior* or *coccygo-pubic*, extending from the point of the coccyx to the base of the symphysis pubis; it is four inches in length, but may be increased to five, owing to the mobility of the coccyx in some women. 2. The *transverse* or *bi-ischiatic*, passing from the internal posterior part of one tuber ischii to that of the opposite side, and four inches long. 3. Lastly, the *two oblique diameters*, extended from the centre of the great sacro-sciatic ligament on one side, to the point of junction of the ascending ramus of the ischium and descending ramus of the pubes on the other; they measure in length four inches. As the sacro-sciatic ligaments enjoy some mobility, these diameters may be somewhat increased at the moment of delivery. The bi-ischiatic alone remains invariable.

The *pelvic excavation* is the space comprised between the superior and inferior straits, and is divided by some writers into two halves—one anterior, the other posterior, whose section would be the vertical plane passing through the transverse diameter of the abdominal straits; by others, into two halves likewise—one right, the other left, whose line of demarcation would be the projection of the antero-posterior diameter of this same strait. We shall adopt this double division, which separates the pelvic excavation artificially into four regions, viz: two anterior and lateral, and two posterior and lateral. These regions bound exactly four inclined planes, over two of which the head of the child must necessarily glide in its passage through the pelvis. The disposition of these planes is such, that if a drop of water, or a spherical body, be placed on one of them, it will find its way toward the arch of the pubes.

This excavation is likewise considered as formed of four parietes:—1. The *anterior*, presenting on the median line the posterior part of the symphysis pubis, and outwardly, the posterior surface of the pubes and the internal obturator fossæ. 2. The *posterior*, formed by the sacrum, the coccyx, the sacro-iliac symphyses, and the most distant portion of the sacro-sciatic ligaments. 3. The *lateral*, presenting two distinct portions—*one anterior*, resulting from the two inclined acetabular planes; the *other*, partly open, partly fibrous, comprises the ischiatic apertures and the remainder of the sacro-sciatic ligaments. The curve of the sacrum gives the pelvic cavity an extent greater than that of the straits. The antero-posterior diameter of this cavity is measured by a line drawn from the most concave point of the sacrum to the middle of the symphysis pubis. This diameter is eight or ten lines longer than that of the superior strait. The oblique, and especially the transverse diameters, decrease successively as we descend into the excavation, until they become no greater than the corresponding diameters of the inferior strait.

The *base* or great circumference of the pelvis, directed forward and upward, presents posteriorly the sacro-vertebral articulation; laterally, the two crests of the iliac bones; anteriorly, a large notch, bounded outwardly and upwardly by the anterior superior spinous processes, inferiorly by the two horizontal branches of the pubes. In the *apex* or lesser circumference we discover three considerable notches, separated by bony eminences. One of these notches is anterior, called the arch of the pubes, and formed by the ischio-pubic rami, terminated above by the symphysis pubis, and occupied in the living subject by the genital organs. The two lateral and posterior are the great sciatic notches. The three eminences are the two tuberosities of the ischium and the point of the coccyx.

§ III.—DIRECTION OF THE PELVIS.

An examination of the pelvis in the skeleton will convince us that its direction is not horizontal; it is always more or less inclined forward, and forms with the axis of the body an angle of about 140 degrees, whence it follows that the axis of the superior strait is not parallel with that of the body. The angle formed by these two axes varies incessantly, according to the subject, and even constantly in the same subject, according to the position of the body. In an adult well-formed female in the erect posture, it may be considered as about equal to 45 degrees; but in a woman in the last period of gestation, it may reach 48 to 50 degrees.

Under these conditions the axis of the superior strait may be represented by an imaginary line dropped from a point just beneath the umbilicus, and falling in front of the point of the coccyx. The axis of the inferior strait is another line extending from the sacro-vertebral angle to the centre of this strait; it is parallel to the axis of the body.

The two lines representing the axes of the two straits meet in the middle of the pelvic excavation, and form at this point a very obtuse angle directed forward. Their direction should be well understood, for they indicate the route followed by the fœtus in its passage through the pelvis, and that which the instruments should take when their application becomes necessary. Carus,* with the intention of determining geometrically the direction of this route, advises us to trace the following curve. If we take as a centre the middle of the symphysis pubis, the very point at which the anterior extremity of the antero-posterior diameter of the pelvic excavation terminates, and for a radius the half of this diameter, that is, a line *two and a quarter inches in length*, and from this centre, with this radius, describe a circle around the symphysis pubis, it will be seen that the portion of the circle which passes over the pelvis traverses exactly the centre of the superior and of the inferior straits, that in its passage across the excavation it is always over the very centre of the canal. It fulfils, therefore, as well as possible, the end we propose, and may be considered as the true axis of the pelvis.

The other parts of the pelvis present dimensions which deserve our consideration. The distance between the anterior superior spinous processes of the iliac bones, which can always be felt, however corpulent a woman may be, is nine and a half inches. The separation

* Lehrbuch der Gynokologie.

between the highest parts of the crest of the ilia is from ten to ten and a half inches. There are seven inches from the middle of one crista-ilii to the tuber ischii of the same side; this distance is nearly bisected by the margin of the pelvis. The vertical extent of the symphysis pubis is eighteen lines, and its thickness six. The base of the sacrum measures two and a half inches antero-posteriorly, and four inches transversely. The length of the coccyx is eleven to twelve lines. Lastly, if we measure the pelvis externally, and antero-posteriorly from the spinous process of the first false vertebra of the sacrum to the symphysis pubis, we shall find it seven inches in extent.

§ IV.—VARIETIES OF THE PELVIS.

The pelvis presents many varieties according to the age, the sex, the individual and the different animals, which may be the subject of study.

1. *According to age.*—In newly born children the pelvis is very narrow and shallow, with the superior strait inclined downward and forward. The bones which compose it, chiefly cartilaginous, have a conformation peculiar to the age; the sacrum is nearly flat, and so elevated that a horizontal line passing posteriorly from the upper part of the pubes will strike on a level with the apex of the sacrum. The iliac bones, narrow and elongated, are nearly straight at their upper portions; the iliac fossæ hardly exist; the cartilaginous cristæ ilii are not yet formed. It follows from this conformation, 1, that the transverse diameter of the hips is less than that of the thorax, and nearly equally less than the bi-parietal diameter of the head—a disposition necessary for delivery; 2, that in consequence of the narrowness of the cavity of the pelvis, the majority of the viscera it is intended afterward to contain, and especially the bladder, the uterus and its appendages, are lodged in the abdominal cavity. Hence the size and projection of the belly of the child and of young animals; hence also the important inferences deduced by Camper* as regards the modus operandi and the direction of the instrument in lithotomy performed in the early years of life.

In proportion as the child increases in age, the pelvis becomes more developed. About the second or third year new points of ossification appear, but the complete consolidation of the parts does not take place until the sixteenth or twentieth. One important fact to be observed is, that in the young girl, although the bones are not fully developed, the straits and the pelvic cavity are very nearly as large as in the adult woman.

2. *According to the sex.*—The female pelvis is larger, more widened, lighter, and shorter than the male; the ischio-pelvic rami, the ischiatic tuberosities, are less thick and turned more outwardly; the insertions of the muscles are less distinct, the capacity greater, the outlines more rounded and extended; the sacro-vertebral angle less projecting; the sacrum shorter, more concave, wider, and not so thick; the inter-articular fibro-cartilages are thicker; the articulations less compact; that of the coccyx and sacrum more movable; the sacro-ischiatic ligaments are wider, more extended, and less resisting than in man.

3. In *individuals* of the same sex these diversities are influenced by the variety of stature, the greater or less curvatures of the spinal column, and by the mode of articulation of the thigh bones.

As the varieties of the pelvis which occur in different animals can be of no service to the subject under consideration, we shall not stop to treat of them.

§ V.—USES OF THE PELVIS.

The pelvis performs numerous and important useful functions; it serves as a foundation for the trunk, whose weight in the erect position is thus transmitted to the lower extremities, and to the tuberosities of the ischia in a sitting posture. It furnishes fixed points of origin for the muscles destined to move the trunk and lower extremities; it affords a powerful protection to the organs it contains, and especially to the bladder, rectum, the uterus and its appendages. Its form is admirably adapted to this purpose, and may be considered as being formed by two arches united at their bases. The posterior and superior of these arches is formed by the most remote portion of the iliac bones, and the sacrum which acts as its keystone, and it supports on its centre the weight of the superincumbent parts. The anterior and inferior is inserted and formed by the pubes, the ischia, and the lower part of the ilia. It possesses sufficient power to resist the efforts of the lower extremities in supporting the weight of the body. But these arches might have been separated and crushed if the thighs articulated outwardly did not perform a part very analogous to that of the abutments of an arch, by resisting lateral pressure and thus maintaining the integrity of the curve.

When we study this disposition of the pelvis, the double pressure in opposite directions, the resistance which it opposes, we will easily understand how, if the nutrition of the bones be diminished, altered, or perverted, if the parts present less solidity than is absolutely necessary to resist this double pressure, changes may occur which will create difficulties and obstacles which will retard or prevent the termination of the delivery.

ARTICLE IV.—OF THE PELVIS COVERED BY THE SOFT PARTS.

We should have a very inaccurate and incomplete idea of the configuration of the pelvis, did we consider it only when stripped of the soft parts which cover it, and which, in the living subject, produce remarkable modifications in the form, disposition, and extent of the different parts which compose it.

Externally, the pelvis gives attachment, by its base, its inferior and lateral portions, to numerous muscles, some of which are inserted into the thorax and others into the lower extremities. All these muscles play an important part in divers functions, and some are powerful auxiliaries of the uterus in the expulsion of the product of conception.

* Demonstrationum Anatomico-Pathologicarum, liber Secundus, contrivens pelvis humanæ fabricam et morbos. Amstelædami, 1762, folio maximo.

Our attention should, however, be directed chiefly to the soft parts which line the internal cavity of the pelvis. Spread, like cushions, over the bony projections, they smooth down all the asperities and angularities of the latter; they protect the principal pelvic viscera, deaden the shocks which they might experience in sudden movements of the body, and change the form and dimensions of the apertures and cavities of the pelvis. Thus, the greater pelvis is completed in front by the muscles and the anterior parietes of the abdomen. Laterally, the internal iliac fossæ are lined by muscles of the same name. Posteriorly, the lumbar and sacro-vertebral projections are diminished by the presence of the psoas muscles, which descend along and on the sides of the lumbar column.

The superior strait changes its shapes; it is contracted by these very psoas muscles, which, leaving the spinal column, pass obliquely outward, to be inserted into the small trochanter, coasting the margin of the pelvis, by the iliac veins and arteries and the numerous lymphatic vessels which pass into the abdomen from the pelvic cavity, and by the nervous cords which arise from the lumbar plexus.

In consequence of this disposition, this strait, which, in the skeleton, presents the form of a curvilinear triangle with its base posteriorly, preserves nearly the same form, but its base is inverted, or, rather, it resembles an oval whose great extremity is turned forward. The transverse diameter, which was the largest, sometimes loses more than an inch in length by the projection of the psoas, and thus becomes one of the smallest. This diminution, however, is not absolutely so great, because the muscles may undergo great compression, either from the weight of the uterus or the efforts made by the woman in labour, or by the precaution, always to be observed, to put them into a state of complete relaxation by flexing the thighs upon the pelvis. Notwithstanding all this, in women of powerful muscular development, the psoas muscles sometimes present great obstacles to the fœtus, and anomalies in presentations of the head.

The extent of the pelvic excavation is diminished, posteriorly, by the sacral plexuses, the hypogastric vessels, the pyriform muscles, and the rectum; anteriorly, by the bladder, the internal obturator muscles, the obturator vessels and nerves; laterally, by a layer of adipose cellular tissue, which penetrates the substance of the broad ligaments, and serves as a medium of transmission to the vessels and nerves which supply the vagina, the uterus and its appendages.

This cavity is also narrowed in its vertical diameter, and singularly modified in the inferior strait, by a muscular membranous plane, which closes the pelvis inferiorly, and to which the name of perineum has been given, and which presents on its median line, the apertures of the three great urinary, generative, and digestive apparatuses.

SECTION II.

FUNCTIONAL STATE OF THE PELVIS.

During the completion of the various uses assigned to the pelvis, it executes different movements, and in some of its parts, such as its articulations and ligaments, certain changes occur which it is now our duty to examine.

Some of these movements are general, extended, and take place in the joints common to the pelvis and the parts adjoining it; others are partial, very limited, scarcely appreciable, and occur in the articulations peculiar to it.

ARTICLE I.—GENERAL MOVEMENTS.

We shall not now consider the general movements executed by the pelvis on the spinal column and lower extremities, as they are interested alone in the different positions of the body; but, in passing, we may remark, that those occurring in the lumbar column, although very limited, have a direct relation with parturition.

ARTICLE II.—PARTIAL MOVEMENTS.

§ I.—ORDINARY STATE OF THE SYMPHYSES.

Are the articulations of the pelvis, in the ordinary condition of life, capable of executing any movements? In approaching this question, which has occupied the attention of physiologists and accoucheurs, decided affirmatively by some, and negatively by others, we think it proper to state that all our remarks will be confined to the sacro-coccygeal articulation, of which the evident mobility is doubted by none.

If we examine only the means of union of the bones with each other, and the solidity of this junction, the impossibility of imparting to their articulations, even in a recent pelvis, even when deprived of the soft parts which cover it, any motion, we shall be induced to adopt the latter opinion, and consider them as perfectly immovable at least in the ordinary condition of life. If, on the other hand, we remark that these symphyses are provided with synovial membranes; that these membranes are found only in movable articulations, we may regard them as possessing, under peculiar circumstances, some slight degree of motion. This opinion is generally admitted by modern physiologists, who think that, in some cases, as for example, when we fall from an elevated point on the feet, they possess a certain mobility which diminishes the shock, which otherwise would be transmitted to the rest of the body.

This in fact occurs under ordinary conditions, but there are certain circumstances in life, which place this supposition beyond a doubt. If, for instance, we examine the symphyses of the pelvis in a woman during labour, or soon after, we shall find, in some cases, the clearest evidence of mobility.

§ II.—STATE OF THE SYMPHYSES DURING PREGNANCY.

The changes experienced by the articulations of the pelvis during the period of pregnancy, have been observed from the earliest periods. Hippocrates (lib. de Naturâ pueri) says that parturient women, and especially when primiparous, experience pain over all the body, but particularly in the loins and the *hips which separate.*

This opinion of Hippocrates, adopted by Galen, Aetius, and Avicenna, after having been considered by physicians for nearly two thousand years as a well established law, in the sixteenth century was attacked and disputed: the proofs of the separation of the bones of the pelvis were not so evident as to silence all doubt; hence, at this period, some men of distinguished merit, amongst others Fernel, denied the possibility of its occurrence, when a case, observed in the chirurgical schools of Paris, on the 1st of February, 1579, in the presence of a number of well informed persons, set at rest all difficulties on this head.*

"A woman twenty-four years of age, hanged ten days after delivery for the murder of her child, was the subject of anatomical and surgical investigations. The question of the separation of the bones of the pelvis during labour was agitated. An in partu mulierum, ossa pubis et ilium, hæc scilicet ab osse sacro, et illa ab invicem distrahantar, nec ne? Each one expressed his opinion; the majority of the assistants denied the possibility of the separation, others maintained it; and the opposing reasons kept the minds of the spectators in a state of uncertainty. Before proceeding to the dissection, the thigh of the corpse was elevated, and the pubes on that side was seen at least half an inch above the level of the opposite one; there was an interval of a finger's breadth between the two pubic bones: the different movements communicated to these parts proved, to the eyes and fingers of all the spectators, that the synchondroses uniting the bones of the ilium with the sacrum, were much more relaxed than in the natural state. All left, full of wonder, and convinced of the fact."

Louis, from whom we have extracted the above passage, adds, "The conduct of Ambrose Paré, on this occasion, was an honourable submission, which should not be passed over in silence. He had maintained the contrary opinion: but hardly had this great man perceived a glimpse of the truth, than he hastened to publicly acknowledge his error."

This fact, well authenticated, should alone convince every one, and revive the opinion of the ancients. Yet, notwithstanding the work of Séverin Pineau,† and the explanations he gives of the causes, mechanism, and utility which he attributes to this relaxation of the symphyses, to facilitate the birth of the child, many authors in his time, and since then, have denied, if not the possibility of this relaxation, at least its frequent occurrence and utility, and consider it, when it exists, only as an accidental circumstance, an exception to the general rules depending on some morbid condition.

Walter asserts that he has dissected more than one hundred women who died shortly before or after delivery, and that he has never found the change said to exist at that period in the consistence of the fibro-cartilages and ligaments of the pelvis. Baudelocque, whilst he admits the relaxation, thinks the mobility is very uncommon; and, as regards the separation, he says:‡ "We have frequently sought for it in the examination of bodies, and have scarcely seen it in one woman so well exemplified as to leave no manner of doubt as to its existence."

We cannot reconcile this double assertion of Baudelocque. In fact, it seems to us difficult to admit a relaxation in the symphyses, without more or less mobility, and tumefaction of the inter-osseous substance without a separation, more or less considerable, of the bones of the pelvis. It is true that Baudelocque recognizes the relaxation of the ligaments, without mentioning the increase in volume of the cartilages which invest the articular faces of the bones of the pelvis, which appears to us physically impossible. All that we can say on this subject is, that in every case in which we have examined these articulations, in women who have died soon before or after parturition, we have constantly found a greater thickness and suppleness in the fibro-cartilages and ligaments, and a mobility more marked than in the ordinary condition of life. Should any one doubt our assertion, we would say to him in the words of Ambrose Paré, "I will refer him, who does not believe, to the book of nature, who performs things which our minds are incapable of understanding."

Causes. As, in our opinion, the relaxation or modification of the symphyses of the pelvis during pregnancy, is an established and incontestable fact, we will proceed to inquire into the causes of this phenomenon.

It has generally been attributed to an infiltration of serum in the fibro-cartilages and ligaments of these articulations. Séverin Pineau thought that this infiltration depended on a flow of mucus to these parts. Others have seen in this infiltration, only a purely mechanical effect, resulting from the pressure of the uterus, distended by the product of conception, exerted on the great vascular trunks, which return the surplus fluid nourishing the lower parts, and from the obstacles opposed to the passage of these fluids to the heart. This explanation, purely mechanical, cannot be admitted, for the relaxation of the symphyses has been observed at a period of pregnancy when the uterus had neither size nor weight sufficient to produce the effect, for Bertin has observed it in the fourth month of utero-gestation.

Others have attributed it to a morbid condition, a peculiar alteration of the solids and fluids, in which both have lost their consistence.

Whilst we admit that certain circumstances, such as a lymphatic temperament, a sedentary life, dwelling in low, damp places, a preceding or chronic disease which has weakened the constitution, an enormous distension of the uterus by a great quantity of water, or by several fœtuses, may predispose to relaxation of the symphyses, we cannot admit that these are the only causes. There is one more powerful, more general, which governs all the rest; it is that which presides over the numerous changes which take place in women during gestation, which produces that energetic fluxionary movement toward the uterus during pregnancy, and which extends from this to the adjacent organs; lastly, which is the origin of this overplus of life, this more active nutrition which modifies in so important a manner the organism of the female. We consider the relaxation of the symphyses as a purely physiological phenomenon, which, like all vital acts, is capable of increase, diminution and aberration. We find in authors so much discrepancy on this subject, because they are too much disposed to generalize the facts otherwise remarkable, but too exclusive, which have come under their notice.

Effects. At the same time that they relax, the symphyses become swollen, and thus separate the bones which assist in their formation.

Séverin Pineau compares the cartilages of the symphyses to sponges, moistened, softened and thickened by the mucus which penetrates them, acting like wedges between the bones, thus increasing the great diameter of the pelvis.

Harvey assimilates the action of the cartilages to that of the small end of an almond, or other stone fruit, which, by the act of germination, opens the valves of the hard, ligneous shell which covers them, and which can hardly be broken by a hammer; or, again, to the tender

* Memoires de l'Académie Royale de Chirurgie, in 4to., t. IV., p. 66.

† Opusculum Physiologicum, Anatomicum, verè admirandum, libris duobus distinctum, etc. Parisiis, 1598.

‡ Art des Accouchemens, V. édit., p. 28.

root of the ivy, which, insinuating itself into the small cracks of the stones, in process of time covers the largest wall. "Admirabile sane est, exiguum pullulantis nuclei apicem (amygdalarum puta, aut aliorum fructuum) ossa, quæ vix malleo rumpuntur, effringere; tenellasque radicis hederæ fibras in tenues saxorum rimulas irrepentes, prægrandes tandem muros discendere."*

Louis asserts† that these cartilages act like the wedges of dry and porous wood which are inserted into the fissures of wells, and which, when saturated with the humidity of the atmosphere, acquire force sufficient to split the rock. He says, also, that they act like polypi in the nasal fossæ and maxillary sinuses. These excrescences, soft and spongy, without altering their character by their increase of size alone, turn aside the bones of the nose, palate and cheek, although the latter are firmly united by serrated sutures, elevate the inferior floor of the orbit, and cause the eyeball to protrude from its cavity.

Of all these comparisons, that which appears to give the most accurate idea of the phenomenon is due to Louis, who likens this change in the symphyses to that which occurs in the intervertebral substance, in the recumbent posture. This substance, being no longer compressed by the weight of the body, dilates by virtue of the elasticity peculiar to it, receives a larger quantity of fluid, and becomes thicker. Hence, we may sometimes find the difference of half an inch in the stature of a man, measured in the morning, on rising from bed after a long sleep, and of the same man, measured in the evening, after the fatigues of the day.

Utility. If the softening and tumefaction of the symphyses, and the enlargement of the osseous circle of the pelvis, as a necessary consequence, be now admitted as incontrovertible facts, will we also grant the utility and advantages which must result and facilitate parturition?

If we consulted only the opinions of the ancients, and, à fortiori, Pineau, who recommended that the articulations of the pelvis should be covered with fomentations and cataplasms, and that emollient fumigations should be directed toward these parts, we should certainly answer in the affirmative. But if we remark that, in the majority of cases, the size of the fœtal head is smaller than the extent of the bony cavity through which it must pass, we shall see that this utility is not so great as has been supposed, and that it would be clearly evident only in some rare cases, in which the head and the bony circle of the pelvis are so exactly in relation, that the difference of a few lines, more or less, might permit or prevent the termination of the labour.

It will be said, however, that nature does nothing in vain, and that since this relaxation exists, it must be useful. We feel fully the weight of this argument, and must acknowledge that if we cannot always point out the end intended by nature, in the performance of this phenomenon, we must attribute it to our ignorance alone. But, in the subject under consideration, may we not see the manifestation of a law, the establishment of a principle, which, without being immediately useful to the human species, may be indispensable for the preservation of other animals?

Is it not evident that nature, always regular and uniform in her progress, does nothing by fits and starts? that what she executes in one case she reproduces in another, although in a less degree? For instance, when she wishes to suppress in any species an organ of great importance and utility to others, she never effects this suppression suddenly; the organ is gradually modified from family to family, sometimes from species to species, and by successive diminution is more or less completely effaced, preserving at the same time rudiments and vestiges of its original formation.

Why should she not pursue the same course in certain physiological acts? Why should not the relaxation of the symphyses, so useful in some animals, exist in a feeble degree in the human species, although it may not be indispensably necessary? Many of the rodentia, the cavy, and guinea-pig, could not bring forth their young, whose heads are large, solid, and therefore admit of but little reduction, without extreme relaxation and considerable separation of the bones of the pubes, which take place several days previous to parturition.

In the human species this relaxation is confined within certain limits. In a majority of cases it is inconsiderable, and can only be ascertained by careful examination. In the living woman there scarcely results any appreciable mobility, for, if it were otherwise, it would be very painful for her to stand, and impossible to walk. How then can we imagine how women on the very eve of delivery, and for a still stronger reason, immediately after, can, as we daily see them, take long journeys, either when repairing to those asylums erected by philanthropy for human misery, or from our lecture rooms where they have served for our instruction, or secretly escaping from the house of the midwife, in which they have left and hidden from the world the fruit of a moment of weakness or guilt?

ARTICLE III.—ANOMALIES OR MORBID STATES.

§ I.—CONSIDERABLE RELAXATION OF THE SYMPHYSES.

When the relaxation is so considerable as to permit the bones to glide over each other and produce an evident unequivocal mobility, the woman experiences uneasiness and fatigue in her movements, and great difficulty in maintaining the erect position. When the pains of labour supervene, the auxiliary muscles of the uterus, finding no longer a fixed point of insertion in the tottering bones of the pelvis, draw the symphyses apart with great agony to the patient. The woman, restrained by the fear of the pain resulting from their contraction, does not exert her strength; the uterus, left to its own efforts, expels very slowly and with great difficulty the product of conception.

Under these circumstances, instead of being, according to the opinions of the ancients and some moderns, an advantage, it becomes an accident, and a grievous occurrence for a woman who suffers from its existence.

From among the many cases we have observed which confirm the opinion just expressed, we shall relate the following.

Mad. de ****, twenty-two years of age, married at nineteen, menstruating regularly, of a nervous and lymphatic temperament, experienced a fatiguing pregnancy, during the latter period of which she could hardly walk. The labour was tedious, painful, and required the application of the forceps for its completion. The patient recovered rapidly, retaining, however, some debility in the hips and loins.

* Exercitationes de generatione animalium, de partu, 516. Amsterdami, 1651.

† Loco citato. p. 82.

Becoming pregnant again, three months after delivery, this young lady was attacked, about the fourth month, with a very acute pain in the head, a dry cough, accompanied by laborious respiration, anxiety in the precordial region, and an unusual development of the pulse, without any well-marked acceleration. Twelve ounces of blood were taken from her arm, although against the wishes of her family. The venesection was followed by some amelioration; but the pain in the head persisting, was removed by the application of twelve leeches behind the ears. Two days afterwards, the cough and precordial anxiety having returned, the pulse preserving all its force, having increased in frequency, she was again bled to twelve ounces. Notwithstanding this, the most absolute rest, and strict diet, the use of tepid drinks, and emollient enemata, and warm emollient applications to the extremities, the symptoms yielded only to a third loss of about eight ounces of blood. The patient soon recovered, the pregnancy went regularly on; but, from that period, she complained of dull pains in the loins, hips, legs, and thighs. All her movements were slow, difficult, and painful, and she could scarcely walk, feeling constantly as though she were about to fall. She was obliged to be carried into the garden, and walked bent exceedingly forward, and leaning on the arms of her attendants supporting her on either side.

During the five months, the greater part of which this lady spent either in bed or on her couch, she had frequent attacks of pulmonary congestion, which were successfully relieved by small bleedings of six ounces each, so that, notwithstanding her highly nervous and lymphatic temperament, we were obliged to bleed her eight times during her pregnancy.

On the 8th of September, 1835, her labour commenced, and terminated happily on the following day in the birth of a male child which weighed six or seven pounds. Nothing unusual occurred afterward, except that she was obliged to keep her bed or couch for a long time, complaining of difficulty in moving, and uneasiness in her hips. On the twenty-first day after delivery, whilst endeavouring to walk a few steps in her room, she experienced acute pains in the hips and region of the pubes, accompanied by a sensation of weakness, and tottering in these parts very peculiar; in attempting to walk she was prevented less by the pain than by the fear of falling, for, as she expressed herself, she felt as if her body were gliding between her legs.

Continued rest, the use of the bitter tonics, Spa water mixed with wine, a strengthening regimen, and a girdle applied moderately tight around the pelvis; the administration of some douches and baths, alternated with the mineral waters of Plombières and Barèges, effected a remarkable improvement in her condition. At the moment we are writing, seven months since the birth of her child, she complains only of a sensation of uneasiness in the pubic region, which we hope will disappear with time, a residence in the country, and the use of sea-water baths, from which we have derived much benefit in similar cases.

Thomas Denman relates a still more remarkable case of a woman, of vigorous temperament, married at twenty-one, who was delivered in the commencement of 1774 of her third child, after a long and painful labour. For many days preceding her delivery, the pain and weakness of the loins prevented her from walking without assistance. Her convalescence was favourable and uninterrupted, but she could not stand erect, nor move for many weeks afterward. Any attempt at locomotion was accompanied by pain and a sensation of tottering at the sacro-iliac and pubic symphyses. The free use, however, of the roborantia, soon enabled her to walk, and perfectly restored her health in a few months.

In a subsequent pregnancy, the uneasiness increased so much, that for three weeks before her accouchement, she could neither walk nor stand erect. Nine weeks after delivery, which took place on the 7th of July 1777, she began to use crutches, and was unable to walk without assistance, until about five months later. Again pregnant in 1778, she was incapable of walking from the 13th of July until the 13th of October of the same year, when she gave birth to a fine child. Her labour, severe and alarming, was the more so from her inability to move; all auxiliary forces were lost, and assistants were necessary even to change her posture.* Denman then enumerates the numerous and various accidents which retarded the recovery of this lady. It was only eight years after that she was able to walk without crutches.

We shall now detail a case which occurred in our own practice, and which does not promise to be followed by so satisfactory a result.

Mad. D———, living in Paris, thirty-three years of age, of apparently a good constitution, had been weak and delicate during infancy, and even presented some symptoms of rachitis, evinced by a slight swelling of the articular extremities of the long bones. At the age of fourteen and a half, she first menstruated, and began to grow rapidly. From that period until her marriage, she always enjoyed perfect health, except having a slight weakness in her ligaments; she was subject to sprains, and even her wrists were very feeble.

Married at twenty-six years, she soon after became pregnant. At first this new condition was marked by no unusual occurrence; but about the second month, an excursion made in one day to a distance of five leagues from Paris, produced general uneasiness, accompanied by acute pain, threatening an abortion. Her physician bled her, prescribed rest, warm baths, and an emollient regimen. The pains which, during the first eight days, were so violent, that the patient could not stir in bed, at last ceased. She was then placed on a couch, and a month subsequently endeavoured to walk; but although she felt no pain, she could not take a step without fainting.

This inability to walk lasted some time, but toward the end of her pregnancy, this lady appeared to have recovered her strength, and walked with less difficulty.

The pains of parturition were first felt on the night of October 16, 1830, and continued twenty-four hours, but the application of the forceps was necessary to assist the birth of a well formed male child, which the mother endeavoured in vain to suckle.

During the first fifteen days after delivery, she experienced acute pains in the hips and parts of generation, which were attributed to the laceration of these organs in consequence of the passage of the child's head and the application of the forceps.

At this period, the patient endeavoured to sit on a chair, but she fainted, and was carried back to bed.

Six weeks elapsed, and she tried to walk from her bed to a couch, supported by the shoulders of assistants, but she suffered intense pain in the articulations of the pelvis, and thought that her body was falling down between her legs.

At the end of five months, by the advice of her physician, Mad. D——— went to the country; there her hips were tightly enclosed in a bandage kept in place by means of straps under the thighs, and she endeavoured to walk in the garden, but these attempts were

* Observations sur les Accouchemens. Paris, 1766, t. II., obs. 1re.

always accompanied by pain. When, by accident, the straps beneath the thighs were forgotten, she felt, to use her own expression, a *separation externally*, and the desire of setting or lying down.

For ten months she used gelatinous baths, the Barèges waters, saline or astringent injections, without any appreciable benefit. A consultation was then held between her accoucheur, M.M. Magendie and Amussat. The examination made by them disclosed a relaxation of the symphyses of the pelvis, which, when the patient was left to herself in the erect position, rendered it impossible for her, not only to preserve this position or to walk, but even to approximate her thighs.

Mad. D——— was then ordered to wear a better and stronger bandage, which was done. This girdle or bandage embraced the hips, the two trochanters, and the upper part of the thighs, so as to keep them firmly together.

Thus supported, Mad. D——— was able to walk, not without fatigue, in her room, and even in the street: but she could not go up or down stairs, and was obliged to be carried even over four or five steps.

After two years' treatment, and the use of sulphurous, gelatinous, and aromatic baths, her health became better; she could walk with more ease. At the end of the year 1832, she could walk for as much as twenty-five minutes; the next day, indeed, she was excessively wearied.

In March, 1833, she became again pregnant. The three first months went on regularly, always excepting the difficulty in walking. At that period, her sufferings increasing, our advice was asked. Notwithstanding her miserable condition, hoping the fresh air would be of service, she continued to go, until the fifth and a half month, to the Luxembourg, a promenade from which she is separated only by the width of the street in which she resides.

Toward the end of August, she felt such acute pain in the hips, the thighs, and loins, that she was obliged to keep, first her room, then her couch, and finally her bed, during the remainder of her pregnancy.

On the first of December, 1833, after a labour of a few hours, neither long nor very painful, this lady was delivered naturally of a fine male child.

Immediately after the second accouchment, Mad. D——— lost the ability to move. In order to render her the services her situation required, it was necessary to move successively each of her legs. This displacement occasioned such intense pain that the patient neither could nor would move nor rise, to satisfy the most imperious desires. She groaned incessantly; cried whenever she was touched; and if, accidentally, in a disturbed sleep she changed her position, she could not recover it without assistance. Still she had no fever nor appreciable swelling in the articulation of the pelvis, nor change of colour of the skin covering them. The left leg was weaker than the other, the groins and mons veneris had acquired so much sensibility, that the patient thought that the hair on these parts was sensible, because the slightest touch gave her pain.

Narcotic and emollient applications, without any sanguine evacuation, diet, diuretic and anodyne potions, two mild laxatives, added to the most absolute rest, gradually removed this state of suffering, which disappeared in a month after delivery.

However, the movements of the lower extremities became less frequent. One fact, remarkable as it differed from the first attack, was that she could not separate the thighs. When she wished to move them, she carried them both at once to the same side, and to perform this act she was and is still obliged to flex the knees by approximating the feet to the pelvis, and inclining the two limbs to the right or left, as if there were the commencement of paraplegia.

In consequence of our frequently expressed wishes to her family, in the month of August, 1834, MM. Magendie and Amussat were called in consultation. After an attentive examination these gentlemen, who had seen her after her first delivery, ascertained that there was an enormous increase in the mobility and separation of the symphyses.

It was then unanimously agreed upon to send the lady into the country, in a dry and elevated situation, to expose her bed to the influence of the fresh air and rays of the sun; to direct her salt, alkaline, sulphurous, or aromatic baths; to submit her to a tonic animal diet, at the same time not too stimulating; and above all, to employ a powerful methodic and permanent support for the pelvis.

Our colleague, M. Amussat, who directed the treatment and attended the patient most assiduously, caused to be made by a skilful workman a mechanical compressor of his own invention, to embrace the hips, resting on the trochanters, and which by means of a screw should exert a gradual constriction. The patient could not bear the first application of the apparatus for more than fifteen minutes, although the straps and screws were not drawn tightly. Our hopes were greatly disappointed, for its application was followed by fever, accompanied with nervous spasms. The same phenomena attended every repetition of the experiment. We were obliged to abandon this instrument and employ a simple girdle provided with buckles and strong straps, which the patient tightened at will. Despite of the most assiduous care, and the perseverance with which the above treatment was pursued for nearly two years, and numerous other therapeutical agents which we shall not notice, the condition of the lady is almost the same as it was in April, 1834.

In a recent pregnancy, about the latter part of November, 1835, we have observed the following symptoms.

The patient has emaciated during the two last years; digestion is slow, sometimes painful; the alvine and urinary excretions are easy and involuntary; the sexual organs have retained their sensibility, and that of the legs and thighs is natural; these limbs have evidently diminished in size, are softer and more flaccid, and nearly lost the power of motion; flexion and extension are performed with difficulty; it is almost impossible to elevate the inferior extremities; hence the patient cannot assume any but a horizontal position. An examination of the symphysis pubis, either externally or internally, shows that its bones are more separated than in the ordinary state. By raising one of the pubes and carrying the other in an opposite direction, we thought we felt a movement of vacillation, which the patient said she perceived. We shall observe carefully what may hereafter occur. We have also seen, in consultation with MM. Marjolin and Sanson, a young Alsatian lady, who by a similar cause, and notwithstanding the most energetic means, such as the transcurrent cautery to the inferior part of the loins and over the sacro-iliac symphyses, has been for several years deprived of the use of the lower extremities.

§ II.—SEPARATION OF THE SYMPHYSES.

The preceding anomalies are not the only ones which may occur in the articulation of the pelvis. In some cases there has been not merely a relaxation, but an actual disjunction and separation of the parts.

The separation of the symphyses may be *congenital* or *accidental.*

Congenital separation is seen at birth, and nearly always accompanies another malformation, of which it is perhaps the consequence—we mean exstrophy or extroversion of the bladder. In five cases of exstrophy which have fallen under our notice in twenty-five years, we have observed constantly a considerable separation of the pubes, through which the posterior paries of the bladder, thrust forward by the viscera contained in the abdomen, protruded, presenting to the eye its internal surface, red, sometimes livid, always moist, at whose lower part the urine distilled guttatim from the orifices of the ureters.

Walter has figured the pelvis of a man in whom the pubes were separated by a distance of one and a half inches, and the intervening space filled by a transverse ligament.

On the 10th of November, 1808, Chaussier exhibited to the Society of the School of Medicine, the pelvis of a child afflicted with exstrophy, in which the symphysis pubis was not united. Many similar cases have come under his notice.

Accidental separation may result from the natural efforts of the woman to hasten her delivery, or from the attempts made to extract the head of the fœtus by the lever or forceps, or even from the delivery by the feet. We shall treat of the consequences of this violent disjunction under the head of Section of the Symphysis.

In the Mémoires de la Société Royale de Médecine,* will be found the following case, related by Souchet, a physician at Boulogne-sur-Mer. Mrs. Harris, an English lady, was delivered of her third child at the age of twenty-four. The exertions she made during a tedious and painful labour were so violent that the symphysis pubis separated to the extent of eight or nine lines. The delivery followed immediately. On the least movement a very evident crepitus was heard; the accoucheur applied a bandage round the loins, and the parts united in less than three months: the lady after that period gave birth to three children without any accident.

In the same collection† this other case is also found. Hannequin, an accoucheur at Charleville, in a very distressing labour observed a separation of nearly an inch and a half in the symphysis pubis, and a remarkable distance between the sacro-iliac surfaces. This separation occurred in a woman twenty-eight years of age, suddenly and accompanied by noise, the patient remaining for a long time in a very uncomfortable condition.

Thomas Denman‡ relates the case of a very delicate, primiparous woman, in whom, according to him, there occurred at the moment of the passage of the child a separation of the symphysis pubis. This appears to us to admit of some doubt. Three and a half months afterward, this young lady, whilst riding in her carriage, felt a discharge from the sexual parts, which she thought was a return of menstruation, but which did not depend on this cause. The discharge ceased before her return home, and five months after the birth of her child she was able to walk. She has since had three children without any unusual occurrence.

Smellie§ saw a woman, thirty-five years of age, who, in her first labour, experienced a violent pain in the left sacro-iliac symphysis. During the pains, it seemed to her as though the bones were separating; her delivery was tedious but natural. Some symptoms arose on the fifth day, which yielded to antiphlogistics; but the patient could not sit down until after the twentieth day. She was obliged to use crutches for six months. She received so much benefit from cold bathing, that she was enabled to walk, supported only by a cane. This woman had, subsequently, several children, without any accident, although her hips never recovered their former strength and firmness.

It must not be supposed that in all cases of separation of the bones of the pelvis, the results are equally satisfactory. On the contrary, these disjunctions, and principally when they follow attempts to extricate the fœtus from the mother's womb, either with the hand or with instruments, are accompanied by serious injuries, which frequently prove fatal. M. Murat, in his excellent article on the *Symphyses of the Pelvis*,¶ says that Duverney was wont to exhibit, in his lectures, a pelvis in which the pubic bones had separated, during labour, by the efforts of nature alone: the patient died. Chaussier relates the case of a woman of Dijon, who had had five children, of which three were presentations of the head, and two of the feet. Being pregnant a sixth time, the operation of turning was performed; and when the head passed the superior strait, the woman felt a terrible crepitation in the bones of the pelvis, which was heard by the assistants: the unfortunate mother perished soon after. M. Desgranges, a celebrated surgeon of Lyons, says, "One of my colleagues was called to a woman who had been two days in labour with her first child; her strength was failing, and the head of the child would not advance beyond the cavity of the pelvis; he applied the forceps, but at the moment of its passing under the arch of the pubes, the symphysis was ruptured, and the bones separated to a distance of more than twenty lines from each other. The woman died on the sixth day. The autopsy exhibited great injury done to the symphyses of the pelvis."

We have seen, and shall hereafter detail, some similar cases which we have observed in the lying-in hospitals in Paris.

Treatment. The indications to be fulfilled when there is considerable relaxation of the symphyses of the pelvis, and, à fortiori, when there is a disjunction of these parts, are the following: the patient must be ordered to preserve absolute rest in a horizontal position; we must combat the inflammatory symptoms which may arise, by all possible antiphlogistic means, such as venesection, baths, emollient applications, narcotics, diet, diluent and slightly acidulated drinks, etc.; but, above all, by the local application of leeches to the affected articulations, to be repeated at short intervals so long as the pain exists, always remembering the general state of the patient's strength.

If there be no reason to dread inflammation, it is proper to assist the return of the inter-articular cartilages, by means of a gentle and gradual compression around the pelvis, by a bandage made of towels, or, better still, of three or four folds of flannel, or a wide bandage of kersey: we may also apply over the articulations compresses soaked in hot wine, rendered more astringent by an infusion of Provence roses, a decoction of tan, the solutions of sulphate of alumina and potash, of acetate of lead, lime-water mixed with a certain quantity of

* Tom. I. p. 314.
† Tom. II. p. 249.
‡ Loco citato, p. 25.
§ Observations sur les Accouchemens. Paris, 1766, t. II., obs.
¶ Dict. des Sciences Méd., en 60 vol.

alcohol, or any other discutient liquid. During the repose in bed, the woman should have a diet tonic and strengthening, as far as is compatible with her digestive powers, and should be permitted the use of good wine taken alone or diluted with some of the gaseous or chalybeate water, such as those of Seltzer, Spa, Pyrmont or others. Bitter drinks, diuretics, and sometimes gentle laxatives, should also be employed. If, notwithstanding these remedies, the recovery seems protracted, we should have recourse to cold baths, taken in running water, salt water baths, douches, bathing in natural or artificial thermal mineral waters; dry, warm frictions, simple or aromatic, the wearing of flannel next to the skin, change of climate, a residence in the south, as means which should not be neglected, and which can only hasten the cure. Is a more energetic treatment useful? Has any benefit been derived from the application of cups, blisters, the actual or flying cautery, and moxas? Without absolutely rejecting these remedies, we think they should be used with extreme caution; and only in some special and exclusive cases.

It must not be forgotten that long continued rest, assisted by proper compression, may afford nature an opportunity of effecting the strengthening and consolidation of the symphyses. The patient, therefore, should not be advised to walk too soon. After the termination of the consequences of labour, if it be thought prudent to try her strength, it should be done with extreme care and circumspection.

During these attempts, the woman should wear a leathern girdle well padded, fixed around the hips by means of buckles, and drawn as tightly as the patient can bear, and maintained at its position by straps under the thighs. She ought likewise to use crutches, which, by supporting the upper part of the body, diminish the pressure exerted by the trunk on the articulations, as yet too feeble to resist so great a weight.

SECTION III.

ABNORMAL STATE.—MALFORMATION OF THE PELVIS.

Whenever the pelvis varies remarkably from that whose dimensions have been assumed as the standard, it is said to be vitiated or malformed.

This malformation depends, generally, on an alteration or corruption of the mode of nutrition of the bones; they result especially from the abnormal inflections and consolidations, produced by various diseases; and may be also occasioned by morbid products of a different nature, developed in the interior of the bones, cartilages or fibrous tissue composing the pelvis.

These deformities may influence, 1st, the whole pelvis; 2d, only some of its parts; 3d, they may modify its inclination, and change the direction of its apertures and axes.

ARTICLE I.—GENERAL DEFORMITIES OF THE WHOLE PELVIS.

These may consist either in excess or diminution of the size of its dimensions.

§ I.—WITH EXCESS OF DIMENSION.

Deformities of this nature are not unfrequent; and at first sight, it would hardly seem that they could constitute an unfavourable condition; yet, upon reflection, it will be perceived that women presenting this disposition, are subject to many inconveniences and accidents unknown to those who are well formed. Thus, the uterus, in a state of vacuity, is exposed to various displacements, the more serious, as, in these women, they are difficult to relieve. During pregnancy, this organ, not being properly supported above the superior strait, falls too easily into the pelvic cavity, and produces an unpleasant sensation of weight. It may, sometimes, by compressing the bladder, rectum, blood-vessels and nerves which line the pelvis, embarrass the flow of urine, arrest the excretion of stercoral matter, and occasion obstinate tenesmus, the development of hemorrhoids, varices, infiltrations of serum into the lower extremities, pains and cramps in these parts. At the period of labour, if the woman exerts all the muscles subject to her will, before the dilatation of the os uteri be completed, the organ, distended by the fœtus, may be expelled through the external parts, as happened in a case related by Paul Portal;* at other times, the dilatation being completed, and the uterine contractions energetic and frequent, the child not meeting sufficient resistance in passing through the straits and cavity of the pelvis, arrives suddenly to the perineum, which is lacerated, because it has not time enough to become distended. If it yields without rupturing, the uterus, too suddenly emptied, exposes the woman to all the dangers consequent on so sudden an evacuation.

These disadvantages, however numerous they may be, are not to be compared in point of frequency and importance to those resulting from narrowness of the pelvis.

§ II.—WITH DIMINUTION OF DIMENSION.

The pelvis seldom retains externally the form and dimensions which we have assigned to the standard, and at the same time presents internally an absolute diminution in the extent of each of the apertures of the cavity which compose it. It may, however, be conceived, that if the bony tissue of the pelvis increased greatly in thickness, as sometimes happens to the bones of the cranium, an absolute narrowness more or less considerable might ensue without change in the shape or in the apparent dimensions of the other parts.

Cases of absolute narrowness with diminution in extent of the other parts, constituting a pelvis generally small, are by no means rare. The pelvis of the woman Olive, described by M. Faurichon-Lavalade in a thesis defended by him in 1832,† was probably of this

* La Pratique des Accouchemens, soutenue d'un grand nombre d'observations. Paris, 1685, page 68 et suivantes.

† Des Vices du Bassin, thèse 78. Paris, 1832, page 7.

description, as the author has merely given the extent of the different diameters of the straits and cavity, without speaking of that of the other parts of the pelvis.

We could also give several analogous examples which have occurred in our practice in a lying-in hospital.

A pelvis may be considered small or narrow if it be compared to the size of the fœtus which is to pass through it; but this relative narrowness, being subordinate to the considerable development which the fœtus or some of its organs may have acquired during the intra-uterine life, deserves here only to be mentioned.

ARTICLE II.—PARTIAL DEFORMITIES OF THE PELVIS.

These, like the preceding, may consist of excess or want of dimension. The most frequent and dreadful are undoubtedly partial deformities with want of extent; they present generally the greatest obstacles to the accomplishment of labour, and force us to have recourse to surgical operations—those last resources of our art, dangerous always both to the mother and child. Partial deformities sometimes affect the greater, sometimes the lesser pelvis.

§ I.—OF THE GREATER PELVIS.

When deformities of the greater pelvis exist, they do not exert a marked influence either on pregnancy or on its termination; therefore we shall not stop to consider them very fully.

They may consist of a deviation, a projection in front of the lumbar column, or rather in an exaggeration of its curvature. When this is excessive, the direction of the uterus is changed; thrown to the right or left, it preserves a forced obliquity, which may impede the successful termination of parturition.

Sometimes the wings or margins of the pelvis or the iliac fossæ are turned too much outwardly; the uterus, not being sufficiently supported, reposes as it were on the superior strait: in our opinion this circumstance may influence the irregular presentations of the fœtus. Sometimes these parts are too closely approximated on account of the straightness of the iliac bones, and the hips of the female are narrow and resemble those of the male sex. M. A. Dubois thinks that the too vertical position of the wings may in some cases occasion abortion, by preventing the development of the uterus—an opinion which appears to us to be not well founded, when we take into view the extensibility and laxity of the anterior part of the abdomen.

§ II.—OF THE LESSER PELVIS.

The lesser pelvis may be deformed in its apertures, in its cavity, or in all its parts simultaneously. One or several of its diameters may be changed. Any change, whatever it may be, in one of the diameters, must necessarily produce an alteration in the shape of its apertures.

Deformities of the superior strait.—When the lesser pelvis is deformed, the superior strait presents a form more or less fantastic, which has been compared to a heart, a kidney, the figure 8, a triangle, a trapezium, etc.

The superior strait is altered more frequently than any other part. Its deformity may affect the antero-posterior diameter and singularly modify its extent; it will be sufficient to state, that all degrees of variation have been observed between four inches, the standard of perfect conformation, and three lines, as indicated by Sir Charles Bell.

The direct causes of these deformities are:—1st, the depression or projection forward of the base of the sacrum; 2d, the turning backward of the horizontal branches of the pubes; 3d, these two causes combined.

At other times the transverse diameter is contracted; this contraction depends on the approximation of the iliac bones, and on the projection forward of the pubes, which may increase the antero-posterior diameter. In the museum of Dupuytren there is a very remarkable pelvis, obtained by M. Jeuffriou, and presented to the Faculty of Medicine by M. Breschet. In this specimen the pubes project so much forward, that they are bent to the form of an elbow nearly on a level with the acetabula, and preserve a parallel direction of twenty-two lines, separated from each other by a distance of only six lines.

Sometimes one of the oblique diameters is diminished by the turning inward of the iliac bones, or by the inward projection of one side of the pubes, whilst the other has an outward direction. When the pelvis presents this disposition, it is said to be curved like the handle of a basket. The opposite oblique diameter then generally gains an extent equal to that lost by the contracted diameter. These cases are not uncommon, and explain very easily how women thus formed may bring forth without artificial assistance. For this purpose it is merely necessary that the long diameter of the child's head should present in the direction of the great oblique diameter, and that the transverse should engage in the contracted diameter. We have attended a woman thus constituted in two different labours, both of which terminated naturally.

Deformities of the inferior straits.—Defects may likewise occur in the shape and diameters of the inferior strait. The projection forward of the coccyx, from an excessive curvature of the sacrum, and the turning up of the base of this bone, may sensibly diminish the antero-posterior diameter. On account, however, of the mobility of the coccyx, this diameter is rarely so small as to prevent the termination of labour. The contraction most to be dreaded is that of the transverse diameter, resulting from the approximation of the tuberosities of the ischia.

The oblique diameters of this strait may be changed or diminished by the vitiated direction of the ischio-pubic branches.

Lastly, the arch of the pubes, instead of its proper shape, sometimes assumes that of the male, and is contracted into the shape of an ogee, with an extent insufficient to allow the passage of the child's head.

Defects of conformation of the two straits are sometimes joined to each other, but in opposite directions, that is to say, if the superior strait is contracted, the inferior is enlarged, and reciprocally. A plain practical consequence results from the knowledge of this disposition,

if the superior strait be contracted, the head of the child can only pass with difficulty; but having overcome this obstacle, and not meeting sufficient resistance at the inferior strait, it may strike violently on the perineum, and produce a perforation or rupture of the latter. In all such cases delivery soon follows the passage of the superior strait.

On the contrary, if the inferior strait be contracted and the superior enlarged, the head will be found, from the commencement of labour, to have descended into the lesser pelvis, and give rise to the opinion, in inexperienced practitioners, that parturition will soon be accomplished; this flattering illusion is soon destroyed, and succeeded by the greatest anxiety, in consequence of the obstacle presented by the inferior strait to the passage of the head.

These defects of conformation do not always occur in the same manner: cases have been seen in which the two straits were simultaneously contracted. These cases, fortunately rare, ordinarily depend on an extreme curvature of the sacrum, and coincide with an increase of the antero-posterior diameter of the cavity.

This condition of things may be followed by very serious and embarrassing consequences: for if the superior strait has extent sufficient to permit the head, after a tedious labour, to pass through it, the latter, having reached the cavity, is retained by the inferior strait, and soon recovers, in consequence of the bony pieces which compose it, the dimensions which it had acquired before its passage through the superior strait. The woman, exhausted by her previous efforts, cannot overcome the resistance of this strait, and the assistance of artificial means becomes indispensable.

Deformities of the Cavity. The causes which alter the form and extent of the straits of the pelvis, such as the internal projection of one or both of the acetabular parietes, produce analogous effects on the lateral parietes of the excavation, which may be also deformed by the too great inward projection of the spine of the ischium, as observed in a case reported by Levret.

The anterior paries of the cavity may be altered, 1st, by the turning backward of the pubes; 2d, by the projection inward of several lines of the inter-pubic fibro-cartilage; 3d, by the excessive length of the symphysis pubis: for in this case the head cannot engage in the arch of the pubes, and the delivery is much retarded.

The cavity may be deformed by other causes which are, in a manner, peculiar to it. The sacrum may be too much curved or too flat. In the former case, the antero-posterior diameter is enlarged, and it may happen that the head of the child, having reached this exaggerated curve, remains there for a greater or less length of time, or else the occiput, resting on the sacrum, executes there that movement of extension which should have taken place externally, and the position of the vertex is converted into one of the face, at the termination of the process.

In cases of flattening of the sacrum, the head not being able to execute the movement of rotation necessary to conduct one of its extremities behind the pubes, and the other into the concavity of this bone, preserves, during its passage through the pelvis, the diagonal position it had acquired at the superior strait, which must be attended with some risk to the mother and child. In fact, for the completion of the labour, the head, compressed for several hours, must experience a considerable reduction, and there may result fractures of the cranium, laceration of some of the blood-vessels of the brain, effusion, or compression of the encephalon, which cause, sooner or later, the death of the child.

On the other hand, the parts of the mother interposed between the flattened sacrum and the projecting part of the head, such as the sacral nerves and vessels, and cellular tissue, being compressed and contused, may give rise to numbness, intense pain, engorgements, abscesses, and sometimes even to paralysis of the lower extremities.

Lastly, morbid products of various kinds, developed either on the internal surface of the bones of the pelvis, or on the articular fibro-cartilages, or in the soft parts which cover the pelvis, may alter the shape of and more or less completely obstruct its cavity.

Pineau has seen an exostosis, arising from the posterior part of the pubes, prove an insurmountable obstacle to the accomplishment of the labour.

In the collection of the Faculty of Paris, there is a pelvis, almost entirely filled, by an exostosis, arising from the body of the right pubes and the ischio-pubic ramus of the same side.

There exists, also, in the same collection, a pelvis, the cavity of which is occupied by a fibro-cartilaginous morbid production, springing from the right sacro-iliac symphysis, and extending anteriorly, so as completely to fill the cavity of the pelvis.

ARTICLE III.—DEFECTIVE INCLINATION OF THE PELVIS.

The majority of the deformities we have just examined, produce changes in the inclination of the pelvis, and the direction of its axes.

The inclination of the pelvis may be increased or diminished, constituting the two deformities which demand our attention.

In some cases, this inclination, instead of making with the axis of the body an angle of 140 degrees, has a tendency to assume the direction of the latter, so that the anterior faces of the pubes and sacrum become perpendicular to the ground.

In October, 1813, I was present at the delivery of a lady, upon whom Désormeaux, Boyer, Evrat, A. Dubois and M. Petit were in attendance.

This lady, who had been affected from infancy with rachitis in the last degree, was so deformed, and the spinal column so twisted, that the concave surface of the sacrum looked directly downward; the axis of the superior strait was parallel to the horizon; the anterior wall of the abdomen, immeasurably distended, formed a kind of sac, or pouch, which supported the whole weight of the uterus and abdominal viscera. The vulva was directed backward and slightly upward, so that sexual congress could only be performed as in quadrupeds. During the latter period of her pregnancy, she could not rest either in a sitting or a recumbent position; for more than three months she passed every night in an erect posture, with her elbows resting on a table covered by a cushion, and her head between her hands.

In the recumbent posture, her belly ascended and embarrassed the movements of the diaphragm, which alone appeared to serve for

the dilatation of a narrow thorax, of which the ribs, closely approximated, were almost immovable. Her respiration became difficult, and a bluish, livid colour, proved that the function of hematosis was performed with difficulty, or not at all; so that she could not preserve a horizontal position for more than a few minutes, without being threatened with suffocation.

The pelvis, contracted in its cavity, and especially in the inferior strait, could not afford a passage for the child. The sacrum and pubes formed two planes inverted in contrary directions, very much separated above and approximated below, between which the head of the fœtus became impacted as it advanced. In this distressing condition the section of the symphysis pubis, or the Cæsarian operation, was indicated as the only chance for the life of the mother and child. But her difficulty of respiration was so great, and the danger of suffocation so imminent when she attempted to lay down, that after several consultations and long discussions during the day and part of the night, this idea was abandoned from the fear of the death of the patient before the termination of either operation. It was then determined unanimously to endeavour to accomplish the delivery per vias naturales.

Désormeaux tried in vain several times to advance the head by means of the lever: this was abandoned and craniotomy resorted to and performed in the erect posture, which the patient had been obliged to maintain for more than three months.

This young lady, notwithstanding the best treatment and most assiduous care, survived but a few days. Her pelvis, remarkable for its defective inclination—the flattening of the sacrum, the inclination inward of the inferior part of the pubes, and the narrowness and faulty direction of the inferior strait—was preserved by Désormeaux, and exhibited by him annually to his pupils in his admirable course of lectures.

The following are the dimensions of this pelvis, which has been presented to me by the family of M. Désormeaux.

SUPERIOR STRAIT.	*inches.*	*lines.*	CAVITY.	*inches.*	*lines.*	INFERIOR STRAIT.	*inches.*	*lines.*
Antero-posterior diameter,	5	2	Antero-posterior diameter,	3	6	Antero-posterior diameter,	2	6
Transverse "	5	2	Transverse "	4	8	Transverse "	3	8
Oblique "	4	6	Oblique "	4	2	Oblique "	3	2

In a case of Cæsarian operation performed on the 4th of February, 1833,* a case which it is to be regretted leaves so much unexplained:—1st, as regards the motives which induced the operation rather than some other resource, as the woman had been pregnant seven times previously, had in these pregnancies aborted twice, and been safely delivered five times per vias naturales by the forceps, of four still-born children and one which lived eighteen months: 2d, concerning the circumstances accompanying the operation, and which would have been important, inasmuch as the incision was made in the posterior and not the anterior paries of the abdomen: 3d, those which preceded the death of the woman, who survived only fifteen hours; its author, M. Bello, has pointed out in the inclination of the pelvis a deformity which is in some manner a counter-part of that which we have just described.

In the case of M. Bello, the pelvis was united to the spinal column at a right angle, so that in the sitting posture the woman rested on the posterior surface of the sacrum instead of the tuberosities of the ischia, the latter being directed forward and slightly downward. The distance between the extremities of the false ribs and the anterior superior spinous of the ilia was only nine lines. The lumbar column, composed of four vertebral bodies and five spinous processes, and two and a quarter inches distant from the symphysis pubis, divided the superior strait into two unequal portions, of which the right was the larger. The antero-posterior diameter of the superior strait was four inches eight lines; the transverse, four inches nine lines; the oblique, four inches four lines: of the inferior strait, the antero-posterior was four inches two lines; the transverse, two inches nine lines.

In other cases the pelvis inclines forward scarcely at all, so that the axis of the superior strait becomes nearly that of the body of the woman, resulting generally from the elevation of the pubes, or the depression of the sacrum—a disposition which must necessarily diminish the antero-posterior diameter of the superior strait. Under these circumstances, the child's head, instead of following the axis of the superior strait, rests sometimes on the upper part of the pubes, from which it is difficult to dislodge it.

The foregoing are the principal deformities of the pelvis.

As has already been remarked at p. 25, they rarely exist alone; they are combined and associated together sometimes without any order, but most frequently with a species of regularity, constancy, and harmony, which enables us, one being known, to judge of the resistance of the other.

ARTICLE IV.—GENERAL CAUSES OF DEFORMITIES OF THE PELVIS.

If we examine the general causes of deformities of the pelvis, we shall find that they may be produced by all those which occasion any modification or change in the vitality and nutrition of the bones, at whatever period of life they may occur. The most frequent of these causes is undoubtedly rachitis. When it appears in early life, it arrests the development of the bones, and prevents them from acquiring solidity sufficient to resist efficiently the various compression they must undergo.

The skeleton is singularly altered and modified in shape; the bones of the limbs become swollen and tumefied at their articular extremities, and, in common parlance, the child is said to *grow rickety*. The bones curve unnaturally, twist in various directions; the pelvis, upon which is exerted the double pressure spoken of previously, becomes deformed in proportion to the intensity and duration of the disease. An examination of the pelves of rachitic women will prove the bones to be lighter, thinner, and smaller, than those of other females: the same is true with regard to the bones of the limbs, cranium, and face. Even the teeth, which compose no part of the osseous system, are often marked by the disease. But when this affection first manifests itself about the approach of puberty, and à fortiori at a still more advanced period of life, the alteration is less extensive, less serious, and the deformities less numerous; they chiefly are seen in the bones of the thorax and of the spinal column, which is more or less curved; the bones and cavity of the pelvis, having

* Transactions Médicales, cahier de Septembre 1833, tome xiii., page 285.

acquired nearly the size of the adult, although their ossification is not completed, escape the deformity, which must be attributed to the multiplicity of the points of ossification, which, being simultaneously developed, afford a mutual resistance and support to each other.

This pathological law explains the facility with which certain deformed women are delivered, and the difficulties experienced under similar circumstances by some apparently well-formed females.

From the preceding observations may be inferred the considerations applicable to the physical care of children in early life. When a child is weak, and still more if it be affected with rachitis, we should avoid putting it on its feet too soon, or forcing it to walking before it is able to do so alone: if, with the intention of assisting its first steps, we have recourse to artificial means, such as leading strings, or go-carts, which are yet in use in some parts of France and in other countries, and which support the child in a vertical position, we may occasion some of the deformities of the pelvis above described. In fact, the weight of the body acting on the base of the sacrum has a tendency to throw it forward: on the other hand, the femurs have a tendency to be turned inward into the acetabula, and if the child, to lessen the fatigue it feels from the vertical position which it is obliged to maintain, leans the weight of its body on either leg more than on the other, a breaking down of the corresponding acetabulum might ensue. The habit of carrying a child constantly on the same arm may cause similar results.

It is more useful, therefore, to abandon young children to themselves, and not to force them to walk: they will begin voluntarily, as soon as their locomotive organs have acquired sufficient energy, strength, and development. If the child be rachitic, it must be kept in absolute rest, in a horizontal position, reposing on soft cushions, filled with leaves of fern or other aromatic plants: it should be submitted to a tonic treatment, and animal diet; in short, to all the remedies required by the disease. This advice is particularly applicable to female children, as the consequences of neglect may be, in their case, very serious, and even fatal.

Rachitis is not the only disease which may give rise to malformation of the pelvis. There is another affection which occurs at a more advanced period of life, known by the names of *osteomalacia* and *malacosteon*, in which the bony tissue loses its solidity; the phosphate of lime is deficient; it is reduced, as it were, to its gelatinous mould, and becomes bent and deformed in various directions. A rare and remarkable case of this malady is exhibited in the skeleton of the woman Supiot, in the Cabinet of the Faculty.

Syphilitic and rheumatic affections sometimes occasion exostoses, which contribute to deformity of the pelvis: the same might result from fractures not exactly consolidated; that is, with considerable overlapping of the fragments. Caries of the bones of the pelvis, the continued pressure of the head of the femur dislocated by coxalgia, or an old unreduced luxation may also cause deformity.

In consequence of similar affections, it happens, that women who have been well made, and brought forth several children, sometimes lose their natural shape, and can no longer be delivered without artificial assistance.

Although the preceding investigation has been very minute, it would be useless, did we not point out the indications by which these malformations may be recognized, and the means of ascertaining, as far as possible, their extent.

ARTICLE V.—INDICATIONS OF PERFECT OR IMPERFECT CONFORMATION OF THE PELVIS.

These indications are furnished, 1st, by external inspection of the woman; 2d, by the pelvimeter or measurement of the pelvis.

§ I.—INDICATIONS FURNISHED BY INSPECTION.

A perfect conformation is known by the following signs:—The pelvis generally is well made when the hips are rounded, equal in breadth and height; the anterior-superior spinous processes of the ilia on the same line, and at a distance from each other of eight or nine inches; the space comprised between the middle of the iliac crests and the lower part of the tuberosities of the ischia is about seven inches; the hollow of the loins not too deep; from this region to the point of the coccyx, there is a regular curve, not too projecting; the pubes rounded, slightly saliant forward; the ischiatic tuberosities on the same line, and separated by a distance of nearly four inches.

Want of width, projection, and elevation of the hips; too great a depression in the loins, excessive convexity or flattening of the sacral or pubic region, narrowness of the arch of the pubes, inequality of elevation, too great approximation or separation of the tubers of the ischia, mark the existence of some malformation, either in the straits or in the cavity.

Lameness, or the drooping of one of the hips may excite the same fear; but this may depend on a luxation, a disease of the hip, thigh, leg, or foot, occurring at an advanced period of life, without any injury done to the pelvis.

The indications furnished by this examination, may serve to awaken our attention, and lead to the detection of malformations; but they are not sufficient to determine exactly their extent. For this reason, we have recourse to the more accurate means furnished by pelvimetry.

§ II.—OF PELVIMETRY.

The name of *pelvimetry*, or *mensuration of the pelvis*, is given to an operation of which the object is to determine the extent of its different parts.

Two important events in the life of a woman, may require us to have recourse to this operation. The first, when a family consults us to know whether a marriageable girl, affected with lameness or curvature of the spinal column, runs any risk, by entering into the hymeneal state, of purchasing the name of mother, at the expense of her life. The second, and unfortunately the most frequent, is when a malformed woman has conceived and reached her full term, and it becomes our duty to determine the mode of treatment best calculated to preserve both the mother and her offspring.

There are different methods of measuring the pelvis: some applied externally, others internally; some consist of various instruments, known under the generic name of *pelvimeters;* and others, in the application of one or both hands, or only several fingers of the same hand.

§ III.—OF PELVIMETERS.

The derivation of this name from the Latin *pelvis*, a basin, and the Greek μετρον, measure, sufficiently explains its signification.

Among these instruments, some are applied to the exterior, and others to the interior of the parts whose dimensions it is desirable to ascertain.

We do not intend to enter into the history of pelvimeters, but merely to point out those which from their simplicity or the accuracy of their results, are of practical advantage.

We will remark, that nearly all these instruments have been invented to measure the extent of the superior strait, which, in relation to the fœtus, forms the entrance to the pelvis, and especially to determine the antero-posterior diameter of this same strait, although some of them may be applied to the measurement of other parts of the pelvis.

The pelvimeters most in use are those of Baudelocque, Coutouly, Stark, Stein, Siméon, and Mad. Boivin.

Baudelocque's Pelvimeter. The calliper of Baudelocque is the most useful, in our opinion, of the pelvimeters which are applied to the exterior of the pelvis. This instrument resembles closely that used in the arts, and known by the same name. It consists of two metallic branches or legs, curved in a semicircle, so as to embrace and contain in their concavity, the hips of the woman. The free extremity of these legs is terminated by a lenticular knob; the other extremity bent almost to a right angle, has a rectilinear prolongation of about five inches; this prolongation is united to that of the opposite leg by a rule-joint which allows the compass to open and close at will. In these prolongations, there are two half grooves, intended to contain, when the instrument is closed, a graduated scale. In applying the calliper, we first insert, into a mortice made at the origin of the curve of the right leg, the scale whose graduations indicate the degree of separation existing between the free extremities; one of the lenticular knobs is then applied on the spinous process of the first false vertebra of the sacrum, a little below the hollow of the loins, and the other in front of the pubes in the separation of the greater labia, at the most elevated point of the anterior commissure of the vulva, the skin of the part to be drawn carefully upward, so as to reach as nearly as possible the upper part of the symphysis-pubis: without this precaution, the obliquity of the line comprised between the legs of the instrument, or the corpulency of the patient, might give rise to an erroneous calculation, amounting, in some instances, to several lines.

If the pelvis be well formed, there should be seven inches between the branches of the pelvimeter. In order to determine the extent of the antero-posterior diameter of the superior strait, we must subtract from this seven inches: 1st, two and a half inches for the thickness of the sacrum; 2d, half an inch for that of the symphysis pubis; thus, there remain four inches for the diameter sought.

If we could determine in all cases the thickness of the sacro-iliac symphyses and of the opposite acetabulum, we might by this calliper, according to Gardien, obtain the oblique diameters. He applies one knob on the middle of the great trochanter, the other on the posterior part of the opposite sacro-iliac symphysis. In a well made pelvis, they will separate to the extent of nine inches. From these, subtract two inches and three quarters for the thickness of the acetabulum added to the great trochanter, and twenty lines for the sacro-iliac symphysis and soft parts covering it, and we have left, for the oblique diameter, four inches and seven lines; but the plumpness or leanness of the subject may cause so great a variation in the thickness of these parts, that the results obtained are by no means accurate.

The calliper will also measure the height of the pelvis, the distance between the cristæ and between the two anterior superior spinous processes of the iliac bones, and lastly, between the two ischiatic tuberosities, if in the two latter cases a rule, a cord, or a king's foot* do not furnish exact distances.

The chief advantage and use of this instrument is to measure the antero-posterior diameter of the superior strait, the distance between the cristæ of the iliac bones, and the height of these bones.

Although Baudelocque asserts that he always found the same thickness, either at the base of the sacrum or the symphysis pubis, and that it varies so s ghtly, as in thirty-five malformed pelves, contracted in every shape and degree, to have presented a difference only of a single line.† Some writers have affirmed that this thickness was not so constant, and that it varied, sometimes, to the extent of four or five lines; and whilst admitting this precision in the result, that the calliper could never reveal the existence of a contraction produced by an exostosis, or other tumour developed in the interior of the pelvis. To remedy this defect, Coutouly invented his pelvimeter.

Pelvimeter of Coutouly. This instrument, intended to act and expand in the cavity of the pelvis, resembles closely the measure used by shoemakers to ascertain the length of the foot; it is composed of two straight arms of steel, ten inches in length, curved at right angles, forming a beak‡ of about the height of an inch and a half.

The arm which has a groove throughout its whole length is called the *female branch*, the other the *male branch*.

The curved extremity of the former, called its beak, is concave on its posterior surface, to fit the promontory of the sacrum to which it is applied. At the lower part of this arm are two small rings by which this instrument may be held during its application. The anterior extremity of this same arm is provided with a kind of plate furnished on each side with two wings, to facilitate the introduction of the male branch into the groove.

The male branch has, likewise, at one of its extremities, a beak curved the opposite direction of the preceding, to be applied on the interior of the symphysis pubis. At the other extremity is a handle by which it can be moved. This branch is divided into inches and lines. The whole instrument is ten inches long, three lines thick, and four wide.

In order to use it, two fingers are introduced, as high as possible, into the vagina; the curved extremity of the united branches of the instrument is made to slide over these fingers; when the beak of the female branch is fixed on the promontory of the sacrum, the operator draws, with his other hand, the male branch forward until its beak is arrested by the symphysis pubis. The separation of the two blades then shows, externally, the exact distance from the sacrum to the pubes.

* Pied-de-roi—King's foot, or royal foot, a French measure, used to measure the foot for a pair of shoes. Similar measures are used in this country.

† L'Art des Accouchemens, page 78, tome I., 5e édition. Paris, 1813.

‡ Bec de-canne—the hook of a walking-stick.

When the examination is finished, the branches are closed, and the instrument withdrawn with the same precautions with which it was introduced.

This instrument, however simple and ingenious, is difficult and painful in its application, and easily displaced: the slightest movement of the woman, or of the operator, in drawing forward the male branch, will cause the beak to slip from the promontory of the sacrum. The soft parts, lining the pelvis, such as the parietes of the vagina and bladder, prevent its complete expansion; and to these causes must be attributed the errors of several lines, more or less, occurring in the results given by the instrument, such as has been just described.

Coutouly, to remedy these defects, has modified it in several ways, of which the principal are, 1st, in giving more length and curve to the beak of the female branch; 2d, to curve this branch beneath, so as to have an angle greater than 90 degrees; 3d, to introduce only the female branch into the vagina; 4th, to give to the square of the male branch a form, height, and curve analogous to the beak of the female branch; 5th, to move this male branch outside of the pelvis, and from in front backward, so as to apply its beak in front of the symphysis pubis; 6th, lastly, to subtract from the length, indicated by the scale on the male branch, six lines, for the thickness of the symphysis pubis.

Notwithstanding these improvements, this pelvimeter retains many of its original imperfections; its introduction is, and always will be, difficult, disgusting and painful to the woman, and can never be applied to young girls, and only to married women in the stage of pregnancy, or during the progress of parturition.

Pelvimeter of Stein. Stein made one or two pelvimeters to measure the antero-posterior diameter. One large, is composed of two branches of unequal size, terminating at one of their extremities in a rounded knob, turned outward, and at the other into two wings to receive the fingers of the surgeon. These branches are united in their middle by a screw, which acts as a hinge. The long leg has beneath the point of junction a graduated scale, which, fitting in a mortice made in a corresponding part of the other leg, marks the distance between the knobs. This pelvimeter, based upon that of Coutouly, has nearly the same disadvantages.

The other, smaller, more simple, consists of a metallic stem, of the length and size of a female sound, provided with an index, and having divisions on one of its surfaces. It is introduced into the vagina, its extremity applied to the promontory of the sacrum, the outer extremity elevated until the graduated surface comes under the symphysis pubis, and, by means of the index, the point is marked on which the symphysis rests. The instrument is then withdrawn, and the portion beyond the index represents pretty accurately the antero-posterior diameter.

Stark's Pelvimeter is remarkable for its extreme simplicity. It is composed of a little round shield of cork or ivory, pierced with two holes, through which are passed two ends of a ribbon, so as to form a loop. In order to use it, the end of the index finger and the thumb of one hand are placed in the loop formed by the ribbon; the shield is then firmly applied against the external edge of the thumb, after having drawn the two ends of the ribbon which are held together in the same hand; the fingers, thus armed with the instrument, are introduced into the vagina, and when they have reached the upper part of this organ, they are separated, and the loop applied by means of the index finger, against the sacro-vertebral angle, whilst the shield is pushed forward by the thumb until it meets the symphysis pubis; the fingers are then withdrawn, and the length of the loop measured by a scale, or foot-rule, and the length of the diameter sought is obtained.

By changing the direction of the fingers, the extent of the oblique and transverse diameters may be ascertained.

Unfortunately, however, this little instrument, so beautiful at first sight, does not answer our expectations: 1st, because its application, requiring the introduction of the whole hand, cannot be performed on a young girl: 2d, because when it is most desirable to obtain the dimensions of the pelvis, its employment is difficult, painful and inaccurate; even in a second or third pregnancy it can only be tried in the last stage of gestation, or during labour: 3d, because here also we must subtract from the length of the loop of the ribbon the thickness of the index finger, varying in different individuals, and still more as the finger has been more or less engaged in the loop.

In short, this pelvimeter is an ingenious, simple instrument, but more fitted to adorn a collection, or to application on the skeleton, than to any practical utility.

The pelvimeters of Simeon and Mad. Boivin are merely modifications of those of Baudelocque and Coutouly, and possess the same advantage and imperfections.

§ IV.—OF THE HAND USED AS A PELVIMETER.

As artificial pelvimeters are all more or less inaccurate, the hands, or merely the fingers, have been proposed as a substitute for them. We can, in fact, to a certain degree, measure the pelvis—1st, externally, by applying the two hands to its saliant and diametrically opposite points, and measuring on a foot rule the distance between them; but these results are too inexact and variable to deserve confidence: 2d, internally, by introducing one or several fingers into the female organs. M. Velpeau* advises us to use the whole hand, to separate the thumb from the index or from the middle finger, so that one may rest on the sacro-vertebral angle and the other on the pubes, then to withdraw the hand, preserving the separation of the fingers, and ascertain its extent by measurement on a scale, so as to obtain the diameter; but, however we may respect the opinions of that author, we must be allowed to doubt the accuracy of the results; and, in addition, this method has also the inconveniences of that of Stark without its advantages.

Under similar circumstances, in our opinion a skilful finger is by far the best pelvimeter. By means of the index finger introduced into the vagina, we can determine the extent of the antero-posterior diameter by placing the end of this finger on the sacro-vertebral angle, and bringing its radial side under and against the symphysis pubis, and then marking with the other hand the exact point on which the symphysis rests. If, as often happens, we cannot feel the sacro-vertebral angle, we may rest assured that the diameter is sufficiently large.

By means of the finger, we may also by practice obtain approximatively the transverse and oblique diameters. But in ascertaining

* Traité Complet de L'Art des Accouchemens, tome I., Paris, 1835, p. 56.

the course of the sacrum, the length of the symphysis pubis, the opening of the arch of the pubes, the height, rectitude, or deviation of the lateral parietes of the cavity, the projection of the spine of the ischium, the shape of the straits, and the presence of an exostosis or other tumour which obstructs the cavity of the pelvis, the finger is immeasurably superior to all the pelvimeters which have ever been invented.

It is unnecessary to speak of the exploration of the inferior strait, because its diameters may be easily ascertained either externally or internally by the fingers or the pelvimeter.

Notwithstanding all we have said concerning the mensuration of the pelvis, it must be confessed that the employment of one method alone will rarely lead us to an exact, rigorous, and mathematical conclusion. Whenever we can, therefore, we should use all these means combined, and, in the words of Désormeaux, errors are then reciprocally corrected, and a result obtained sufficiently accurate for all practical purposes.

It must not be forgotten, at the same time, that the pelvis of a young girl must and can be examined only externally: in this case, the data furnished by the compass of Baudelocque have been as yet, in our practice, amply precise and certain.

CHAPTER II.

OF THE GENITAL ORGANS.

The female genital organs are composed of the organs of secretion, of transmission, of incubation, of development, of eduction, and of sensation.

Nature, always perfect in her arrangements, has stationed, like vigilant sentinels, on the exterior of the pelvis, the organs which as it were awaken and solicit action, whilst she has protected by a bony girdle and enclosed in a deep cavity those whose duty it is to produce and develope the new being, and which should be removed from the influence of external agents.

The genital organs, in consequence of this arrangement, founded on the succession and importance of their functions, are divided into external and internal.

SECTION I.

EXTERNAL ORGANS OF GENERATION.

This name is applied to those parts which, situated on the exterior of the pelvis, present themselves naturally to the eye, and which may be studied almost without dissection:—they are, 1st, the mons veneris; 2d, the vulva and the parts which it contains; 3d, the perineum.

ARTICLE I.—OF THE MONS VENERIS.

The *supra-pubal eminence* or *mons veneris*, is a triangular space, located at the lower part of the hypogastrium, from which it is separated by a groove more or less marked in proportion to the corpulency of the woman, and bounded laterally by the folds of the groins. This space, more or less projecting, is formed by the symphysis and body of the pubes, which act as its base, by the lower part of the muscles of the anterior wall of the abdomen, and by a thick layer of adipose cellular tissue, through which some branches of the external pudic vessels and nerves ramify, and in which some fibres of the round ligaments of the uterus are distributed; and externally by the skin, which, after puberty, is covered with hair.

This part, whose uses in the act of copulation are not well determined, serves in parturition to increase the size of the vulva, by the extensibility of the skin, and laxity of the cellular tissue which it contains.

It may be the seat of all those diseases peculiar to the tissues which compose it. It has been said that the existence of deep-seated abscesses, sometimes developed in the cavity of the pelvis, is evinced by pain in this region; this has never occurred to us in similar cases.

ARTICLE II.—OF THE VULVA.

The older anatomists designated by the term *vulva, valva, cunnus, pudendum muliebre*, that large slit or longitudinal fissure, situated at the base of the trunk, on the median line, bounded above by the mons veneris, below by the perineum, and laterally by two folds of skin called the *labia pudendi*, or *labia majora*. Some modern, and we among the number, comprise under this term all the parts contained by the labia pudendi, and which are seen by separating the latter from each other.

The aperture of the vulva serves as a door to the deeper seated organs; its extent varies according to age, in different persons, and the peculiar circumstances in which the woman may be placed. Its size, generally double that of the orifice of the vagina, after the destruction of the hymen, is very small in infancy, small and narrow in girls, wider and more extended in women, and is capable of an enormous distension at the time of labour. This opening generally remains large in women who have had many children, and especially in those who, either left to themselves or improperly treated in the last stage of parturition, have suffered from laceration of the perineum.

§ I.—OF THE LABIA PUDENDI.

The *labia pudendi* are two rounded folds which bound the orifice of the vulva laterally; extending from above downward, they diminish in thickness from before backward, and are lined internally by a mucous membrane; their external surface in contact with the upper and internal parts of the thighs, is formed by the skin sprinkled with a few hairs. Adherent superiorly, their inferior extremity is free and rounded. The union of their anterior extremity, which is lost in the mons veneris, forms the *anterior commissure* of the vulva. They descend parallel to each other, and in contact, for three-fourths of their extent, then separating, in proportion as they become thinner and incline backward, they mingle and are lost in the anterior edge of the perineum, where they form a kind of bridle, known by the name of *fourchette* or *posterior commissure* of the vulva.

The separation of the labia pudendi at their posterior part, constitutes a kind of groove, bounded by the fossa navicularis, and which leads to the orifice of the vagina; upon this point the end of the finger should be directed, as will be hereafter explained, in making an examination per vaginam.

These labia are formed by the skin, the origin of the genito-urinary mucous membrane, of serous, lax, filamentous tissue, in which adeps is not deposited, and by vessels and nerves furnished by the external pudics.

In the ordinary conditions of life, by their approximation, they serve to cover, protect and shelter from the air and external agents, the organs they contain, to keep them in a suitable state of moisture, suppleness and sensibility: at the moment of the passage of the child, they increase the capacity of the vulva, by their elongation and almost total disappearance.

The labia pudendi may be the seat of inflammation, of abscess, of hernia, varix, thrombus, serous infiltration, and sometimes of lipoma, diseases which may impede the exercise of their functions, or occasion various accidents, of which we shall treat hereafter.

The parts covered by the labia pudendi, are the labia minora or nymphæ, the hymen, the carunculæ myrtiformes, and the fossa navicularis.

§ II.—OF THE NYMPHÆ.

These are two membranous folds, situated between the labia pudendi, and extending from the anterior commissure of the vulva to nearly the middle of the vagina. Their shape may be compared to that of a cock's comb; they present two surfaces, one external, in contact with the labia, and the other internal, in contact with each other; they cover the vestibulum, meatus urinarius, and a part of the orifice of the vagina. Of their two edges, one is superior and coherent, the other inferior and loose; of the two extremities, the anterior one is united to its opposite fellow, a little below the anterior commissure of the vulva, where it forms a kind of hood or prepuce for the clitoris; the posterior is lost in the corresponding labium pudendi.

The nymphæ are formed externally, by the mucous membrane of the vulva; internally, by a spongy, erectile tissue, which is a continuation of the peculiar tissue of the vagina, and by vessels and nerves, and are endowed with a considerable degree of sensibility.

They were supposed, by the ancients, to direct the course of the urine, and hence obtained the name of *nymphæ*. The general opinion, in modern times, is, that they serve, at the time of labour, to amplify the vulva: but this idea is erroneous, of which any one may be easily satisfied by an inspection of these parts at that time. They extend so slightly, that, in one case, we have seen the right nympha, pressed by the child's head, separate throughout its whole length, adhering only by its anterior extremity.

The colour and size of the nymphæ are very various; in healthy young girls they are smooth, firm and roseate; flaccid and pale in women of a lymphatic temperament, especially in those affected with leucorrhœa; granulated and dark in brunettes; at birth, they are so long as to exceed the labia pudendi, and this length, which generally disappears with age, sometimes remains, especially in brunettes. In some subjects, this unnatural development may become inconvenient, and require their removal by an operation. The *apron* of the *Hottentots*, said to be peculiar to the *Bochisman* women, is merely an excessive elongation of these parts.

§ III.—OF THE CLITORIS.

The *clitoris* is situated at the point of union of the nymphæ; it is a species of imperforate rudimentary penis, terminated by a tubercle, in the shape of the glans, and composed, like the male penis, of two corpora cavernosa, which arise from the crura of the pubes. These bodies, separated at their origin, embraced, as in man, by the erectores clitoridis muscles, approximate as they ascend, and unite below and in front of the pubes, to which they are attached by a suspensory ligament.

In the fœtus and newly born children, the clitoris has considerable volume, and projects beyond the vulva: this size is merely apparent, and owing to the want of development of the adjacent organs, especially of the labia pudendi. In the adult woman it is small, and compared, by Hiester, to a little *uvula*.

The clitoris possesses great sensibility, is susceptible of erection, and is considered as the principal seat of the voluptuous sensation experienced by woman in the act of copulation. Hence the name of *veneris amor et dulcedo*, given to it by Columbus. This organ affords no assistance to delivery.

Its size is the subject of remarkable anomalies; and, sometimes, has even led to doubts as to the sex of the individual. It has been seen of twelve inches or more in length.* Some ten years ago, in the absence of one of our friends, we attended a lady in this city. On our arrival, the child was born and in the hands of the nurse. After the necessary attention to the mother, we were requested to look at the child, the sex of which, being declared by the assistants to be male, filled the family with joy. On a close examination, we found this pretended boy to be a girl, whose clitoris, about an inch in length, and terminated by a large tubercle like a small raspberry, resembled a glans denuded of prepuce, and deceived the women and its parents.

* Haller, Elementa Physiologiæ, Tom. 7, Paris 2, p. 82.

It has been, and is still believed, that women presenting this disposition, have a propensity to seek individuals of the same rather than of the opposite sex. The ancients gave them the name of *confricatrices* or *tribadæ*, but these scandalous inclinations appear to be more the result of excessive moral depravation than of any special organization. At least we may deduce this conclusion from the remarks of Parent Duchâtelet,* who says "that the enlargement of the clitoris is rare in prostitutes; and that, when it does exist, does not indicate in them any unnatural propensities; that he has examined women and girls addicted to this vice, and never found in their organization any mark distinguishing them from other prostitutes, or from women in general." It may be conceived, that a voluminous clitoris, exposed in walking to continual friction by the clothing or other cause, may keep up a state of excitement and orgasm in the genital organs, which may injure a female's health, and, according to some, occasion nymphomania, for the remedy of which, from the earliest times, amputation and cauterizing of the clitoris have been recommended.

The fibrous coverings of this body may be penetrated by phosphate of lime, retain it in its tissues, and give the organ an osseous consistency. Thomas Bartholin† relates the case of a Venitian courtezan, in whom the clitoris was bony.

§ IV.—OF THE VESTIBULUM.

The *vestibulum* is a triangular space bounded above and in front by the clitoris, below and behind by the orifice of the urethra, and laterally by the labia minora or nymphæ. In this space the operation of lithotomy is performed in the female; and it may likewise serve as a guide to the introduction of the catheter, as the orifice of the urethra is immediately beneath.

§ V.—OF THE URETHRA.

The *external orifice of the urethra*, erroneously called by some *meatus urinarius*, is placed beneath the vestibulum in front of the anterior opening of the vagina. This orifice, generally narrower than the canal which it terminates, is irregularly rounded, surrounded by a membranous swelling or cushion thickly studded with mucous follicles.

The urethra is a canal of about twelve to fifteen lines in length, larger and more dilatable than in the male, directed obliquely backward and upward, beneath and behind the symphysis pubis, from which it is separated by an extremely lax cellular tissue; its inferior and lateral parts are lodged in the anterior wall of the vagina; its superior extremity opens into the bladder.

During pregnancy or delivery, the direction of the urethra is sometimes changed so as to cause the displacement of its orifice, and occasion mistakes or difficulties in introducing the catheter. The elevation of the uterus, the distension of the vagina by the presenting part of the child, thrusts the urethra against the pubes and brings its orifice behind the symphysis. In sounding a woman under these circumstances, we must be careful to introduce the sound behind and parallel to the symphysis.

The mucous membrane of the urethral canal may be the seat of tumefaction and of prolapsus. Polypi are sometimes developed in it. In 1816 we were consulted by a very fair woman of about forty years of age, who experienced in walking intense pain in the canal of the urethra, followed with difficulty of urinating. She said, moreover, that she could not bear without pain the embraces of her husband, and that after connection her linen was stained with blood. An examination of the organs of generation exhibited a red fungous mass of the shape and size of a large strawberry, which emerged from the canal of the urethra, adhering to it by a narrow pedicle six or eight lines in length. The polypus was easily seized and removed by drawing its pedicle forcibly outward, and the woman instantly relieved of her inconvenience.

§ VI.—OF THE HYMEN.

Below the orifice of the urethra we find the inferior aperture of the vagina, which in virgins is furnished with a membrane called *hymen, flos virginitatis, claustrum virginale*, etc.

This membrane, concerning whose existence so much has been written by anatomists, is situated at the orifice of the vagina, which it serves to diminish: it is always found in the human species, and in some animals, unless it has been destroyed by accident or violence.

The hymen is frequently of the shape of a crescent, of which the adherent convexity is directed downward, whilst the loose cavity is turned upward. Sometimes it is circular, and then presents a single central or several narrow apertures, which afford egress to the various discharges from the uterus and vagina. Sometimes it is imperforate, and becomes at puberty the cause of accidents, of which we speak when treating of occlusion of the vagina. It is formed by a fold of the mucous membrane of the vulva, and a small portion of erectile tissue, containing nerves and blood-vessels, as is proved by the pain and effusion of blood which almost always accompany its laceration. This membrane varies in width, density, and thickness: sometimes soft and lax, it yields without rupturing: in some rare cases, dense, thick, and fibrous, it presents a resistance which may prevent sexual connection, or embarrass greatly the act of parturition.

This membrane, whose uses have not been well defined, and which do not appear to be very important, since it is lost daily without injury, has been regarded by physiologists as a sign of virginity; but it should be borne in mind, that it is sometimes destroyed accidentally in the most chaste females, and in others found entire at the moment of delivery.

In June, 1823, we were consulted by a young girl of eighteen or twenty years of age, who had suffered for six months preceding from suppression of the menses, and tumefaction of the breasts and belly. During the latter period she complained of unusual movements in the hypogastrium, which she could not attribute to any cause. The enumeration of her symptoms, her healthy and plump appearance, the perfect performance of the other functions, made us suspect pregnancy. Communicating to her our suspicions, she assured us that

* De la Prostitution dans la Ville de Paris, Considéreé sous le Rapport de l'Hygiene Publique, de la morale et de l'administration. Paris, 1836, tome I. page 220 et suivantes.

† Anatomia Reformata. Lugd. Batav. et Bœrod. 1669. Lib. I. cap. 34, p. 187.

she had never had connection with a man. After such an assertion, instead of practising the touch, we demanded a view of the organs of generation, and were surprised to find the hymen entire. Notwithstanding the presence of this external sign of virginity, an accurate scrutiny confirmed our first opinion, which was afterwards reluctantly acknowledged to be correct. Conception had taken place without the perfect accomplishment of the generative act, and she was six months gone with child. This case, and many similar ones to be found in different authors, is as interesting in a physiological as in a medico-legal point of view.

§ VII.—OF THE CARUNCULÆ MYRTIFORMES.

The *caruncul*æ *myrtiformes* are rounded reddish tubercles, at the orifice of the vagina, generally two or four, rarely five in number, disposed in pairs; of which the two posterior are commonly larger and longer than the two anterior.

The majority of anatomists consider them as the remains of the hymen which have cicatrized separately; others as the termination of the columns of the vagina, and assign to them an existence independent of this membrane;* and lastly, others suppose that some of them, namely, the anterior, are the valves of the mucous membrane of the vagina. Their true use seems to be the amplification of the vulva, for they disappear at the moment of the passage of the child.

They sometimes become exceedingly large. In the month of December, 1834, a lady living in Paris, who had been delivered ten months previously, sent for us to relieve her of an inconvenience which she attributed to a portion of the umbilical cord, which, she supposed, had been neglected. On examination, we found, at the posterior part of the vulva, a fleshy production about two inches in length, as thick as a common goose-quill, and formed by the unnatural development of the left inferior caruncle. A single stroke of the scissors removed the excrescence.

§ VIII.—OF THE FOSSA NAVICULARIS.

The *fossa navicularis* is a depression between the orifice of the vagina and the posterior commissure of the vulva. Resembling slightly the cavity of a small boat; its greatest extent is six lines; it is strongly marked in girls and women who have had no children, but disappears in those who have suffered from laceration of the perineum. It is the most inferior part of the vulva, and the receptacle of all the discharges from the uterus and vagina. In prostitutes, it is frequently the seat of inflammation and syphilitic ulcerations. When these ulcers do not heal rapidly, or when these girls, having been for a long time diseased, are admitted too late into the hospital, they may, as we have frequently seen, perforate the recto-vaginal septum, and cause an obstinate and often incurable fistula.

§ IX.—OF THE FOURCHETTE OR POSTERIOR COMMISSURE.

The *fourchette* is a kind of bridle, which terminates the vulva inferiorly, and separates it from the perineum; it results from the union of the posterior extremity of the labia pudendi on the median line of the body; constitutes the posterior commissure; is the most dense and resisting point of the vulva; yields with difficulty; and is often ruptured in the first accouchement.

The blood-vessels of the vulva are numerous and small; they are furnished by the hypogastrics and femoral; the lymphatic vessels, for the most part, empty into the inguinal ganglia; the nerves are derived from the second lumbar pair, and are called the small sciatic, and the pudendal.

ARTICLE III.—OF THE PERINEUM.

The inferior region of the trunk is formed by a kind of musculo-membranous floor, which extends from the coccyx to the pubes, embraces the whole inferior circumference of the pelvis, and presents the orifices of the termination of the great urinary, generative, and digestive apparatus. To the whole of this space, in our opinion, belongs the title of perineum. Commonly in man, the name of perineum is given only to the anterior and triangular part of this space, bounded laterally by the rami of the ischia, posteriorly by a line drawn from one tuberosity to the other, and bisecting the anus. In the female, this expression is applied, merely, to the more circumscribed space which separates the vulva from the anus.

The female *perineum* forms a species of quadrangular bridge, of which the medium length is twelve or fifteen lines in women who have not borne children, less in those who have been mothers, at the expense of laceration during delivery. It presents, on its external surface, a salient line, which is the raphe.

The perineum is composed, proceeding from without inward, of the skin, of a layer of adipose cellular tissue, of the perineal aponeurosis, in the centre of which is the aperture of the vulva, the sphincter ani, the constrictor vaginæ, transversalis perinei, and levator ani muscles: the superficial and transverse arteries of the perineum, which are smaller than in man, and veins and lymphatics not remarkable enough to demand much attention.

In the last stage of labour, the perineum at first resists, then grows thinner, elongates, and extends, sometimes, to the distance of four or five inches. At this moment, it is now and then ruptured, or, as more rarely happens, its centre is perforated to afford a passage for the child.†

* Haller, loco citato, tom. 7, pars 2, page 90.

† Voyez le Mémoire que nous avons publié à ce sujet. *Considérations sur les perforations du perinée, et sur le passage de l'enfant à travers cette partie.* Revue cahier de Juin, 1835, et les leçons orales de clinique chirurgicale faites par Dupuytren, tome 3, page 175.

The perineum may be the seat of hernia, formed either by the bladder or the intestine, of which cases have been reported by Merry,* Smellie,† and Curade the elder.‡

SECTION II.

OF THE INTERNAL ORGANS OF GENERATION.

The internal female genital organs, are those which can be seen and studied only by means of dissection. We comprise in this section the vagina, the uterus and its dependencies.

ARTICLE I.—OF THE VAGINA.

The vagina, a species of membranous sheath, cylindroid, curved in its length, slightly flattened from before backward, is an organ situated in the pelvic cavity, behind the urethra and bladder, in front of the rectum, between the ureters, blood-vessels, and levatores ani muscles, above the vulva, which acts as an entrance to it, and below the uterus, of which it embraces the inferior portion.

The ancient anatomists designated it by the names of *cervix, ostium uteri*, and our celebrated Mauriceau by that of *neck of the womb.*

Its *position* is not vertical, but slightly oblique upward and backward, and then from behind forward, because it is slightly concave on the side of the pubes, and convex on that of the rectum; it is larger in the middle than at the extremities; and, as the latter terminate obliquely in opposite directions, it follows that its anterior wall is shorter than the posterior.

Its *size* varies according to age, to the individual, and the different circumstances of life. 1st. *Age.* It is very long in the fœtus; after birth, it grows with the other parts and consequently is smaller in the child than in the adult; 2d. *Individuals.* It is very long in some women, and short in others; 3d. *Different circumstances of life.* It is longer and more narrow in girls than in married women, and especially those who have had children. Lastly, in a well formed woman, its length is five or six inches, and its width one; but as it is very extensible, its dimensions change in pregnancy and delivery.

In order to facilitate the study of the vagina, we shall divide it into two surfaces, an interior and exterior, and two extremities.

Its *external surface* is in contact, in front, with the urethra and bladder, behind with the rectum, laterally with the ureters, the umbilical arteries, the broad ligaments, the sacral plexuses, the hypogastric vessels, the levator muscles of the anus, and the cellular tissue which lines the pelvis. This smooth surface is covered by the peritoneum only above and behind, over about one-fifth of its extent. At the other points it is joined to the urethra, the bladder anteriorly, and the rectum posteriorly, and adheres more firmly to these organs as it approaches the vulva, excepting below and behind, where it recedes from the rectum, and leaves between it, the intestine and the perineum, a triangular space occupied by cellular tissue.

Its *internal surface* is in contact with itself, and divided into anterior and posterior wall. Each of these parietes presents in its middle a salient, longitudinal line, extending its whole length, and more distinct on the anterior than on the posterior wall; they were called by Haller *columnæ vaginæ*, or columns of the vagina. These two lines are terminated inferiorly by one or two tubercles, considered by some anatomists as the caruncule myrtiformes, and this was one of the reasons on which they based the existence of the caruncule independent of the hymen. The columns of the vagina are cut at right angles by transverse parallel lines, closer together and more salient as we approach the vulva; they, however, do not constantly exist; they are supposed to assist the enlargement of the organ during labour; but their direction would seem rather to favour its elongation, required by the ascent of the uterus during pregnancy. Haller thinks that they multiply the points of contact between them and the male organs, and increase the voluptuousness of coition.

Its *inferior extremity* or external orifice terminates at the vulva, below the urethra: it is narrowed, and, in virgins, guarded generally by the hymen.

Its *superior* or internal *extremity* embraces the neck of the uterus, and forms a cul-de-sac of greater or less depth, in proportion to the projection of this neck.

Organization. The vagina is composed of a tissue peculiar to it, of an internal or cellular coat, of an external or mucous membrane, of muscles, blood-vessels, lymphatics, nerves, and partly of peritoneum.

This peculiar tissue, whose nature is not accurately determined, but which resembles the fibrous, is about a line and a half thick beneath, and less toward the uterus; it is of a gray colour and pearly lustre; studded with numerous blood-vessels, and at its lower portion becomes spongy and erectile. The part surrounding the orifice of the vagina has been called, by anatomists, *plexus retiforme.* During the venereal orgasm, it increases the resistance of the vagina, and contracts its cavity.

The vagina is lined internally by a mucous membrane, continuous with that of the vulva and internal membrane of the uterus. The epidermis of this membrane may become thickened, and cartilaginous points are sometimes found in it, especially toward its lower portion. This membrane forms the folds of which we have spoken. The constrictor vaginæ muscle is formed by some fibres detached from the sphincter ani. This muscle surrounds the orifice of the vagina, serves to contract it, and to depress the clitoris.

The vagina receives its arteries from the internal iliac, its nerves from the sacral plexus; its veins are lost in the plexus retiforme, and its lymphatics in the hypogastric lymphatic plexus, following the course of its arteries.

It affords a passage for those bodies which are directed from without toward the uterus, and gives exit to the contents of the latter, as the menses, the product of conception, etc.

* Mémoires de l'Académie Royale des Sciences, annee, 1713, p. 111.

† Loco citato. vol. ii. pp. 171 and 173.

‡ Mémoire de l'Académie Royale de Chirurgie, tom. II., in 4to., page 25.

ARTICLE II.—OF THE UTERUS.

The uterus is a hollow viscus, peculiar to the females of the mammiferæ, destined to receive the germ after the impregnation, to protect and preserve it until its expulsion. It is a perfect organ of incubation, nutrition, and development, and has received the names of ὑστερα, μητρα (Hippocrates), vulva (Celsus*), matrix, uterus; it is popularly called the womb, but in scientific language, designated by the term *uterus*.

Situation.—The uterus is situated in the lesser pelvis, above the vagina, below the small intestines, behind the bladder, in front of the rectum, from which it is sometimes separated by a portion of the epiploon or the small intestines: its sides are in contact with the broad ligament; its direction is such that its upper extremity looks upward and forward; its inferior, downward and backward. It is generally slightly inclined to the right; its situation is influenced by its state of vacuity or fulness, and that of the adjacent organs. In the adult the base of the viscus is nearly on a level with the superior strait; in the fœtus and newly-born infants it is entirely below.

Form.—It is nearly prismatic or pyramidal, and has been compared to a small pear flattened from before backward, with the base upward and apex downward.

Volume.—This is variable. In the child at birth it is very small; it increases rapidly toward puberty, and continues to grow until adult age; it decreases and loses its density after the period of child-bearing. In an adult woman, on an average the length of the uterus is about three inches, its width two inches and some lines on a level with the fallopian tubes, its thickness eight or nine lines, giving nearly four lines for the thickness of each of its walls. According to Meckel, its weight is seven or eight drachms in a woman who has not had children, whilst in others it often reaches that of twelve drachms or an ounce and a half—a difference which must arise either from the uterus never recovering its primitive size, or, as seems to us more probable, from an increased nutrition resulting from pregnancy.

Division.—In order to study the uterus physiologically, that is, to understand its mode of development and some of its uses, it is divided into three parts:—one superior, or the *fundus*, comprises all that is found above a horizontal line drawn from the insertion of one tube to that of the opposite; a second, or *body*, is formed by that situated below this same line as far as the contracted part of the organ; lastly, a third, or the *neck*, located below the preceding, is embraced by the vagina, and forms in its cavity a projection known by the name of *os tincæ*. For anatomical study, its *surface* is divided into *external* and *internal*.

The external surface is subdivided into two regions—one anterior, the other posterior; three margins—one superior and two lateral; three angles—two superior and one inferior. The *anterior region*, smooth, polished, slightly convex, covered by the peritoneum at its upper two thirds, is in contact with the posterior surface of the bladder, to which it adheres inferiorly. The *posterior region*, more convex than the preceding, invested throughout its whole extent by peritoneum, is in contact with the rectum, and opposite to the concavity of the sacrum. The *upper margin*, convex, and the only one covered by peritoneum, assists in forming the fundus of the uterus. The *two lateral margins*, irregular, convex in their superior half, concave inferiorly, are located in the space between the two duplicatures of the peritoneum, which constitute the broad ligaments. The *two superior angles*, formed by the meeting of the lateral edges with the superior, seem to be prolonged into the fallopian tubes, which terminate there. The *inferior angle* results from the union of the two lateral margins; it is known by the name of *os tincæ* or *os uteri*, and is embraced obliquely by the vagina, into which it projects for four or five lines. In its apex we find a transverse aperture or slit of two or three lines in extent, dividing it into two parts, one anterior and the other posterior, and called *lips of the os uteri*, of which the anterior, slightly thicker and more salient than the posterior, seems to the touch to be also rather shorter. But this sensation is owing to the mode of insertion of the vagina into the neck of the womb, for if the latter, separated from the vagina, be applied to a horizontal plane, the two lips will be found to be of equal length.

In virgins and women who have not borne children, the lips of the mouth of the uterus are smooth, regular, small, firm, thin, and closely approximated. The slit which separates them, and called *external orifice of the uterus*, but more appropriately *vaginal orifice*, is transverse, regular, and only of one or two lines in extent.

When women have had children, the orifice is usually deformed, gaping, larger, and less regular; the lips are thicker, softer, filled with fissures, especially at the left sides of the neck, where a deep notch is frequently seen, the marks of the laceration of the parts during delivery.

These remarkable differences are of great importance in legal medicine. Absolute confidence cannot, however, be reposed in them, for they may be wanting, or produced by other causes than delivery.

The *internal surface* of the uterus presents a narrow, oblong, irregular cavity with contiguous parietes: a contraction in its middle divides its length into two parts—the *cavity of the body* and the *cavity of the neck*.

The cavity of the body, triangular in shape, would hardly contain, when empty, a large Windsor bean. It presents—1st, two parietes—one anterior, the other posterior, on each of which the raphe may be distinguished; 2d, three margins—one superior, two concave and lateral; 3d, three angles—one inferior and two superior; 4th, three apertures—one at each angle. The apertures in the superior angles are those of the fallopian tubes; they are very narrow, and will scarcely admit a hog's bristle: that of the inferior angle is much larger, and establishes the communication between the cavity of the body and the neck: this opening has received the name of *internal orifice* of the uterus, in contradistinction to the *os tincæ*, which is called *external or vaginal orifice*. This cavity is constantly moistened by a sero-mucous fluid, and at the menstrual periods by that secretion.

The *cavity of the neck*, of an oval form, larger in the middle than at its extremities, is twelve or fifteen lines in length, and five or six in its greatest breadth. It has also two contiguous parietes—one anterior and one posterior, with several rugæ, longitudinal and transverse, formed by the membrane lining the neck disposed so as to resemble a fern leaf: these frequently disappear after delivery. On the same surface are also seen the orifices of the mucous follicles intended to lubricate the cavity. Some of these follicles are obliterated,

* Cornelii Celsi de le Medica. Parisiis, 1772, lib. iv. p. 172.

and then form vesicles, or bubbles, filled by a viscous transparent jelly: these small rounded bodies are named the *ovula Nabothi.* The cavity of the neck of the uterus communicates above with that of its body by the internal, and below with the vagina by the external or vaginal orifice.

In a state of vacuity, the structure of the uterus is difficult to be understood; we may, however, distinguish in it,

1st. An *external membrane* furnished by the peritoneum, which, after having covered the posterior surface of the bladder, is reflected from behind forward, to invest successively the anterior surface, the upper margin and posterior surface of the uterus, forming in front of and behind this organ four small falciform folds, called anterior and posterior ligaments, and on each side two large folds designated as the broad ligaments of the uterus.

2d. An *internal membrane* which lines the interior of the neck, and is a continuation of the genito-urinary mucous membrane. The existence of this membrane in the cavity of the body is not so evident. Chaussier affirmed that it is impossible to demonstrate it anatomically. We ourselves, in a work published in 1814,* have maintained the same opinion, which has been adopted and confirmed by the researches of MM. Ribes and Breschet,† and since by Beclard. In fact, experience and argument contradict its presence, at least such as is found in the vagina and other parts of the mucous system.

On examination, we find the inner surface of the body of the uterus to be soft, pulpy, having neither the brilliancy of the peritoneum, nor the whiteness of the mucous membrane of the vagina; of a reddish or blackish brown colour; it generally contains, whatever may have been the circumstances preceding the death of the woman, a brown or dirty gray fluid. When the uterus is macerated, or boiled, or dissected soon after death, it is impossible to trace the mucous membrane beyond the cavity of the neck. If, on the other hand, we observe that all the hollow organs provided with mucous membranes, such as the stomach, intestines, bladder, and the vagina itself, and which are required, by their functions, to change in size, present, when empty, a rugose surface and folds more or less projecting, formed by the lining membrane; that this membrane is furnished, moreover, with numerous follicles which pour out mucus intended to protect the organ from the irritation of the substances or bodies they may contain, or which may pass through them, we will see that no similar arrangement obtains in the cavity of the body of the uterus; the follicles are found only in the cavity of the neck; they are there disposed symmetrically, on four opposite lines, two on the anterior and two on the posterior paries.

If the uterus were provided with a mucous membrane, could it bear the enormous enlargement resulting from pregnancy, without lacerations of its internal surface, such as frequently occur in the vagina at the time of delivery, and of which traces may be seen almost always in women who have borne children? Moreover, in advanced age, we often find obliteration of the cavity of the body of the uterus, as well as of the tubes. We have long observed this fact, which is confirmed by the researches of Mayer, reported by M. Breschet,‡ and what is very remarkable, this obliteration, the natural consequence of age, does not extend beyond the internal orifice, at the point at which we have said the mucous membrane terminates. In organs lined by a true mucous membrane, the cavity always remains. In old cases of artificial anus, that part of the intestinal canal below the accidental opening, no longer giving issue to fæcal matter, contracts, but never consolidates.

We shall terminate these considerations by a single remark. The serous and mucous tissues, evidently communicate by means of the aperture of the fallopian tubes. Is there a point at which these tissues change, and are transformed into each other? Undoubtedly there is: but where is it? Is the serous tissue suddenly arrested at the digitations of the tubes? Does it line the cavity of the fimbriated extremity? Does it extend along the tube as far as the uterus? or does the mucous tissue occupy the whole cavity? Is the latter prolonged as it is said, into the cavity of the tube? Does it terminate at the fimbriated extremity, or extend beyond? This cannot be demonstrated. If it be impossible to assign the precise point at which one of these tissues commences, and the other ends, is it not reasonable to regard the cavity of the body of the uterus, and of the fallopian tubes, as respiratory surfaces, intermediate by their position, organization and uses, to the serous and mucous tissues: upon them the transformation is exerted, but in a gradual, successive manner, without being able to determine accurately the point of mutation.

This opinion acquires more value if we observe that the exhalations of the internal surface of the uterus are not identical over its whole extent. Haller had already found in the cavity of the body, a serous, whitish, muddy and thin liquid, which, in the uterus of newly born children, resembled milk, whilst that in the cavity of the neck was a thick, dense and reddish mucus. The exhalations of the cavity of the body of the uterus, present under various circumstances, but normal for them, the characters of exhalations of the mucous and serous tissues, alternately morbid and physiological. Thus, in ordinary health, the matter exhaled by the uterine cavity, has a great analogy with mucus. When this surface is excited in a special manner by the act of generation, the fluid produced resembles more the serous exhalations: it is a concrescible, plastic lymph, which becomes condensed, and quickly changed into a species of false membrane, the *caduca.* When simply the seat of some fluxive function, as at the menstrual periods, a phenomenon is manifested which belongs equally to over-excited or highly inflamed mucous and serous tissues, a sanguine discharge is established, the affluxus is dispelled, and nature resumes her usual course.

We may hence conclude that the cavity of the body of the uterus, possesses no mucous membrane, or if it exists, it has undergone such modifications as to leave no longer any resemblance to the same tissue in other parts.

3d. A *peculiar tissue*, dense, resisting, three or four lines thick, of a dirty gray, and sometimes slightly pearly near the neck, described under the names of *middle, fleshy* and *muscular* coat of the uterus, constitutes, of itself, the greater part, and is, as it were, the fundamental structure of the organ; in a state of vacuity, it is difficult to determine its nature; its aspect, colour and density are not the same throughout; it is impossible to ascertain the form and arrangement of the fibres composing it; considered by some as belonging to the muscular, by others to the fibrous tissue, its characteristics are distinct only in pregnancy: all uncertainty then ceases, and it is impossible to mistake a true muscular tissue.

* Essai sur la disposition de la membrane caduque, sa formation et ses usages, No. 186 du Recueil des thèses in 4to. de la Faculté. Paris, 1814.

† Mémoires de la Societé Medicale d'émulation, huitième année, 2d part, p. 608, in 8vo. Paris, 1817.

‡ Archives Générales de Médecine, t. x., p. 98.

Blood-vessels. The *arteries* of the uterus are furnished by the hypogastrics under the name of uterine arteries, and by the aorta or emulgents, under the name of ovarian. The former penetrate the organ by its lateral margins, describe tortuosities in its tissue proper, and ramify in very well marked zigzags: the branches of the same side frequently anastomose with each other and inosculate on the median line with those opposite. Above and laterally, they communicate with the branches furnished by the ovarian arteries, and terminate in the interior of the tissue, continuing into the veins, and perhaps also presenting apertures in the uterine cavity.

The *veins*, more numerous than the arteries which they accompany, have no valves, and exhibit in the thickness of the uterus a special arrangement analogous to that in the corpora cavernosa and the erectile tissues. On the internal surface of the organ their apertures are very large during pregnancy, and visible after delivery, and are considered as the orifices of the *sinuses of the uterus.*

The *lymphatics*, very numerous, are very small when the organ is empty, but become prodigiously enlarged during pregnancy, and play a very important part in the diseases of the uterus. Arising from different parts of the organ, they form reticulations, branches, and trunks, which, united in fasciculi, escape from uterus in three different directions. The least numerous leave the abdomen by the inguinal canal, and are distributed to the inguinal ganglia: others, united to the lymphatics of the vagina, accompany the uterine and vaginal arteries, and terminate in the hypogastric lymphatic plexus. But the most numerous arise from the anterior and posterior surfaces of the neck and of the body, run toward the lateral margins, follow their direction, are then united with those of the ovaria, the tubes, and fundus uteri, ascend with the ovarian arteries and veins, in front of the psoas muscle, to join the ganglia situated in front of the aorta, the vena cava, and in the vicinity of the kidneys.

The *nerves* are furnished by the renal and hypogastric plexuses and by the sacral nerves. We also find in the organization of the uterus some cellular tissue, which serves as a bond of union to all its parts, and is always free from fat.

ARTICLE III.—OF THE DEPENDENCIES OF THE UTERUS.

By the dependencies of the uterus we understand the peritoneal ligaments and the parts which they contain.

The uterus is maintained in the pelvic cavity by six duplicatures of peritoneum—two *anterior* or *vesico-uterine*, two *posterior* or *recto-uterine*, and two *lateral* or *broad ligaments.* The four first are small, indistinct falciform folds, proceeding from the bladder and rectum to the uterus. The two last are much larger, and more important.

§ I.—BROAD LIGAMENTS.

They are formed by the contact of two planes of the peritoneum, which, covering the uterus, divide the pelvic cavity into two nearly equal cavities, the anterior of which contains the bladder, and the posterior the rectum. These ligaments, of a quadrilateral shape, have three adherent edges; the upper one alone is loose, and presents three small folds called *alæ* or *wings.* The anterior wing is not admitted by all anatomists; it is quite indistinct; and is occupied by the *round* or *supra-pubic* ligament. The middle one contains the *fallopian tube*, and the posterior the *ovarium* and its ligament. The space comprised between the two planes of the broad ligaments is filled by cellular tissue traversed by the uterine vessels and nerves.

During gestation the two folds of the peritoneum separate to receive the uterus, so that toward the end of pregnancy these ligaments entirely dlsappear.

§ II.—ROUND OR SUPRA-PUBIC LIGAMENTS.

The *round* or supra-pubic ligaments, two in number, one on each side, are cylindrical cords six or seven inches long, of a fibrous appearance, and a grayish white colour, and arise from the anterior part of the superior angles of the uterus. They are directed outwardly from below upward, follow the outline of the pelvis, enveloped in cellular tissue, and covered by the peritoneum; they enter the inguinal canal on each side, traverse it, emerge by the corresponding inguinal ring, and expand in front of and above the pubes, where they are lost in the cellular tissue of the groins, mons veneris, and labia pudendi. Some anatomists pretend that this may be traced to the upper internal parts of the thighs.

The structure of these ligaments has been the subject of much controversy. Some dissectors could discover only a fibrous or condensed cellular tissue: others, struck by their red colour during pregnancy, and the ease with which they are injected artificially, could see only muscular fibres or blood-vessels. These exclusive opinions are equally erroneous. If we examine the round ligaments in a woman who has died soon after delivery, or still better in the last stage of gestation, they will be seen to be formed by an expansion or prolongation of the muscular fibres of the uterus, and that they contain blood-vessels, lymphatics, nerves, and cellular tissue.

The use of the round ligaments appears to be to maintain the uterus in its proper position, to prevent its retroversion during pregnancy, to keep its fundus inclined forward and applied behind the anterior wall of the abdomen, probably in order to leave behind more space for the intestinal canal, and diminish the pressure that this part might have suffered from the distended uterus. According to Haller, they serve to unite the vessels of the uterus to those of the thigh, in order to relieve this organ from the plethora which it experiences during pregnancy. It has been thought that during the act of generation they might depress the uterus, and approximate its orifice to the penis. This opinion, already disputed by Haller, has been exploded entirely by M. Velpeau, who has shown that their tendency, from their insertion, was rather to elevate than to depress this organ.

The round ligaments are sometimes the seat of engorgement during pregnancy and some pathological states of the uterus, and to this circumstance are attributed the pains not unfrequently experienced by women in the groins.

§ III.—OF THE FALLOPIAN TUBES.

The *uterine* or *fallopian tubes* are two cylindrical canals, situated in the thickness of the middle wing of the broad ligaments. They are flexuous and waving, and extend from the uterus to the ovaria; they are four or five inches in length, of a conical shape, and have a cavity from one end to the other. This cavity, very narrow at the uterus, increases in proportion as it extends outwardly, but again contracts just before opening at the fimbriated extremity. The internal extremity of the tube is inserted into the superior angle of the uterus, where it opens into the cavity of its body. The external extremity, called *morsus diaboli* or *fimbriated* extremity, communicates with the cavity of the peritoneum by an oblong inverted opening, with digitated edges; one of them, longer than the other, is curved and inserted into the external extremity of the ovarium.

The tubes are composed—1st, of a peritoneal membrane, which envelopes them entirely, except below, where the vessels and nerves enter: 2d, according to most anatomists, of an internal membrane, which they consider as the continuation of the uterine mucous membrane, but which, as we have stated, (p. 37,) we cannot admit to be identical; our opinion on this subject is not original; Haller has already stated that the structure of the lining membrane of the tubes was different from that of the uterus: 3d, a tissue proper, which appears to be erectile or cellular, and surrounded by an expansion of fibres from the uterus. To this tissue are due the density, turgescence, and peristaltic movements they are said to present during the venereal orgasm.

Their blood-vessels and nerves proceed from the same source as those of the ovaria.

Their uses are to conduct the vivifying principle to the ovarium, to seize the fecundated ovule and transmit it to the uterus. The ancients supposed them to be analogous to the vasa deferentia, and Fallopius gave to them the name of *seminal ducts.*

§ IV.—OF THE OVARIA.

Until the time of Steno, the ovaria had been designated as the *testes muliebres*, on account, merely, of their supposed uses; for the ancients had clearly pointed out the numerous differences of situation and structure between these and the male organs.

The ovaries are two oblong, oval, whitish bodies, twelve or fifteen lines long, slightly compressed from before backward, about the size and shape of an almond, situated in the thickness of the posterior wing of the broad ligaments, behind and below the fallopian tubes: their surface, generally, in women who have not had children and in virgins, is polished, and embossed; and wrinkled, with small longitudinal fissures in the opposite case. They present a superior convex, loose margin; an inferior, straight, adhering to the broad ligaments; an external extremity, joined to the fimbriated extremity of the fallopian tube; an internal one, fixed to the uterus by means of a dense, imperforate cellulo-fibrous cord, which has been long considered as their excretory duct, and is called *the ligament of the ovary.*

Structure. We find in the ovaria, 1st, externally, a plane of peritoneum; 2d, below, a white, resisting envelope of fibro-cellular tissue, which may be considered as the expansion, or extension of the ovarian ligament. On its internal surface, this membrane sends prolongations which divide the ovaria into many small cells and compartments filled by its tissue proper; 3d, of a tissue proper of a reddish brown colour, abundantly provided with vessels, and which somewhat resembles the erectile tissue; 4th, of small transparent vesicles lodged in the substance itself of the ovaries, where they are, as it were, encysted in a species of matrix, and have received the appellation of *Graafian vesicles.* These vesicles, fifteen to twenty in number, according to some, and forty to fifty according to others, situated beneath the two membranes, are scarcely visible in children and old women, but very distinct during the period in which pregnancy may occur; they vary in size, but are never larger than a hempseed: the most superficial are generally the largest. The membrane proper of these vesicles is delicate, smooth, diaphanous, and easily torn; it contains a fluid either limpid, or reddish, or slightly lemon-coloured, concrescible, coagulable by heat, alcohol and the acids. They must not be mistaken for the serous or hydatid cysts, which are frequently seen in the ovaria, and seem to often proceed from the degeneration of these vesicles.

The blood-vessels are called the ovarian, and have an origin similar to that of the spermatic vessels in the male. The nerves come from the renal plexuses.

The volume of the ovaria bears no relation to age; very much elongated in infancy, they are situated, at birth, on the iliac fossæ, and scarcely increase until puberty; at that period they are of the size we have mentioned; during pregnancy they become remarkably large; and then diminish as women recede from the period of child-bearing. In old age, they are frequently atrophied, or are the seat of organic alterations. The use of the ovaria is to furnish the ovula, which contains the rudiments of the future animal.

SECTION III.

FUNCTIONAL CONDITION OF THE UTERUS.

When a function commences, the organ which performs it takes on an increased energy, and activity proportioned to the importance and duration of the duty it has to perform. This general physiological law allows no exception, but it is no where so marked, so easily verified and followed in its various periods and phenomena, as in the organs of generation, whether they be studied as a whole or separately.

Here we find violent, passionate, irresistible desires and appetites; exquisite sensibility, enormous turgescence, active circulation, copious exhalation, secretion, and excretion; then the depressions of the organs, their return to a state of rest, and a sensation of fatigue, weakness and collapse, as after all great expenditures of vital power.

In order not to enter into minute and well known details, we shall confine ourselves to these general remarks, on the external genital organs; but we must examine more in detail, the phenomena which occur in the internal organs, and more especially in the uterus.

ARTICLE I.—OF THE PHENOMENA OCCURRING IN THE UTERUS DURING PREGNANCY.

By the simple fact of the impregnation of the germ, the uterus, until then inactive and limited to the performance of the nutritive functions, receives, as it were, an electrical shock and impulse, and is animated with new life; its sensibility is developed, its heat increased, and it swells, like the lip of a child, stung by a bee, nempe ut puerorum labia (dum favos depeculantur, ut mella liguriant) apum spiculis icta, tument, inflantur orisque hiatum aretant;* a series of changes and phenomena, both highly curious and important, commence. These phenomena, at first scarcely perceptible, increase, are developed, succeed each other, then irradiate from the uterus as from a common centre, to the adjacent organs, and to the whole female economy. This succession of phenomena is maintained during the whole period of pregnancy. The changes which then occur in the uterus are of two classes; the former, purely physical, first excite our attention; the latter, essentially vital, are more obscure, but not less real. These phenomena are in close unison, and mutual dependence with each other. Therefore, we shall consider them separately, only for the purpose of study.

As the physical phenomena are more easily appreciated, we will commence with their investigation.

§ I.—PHYSICAL PHENOMENA OR CHANGES OF THE UTERUS.

These changes concern its form, volume, weight, situation, direction, and relations to the adjacent organs.

A. *Its form.* During the first month of pregnancy, this is not sensibly changed; but from the second to the fifth or commencement of the sixth, the increase of the fundus and of the body, not being accompanied by a similar increase of the neck, the organ takes the shape of a bottle or a gourd; after the sixth month, the increase occurs at the expense of the neck, which is everted, shortened, and insensibly effaced, and the uterus approaches nearer to the ovoid form of the last period of gestation.

B. *Its volume.*—Its dimensions change, its volume increases in every direction, and to such a degree that at the termination of pregnancy it presented the following proportions:—1, through its vertical axis, ten or twelve inches; 2, from before backward, seven or eight inches; 3, transversely, on a level with the insertion of the tubes, nine inches; 4, circumference at the same point, twenty-six inches; 5, circumference at its lower part, or at the middle of the neck, thirteen to fifteen inches.

C. *Its weight* at nine months, and distended by the product of conception, is from twelve to fifteen pounds; when freed from this product it is from one and a quarter to one and a half pounds. We found it to weigh two pounds ten ounces in a woman who died twenty-six hours after a rupture of the uterus; and one pound only in a female who perished nine hours after delivery in consequence of hæmorrhage. These circumstances are far from being exact or constant; for the volume and weight of the uterus vary according to many contingencies, and are affected by the stature, strength or weakness of the woman, the product of conception, and the causes of death.

A woman pregnant with twins was brought moribund to the lying-in hospital, and died before delivery: we removed, weighed, and measured the uterus. Its dimensions were—through the vertical axis or diameter, fourteen inches; through the transverse, eight and a half inches; through the antero-posterior, eight and a half inches; circumference just below the level of the tubes, twenty-nine inches; its greatest length, thirty-eight inches.

Thickness of its parietes.—At the fundus, two lines; at the insertion of the placenta, three and a quarter lines; at the neck, four lines. This disposition in the thickness of the uterine parietes, the contrary of the general state under similar circumstances, may be explained—1st, by the enormous distension caused by the presence of two children; 2d, because the amniotic fluid having been discharged, and the head of the first child having reached the vagina, the neck of the uterus had contracted considerably during life.

Weight.—The children were both of the male sex. One weighed six and a half pounds; the other seven and a half pounds: the placenta of the former, one pound; that of the latter, one and a quarter pound: the water of the amnios having been lost could not be weighed: the empty uterus, three and a half pounds: total, nineteen and three quarter pounds. Supposing that the waters weighed one and a quarter pounds, the whole weight of the distended uterus must have amounted to nearly twenty-one pounds.

D. *Its situation.*—As it increases in size, the uterus rises from the cavity of the pelvis into that of the abdomen, pushing before it the organs which oppose it. The points of the abdomen to which the fundus of the uterus successively corresponds being sufficiently exact, and enabling us to determine the period of pregnancy, we shall speak of them when treating of this subject. We will merely observe here, that it remains in the pelvic cavity during the first two or three months; from the third to the sixth it extends from the hypogastrium to the umbilicus; and from the sixth to the ninth it rises from the umbilicus to the epigastric region.

E. *Its direction.*—As long as it is retained in the pelvis, where it is sustained by the bones forming this cavity, the uterus preserves its vertical direction: but when it reaches the abdomen, and is supported by the soft parts alone, it deviates from this vertical line in two ways:—1st, laterally, and more frequently to the right than to the left; 2d, it rotates on its axis, which causes its anterior and posterior surfaces to become lateral, whilst the lateral margins incline, one forward and the other backward. It is important to understand this double deviation, which is clearly explained by the form of the uterus, and the disposition of the parts with which it successively comes into contact during its ascent.

F. *Its relations with adjacent organs.*—During its ascent, the uterus thrusts the intestines upward and backward, and is in immediate contact with the anterior wall of the abdomen; sometimes, however, a portion of omentum is interposed between it and the latter. The rectum is compressed and turned to the left, the bladder is pushed upward, the canal of the urethra ascends and is closely applied behind the symphysis pubis, the vagina is elongated, contracted, its rugæ decrease, the portion of peritoneum covering the uterus extends; the anterior, posterior and broad ligaments unfold and disappear; their planes are applied to the surfaces and margins of the organ; the round ligaments are stretched, straightened, and their uterine extremity elevated. The tubes, after having followed for some time this

* G. Harv., Loc. cit. Exercitatio 68, p. 438.

ascending movement, approach the uterus and are agglutinated to its lateral margins. The ovaries observe the same law: at the termination of pregnancy they are found, with the fimbricated extremities of the tubes, about the middle of the height of the uterus.

Although the development of the uterus takes place in a regular manner, it is not uniform; and admitting that, from the moment a woman has conceived, all the parts of the organ undergo certain modifications, these cannot be equally perceived in each. The fundus and body of the uterus increase sensibly in the first month, whilst the neck is not developed until much later. Anatomy explains this difference: it shows the fundus to be softer and more abundantly provided with blood-vessels than the body, and the latter is less dense than the neck, which is the firmest part of the whole organ.

In an examination of the different periods of pregnancy, it will be found that from the first to the third month the development is principally effected at the expense of the fundus; from the third to the sixth, by the increase of the body; in the last three months it continues at the expense of the neck. This order cannot be broken without a change in the duration of pregnancy: we can readily understand an extension of gestation beyond the ordinary period, by a too great density or resistance of the body or neck, and explain premature delivery by a weakening of the same parts. Upon this fact Baudelocque laid great stress.

How is this development effected? Can it be compared to that of the hollow viscera, such as the stomach, the intestines, or bladder, whose parietes diminish in equal proportion to the volume they acquire? This was the opinion of Galen,* Aetius, Avicenna, and Vesalius, and also of the celebrated Mauriceau. Smellie thought that it retained nearly the same dimensions as in the empty state. He says,† "The substance of the uterus preserves its natural thickness throughout the period of gestation, notwithstanding the opinion of Mauriceau that it grows thinner, and that of Dwenter that it becomes thicker." Bartholin contended that it increased considerably in thickness. "Nam a primo concepti usque, ad partum augetur secundum omnes dimensiones, et uti amplior, sic crassior paulatim reddiet mollior, ita ut postremis mensibus duos digitos crassa sit uteri substantia." He quotes in confirmation of his opinion the authority of Sylvius, Arantius, Varolius, Plater, and Bauhinius.‡.

What must be thought of opinions so contradictory? That Mauriceau and the ancients, reasoning from analogy, and having examined only the uteri of animals, and especially those of the carnivora and ruminantia, distended by the product of conception, or having touched the neck, which had become very thin toward the end of gestation, or at the commencement of labour, supposed that the remainder of the organ was in the same condition.

Smellie had more correct views. The partisans of thickening have forgotten the contraction of the uterine fibres after delivery, and the engorgement of its parietes. But if we examine with care the uterus distended with a fœtus, at the last period of gestation, we shall find that the thickness of its parietes varies with the part of the organ examined; thus, as Mauriceau observed, it is very thin at the neck. In its body and fundus, it preserves, according to Smellie, nearly the same thickness as when empty; lastly, it is thickest at the insertion of the placenta. To recapitulate, when examined as a whole, the organ is found to have considerably increased, since its volume and weight are sensibly augmented. Levret§ says that the proportion of the smallest empty uterus, to the largest impregnated one, is nearly as 9 are to 102, or as 1 is to 11⅓.

It is therefore evident that the distension of the uterus is not passive, that it cannot be compared to that of the other viscera, that it is owing to a powerful, active cause. What is, then, this cause? Where shall we find it? Probably in the phenomena we are now about to investigate.

§ II.—VITAL PHENOMENA.

We comprise in this series, 1st, the modifications of the texture or organization of the uterus; 2d, those of the vital properties.

1. *Changes of Texture.*

A. *Tissue proper.* Of all the constituent parts of the uterus, none undergo such perceptible, and remarkable modifications as the muscular coat or tissue proper. This tissue, where nature is equivocal in an empty state, in which no fibre can be traced, dense, of a dirty gray colour, creaking under the scalpel when divided, in pregnancy loses its density, extends, swells, assumes a roseate, then a reddish hue, its fibres are elongated, unfolded, and clothed with all the characters of muscular tissue. It is in this state that anatomists have ascertained its nature, and endeavoured to learn the arrangement of its fibres, to explain its mode of action. But the discrepancy of the results obtained, proves that there is yet much left to learn on this point.

Vesalius saw very numerous external transverse fibres: he says that there are few internally, that they are straight, and placed between the two oblique planes. Verheyen has described circular fibres at the neck of the uterus, and others continuous with the longitudinal fibres of the vagina.

Ruysch says that there are, at the fundus of the uterus, thin, concentric, circular fibres: he has constituted of them a peculiar muscle, whose office it was to expel the placenta. Others have found in the uterus two planes of fibres, one longitudinal, the other transverse. Burton said, that there were radiated fibres, placed between the fallopian tubes.

Weistbrecht admits two orbicular and lateral muscles, situated around the orifices of the tubes, a little distant from each other anteriorly: he found, in the interval between these muscles, a plane of fibres which extend from the fundus to the neck, where they commingle with the transverse fibres: he says, moreover, that there is a transverse plane beneath the preceding, forming a kind of girdle to the uterus, which is lost near the neck in fibres arranged according to no particular direction. Sue has minutely described, 1st, the external fibres which form different muscles placed on the body of the uterus, which interlock with each other. According to him, some fasciculi pass out which extend between the round ligaments; some of the fibres accompany these ligaments. Under this first plane

* Traité des Maladies des Femmes Grosses, etc. Paris, 1740, tome I., p. 19.
† Loco cit. p. 163.
‡ Loco cit. tom. I. p. 1.
§ L'Art des Accouchemens, 3e édition, p. 309.

there is a network of blood-vessels. 2d. The internal fibres forming, near the fundus, two concentric planes which surround the orifices of the tubes, and lower down, another plane, which descends obliquely from the side of the neck; these fibres interlace, and are lost in a large muscle which bounds the vaginal orifice. 3d. Lastly, four small triangular muscles, disposed internally in pairs, two in front, and two behind, which appear to arise from the orifice of the tubes. Levret thinks that the fibres of the uterus formed curve lines, in the centre of whose vortex, the aperture of the tubes was located.*

Alphonse Leroi† pretends that there exists in the fundus of the uterus a network of small tendinous cords, which are prolonged into small flattened muscular fasciculi, descending on the sides to the right and left, terminating insensibly in the neck, and internally in the orbicular muscle. He admits on the right, left, in front, and behind, four similar structures, which elongate in fasciculi and terminate also in the neck. From his account, five muscles compose the external plane of the viscus.

Internally, the aperture of each fallopian tube is a centre of muscular circles, which spread out and form a round muscle, of a radius of only three fingers. Beneath each orbicular muscle, there issues a plane of longitudinal fibres, which descends below the constrictor muscle of the neck. Lastly, around the neck is a muscle, of three fingers width, stronger than the four of which we have just spoken; it is a constrictor of the orifice of the uterus, similar to the sphincter ani. M. Gerdy, adopting the opinions of Hunter on the structure of the uterus, says‡ that it is composed, 1st, of annular fibres in its body, raised in front and posteriorly, and depressed on the sides, and the more so as they approach the neck; of superficial transverse fibres, which extend from the fundus to the supra-pubic ligaments: circular fibres around the tubes; 4th, frequently of an *ansiform* band, which embraces the fundus of the organ from before backward.

Madam Boivin, who has minutely studied the structure of the uterus,§ asserts, that after a maceration of several days, when the uterus has been stripped of its membranes, we discover on each of its surfaces *six fibrous fasciculi*, three on the right and three on the left of each paries, and one vertical, which forms the median line. The vertical or median plane extends from the contour of the fundus to the base of the body of the uterus; its fibres are longitudinal: each of the other fibrous planes seem to arise from the median line.

1st. On the middle of the fundus of the uterus, two fasciculi of fibres, one on each side, extend transversely over the outline of the fundus to the superior angles, where they assist in forming the fallopian tubes.

2d. Beneath this first plane, we find two others larger, which, occupying the superior half of the body of the uterus, extend from the median line horizontally in front of the angle of the fallopian tube, to form the origin of the round ligament.

3d. At the inferior third of the median line two other planes of fibres pass obliquely downward, separating over the sides of the uterus; some of these fasciculi are united to the fibres of the supra-pubic ligaments, and some are lost in and interwoven with the transverse fibres of the posterior regions of the organ. On the posterior surface, the disposition of the fibrous planes is nearly the same, except that the median plane is more saliant than that of the anterior surface, and the two planes which concur in forming the fallopian tubes are prolonged to the ovarian ligaments. At the inferior extremity of the median line, two fasciculi, composed of fibres of the neck, separated by some lines, are attached to the lateral margins of the middle region of the sacrum and form the posterior ligaments of the uterus.

Mad. Boivin observes, that there exist in pregnancy other muscular planes which are to be seen only in this state; moreover, that the direction of the different planes she has described, changes when the uterus is distended by the product of conception; and that, after delivery, they present some very remarkable arrangements.

By comparing the descriptions we have just detailed with our observations in nature, that is to say, in women who have died in the last stage of gestation, or soon after delivery, we will see that, except the disposition of the superficial fibres whose direction may be ascertained by the naked eye, all that has been said on the arrangement of the fibres in the substance of the uterus itself, is open to controversy. A skilful dissector may give the fibres any direction he chooses, without the possibility of proving the contrary. We think that, except the superficial planes, in which we willingly admit all the partial muscles described by Ruysch, Weistbrecht, Sue, Mad. Boivin, etc.; the remainder of the organ presents an inextricable tissue, whose fibres crossing each other, interwoven and inclined in every imaginable direction, form a kind of network, or cribriform structure, well fitted to effect the different movements of contraction, dilatation, and shortening which the uterus is required to perform. The muscular network, which we here admit, is not peculiar to the uterus; it is also seen in the heart and tongue, which are organs whose office it is to execute numerous and varied movements.

B. *Blood-vessels.* The tissue proper of the uterus is not the only one which takes on increased action; all the other elements entering into the composition of the organ experience similar changes.

The arteries, small, flexuous, very contracted when empty, describe more regular curves, and tend more to approach to right lines, less compressed by the fibres of the uterus, softened, and expanded, they dilate, their calibre increases, the blood circulates in greater abundance and with more rapidity, and there results a more active, copious, and energetic nutrition.

The venæ comites of the arteries undergo changes proportioned to the activity of the external circulation: in the last stages of pregnancy, their calibre is equal to that of an ordinary goose-quill, and will, sometimes, even admit the end of the little finger. The venous circulation being deprived, from its origin, of any vis atergo, the afflux of blood is not very rapid. It was important that this function should experience no delay nor impediment of any kind; that, all the blood remaining from the nutrition of the uterus and the product of conception, should be completely and easily restored to the centre of circulation. For this purpose, nature has greatly dilated the uterine veins and multiplied the points of communication of the vessels with each other; so that the tissue of the uterus, at the termination of pregnancy, is traversed by an inextricable mass of venous vessels, which give it the appearance of an erectile or cavernous tissue. The lymphatics become considerably enlarged. Cruikshank says:‖ "In pregnancy, the trunks of the hypogastric absorbents are as large as a goose-quill, and the vessels themselves are so numerous as, when injected with mercury, to give to the uterus the appearance of a

* For more ample details, see Haller, loc. cit. vol. viii. pars 2d, p. 61, et seq.

† Essai sur l'Histoire Naturelle de la Grossesse et de l'Accouchement. Genève, 1787, p. 36.

‡ Thèse in 4to., No. 143. Paris, 1823, p. 24.

§ Memorial de l'Art des Accouchemens. Paris, 1836, p. 60, et suiv.

‖ Anatomie des Vaisseaux Absorbans, du Corps Humain, traduction de Petit-Radel, in 8vo. Paris, 1787, p. 802.

collection of absorbent vessels." We have frequently seen, without the aid of injection, these vessels enormously distended with pus, in women who have died of puerperal metro-peritonitis. Our colleague and friend M. Cruveilhier, has reported with great fidelity* several cases of this nature, which we have jointly observed in the Lying-in Hospital.

C. The *nerves* seem to participate likewise in this growth. Hunter found them larger, and more developed than in the empty state.

D. The *cellular tissue* becomes more distinct and softer, the meshes composing it are larger, and more easily penetrated by fluids, especially the sub-peritoneal cellular tissue adjoining the neck, fallopian tubes, and ovaries, thus explaining the frequency of the inflammation, serous, or sanguine, or purulent infiltrations, so frequently seen in these parts.

E. The *peritoneal membrane* likewise stretches, but not in proportion to the increase of the uterus, and if it cover nearly the whole of the organ, it is less in consequence of its extension than from the portions it borrows from the neighbouring organs, and the disappearance of the folds forming the ligaments of the uterus.

2. *Changes in the Vital Properties.*

In order to render our remarks on this subject more clear, we shall, after the manner of Bichat, divide the vital functions into those of *organic*, and those of *animal* life.

When the uterus is empty, its vital properties are not very well marked. They are limited to *organic sensibility* and *insensible contractility*, called also *tonic forces*, whose object is to separate from the blood the elements of nutrition and growth, and to remove those which, after having assisted to constitute the organism for a certain length of time, are no longer useful to the support of life.

In pregnancy, two properties which did not exist, or which, more properly speaking, were latent, are manifested: we mean the animal sensibility, and sensible organic contractility.

A. *Animal sensibility* is not entirely wanting when the uterus is empty; for, in touching, the woman is conscious of the contact of the finger, but here the sensation ceases.

The organ may be compressed, especially at the neck, pricked, and even cauterized, without exciting pain, unless it be in a morbid condition. When the uterus is diseased, or distended by the product of conception, the animal sensibility is developed and exalted; the woman is conscious, not only of any substance in contact with the organ, but also of the motion of the fœtus contained in its cavity. This property becomes more and more evident; the touch becomes painful, agonizing even, to some women, in the latter stage of pregnancy; and during labour, the contractions of the uterus are productive of extreme suffering. The proof of the inherence of this pain in the uterus is, that if the hand be introduced to perform turning or artificial delivery, the pains are the same. In cases of unnatural adhesion of the placenta, the artificial removal of this body is so distressing, that the woman believes and says that her entrails are being torn out.

B. The *sensible organic contractility* is the most remarkable of all the properties of the uterus. It effects the contraction, shortening, sudden and instantaneous return of the organ to its natural condition, and, in consequence, the expulsion of the fœtus and of the different accidental productions which may be developed in the uterine cavity. This property is so marked, so energetic in some cases, as to benumb the hand of the strongest man, as many have no doubt experienced, who, like ourselves, have been obliged to terminate a labour by turning, several hours after the discharge of the liquor amnii. Sometimes the organic contractility continues long after the cessation of animal life, and of the action of the heart and lungs. If the cases reported by Riolan,† Leroux,‡ and Baudelocque,§ leave any doubt on the mind upon the subject, we will detail the following.

On the 31st of October, 1823, we were sent for at two o'clock, A. M., to visit a woman in labour, who was said to be in great danger. We repaired immediately to her dwelling. On our arrival we were informed that the woman, in her fifth pregnancy, had just expired. She had been in labour for three days; the midwife in attendance felt no uneasiness; three hours before our arrival the patient was attacked with a sensation of suffocation and convulsions. One of our friends, whom we found near the bed, called immediately after the first appearance of these unpleasant symptoms, had endeavoured, but in vain, to apply the forceps. On examination we found the os uteri sufficiently dilated, the membranes ruptured, the head in the first position of the vertex, movable, and as yet within the os tincæ. We terminated the labour by turning, and delivered the patient of a still-born child. On proceeding to the extraction of the secundines, we found the placenta loose in the vagina, and the uterus so perfectly contracted that for an instant we hoped life was not quite extinct: we hoped in vain, the vital spark was extinct.

3. *Anomalies of the Vital Properties.*

These properties do not always exist in the same degree: they sometimes present anomalies which deserve our attention.

The animal sensibility may be so exalted, that the motion of the fœtus gives the mother great pain and uneasiness: in other cases it is so slight that the woman has no consciousness of any motion until the sixth, seventh, or eighth month of pregnancy, and in some not at all.

We recommended as a wet-nurse, to a lady living in the Place Victoires, a woman from the environs of Paris, large, strong, well-formed, and in perfect health: she fulfilled her duty so faithfully, that after weaning the child she was retained as its waiting-maid. From this moment her husband was at liberty to see her when he chose. Ten months or a year after, we were consulted by the lady of the house, then in the early stage of pregnancy, respecting the health of her child's nurse, whose situation gave her some uneasiness. On questioning the latter, she said she had been uncomfortable for some months, that her menstrual periods were irregular, and that for the last fifteen days she had had a continual bloody discharge; and that, notwithstanding all this, she increased in size. Feeling the abdomen,

* Anatomie Pathologique du Corps Humain. Paris, 1829 a 1835, gr. in fol., 13e livraison, planches 1, 2 et 3.

† Riolani Anthropographia et Osteologia. Paris, 1726, 4to. liv. vi.

‡ Observations sur les Pertes de Sang. Dijon, 1776, p. 26.

§ Loco citato, tome I. p. 123.

we suspected pregnancy; but, before giving a decided opinion, we examined her per vaginam, and ascertained that she was seven months gone with child, and that her delivery would be favourable, for the presentation of the fœtus was natural. The woman herself did not credit our assertion, and even attempted to dissuade us from it, saying, that if she were pregnant *she would not always be in blood*, that from the size of the abdomen she would feel some motion: still she was conscious of none, nor of any indication of the existence of a child; and, as such was not the case in her first pregnancy, she could not be mistaken in this respect: lastly, in order to convince us, she added, "*You certainly are mistaken, sir;* if I were pregnant, and as far gone as you say, I could suckle the second child of my mistress! such good luck is not for me."

We relate the expressions of this woman to prove her sincerity, and justify the confidence which we thought her statement deserved. We watched her closely, and until the manifestation of the first pains of labour, she would not believe in her pregnancy. About two months after our first examination she was delivered, and, as we had foreseen, naturally and safely, of a well-formed male child, apparently in good health, but which survived only twenty-four hours.

We have also attended an English lady, who assured us that in three pregnancies out of nine she felt no motion whatever of the fœtus; and yet she had always given birth to healthy children. The same thing occurred to her sister in her first pregnancy; but in her second she distinctly perceived the motion of her child.

Sensible organic contractility, like animal sensibility, may be exalted and produce spasmodic convulsive contractions, either general or partial, of the parietes of the uterus. In some cases rupture or laceration of the tissue of the uterus may ensue from the violence of these contractions. We observe much more frequently, however, a diminution of the contractile energy—a condition diametrically opposite, and designated by the term *atony* or *inertia* of the uterus.

Atony of the Uterus.

Atony or *inertia* consists in a remarkable diminution or suspension, more or less prolonged, of the sensible organic contractility, and not, as is generally supposed, in the loss of this property. The atony may be general or partial: it may occur during labour, or after the expulsion of a part or the whole of the fœtus.

When the atony is general, and occurs during labour, the contractions are feeble, slow, at long intervals, the progress of the labour is impeded: rest, patience, and time, are the best remedies for this condition. Atony is rarely observed in this stage: it ordinarily takes place after the expulsion of a part or the whole of the product of conception. If it occur immediately after the expulsion of the fœtus, before the placenta is detached, no danger is to be apprehended. In this case, however, as the uterus does not contract, its connection with the placenta not being destroyed, it is said that hæmorrhage may proceed from the umbilical cord. We have never met with a case, but, as Baudelocque has advanced the opinion, we think it our duty to warn practitioners of its possibility. The treatment here would be to apply a ligature to the placental end of the divided cord. When atony occurs after the expulsion of the fœtus, the placenta being partly detached, the hæmorrhage may endanger the life of the mother: in this case it must be immediately removed artificially, for the loss of blood only increases the debility of the organ.

Generally atony does not manifest itself until after the expulsion of the fœtus and placenta: if it be general, the uterus remains soft, the vessels open, and a dreadful hæmorrhage ensues, which may destroy the woman in a few moments. It should, however, be remembered, that by careful attention these hæmorrhages may be frequently prevented and almost always arrested.

Partial atony is more common. The neck of the uterus being its thinnest part, least furnished with blood-vessels and fibrous tissue, and that in which the head of the child remains longest engaged, is almost constantly the seat of atony. But, by reason of its small number of blood-vessels, the loss of blood is not copious, and the atony not alarming. This is not the case when atony affects the fundus or body of the organ; the internal orifice of the neck contracts, the body and fundus remain flaccid, the open vessels pour out blood abundantly; the cavity of the uterus is filled; the organ is distended anew, and becomes nearly as large as during pregnancy. The woman experiences a sensation of heaviness, and stupor, a kind of happiness; her face becomes pale, she desires to sleep: if she yields to this desire, she is in danger of internal hæmorrhage.

The *causes* of atony are numerous and various; some are as it were constitutional, others are purely accidental. Among the former may be classed a delicate lymphatic temperament, general debility resulting from previous disease, privations of all kinds, improper food, excessive labour, misery, deep grief, etc. The accidental causes are—an enormous distension of the uterus from the accumulation of the liquor amnii, the presence of several fœtuses, the too sudden depletion of the organ, a tedious labour, lastly, the debility resulting from hæmorrhages.

The *symptoms* of atony during labour are, feeble pains occurring at long intervals, and producing but little effect; after the discharge of the waters, the slow progress of the fœtus; when the labour is terminated, the softness and flaccidity of the uterine parietes: it cannot be felt firmly contracted. On introducing the finger into the os uteri, it penetrates a large spacious cavity, generally filled with fluid or half-coagulated blood.

Prognosis.—If the woman is young and of a good constitution, the prognosis is favourable; it is less so, if the atony is general, and the woman exhausted, especially if the accident has existed a long time before the attention was excited.

Treatment.—It must vary with the causes, and may be prophylactic or curative. When the labour advances rapidly, and there is a danger of too sudden a birth, the woman should be recommended to moderate her efforts of expulsion, not to contract the muscles of which she has command, to leave, as it were, the uterus to its own efforts, and avoid every thing which may excite the sensation of tenesmus. If the labour proceeds too slowly, endeavour to produce uterine contractions, by dry, warm, and gentle frictions over the lower belly, and sustain the strength and courage of the patient by proper means and consoling language. If the woman is lymphatic and impoverished by want of proper food: if atony occur before or after delivery, she should remain in bed, in a horizontal position, and take

strengthening food, of easy digestion, such as broth, cullis, animal jellies, light porridge, and sometimes a small quantity of luscious wines, such as those of the south of France, or Spain.

When atony supervenes to delivery, without separation of the placenta, or hæmorrhage, we must wait. If there is partial separation of the placenta, and loss of blood, the secundines must be artificially delivered: lastly, when the product of conception is entirely expelled, and the uterus is distended by the accumulation of blood in its cavity, we must have recourse to a treatment which will be indicated when treating of internal hæmorrhages.

4. *Of the changes which take place in the Uterus after delivery.*

All the tissues of the uterus, after having been developed during pregnancy, and acquired the properties which we have just examined, experience, after delivery, changes of an opposite character. By its contraction the fibres are shortened, approximated, and the intervals between them diminished. In consequence of this universal decrease, the cavity of the uterus is lessened, and the contained bodies escape by the point which presents the least resistance. At the moment of their expulsion, the organ loses the enormous dimensions it had acquired, suddenly collapses, returns to the pelvic excavation, and in a majority of cases, does not project more than a few fingers' breadth beyond the pubes. The intermediate tissues share in this general diminution. The vessels being no longer compressed, lessen in calibre, they become more tortuous, and the circulation slackens. Upon the knowledge of these phenomena depends the theory of the treatment of uterine hæmorrhage, and rests the precepts laid down by Puzos, to rupture the membranes, evacuate the fluids, to stimulate the contractions of the uterus, and hasten delivery in cases of hæmorrhage.

This sudden, rapid, as it were instantaneous contraction of the uterus, the consequence of delivery, is followed by another, less sensible, much slower, during which the uterus is emptied: its vessels decrease, its fibres become pale and more dense, its ligaments reappear, so that in five or six weeks, the organ has recovered its natural position, aspect and dimensions. This gradual, successive return of the uterus, does not depend on the sensible organic contractility, but appears to be owing to the tonic forces.

SECTION IV.

ANOMALIES AND MORBID STATES OF THE GENITAL ORGANS.

Although nature follows a regular course in the formation and arrangement of our different organs, she sometimes wanders from the beaten track; and these deviations, however trifling, are always injurious to the organ interested, the functions it performs, and the individual affected by it. The frequency and extent of these aberrations of nature, are generally in inverse proportion to the importance of the organs themselves. If this law be true, it is not astonishing that the organs of generation should be frequently the seat of numerous anomalies, which it is our duty to examine.

We will include in this section the different malformations, displacements, and some pathological conditions of those organs.

I. MALFORMATIONS.

Under the head of the external genital organs, we treated of those which may occur to each of these separately; it now remains to consider those which may affect them as a whole, and also interest the internal organs.

ARTICLE I.—ABSENCE OF THE GENITAL ORGANS.

The genital organs not being essential to life, each one may be wanting without influencing seriously the health of the individual. They might even be absent wholly, without fatal consequences, did they not include the orifices of excretory canals, as the urethra and rectum, whose functions cannot be interrupted without being followed by death. This we have seen in a monster, received by M. Evrat, and which we examined with MM. Geoffroy St. Hilaire and Serres, who published a drawing of it. All the genital organs were wanting; the urethra, bladder and rectum were completely absent. In this treatise, we shall consider less the absence of one or two of these organs, than the obstacles opposed to the exercise of the generative functions, or the accidents which necessarily result.

ARTICLE II.—ABSENCE AND OCCLUSION OF THE URETHRA.

Although, in the female, the canal of the urethra does not, as in the male, constitute an essential part of the genital organs, it is so intimately connected with them, that we will add the history of its anomalies to that of these organs, as we have already done in its anatomical description.

At the period of birth, the urethra is sometimes closed by a membrane more or less thick, which obstructs its external orifice. Sometimes its canal is partly or wholly wanting. In both of these cases, if the accident is not soon remedied, the forced retention of urine produces distension, inflammation, and reabsorption, which are quickly followed by death: unless nature, by another anomaly, has contrived some unusual exit for this secretion. It sometimes happens, that the urachus remains open, and affords a passage to the urine, as was the case in the young girls described by Cabrol and by Lithe;* and also in a young child of Auteuil, ten or twelve years of age, whom we saw, in 1813, at the Hôtel Dieu, in consultation with Dupuytren. This child enjoyed good health, the genital organs were well formed, but the canal of the urethra being imperforate, the urine escaped by the umbilicus.

When only a simple membrane exists, we might, like Cabrol, divide it, and restore the natural opening; but if the canal be wanting,

* Mémoires de l'Academie des Sciences, 1701, 2e partie, p. 90.

or be imperforate throughout its whole length, as in the child from Auteuil, no tedious, painful operation should be attempted, which might compromise the life of the patient, without offering much hope of success.

In case of absence of the urethral canal, and imperforation of the urachus, puncture of the bladder may be performed, to save the life of the infant. How, and at what point should it be done? Without wishing to establish any general rule, we may remark, that in a female child, the puncture should be made in the anterior wall of the vagina; in the male, either above the pubes or through the rectum. We should, ourselves, prefer the latter method.

ARTICLE III.—MALFORMATION OF THE VAGINA.

Occlusion, Absence, Contraction of the Vagina.

We include in one article these divers anomalies, because the obstacles they occasion are nearly the same in all cases, though they may arise from different causes.

The vagina may be imperforate naturally or accidentally, in a part or whole of the length. In some cases, the upper part is obliterated, the canal does not extend to the uterus, but terminates in a cul-de-sac at a greater or less distance from the vulva; in others, the upper part exists, but the lower is wanting: the vulva forms a kind of imperforate funnel. Lastly, this canal may be entirely absent.

The causes of occlusion of the vagina are numerous; imperforation of the hymen is one of the most frequent, and most writers on midwifery have reported cases of it. A. Paré,* Amand,† and Mauriceau,‡ have given several. This occlusion may also depend on the congenital agglutination of the labia pudendi, or their accidental union, produced by a badly treated burn, inflammation, irritation, local contusion, or by variolous or syphilitic ulcerations. Amand§ quotes from David the case of "a daughter of a citizen of Marseilles, whom her father sent to his country seat on an ass; the rough gait of the animal, or the hardness of the pack-saddle, galled the rider so much, that the excoriated labia pudendi, from want of care, became agglutinated together. She was married some time afterwards, and the husband, being unable to consummate the nuptials, conceived some suspicion as to the chastity of his bride, who soon explained matters by relating the history of her journey, which she had kept until then locked in her own bosom." Although only a small hole remained through which the menstrual discharge escaped, she became pregnant, but David was obliged, at the time of delivery, to separate the labia by means of scissors.

The vagina may also be closed by one or several membranes developed accidentally after conception, as in the case reported by Ruysch,‖ of the wife of a tobaconist who could not be delivered, and in whom he was obliged to divide a membrane which he says was the hymen; then a second in the vagina, an inch above the first; after which the woman bore a healthy and well-formed child.

The partial, like the general agglutination, may be congenital or accidental. In the first case, the vagina exists in the form of a dense solid cord, not canaliculated, or else is completely wanting; it may be reduced to a single cellular web, as in the case observed by M. Williaume, of Metz.¶ In the second, it may ensue from criminal acts, similar to those done by the female lamp-lighter of Geneva,** who, in order to bring on abortion, injected into her vagina some sulphuric acid of commerce, and excited a violent inflammation terminating in adhesion, in consequence of which the obliterated canal could not give passage to the product of conception at the period of delivery, and she expiated the unnatural crime with the penalty of her life.

This agglutination generally succeeds lacerations and lesions of the vagina, produced by a natural or by an artificial delivery.

An English lady, thirty-six or thirty-eight years of age, of a vigorous constitution, and very corpulent, was delivered the first time at London, on the 11th of December, 1835, at four o'clock, P. M. The labour was tedious and painful; but terminated, by the natural efforts alone, after sixty hours of suffering, in the expulsion of a dead infant. Her recovery was uninterrupted; the menstrual flux appeared toward the end of February, 1836; on the 30th of March it was less copious and appeared no more. A tension in the lower belly and loins; a sensation of weight in the pelvis; swelling of the hypogastrium, accompanied by a capricious appetite; slight pain in the head, and some derangement in the digestive functions, gave rise to a suspicion of pregnancy. In the spring of 1836 this lady came to Paris: on the 13th of the following July a slight discharge of blackish blood caused her to apprehend abortion. Dr. Macloughlin called in a midwife to ascertain her condition. The latter could not practise the touch, on account of a violent spasm of the vagina, which prevented the introduction of the finger. The physician himself was not more successful in his attempt. On the 30th of July we were sent for, and discovered an occlusion of the vagina. This canal terminated at the distance of an inch from the vulva. On examination with the speculum we perceived a black spot, owing to a small clot of blood which closed a narrow aperture, into which we introduced a blunt probe: this aperture led us into a spacious cavity, formed by the upper part of the vagina, distended by a large quantity of altered and coagulated blood. In order to give exit to this foreign fluid, we introduced a female catheter, but not without difficulty and acute pain. Warm water was injected through the catheter, but, owing to its small size, no satisfactory results ensued. It was then evident that the symptoms of the lady were to be attributed neither to a spasmodic contraction of the vagina, as had been at first supposed, nor to pregnancy, and still less to an incipient abortion.

The occlusion of the vagina being ascertained, the indication was clear that, to remove the symptoms and prevent their return, we must, 1st, give exit to the extravasated fluid; 2d, restore the vagina to its natural condition. Two methods presented themselves to our consideration: we might restore the vagina by means of a crucial incision, but this mode was not free from objection; for, in addition to

* Œuvres, liv. 84, chap. L., p. 973, in fol. Paris, 1598.

† Nouvelles Observations sur la Pratique des Accouchemens. Paris, 1715, obs. 34, p. 145; obs. 58, p. 102; obs. 117, p. 312.

‡ Loc. cit. obs. 231 et 495.

§ Loc. cit. obs. 1er, p. 44.

‖ Opera Omnia. Amstelodami, 1757. Observationes Anatomico-Chirurgicæ, p. 20, fig. et obs. 22.

¶ Bibliothèque Médicale, tom. 1er, p. 137. Paris, 1828.

** Lombard. Archives Générales de Médecine, tome xxv. p. 568.

the fears of the patient, the incision might implicate the bladder, rectum, or some blood-vessels, and occasion an alarming hæmorrhage. The symptoms were not urgent; we had already succeeded in enlarging slightly the orifice by means of the probe and catheter, and we preferred the operation of dilatation. The female catheter already introduced was left in situ.

On the following morning, July 31st, it was replaced by a piece of gentian root, sharpened to a delicate cone, and traversed by four waxed threads, so as to withdraw it at pleasure. The patient took a bath to allay her sufferings and assist the expansion of the root. After the bath she was put to bed on diet and the use of refreshing and slightly acidulated drinks. On the 1st of August the gentian root was withdrawn; at the moment of its extraction there was an escape of fetid gas and some spoonfuls of disintegrated blood. Two injections of warm water, by means of a canula of gum elastic, promoted the discharge of several half-decomposed clots, which greatly relieved the patient. A new cone of gentian, with a base as large as the little finger, was substituted for that of the preceding day: the patient was again bathed, and placed on the same regimen. The night was restless, she had fever, and complained of a sensation of heat, weight, and distension in the vagina. The dressing on the second of August gave great relief. The injections of warm water brought away the rest of the blood contained in the upper part of the vagina and uterus. A root of gentian, shorter and thicker than the preceding, was introduced: it swelled so much that it could not be withdrawn, but broke off, and was only extracted three days afterward. Except this accident, nothing peculiar occurred. On the 27th of August the vagina had acquired its usual size, and the lady, entrusted to her physician in ordinary, to whom we recommended the use of some foreign body in the vagina until the cicatrization was completed, returned to England during the following month.

The vagina and uterus, as we shall see hereafter, are sometimes both wanting: in this case they are converted into a fibro-cellular tissue more or less dense, or reduced to a rudimentary state; but, as the menstrual secretion cannot take place, there is no collection and can be no possible dangerous symptoms, nor any indications to fulfil.

The accidents which follow occlusion of the vagina supervene at different periods, and vary in intensity according to the species of occlusion, that is, whether it be complete or not. When the obliteration is congenital and complete, the uneasiness is only felt at puberty: when it is accidental, it is at the menstrual period next following the obliteration. It occurs only at the time of parturition, when the occlusion has taken place after conception. In the former case, about the age of fourteen or fifteen the young girl experiences for several days the prodromi of the eruption of the menses, such as a sense of weariness and weight in the limbs, tension in the lower belly, dragging in the loins and back, heat and heaviness in the pelvis; no discharge takes place from the sexual organs, and the natural order of things is restored. On the following month the same symptoms reappear, and increase in intensity at each menstrual period, owing to the accumulation of blood in the vagina and uterus. The hypogastrium is soon distended, the belly swollen, the breasts tumefied, vomiting, nervous and hysterical symptoms supervene, and excite the suspicion of pregnancy.

In 1810, we saw at the Hotel-Dieu a young girl from the environs of Paris, eighteen to twenty years of age, who, in consequence of this morbid state, had been driven from her father's house, because he thought she was pregnant, when she was not in a condition to possibly become so. Pelletan, the chief surgeon of that hospital, examined her, and discovered an imperforate hymen. A crucial incision was made in the membrane; a black, viscous, thick blood, of the consistence of syrup, was discharged, and the patient cured. Three years since, we were consulted for a young girl of fifteen, living in a village about four leagues from Paris, labouring under similar symptoms. From the account given, we suspected imperforation of the hymen, and, as we could not visit her ourselves, we communicated our opinion to the surgeon of the village, who by means of a lancet restored her to health.

When the cause of these symptoms is misunderstood, or ascertained too late, the patient may perish, as happened in the case of a young lady of twenty-four years of age, related by Dehaen,* and another of twenty-two, who died at La Charité, in the month of June, 1814, without having undergone any operation.†

The prognosis is favourable when the occlusion is owing to the agglutination of the labia pudendi, or the presence of a membrane. In order to cure these patients, it is sufficient in the former case, to separate the labia with a scissors or scalpel; in the second, to divide the membrane by a crucial or a simple incision, of which the edges should be kept apart by a dossil of lint until cicatrization is completed. Celsus recommends us to make an X shaped incision, in order to avoid the meatus urinarius, and then to excise the centre of the flaps. "Oportet autem membrana duabus lienis inter se transversis incidere ad similitudinem litteræ X, magnâ curâ habitâ, ne urinæ iter violetur: deinde undique eam membranam excidere."‡ Some little care is required not to injure this duct. As soon as the incision is made, if the air has not had access to the interior, there is discharged a black, thick, viscous, inodorous blood, of a tarry consistence. The uneasiness felt by the patient cannot be attributed to putrefaction, or a pretended acrimony of the blood, but only to a retention of this fluid.

When the occlusion is owing to the agglutination of the parietes of the vagina, to a great extent, or the complete absence of this canal, the prognosis is more unfavourable, and the indications more difficult to fulfil. Should we endeavour to reach the uterus, by means of a long, difficult, and painful operation? Cut a passage through a considerable thickness, between the rectum and bladder, with the danger of wounding these organs? Or should the patient be left to nature?

The last is to doom her to certain death, and the results of the operation will be nearly as fatal. In the skilful hands of Dubois and Dupuytren, women have fallen victims to the endeavours made to save them; whether there have been a laborious dissection in order to re-establish the canal, or puncture of the uterus, either through the os tincæ or its parietes. The operation, however, is our only resource, and if it succeeds but once in a thousand cases, it should be performed. Other operators have been more successful. The cases reported by M. Williaume of Metz, in 1823,§ and by M. Amussat, in 1832,‖ should sustain the courage of the surgeon, and induce him not to recoil from the dangers of an operation which alone can save his patient's life.

Before proceeding to the operation, we must ascertain the existence or absence of the vagina. This may be done by introducing a

* Ratio Medendi, pars sexta, ch. 11, p. 31. Paris, 1764, in-12.

‡ De re Medica, lib. 7. cap. 3. sect. 12, p. 444. Parisiis, 1772.

‖ Gazette Médicale de Paris, Séance de l'Institut du 2 Novembre, 1835.

† Voyez Boyer, Traité des Maladies Chirurgicales, tom. x., p. 429. Paris, 1825.

§ Nouvelle Bibliothèque Médicale, tome I. Paris, 1828, p. 136.

finger into the rectum and sound into the bladder, approximating the point of the finger to the convexity of the sound, and moving both from side to side, we may then judge of the thickness, and resistance of the interposed parts, if the vagina exists or not. In the first case, we may endeavour to re-establish it by means of an incision: in the second, we may follow the example of M. Williaume, who reached the uterus by a tedious dissection, or that of M. Amussat, who isolated the parts with his fingers, and separated them by the introduction of a large flexible bougie. Under similar circumstances, as we stated in the Academy, when the discussion arose upon the case of M. Williaume, we should prefer, after having made a transverse or vertical incision in the interval between the meatus urinarius and anus, endeavouring to reach the cavity containing the effused blood, by separating the bladder from the rectum by means of the handle of the scalpel, which tears apart rather than cuts the laminæ of the cellular tissue.

At other times, the vagina, without being obliterated, is exceedingly contracted or narrowed; we saw, with M. Evrat, a young lady in the fourth or fifth month of pregnancy, in whom the vagina would scarcely admit a writing quill. This contraction, which gave great uneasiness to her husband and her family, yielded to the natural efforts alone. She was delivered at term, slowly but naturally, without any recourse to dilatation.

Sometimes, the vagina is double, that is to say, divided in its axis by a partition in the median line, and generally coinciding with a similar malformation of the uterus. Within a short period, however, M. Auguste Berard, has presented as a specimen of a vagina double throughout its whole length, with a well-formed uterus, which he obtained in the Hospital Saint Antoine, from a woman of about fifty years of age, who died in a ward under his care.

Lastly, the vagina has been seen to open into the rectum, or into the bladder.

ARTICLE IV.—MALFORMATION OF THE UTERUS.

Malformations of the uterus are as numerous and various as those which we have just investigated. Subjects have been found in whom it was entirely wanting, as may be seen, by reference to works on Anatomy and Midwifery, and similar cases may be found in Morgagni,* Engel,† Baudelocque,‡ and in the collection of the bulletins of the Faculty of Medicine of Paris.§

At other times this organ exists, but so small and slightly developed, that it is only in a rudimentary state.‖ This occurred in a girl, twenty-two years of age, who died at the Hospital Saint Louis, and whose genital organs were presented by M. Jules Cloquet, to the Society of the Faculty of Medicine, on the 3d of February, 1820.¶ Dupuytren has since met, at the Hôtel-Dieu, the same structure, and exhibited the specimen to the Academy. This case, like the preceding, necessarily produces absence of the menstrual discharge and sterility.

There has been found, also, only a kind of half uterus, and yet this half fulfilled all the functions of the entire organ. This is proved by the case related by Chaussier,** of a woman who died at the Maternité, in whom the left fallopian tube, ovarium, and half of the uterus were wanting: she had, however, borne several children of both sexes.

The uterus, although well formed, may open above the umbilicus, as is said to have occurred in a case of Gianella, reported by Morgagni,†† and require an operation at the time of parturition: but the case appears to us so extraordinary, and the details accompanying it so little satisfactory, that we doubt its accuracy; Gianella neither saw the woman, nor the specimen: he examined the picture of a case which had occurred forty years previously, and which has no greater authority than the gossip of the inhabitants of Lignano.

It is less rare to see the uterus open into the rectum; it has been observed in two cases of delivery per anum, reported in the work of Barbeau.‡‡ This disposition ought to coincide with, or rather be the consequence of, absence of the vagina.

We sometimes see on the internal surface of the uterus, one or two salient cristæ on the middle line, the rudiments of an incomplete septum. In some women the uterus is divided into two equal or unequal parts, by a simple partition. Morgagni§§ attributes to François Antoine Catti, a Neapolitan anatomist, who lived in 1557, the honour of having first described this malformation. The septum does not, generally, extend beyond the cavity of the uterus; in 1824, M. West presented to the Academy a specimen of this nature, obtained at the Maternité from the body of a woman who died soon after delivery. We have, likewise, seen two similar cases in the same establishment.

This septum may be prolonged into the vagina and as far as the external organs of generation. Eisenman has described and engraved‖‖ the uterus of a girl of nine years of age, divided by a median partition. This uterus had two apertures, which opened each into a vagina, right and left; each vagina had a hymen, and was rugose internally, as found in the natural conformation. There were only one fallopian tube, one ovary, and one ovarian artery for each half uterus. Under some circumstances, the external inspection of the organ cannot discover to us the malformation now under consideration. Under others, a more or less evident depression marks the presence of the septum; when this depression extends to the fundus uteri, it gives the organ the shape of the heart on a playing card. Lastly, in other cases, the depression being still deeper, divides the uterus into two distinct parts, and causes it to resemble, somewhat, that of different species of animals, as the rodentia and carnivora. A uterus presenting this conformation has been designated by the names of bifid, bilocular, bilobed. Each half may, in some cases, perform the functions of the perfect organ.

Mad. B——— was admitted into the Maternité on the 19th of December, 1831, in the seventh month of utero-gestation. The pains of labour first appeared on the 13th of January, 1832, at 11 P. M. On examination we discovered a very decided left lateral obliquity of the uterus; the os tincæ was soft, thin, and dilated about twelve lines; the membranes were ruptured: the head presented, but could not be reached by the finger. After a labour of fifteen hours, the dilatation was complete: during this time, the head remained above the

* Epistola 46, p. 12 et 13.
† De utero, deficiente, apud Schegel. Tom. i. p. 233.
‡ Loc. cit. Tom. i. p. 153.
§ Bulletins, Tom. ii. p. 35. Tom. vi. p. 51.
‖ Haller, Disputationes Anatomicæ, Tom. v.
¶ Bulletins, Tom. vii. p. 66.
** Bulletins de la Faculté, Tom. v. p. 436.
†† De Sedibus et causis morborum, epistola 67, p. 325, Tom. iv. Lovanii, 1767, in 4to.
‡‡ Cours d'Accouchement, tome 1, p. 59. Paris, 1775.
§§ Epistola anatomica tertia, p. 40, § 21, Tom. i.
‖‖ Tabulæ anatomicæ. Georg. Henr. Eisenmani. Argentorati, 1752, in fol., avec figures.

superior strait. The pupil in attendance, thought she recognized a shoulder presentation. Struck by this idea, she desired several of her companions to make an examination: some were of her opinion, others thought that the labour had not commenced. This difference of opinion, and the hope of seeing the operation of turning performed, caused about thirty pupils to remain with the patient. The sight of so many persons, repeated examinations, and some expressions imprudently dropped by the by-standers, produced an unfortunate impression on the woman, who was attacked with convulsions, which, however, were relieved by the chief midwife, Mad. Lægrand. The head of the fœtus passed through the mouth of the uterus, but after remaining five hours in the vagina, was delivered by the forceps. The child, a male weighing seven pounds, was alive. The contraction of the placenta was natural, and her convalescence rapid.

This woman came again to the hospital on the 2d of January, 1833, in the eighth month of her pregnancy. On the 4th, she felt the first pain. The head, at first, in the fourth position of Baudelocque, changed, during the labour, to the second. The delivery terminated naturally on the following morning. The child, a female, very feeble, and weighing four pounds, died soon after birth.

On the evening of the second day, the patient was attacked with chills, pain in the abdomen, and all the symptoms of an intense epidemic peritonitis, of which she perished on the 14th of January, and the ninth day after her delivery.

Autopsy.—The external habit of the body gave evidence of a robust constitution. No unusual appearances were to be observed in the head or chest. On opening the abdomen, the peritoneum was seen to be inflamed, and filled with purulent serum. But the uterus immediately arrested our attention. The neck, terminating by two orifices, exhibited, at the distance of half an inch from the mouth, a bridle, perpendicular to the axis of the vagina, and extending from the anterior to the posterior raphe. This cylindrical column in the organ, two or three lines in thickness, was the débris of a more extended septum, which had originally divided the vagina into two parts, and had been ruptured, either by the act of coition, or by the first delivery. The uterus was divided into two halves, or cornua, of which one was larger than the other. The larger, on the right, had been the seat of the last conception; its transverse diameter was three and a half to four inches long, and its antero-posterior four to five inches. The other cornu had nearly the same length, but its transverse diameter was much shorter, and this cornu had been the seat of the first pregnancy. Each half had a fallopian tube, an ovary, a round ligament, situated externally near its apex. The internal margin was smooth throughout, and uniting inferiorly with that of the opposite cornu, formed an angle in which was placed the rectum. The dependencies or appendages of the uterus, were in the illiac fossæ, instead of being contained in the pelvic excavation.

Many similar facts are found in different writers. M. Cassan, who, in a thesis defended in 1826,* has collected a vast number of cases of bilobed uteri, has described and figured a uterus nearly similar, taken from a barren woman, who died in the Maison de Santé, under the care of M. Dumeril.

Lastly, to conclude the subject of malformation of the uterus, we will detail the case of M. Baudelocque the nephew.†

Louise Marguerite Lapierre, fifty-three years of age, died at the Hospital Beaujon, in consequence of a pleuro-pneumonia. She had never had a child. On opening the body, the uterus was seen of its natural size, the fallopian tubes were each about the size of a crow's quill. In the substance of the right lateral wall of the uterus, a canal of the same calibre as that of the fallopian tubes was discovered. This canal extended from the right tube, at three or four lines from its internal extremity, to the cavity of the neck, near the lower part.

This peculiarity is of more importance, as it appears to us, to explain certain very rare anomalies of extra-uterine pregnancy, called interstitial pregnancy, which, until now, have never been well defined, unless they be regarded as varieties of tubular pregnancy, which appears to us very probable. It is to be regretted that M. Baudelocque has not preserved the anatomical specimens, and that he was satisfied with having it engraved.

When the uterus is bilobed, the neck is sometimes single, as well as the vagina: at others, it is divided by a median septum, and opens into a single vagina, or it is double, and opens into a double vagina, as was seen in the woman B——. This disposition may give rise to mistakes analogous to those which occurred in the cases related by Tiedemann,‡ and M. West, in the case of the said B——, where two persons, successively examining the woman, the former by one vagina, declares that the labour is about terminating; the latter, on the contrary, by the other, says that she is not in labour, or that she is not pregnant, or that, if pregnancy exist, it is extra uterine.

In some cases, one of the necks opening into a vagina communicating with the rectum, whilst the other opens into another vagina communicating with the urethra, as we have seen in a fœtus dissected by Saviard and Duverney.§

The os uteri may be obliterated, and the menstrual blood, retained in the uterine cavity, may excite the symptoms which supervene on occlusion of the vagina. This obliteration is complete or incomplete, congenital or accidental. When incomplete, it may impede, but not entirely prevent the flow of the menses; and may even embarrass, without precluding, fecundation. When complete and congenital, the symptoms manifest themselves only after the period of puberty. When accidental, it occurs before or after impregnation: in the former case, the uneasiness is felt at the first menstrual period which follows the occlusion; in the latter, it happens at the moment of parturition, as in the case related by Amand.‖

Congenital occlusion may depend on the total or partial absence of the vagina, the presence of a membrane uniting the lips of the os uteri. Accidental occlusion generally follows lesions of the vagina, or of the os tincæ produced by antecedent pregnancies; or inflammations and ulcerations of divers kinds, which before or after conception, may be seated in these parts.

The *diagnosis* is easy, the disease may be recognized by the symptoms we have pointed out, when treating of obliteration of the vagina, or by the touch: and, lastly, should any doubt exist, it will be removed by the use of the speculum.

The *prognosis* varies according to the nature of the obstacle; but all things else being equal, it is more serious than that which results from obliteration of the vagina, because the distension of the uterus and the operations performed on it are frequently more grave in their consequences than those of the vagina.

* Voyez Collections des Thèses, in 4to. Paris, 1826, No. 43.

† Archives Générales de Médecine, tom. 9, p. 419.

‡ Journal Complémentaire, t. vi., p. 371. Paris, 1820.

§ Recueil d'Observ. Chirurg. Paris, 1784, obs. 94, p. 312.

‖ Obs. 11, p. 63.

Treatment.—No absolute rules can be established: they must vary according to the peculiarities of the case, and of the existing derangement. A simple incision of the membrane which seals the os uteri, or a puncture with the trocar, will generally give issue to the blood, water, or gas contained in the uterus. If the woman be pregnant, and the symptoms arise during labour, the incision must sometimes be extended even to the parietes of the neck.

We saw, in 1813, at the Hôtel-Dieu, a woman in whom Dupuytren made a transverse incision in the mouth of the uterus, to relieve the obliteration of this part, caused by a laborious delivery. About a quart of thick fluid, of the colour and consistence of the dregs of wine, was discharged. The patient was at first relieved, but inflammation supervened, and phenomena of reabsorption, which no remedies could arrest, and of which she died in a few days. On opening the body, the hypertrophied uterus presented the form and appearance of that of a woman who had died four or five days after delivery. Its internal surface was blackish, exhaling a gangrenous odour, and the peritoneum lining the pelvis was inflamed.

ARTICLE V.—ANOMALIES OF THE APPENDAGES OR DEPENDENCIES OF THE UTERUS.

The dependencies of the uterus, like the other genital organs, may be the seat of divers anomalies.

The fallopian tubes, or only one of them, may be wanting, or may be obliterated. Their fimbriated extremity may be inserted at a point distant from the ovarium, or have contracted an unnatural adhesion with one of the abdominal organs: all these anomalies, which may be suspected during life, can be verified only after death; they present, moreover, no indication to fulfil. It is well to observe that, for the most part, women thus affected are barren. The fallopian tubes may also constitute a portion of a hernia.

The ovaria much more frequently than the tubes may form a hernia. M. Deneux,* in a memoir published in 1818, has collected several cases of this nature. Verdier† says that one of his colleagues, M. Veyret, has seen in the body of a little girl one of the ovaries engaged in the ring, and projecting outwardly. Lassus,‡ dissecting a full-grown fœtus which had a small tumour in the groin, found it formed by the right ovary. In 1759, Camper found, in the dissecting room at Amsterdam, the left ovary projecting through the ischiatic notch. But a much more curious case is reported in the works of Percival Pott.§

A young woman, of twenty-three years of age, was admitted into St. Bartholomew's Hospital for two small tumours in the groins, which had been so painful for some months past as to render her incapable of doing her duty as a house-servant. These tumours were soft, unequal, very movable, and situated in front of the inguinal rings. Their reduction was attempted in vain; the operation for hernia was performed on both sides, and the two ovaria removed. The woman recovered, but subsequently to the operation she became emaciated; the development of the muscles was arrested; her breasts, which were very large, almost disappeared, and the menses never appeared.

If we could draw general conclusions from a single case, we should say, that the removal of the ovaria exerts on the constitution of women modifications analogous to, but the reverse of, those effected in men by the loss of the testicles. Thus, whilst a man under these circumstances acquires the voice, characteristics, and almost even the inclinations of a woman, she, on the contrary, divests herself of the attributes of her sex, and assumes those of the male.

SECTION V.

MORBID STATES OF THE UTERUS.

The uterus, situated nearly in the centre of the pelvis, feebly supported by the membranous folds furnished by the peritoneum, floats as it were at the will of the surrounding viscera. It follows from this arrangement that it must constantly experience variations in its situation, in consequence of the changes in the organs with which it is in contact, such as the bladder, rectum, and the intestines. In the ordinary conditions of life these instantaneous deviations are scarcely appreciable, and in no manner influence the health of the female. But, when influenced by an active and powerful cause, they exceed their natural limits and become permanent, they produce remarkable changes in the health, cause defects more or less serious, which constitute actual morbid states. These changes of position are designated under the generic name of *displacements.*

Displacements of the uterus may take place either externally or internally. We shall divide into two great classes:—1st, those which occur without the pelvis; 2d, those which are effected within this cavity.

FIRST CLASS.

On Displacements of the Uterus.

This comprises the displacements which occur without the pelvis, that is, out of the pelvic cavity and above the superior strait.

ARTICLE I.—HERNIA OF THE UTERUS.

From what has been said of the situation of the uterus, it might be supposed that it could never pass beyond the pelvis and protrude through the abdominal parietes. It may, however, be conceived that, carried by the adjacent organs, it may accompany their displacement: but it is very difficult to explain how the uterus alone can protrude through the inguinal ring, and cases of this nature are fortunately very rare.

* Recherches sur les Hernies de l'Ovaire. Paris, 1813, broch. in-8.

† Recherches sur la Hernie de la Vessie. Mem., Acad. Chir. in-4o., t. i. p. 3.

‡ Médecine Operatoire, t. i, p. 211.

§ Œuvres Chirurgicales de Percival Pott. Traduction de M***, t. i. p. 492. Paris, 1777.

Chopart* says, he found in a woman of fifty years of age nearly the whole uterus with its dependencies projecting through the left inguinal ring. In the Memoirs of the Medical Society of Emulation,† Lallemand has reported the case of a washerwoman who died at the Sâlpetrière, at the age of seventy-one, who for twenty-one years had a right inguinal hernia. On opening the body, in a very thick hernial sac the whole of the uterus with its right tube and ovary was found, and the left tube and ovary closely applied to the external part of the ring. The vagina, dragged by the uterus, was slighly oblique, and compressed the bladder against the pubes. The upper part of this canal, as well as the os tincæ, had also protruded through the ring.

The same author has reported, in the Bulletins of the Faculty of Medicine,‡ another case of crural hernia of the uterus, observed likewise in a washerwoman, eighty-two years of age, who died in the same hospital in 1815. In this woman the hernia had existed for forty years, and the uterus, accompanied by the ovaria, fallopian tubes, a portion of the vagina and omentum, and by two cysts, or probably hydatids, had escaped from the abdomen by passing beneath the right crural arch.

From these facts, it is evident that the uterus when empty may protrude through the natural apertures of the abdominal parietes. Although sterility generally follows so considerable a displacement, yet we may say that it is not an inevitable consequence. Michael Doring relates, from Sennert,§ the history of Ursula, the wife of Martin Opitz, a cooper, who, whilst assisting her husband to bend a green pole in order to make a hoop, let it fly; one end struck her in the left groin. In a short time a small tumour appeared, which soon increased in size: five or six months afterward the motions of a child were distinctly felt in it. The pregnancy progressed: having arrived at its termination, the woman could not be delivered naturally: the operation of hysterotomy was performed, and a living child extracted. The mother survived only twenty-five days. Doring adds, "I have seen this child, now two years old, in this present year of 1612. It is strong, but small for its age. On the right of one of the eyes, on the forehead, is a certain cicatrix, proceeding undoubtedly from a small wound made when performing the Cæsarean section."

The same Doring, in a second letter to Hildanus,‖ relates the following case: "There was a poor woman at Niesse, a town of Silesia, who cohabited fifteen years with her husband, and had by him nine children. In her first labour she was abandoned by the midwife and assistants, on account of her great impatience, and peevish temper, so that she was delivered without any help; and she was well aware that there was something wrong in her belly, although she had children afterward, with natural and fortunate labours. But soon after the embarrassment left by the first parturition, she several times felt as if something wanted to escape from her belly by the left groin, which was pretty large; being in trouble, she first consulted her husband, and then some women, who advised her to put her trust in God. Nevertheless, the tumour increased daily, so as to resemble a bull's bladder distended with wind, and became so large as to descend to her knees; by other signs it was afterwards found that it contained a child; she suffered great pain either in the sitting or recumbent position, being obliged to move the sac from side to side, in order to obtain relief. The time of her delivery being near, the town council, on account of her poverty, took care of her, and placed her in the hands of skilful physicians, surgeons and midwives, who, after mature deliberation, saw that there was no chance for a delivery per vias naturales, and that the mother and child could only be saved by opening the tumour; this opinion was communicated to the poor woman, in which she willingly acquiesced: the tumour was opened, and a healthy child extracted with some difficulty. The mother died in three days after the section, after suffering acute agony, and the child lived for six months."

Can the uterus, when distended by the product of conception, protrude, and form a hernia? Although Sponius¶ and Ruysch have given cases of this accident, we cannot consider the facts related by these authors as belonging to hernia, properly so called: they seem to us to constitute an actual eventeration, owing undoubtedly to a separation of the linea alba, since the mere elevation of the tumour suffices to reduce it, and that, without any other assistance, the delivery was terminated per vias naturales.

Causes.—The predisposing causes of hernia of the uterus are the relaxation of the ligaments of the organ, that of the natural apertures of the lower belly, the weakening or contusion of the linea alba, or of the abdominal muscles. The active or proximate causes, are all violent efforts, or the existence of an old rupture.

Signs.—They are as follows: this hernia generally occurs in the most depending part of the abdomen; it appears under the form of a hard tumour, more or less voluminous, pyriform, with a pedicle narrowed toward the rings or the belly. This tumour, according to the healthy or morbid state of the uterus, is very painful, or has but little sensibility. In all cases, strong compression occasions suffering, and sometimes fainting. It might be mistaken for omental or intestinal hernia, but will be easily distinguished by its greater hardness. By the touch we find the vagina elongated, contracted, and turned toward the tumour: when the hernia is complete, the os tincæ disappears, or its lips alone are engaged in the aperture which affords it a passage. In cases of conception, the progressive augmentation of the tumour relatively to the development of the uterus at different periods of pregnancy, the motion of the fœtus about the fourth or fifth month, and the stethoscopic signs leave no doubt as to its nature.

Prognosis.—If the hernia is simple, if it occurs in the unimpregnated state, the prognosis is generally favourable; it is more serious, if it is complicated by the presence of a portion of the bladder, omentum or intestine, if there are adhesions, if strangulation be threatened, or if the woman is not beyond the age of child-bearing: it is very unfavourable if the woman has conceived, and at the same time the hernia is irreducible.

Treatment.—It consists, 1st, to reduce the hernia if possible, and to keep it in that situation; 2d, to operate if there is strangulation; 3d, to perform hysterotomy, if, the woman being pregnant, the child cannot be expelled per vias naturales. Consequently, we must endeavour to reduce the tumour by placing the patient in a suitable position, and by the gentle use of the taxis. When once restored, it should be maintained in its place by a truss. When the reduction is impossible on account of the adhesions, size of the tumour, or any other cause, it must be supported by a napkin, a suspensory bandage, or any other appropriate means, unless symptoms of strangulation

* Traité des Maladies Chirurgicales, tom. ii. p. 305. Paris, an. iv.
† Troisième année, p. 323, in-8. Paris, an. viii.
‡ Tom. v. p. 1, et seq.
§ Observations Chirurgicales de G. Fabri de Hilden. Obs. c., p. 456.
‖ Observations Chirurgicales de G. Fabri de Hilden. Obs. ci., p. 465.
¶ Vide Morgagni, Epist. 43, § 14.

should supervene; the operation should then be performed, as in any other hernia. If, notwithstanding this displacement, the woman has conceived, it should be reduced, if possible, before the size of the uterus prevents its return; and when the reduction is impossible, we must content ourselves with the palliative means above indicated, and wait for the pains of labour to perform the Cæsarean section. It is true that this operation offers but little hope for the mother, but it is our ultima ratio in these distressing circumstances.

SECOND CLASS.

Displacements of the Uterus which occur in the cavity of the Pelvis.

The displacements of this class are more numerous and frequent than those of the preceding: they may be referred to the three following heads: 1st. Vertical depression, whence result, the relaxation, descent, fall, or prolapsus of the uterus, which are only three degrees of one and the same disease. 2d. Inclination in four opposite directions, forward, backward, and laterally, designated by the names of anteversion, retroversion, right or left obliquity, or latéversion. 3d. Introversion or inversion properly so called, in which the uterus, pressed upon itself, passes through its own cavity, and may be compared to the finger of a glove turned inside out.

ARTICLE I.—DEPRESSION, DESCENT, FALL OR PROLAPSUS OF THE UTERUS.

We distinguish by the following names, *uteri relaxatio, uteri prolapsus aut procidentia, uteri precipitatio,* three degrees of one and the same disease, which consists in the vertical depression of the uterus. When this organ, impelled by the contractions of the abdominal parietes, yields to the pressure of the viscera, and remains more or less deeply plunged into the vagina, it is said to be *depressed or relaxed;* when the os uteri projects externally, there is a *descent or procidentia of the uterus;* lastly, when this organ has escaped through the vulva, and appears between the thighs of the woman, there is said to exist a *fall or prolapsus of the uterus.*

This disease was known to the ancients. Hippocrates* speaks of it, but it is only in modern times that the affection has been properly studied and accurately described.

Relaxation, descent or prolapsus of the uterus may happen at all periods of life; they rarely occur in girls, but very frequently in women, and especially in those who have had several children. They may happen in the various conditions of the uterus, and are often observed when the organ is empty. Women are not exempted by pregnancy; sometimes these displacements occur at the very moment of parturition; sometimes they are the consequence of affections seated in the uterus itself, or in the adjacent organs.

We have said that these displacements might occur at all periods of life, and in the different states of the uterus. The following cases will illustrate our remark:

Chopart quotes† from Marrigue, a surgeon of Versailles, the history of a girl, fourteen years of age, who, whilst she was menstruating, threw a bundle of herbs over a wall. At that instant she felt a crepitation in her belly, and perceived that a tumour had formed in the sexual parts. She experienced great pain, but did not complain; gradually became accustomed to the inconvenience, and recovered her health and freshness. The tumour increased, and insensibly became as large as a goose's egg. At twenty-two years of age she was married to a peasant, who, honest fellow, thinking all women were made like his, endeavoured, for twenty-one years, to make her a mother. At the end of this period, the os uteri having dilated, conception took place; but when the moment of delivery arrived, the hard, callous edges would not yield sufficiently to allow the child's head to pass. When Marrigue saw her, the labour had lasted for more than twenty-four hours: the child was dead, the woman moribund. Two incisions were made in the os uteri, which allowed the extraction of the fœtus. The woman recovered, and was perfectly well ten years after the accident. This case is very remarkable, both as regards the period of the prolapsus, and the circumstances of the pregnancy and delivery.

Paul Portal‡ says that he was desired by a midwife, on the 14th of January, 1666, to see a patient between whose thighs and in the place of the organs of generation there was an enormous tumour, of the size of a foot-ball, which contained a child. Inferiorly in the centre of this tumour there was a slit of a half line in length, which distilled a sort of mucous serosity or humour. The patient, pregnant for the first time, had been long subject to a relaxation of the uterus: during the whole period of utero-gestation she had been free from this malady, and it was only the preceding evening, in consequence of violent efforts during the pains, that the tumour had appeared. In so extraordinary a case Portal called Moreau, surgeon of the Hôtel-Dieu, in consultation. After a careful examination of the tumour, they agreed to slowly dilate the os uteri by the introduction of a blunt silver probe, then the index, and successively the other fingers, in order to form a *speculum matricis* more natural than one of iron. By taking advantage of the contractions of the uterus, and this proceeding, they succeeded in dilating the os uteri so as to allow the passage of a healthy child, which lived two years. After her delivery, Portal reduced the uterus. The woman experienced no bad effects; she recovered, but never had any more children.

Causes.—They may be divided into proximate and remote. 1st. The *remote or predisposing causes* are, a delicate lymphatic constitution; laxity of the ligaments of the uterus; frequent deliveries, especially a recent accouchement; a very large pelvis; a laborious life; rapid emaciation, etc.: certain trades, such as that of the laundress, the fruit or fish woman, who to the erect position add the exertions necessary to spread out their linen, raise heavy burdens, and cry their merchandize, and carry before them a flat basket of which the pressure on the abdomen tends to thrust the viscera into the cavity of the pelvis. 2d. Among the *proximate causes* we may include all the efforts which have a tendency to contract the abdominal cavity, such as singing, crying, the agitation produced by dancing, jumping, jolting in a vehicle without springs, riding on horseback, violent exercise, a fall on the feet, difficult defecation, etc., and a polypus or any other tumour developed in the uterus or abdomen.

When procidentia uteri occurs during labour, it is when the woman, left to herself, or assisted by inexperienced persons, remains

* De morbis mulierum, liv. ii. c. 37, 38, 39.

† Traité des Maladies des Voies Urinaires, nouvelle ed. Paris, 1830, tom. i. p. 389.

‡ Loco citato. Obs. x. p. 68.

for a long time in the erect position, and makes violent efforts to effect the delivery before the dilatation of the os uteri is completed. The application of the forceps when the os tincæ is not sufficiently dilated, imprudent traction on the cord when the placenta is not detached, may also occasion it. Women are most liable to these displacements in the first five or six weeks succeeding delivery. The uterus, which has been distended by the product of conception, yet filled with fluids, and as it were hypertrophied, is larger and heavier than in the natural state; the ligaments which have been stretched have not recovered their usual length nor force. Therefore, if, on the one hand, there is a greater weight in the organ to be supported, and, on the other, more laxity in the supporting ligaments, we can easily learn how a cause insufficient under ordinary circumstances to effect a displacement may produce it in the case just mentioned. For this reason women cannot be too earnestly requested to preserve the horizontal position, and refrain from all severe labour for the first five or six weeks after delivery. These considerations, and many others peculiar to the state of the lying-in woman, undoubtedly induced the great Jewish legislator to enact the law which prevents a female from leaving her home and presenting herself at the temple for purification until the expiration of forty days. If the examination of the laws of Moses did not lead us away from our subject, it would be easy to show that this is not the only case in which this physiolosophical physician, called upon to govern an ignorant and superstitious people, had the good sense to establish as religious precepts the simple rules of hygiene.

Signs of the first degree.—In the first degree of relaxation the symptoms do not appear suddenly, but gradually: the woman complains of as light sensation of weight toward the anus and vulva; a dragging in the groins and lumbar region; the os uteri much lower down than natural, rests on the vagina, rectum, or bladder, and irritates these organs; a serous whitish or greenish yellow discharge ensues; the patient emaciates and loses her freshness. When the discharge has lasted for a long while, if the woman be not very cleanly, it adheres to the parts, becomes changed in its nature, acts like an irritating substance, occasions pimples, excoriations, and ulcerations, sometimes very obstinate. This first stage may be confounded with an incipient pregnancy, an elongation of the neck, or a polypus.

In incipient pregnancy the uterus is naturally lower than in the unimpregnated state, and, although it occasions some disturbance in the functions, it produces none of the symptoms just enumerated.

In an elongation, the neck, which in the natural state projects out five or six lines into the vagina, in some women becomes an inch in length. This disposition, more common than is generally supposed, may be a source of error. To Lallemand is due the credit of having excited attention to this malformation. We cannot, however, be mistaken, if we remember that, in elongations of the neck, the organ occupies its usual place: that there is no dragging in the groins nor in the lumbar region, nor any of the symptoms of depression, with the exception of tenesmus or stranguary, which may occur in both cases.

Polypus may be mistaken for procidentia, for the former is generally elongated, pedicellated, and bleeding; but if it be carefully examined, we do not find the fissure observed in the neck of the uterus. Another distinguishing mark may be drawn from the shape of the tumour: in polypus the larger extremity is inferior and the pedicle superior; the contrary obtains in procidentia. In 1832 we saw, however, in a young lady of twenty-two, sent from the country with a supposed procidentia, a polypus of equal size throughout its whole length, and which we removed by ligature. Lastly, we may state that polypus is insensible, whilst the uterus is frequently painful.

Signs of the second degree.—The symptoms of the second degree, or descent, are, properly speaking, an exaggeration of the first; in addition, the neck appears at the vulva, projects between the labia pudendi, or rests upon the perineum. The uterus compresses the bladder and the rectum, embarrasses the flow of the urine and excretion of the fæcal matter, and may even occasion obstinate constipation or retention of urine. The hand applied to the hypogastrium will ascertain the vacuum left in the pelvic excavation.

Signs of the third degree.—In the third degree, or in the *precipitation*, the uterus protrudes from the external parts. All the symptoms above described are exalted to their highest point, except the difficulty of defecation and urinating, which is generally less than in the second degree. The woman walks bent forward, assumes the erect position with difficulty; the uterus hangs between the thighs, its small extremity directed downward, exhibits a transverse fissure which is the orifice of the neck. From this orifice there flow continually mucous, and at the menstrual periods bloody discharges: the organ is covered by the inverted vagina, which contains not only the uterus and its appendages, but frequently the inferior wall of the bladder, and sometimes a portion of omentum or intestine. When the disease is of long standing, the mucous membrane of the vagina loses its moisture, becomes rose-coloured, dry, and resembling the skin; such cases have been mistaken by ignorant or inaccurate observers for hermaphrodites. Saviard has related* the history of Marguerite Malaurd, sentenced by the authorities of Toulouse to wear a man's dress, under penalty of corporal punishment. Her situation was exceedingly distressing. In 1693 she exhibited herself, for gain, in Paris. Some physicians, excited by curiosity, went to see the pretended hermaphrodite; they spoke to Saviard, who on examination recognized the disease, reduced the prolapsus, notwithstanding its long existence, and restored Marguerite to her true sex: but a royal ordinance was necessary to restore her to her civil rights.

The evil does not cease here; in time, phenomena more serious supervene. In consequence of the friction of the thighs, and clothing, the passage of urine and fæces, the surface of the tumour is inflamed and excoriated: ulceration follows, and the patient becomes an object of disgust to herself and to her assistants. In October, 1835, we saw, with our excellent friend M. Chomel, a farmer's wife who was in this distressing condition. Eighteen months previously, we had reduced the displacement of the uterus, which was now irreducible. In this woman, the precipitation of the uterus is symptomatic, and results from an encysted ovarian dropsy, which having acquired an enormous size, fills the whole belly, the pelvic cavity, thrusts the vagina and uterus externally, and in addition, causes prolapsus ani.

In some cases, the inflammation may run so high as to produce gangrene, and separation of the uterus. Rousset relates, in his work de Partu Cæsareo,† the history of a woman in whom the uterus, for a long time prolapsed, became gangrenous and separated, in 1574, at the moment she happened to be passing her urine. The cure was effected by the efforts of nature alone: the edges cicatrized separately, and left a communication with the abdomen. When the woman was in the erect position, and the wind blew hard, she felt a sensation of cold in the belly. Having died in 1577, during the absence of Rousset, he obtained permission from the magistrates to exhume the body; and

* Recueil d'Observations Chirurgicales. Obs. xv. p. 57. Paris, 1784.

† Caput vi. Historia ii. p. 467. Apud. Gynæciorum, etc. Spachii. in fol. Argentinæ, 1597.

on examination of the corpse, in the presence of several surgeons, no trace of a uterus or its dependencies, could be found between the bladder and the rectum, but there was an aperture through which the handle of a large scalpel could be passed without difficulty.

Complete inversion of the vagina, with thickening of the parietes, sometimes leads to the supposition of the affection being a procidentia of the uterus. Morgagni has long since pointed out this source of error:* he says, that a displacement of this nature has been described and figured by the celebrated Will. Widman, who found it formed of the internal coat of the vagina alone. He also states that some distinguished surgeons thought they had removed the uterus, whilst they had only dissected off a portion of the vagina. This pathological disposition has been observed in many autopsies at the Salpêtrière. Morgagni recommends as a diagnostic measure, the introduction of a probe into the fissure at inferior part of the tumour: if the probe penetrates to a greater depth than that of the uterus, it is a proof that the affection is an inversion of the vagina. This plan does not appear to us to have much value, because the probe may be arrested between the vagina and os uteri, and not penetrate the cavity of the uterus. The volume, form, degree of resistance, and sensibility of the tumour, are signs more able to dispel error, but the very best means is the exploration of the vagina, by the finger, when this is possible, because it ascertains the distance to the os uteri.

Prognosis.—This varies according to the degree of displacement, the age and constitution of the subject, the configuration of the pelvis, whether she be a virgin or not, and has had several children, or none at all. All other things being equal, it is more favourable if the disease is recent, the woman young, and a virgin, if the pelvis has moderate dimensions, and the patient belongs to a family in easy circumstances; lastly, if relief is promptly administered.

Treatment.—The treatment consists in restoring the uterus, and maintaining it in situ, either by a proper position of the woman, or by supporting the uterus, by means of sponges and pessaries. The indications vary with the degree of displacement, its simplicity or its complications. Thus, when the disease exists in the first degree, is simple, recent, and the woman young and of good constitution, it is generally sufficient to keep her in a horizontal position: to prescribe the use of tonic and slightly astringent injections, cold baths in running water, and douches on the groins and lumbar region.

When inflammation exists, it is often useful to combat it by means of venesection, leeches, baths, and emollient applications, before attempting the reduction.

Whatever may be the degree of the malady, the inflammatory symptoms being once dispelled, the uterus must be reduced. To effect this, the woman is laid on her back, the legs flexed on the thighs, and the latter on the pelvis, the head slightly inclined forward, the breech elevated and supported on a cushion. The uterus is then thrust back by the introduction of one or two fingers into the vagina. The reduction is pretty easy when the neck has not protruded from the vulva, but is more difficult when the organ is completely displaced, and the parietes of the vagina are hard, thick, and callous, or when they contain a portion of omentum or intestine: the tumour must then be gently compressed, and pushed slowly upward, in order to restore it to the pelvis. A chronic engorgement, pimples, or superficial ulcerations, do not contra-indicate the reduction: these accidents, resulting generally from the displacement, cease with its reduction, but we should be careful, according to the advice of Boyer, to cover the vagina with some fatty substance, in order to prevent the natural adhesion of its parietes, and the points where the pessary, employed to support the uterus, does not separate them.

The uterus being reduced, it must be kept in situ: when the relaxation is of the first degree, we have said that long continued rest in the recumbent position would suffice. But, when it is complicated with inflammation, it is proper to prescribe emollient injections, thin cataplasms of flaxseed meal, or crumbs of bread, or of wheat or rice flour and milk thrown into the vagina, by means of a syringe, and retained there by a bandage or napkin. In the course of a few hours, they may be washed out by emollient and tepid injections. When the inflammation is removed, we make use of injections slightly astringent, in order to give tone to the parietes of the vagina. Injections of pure cold water, or else mixed with white wine, a small quantity of alcohol, some drops of a solution of acetate of lead, a strong infusion of red rose leaves, are well adapted to this purpose. In soft lymphatic women, whose vagina has been distended by frequent deliveries, we are obliged to resort to decoctions of tan, peruvian, or pomegranate bark, or of the root of the krameria.

Among the remedies useful in this affection, may be reckoned cold baths, sea-water baths, douches with the gelatino-saline waters of Plombières, alone or combined with the sulphurous waters of Barèges, directed over the inguinal rings and loins, in order to strengthen the broad and anterior ligaments of the uterus.

Pregnancy is also a valuable means to prevent the return of the disease: when a woman is not beyond the period of child-bearing, the physician may advise a new pregnancy, but, on condition, that during the first three or four months, she will observe the most absolute rest, in a horizontal position: the reason is easily understood. Until this period, the uterus is not sufficiently large to remain above the superior strait, and falls easily into the lesser pelvis: but after the fifth month that danger is passed, and the patient may rise, remembering never to exert herself so much as to produce fatigue. During the last stages of utero-gestation, and at the time of labour, she must by no means preserve the vertical position. At the very commencement of labour she must lie on her back; the membranes should not be ruptured until the os uteri is perfectly dilated; the uterus must be supported by a finger introduced into the vagina until the head has escaped from it, in order that it may not accompany the latter; and the woman must not make any violent efforts of expulsion.

By using all these precautions, and keeping the woman for five or six weeks afterward in the horizontal position, we will prevent the return of the disease.

Although the vertical displacements of the uterus do not compromise the life of the woman, the uneasiness they occasion is so great, that she is often willing to be relieved at any price. A few years ago, Mr. Marshall Hall cured a procidentia uteri by removing from the mucous membrane of the vagina, throughout its whole length, a strip of one and a half inches in width, and uniting the wound by the interrupted suture. The operation was successful. Since then, it has been equally fortunate in the hands of MM. Velpeau and A. Bérard.

We omitted designedly speaking of sponges and pessaries, because we intend to defer the consideration of these means, until after the history of the other displacements of the uterus, to which they are equally applicable.

* Epistola Anat. p. 45.

ARTICLE II.—RETROVERSION OF THE UTERUS.

We designate by the term *retroversion* a displacement in which the uterus, resting more or less horizontally in the pelvis, has its fundus directed toward the sacrum, and its neck toward the pubes. In order that this displacement can take place, the uterus must execute a see-saw motion, in which the fundus passes over the concavity of the sacrum from above downward, and from before backward, and falls as low as the adjacent parts will permit; whilst the neck approaches and mounts up behind the symphysis pubis, describing, but in a contrary direction, a curve analogous to that traversed by the fundus.

This displacement, much more common, and, judging from our own observations, in some cases more serious than procidentia uteri, has only been understood since the middle of the last century. Although we find in Hippocrates and in the writings attributed to Aspasia, passages which might lead to the supposition that this disease was not unknown to the ancients, they are so vague and diffuse as to apply equally to any other displacement of the organ. A French surgeon named Gregory, in a course of lectures on midwifery, which he delivered in Paris about the middle of the last century, first pointed out this mode of displacement, and attracted the attention of practitioners. Some years afterward, in 1754, Walter Hall, a surgeon of London, who had attended Gregory's lectures, afforded the celebrated William Hunter the first opportunity of observing this affection.

The history of the case is as follows:* "A young English woman, in the fourth month of pregnancy, received a fright, which produced syncope. She afterward experienced great difficulty in defecation and urinating: this difficulty increased during the following days. Seven days had elapsed when Walter Hall was called in; he introduced the catheter, and drew off about three pints of urine. He then endeavoured to administer an enema, but could force very little fluid into the intestine. On an examination per vaginam, he found an enormous tumour, which compressed this organ against the internal surface of the pubes. He could find neither the neck nor the orifice of the uterus. By introducing the finger into the rectum, he found the same tumour pressing against the coccyx. This disposition recalled to his mind the observations of Gregory on retroversion of the uterus. He endeavoured, in vain, to replace the viscus, and desired William Hunter to visit, with him, the young lady, now much debilitated. Hunter introduced his finger into the vagina, removed the tumour from the pubes, and gave issue to a large quantity of urine. Having placed the patient on her hands and knees, he endeavoured to push the fundus of the uterus upward by means of two fingers in the rectum, whilst with two fingers of the other hand in the vagina, he endeavoured to draw the neck of the organ downwards. His endeavours were unsuccessful, and the patient died on the following day.

"On opening her body, the bladder, distended by the urine, occupied nearly the whole of the anterior region of the abdomen. The uterus, inverted in the pelvis, formed a round tumour which elevated the neck of the bladder; the os uteri was on a level with, and rested on the superior margin of the pubes; the fundus, directed downward and backward, compressed the rectum near the anus. The inverted and swollen uterus was incarcerated in the pelvic cavity, to such a degree, that it was necessary to divide the symphysis pubis, in order to straighten it."

From this case Hunter engraved the four figures of the twenty-sixth plate of his magnificent work, entitled "Anatomia uteri humani gravidi, tabulis illustrata."†

The impossibility which Hunter experienced to elevate the uterus caused this distinguished surgeon to ask himself if, in a similar case, it would not be proper to puncture this viscus through the posterior wall of the vagina, in order to evacuate the liquor amnii, and diminish its volume? We shall presently give our opinion of this precept, which has, since his time, been frequently acted upon in analogous cases.

Desgranges, a surgeon of Lyons, in a prize essay read before the Royal Academy of Surgeons, in 1785, added new cases of retroversion to those which had appeared in Germany, England and France, since the publication of the observations of Hunter. This essay was not printed, and is said to be lost among the archives of the Academy.

The attention of surgeons being once directed to this point, cases have multiplied ad infinitum. Most modern writers on the diseases of women, have related additional facts, and it now may be said to be one of the diseases which are best understood.

Synonyms.—Different names have been given to this displacement. Gregory called it *inversion.* Levret proposed to designate it by the name of *transverse inversion*, to distinguish it from that in which the uterus turns on itself, like a stocking or cotton night-cap. The term *retroversion*, given to it by W. Hunter, has remained in use, and is most appropriate, as it indicates the direction taken by the organ in its displacement.

Causes.—The causes of retroversion are remote or proximate. Among the former we may include largeness of the pelvis, relaxation of the round and broad ligaments, in consequence of repeated pregnancies; a weak and delicate constitution, certain social conditions; lastly, nearly all the causes which we have enumerated amongst those of procidentia uteri.

The proximate causes are all those which increase the pressure of the abdominal viscera on the fundus, and anterior surface of the uterus, either by acting directly, as the simultaneous contraction of the abdominal muscles and diaphragm; or indirectly, as a strong pressure by a voluminous body applied to the anterior region of the abdomen. Desgranges, of Lyons, related a case in which the retroversion appeared to have been effected by a small kettle full of wet linen, which a woman was supporting on her belly. Crying, efforts at vomiting, straining at stool, or in passing water, etc., may produce the same effect. Baudelocque knew a woman who was obliged to push back her uterus with her finger, whenever she wished to urinate. One day she pushed it too roughly: she felt something wrong in her belly; the uterus was retroverted.

This displacement may be congenital or accidental; in the former case, it is joined to another malformation. A case of this kind fell under our notice, in the lying-in hospital of Paris, in a little girl affected with exstrophy, in whom the posterior wall of the bladder, protruding through the separation of the pubes, carried with it the anterior wall of the vagina; the latter in its turn, elevated the neck of the uterus in the same direction, and produced a complete congenital retroversion. When retroversion is accidental, it may happen to

* Medical Observ. and Inquiries, vol. 4, p. 461

† Londini, 1774, large folio.

virgins as well as to pregnant women. We are surprised that Boyer, whose experience was so great, has stated that it scarcely ever occurs in the former. We have observed it much more frequently in the empty uterus than during pregnancy, where it can only take place in the first four or five months, never beyond that period, for then the longitudinal diameter of the uterus being greater than the antero-posterior diameter of the superior strait, it becomes impossible.

Retroversion may occur slowly, gradually, successively, or else suddenly, as in the cases related by Hunter, Desgranges, Baudelocque, etc. In June, 1823, we were desired to visit the wife of a storekeeper, who, vexed at the slowness of one of her clerks, seized a fifty pound weight to put it into the scale of a balance; immediately she experienced acute pain in the belly, was attacked with lipothymia and vomiting, and I found her, on my arrival, in a state of extreme agitation and anxiety. She complained of weight and pain about the anus, accompanied by desire and difficulty to urinate, and an impossibility to go to stool. On examination, we discovered a round projecting tumour between the rectum and posterior part of the vagina. A closer scrutiny convinced us that it was formed by the uterus, of which the neck was directed upward and forward, and the body backward and downward; the retroversion was as complete as possible. The displacement was easily reduced, as it had existed only two hours; the symptoms ceased immediately; a few days' rest in a horizontal position, alternately on the belly and sides, were sufficient; and, from that time, the woman has felt no inconvenience resulting from the accident.

Signs.—The signs by which we may ascertain the existence of retroversion are of two kinds; that is, some which are common to other displacements, and others which are peculiar or proper to this alone.

The common signs are the following: when it occurs slowly and gradually, the woman experiences a sensation of uneasiness in the hypogastrium, and of dragging in the groins and lumbar region; and she complains of a weight on the rectum. The excretion of urine and fæces is performed with difficulty; it is irksome to her to stand erect, she is more comfortable in the recumbent position; in short, she presents, in one word, the symptoms of relaxation.

The signs proper can be known only by an examination by the touch. By introducing a finger into the vagina, if the displacement is inconsiderable, and the uterus has not yet acquired the horizontal position, the neck will be found near the canal of the urethra and fundus, merely inclined backward; in a more advanced degree, the neck is near the fundus of the bladder, and the fundus uteri, in the concavity of the sacrum; the organ is then horizontal: lastly, in a third degree, the neck is turned directly upward, and the fundus is on a level with, or even below, the point of the coccyx. In order to appreciate the extent of the displacement, we must not always refer to the position of the neck: it may be in its natural situation, and yet the retroversion be as complete as possible, in consequence of a flexure of the organ at the point of junction of its neck and body; a curve which has been compared to that of a retort. This displacement is very interesting to study, for it is much more difficult to reduce.

Accidents.—When retroversion occurs in the empty state of the uterus, and progresses slowly, there are few accidents to be feared. We have even met with women who had been thus affected for a long time, and experienced so little uneasiness as to be scarcely conscious of the existence of the disease. This is not the case when retroversion happens suddenly, or at the commencement of pregnancy. Numerous and sometimes dangerous accidents may then supervene. In pregnancy, it happens, that the uterus, embarrassed in its development, becomes irritable, contracts, and expels prematurely the product of conception. This cause of abortion, which I have found nowhere mentioned as an accident of retroversion, is not unfrequent; several cases have occurred in our own practice, as well as in that of some of our friends, which could be attributed to no other cause.

At other times, the product of conception continuing to increase, the uterus impacted in the pelvis becomes engorged, swollen and inflamed, compresses the adjacent parts, impedes the flow of urine and discharge of fæces, and produces retention of these excretions. If we do not soon give exit to these excremental substances, their accumulation in the reservoirs containing them aggravates the disease and occasions accidents still more serious. The posterior wall of the distended bladder projects backward, presses on the anterior surface of the uterus, pushes it in the same direction, and prevents its elevation. The matters accumulated in the upper part of the rectum and in the sigmoid flexure of the colon, weigh on the fundus of the uterus, and tend to depress it still further. Under these circumstances, the distension of the bladder may produce rupture, inflammation or gangrene of this viscus. John Linn relates the history of a rupture of the bladder with gangrene caused by a retroversion, and followed by fatal effusion, it being impossible to reduce the displacement, and the patient refusing to submit to the operation of puncturing the bladder.*

The accumulation of fæces in the intestine occasions so imperious a sensation of tenesmus, that the woman makes immoderate exertions to expel them. These exertions may, in some cases, rupture the vagina, and precipitate the fundus uteri through the vulva. This actually occurred in the following case, communicated to our colleague and friend, Professor Dubois, by Dr. Mayor (of Lausanne).

S. G———, a countrywoman, thirty-two years of age, of limited intellect, the mother of three children, with the last two of which she had been attended by her stepmother, who possessed no knowledge of midwifery; in the third and a half month of an ensuing pregnancy was attacked, on the 7th November, 1836, with fugitive pains, which, though not sufficient to prevent her from going out and doing the hard work incidental to her station, gave her so much uneasiness as to induce her to remark, "that perhaps she would be dead to-morrow."

On her return home, on that day, about 8 o'clock, P. M., she went to bed, and was seized with acute pains in the belly and loins, which her stepmother considered as the forerunners of a premature delivery. It was now 9½, P. M.; at 10½, the husband, in assisting his wife, perceived a tumour projecting from the sexual parts. Alarmed by her sufferings and the flooding, he sought more skilful assistance, and immediately went himself for the midwife from M———, a neighbouring village. She arrived in an hour, and found an enormous tumour protruding from the vulva, and such an unnatural state of things, that she desired the instant attendance of an accoucheur. The husband ran for M. C———, who reached the house at 3½, A. M.

* Sabatier, Médecine Operatoire, tom. i. p. 394. Paris, 1796.

After examining the tumour, the surgeon ascertained that it was the uterus in a complete state of retroversion, and hesucceeded in reducing and restoring it to its natural situation; but the woman, already exhausted, lived only an hour after.

The death might have been unnoticed, as one of those events which sometimes succeed abortion, or flooding, if public clamour had not attributed it to foul play.

On the 10th, at 3 o'clock, P. M., fifty-seven hours after death, MM. M——— et C———, two well-informed and distinguished surgeons and accoucheurs, were appointed to make the autopsy. The following is an extract from their account:

"The external genital organs presented no remarkable appearance; but, being slightly opened, they displayed, at the depth of two lines, in the direction of the fourchette, a fringed or jagged wound. To the touch, the vagina appeared smooth, and the finger could be carried to the os uteri, resting on the pubes, closed and not engorged. The vagina was very lax, and the body of the uterus easily elevated.

"We opened the abdomen and divided the pubic bones, in order to examine accurately the organs contained in this cavity and in the pelvis. The bladder very large and flaccid, containing no urine, was elevated above the pubes, and appeared to have been distended; it presented otherwise no change, and partly covered the body of the uterus. This organ, of a pyramidal form, was six inches long and five wide; it was soft, flaccid, reddish, and exhibited a number of ecchymoses and small semi-circular lacerations resembling the marks made by the finger nails. Having observed a transverse wound, in the peritoneal wake of the pelvis, in front of the sacrum, we ascertained that, by means of this wound, there was a communication between the abdominal cavity and the posterior-inferior part of the vagina. Thus, there was an accidental canal, of which the superior orifice was formed by the rupture of the peritoneum, the inferior by the laceration of the vagina, and of which the middle portion occupied the lacerated recto-vaginal septum.

"Having pushed the body of the uterus through this upper aperture, we could hastily make it pass out by the inferior opening, near the fourchette, and there observed the position of the uterus, as seen by M. C——— during life. Having then replaced the organ, we divided the vagina at its anterior portion throughout its whole length, as far as the os uteri, which we found much elongated, closed, covered with a filamentous or gelatinous secretion seen in the first months of pregnancy. Penetrating the uterus, we examined the membranes yet unruptured, and extracted a fœtus and its appendages, of about three and a half months. We then opened the sac, and found the fœtus, with its umbilical cord, whole, and attached to the placenta, which was bruised and mashed. There were several ecchymoses on the fœtus, a large one on the occiput, and a still larger on the back.

"Having removed the body of the uterus, to ascertain more clearly the wound of the vagina, we found the lower fringed opening, at two lines distance from the fourchette, dilated to an extent of five inches. It ascended, increasing, along the recto-vaginal septum as far as the peritoneum, in which there was an aperture of seven inches in breadth. On each side were small semicircular lacerations like marks of the nails, with lateral separation of the peritoneum. The rectum was empty and uninjured, at least in its muscular and mucous tissues; the whole abdominal system was very pale, and its vessels contained no blood. Hence the physicians have concluded: 1st, that these lesions were mortal; 2d, that the woman G——— had perished from hæmorrhage and the pains which resulted from it; 3d, that the woman G——— could not have inflicted the lesions on herself."

This case having given rise to a judicial investigation, and the report of the inquest not appearing sufficiently clear, was sent, with the conclusions accompanying it and the following questions, to the Council of Health, on the 16th December, 1836:

"Is it possible that the deceased, J. G———, could have inflicted on herself the wounds and lacerations which were found? 2d. That she could herself have retracted the uterus? 3d. That the uterus could have protruded sua sponte? 4th. Was the hæmorrhage, as a cause of death, produced by these wounds and lesions?"

The Council of Health, after serious deliberation, returned a negative answer to the two first, and a positive to the two last questions.

This opinion, founded on an accurate investigation of the facts, appears to us to be the only one admissible, especially after the judicious reflections and developments of M. Dubois,* who, confining himself more to the spirit than to the letter of the questions, gave them the following form:

1st. Were the lesions observed the result of violence done by the woman J. G——— to herself?

2d. Did the lesions result from criminal violence exerted by others?

3d. Were the lesions the consequences of the natural efforts involuntarily made by the woman J. G———?

4th. Was the death of the woman J. G——— the result of these lesions?

The incarceration of the uterus, the tumefaction of its parietes, may occasion violent inflammation, accompanied by various nervous phenomena, frequently followed by gangrene, and sufficient alone to cause the death of the patient.

Prognosis.—From the preceding remarks we see that the prognosis is generally favourable when the retroversion occurs in the empty state of the uterus, and is very much the contrary when it is complicated with an incipient pregnancy, especially if the reduction cannot be effected at the proper period.

Treatment.—This consists in restoring to and keeping the uterus in its natural position. Before proceeding to the reduction, it is sometimes necessary to allay the symptoms which accompany this displacement. We have said that the incarceration of the uterus in the pelvis might produce retention of the fæces and urine, engorgement of the organ, and inflammation of the neighbouring parts. We must begin by evacuating the bladder, which is not always easily done, for the distended viscus rises in the abdominal cavity, carries with it the canal of the urethra, compresses it against the pubes, and makes it very difficult and sometimes even impossible to introduce the catheter. Therefore, when this cannot be performed, many surgeons, among them Sabatier, recommend the puncture of the bladder above the pubes, in order to prevent its rupture. Frequent enemata are necessary to assist the discharge of the stercoral matter, and sometimes they must be retracted by the finger, a spoon, or a scoop.

If there be inflammation of the uterus or adjacent organs, we must take blood in proportion to the patient's strength and the intensity

* Voyez Presse Médicale, tome i. p. 133, N. 20, 11 Mars, 1837.

of the disease, keep her in a bath for three or four hours, apply emollient cataplasms to the belly, and throw mucilaginous and oily injections into the vagina and rectum. These remedies should be continued until the cessation of the symptoms, and then the reduction may be attempted.

The first condition necessary to success is to give the woman a suitable position. The majority of authors recommend her to be placed on her elbows and knees, in order to diminish the pressure of the muscles and intestines on the uterus. We have several times tried this plan, and always been obliged to abandon it. Women cannot maintain this position for any length of time: on the first attempt at reduction the compression of the uterus causes them a peculiar pain, which we call enervating, because it destroys their strength and causes them to fall flat on the belly. This pain can only be compared to that which is produced by compression of the testicle. Under these circumstances we place the woman in the position for the reduction of hernia, the legs flexed on the thighs, the latter on the abdomen, and the head resting on the chest. Two fingers are then introduced into the vagina, the body of the uterus is pushed upward, and the index finger is hooked into the os uteri to draw it downward. This method generally succeeds in the most simple cases.

The reduction is sometimes exceedingly difficult, and for this purpose various means have been employed. It has been advised to introduce two fingers into the rectum, in order to push the fundus uteri upward, and two others in the vagina, to hook into the os uteri and draw it downward. We have frequently, but vainly, tried this plan, and are convinced that the simultaneous introduction of two fingers into the vagina and into the rectum is impracticable in the majority of well-formed women: when it is possible, it is only in those whose perineum has been ruptured, and even then if we succeed there is not sufficient space to operate comfortably and effect the elevation of the organ.

A surgeon of Lyons, Dussaussois, asserts that, in a case of retroversion, he was able to introduce his whole hand into the rectum. M. Parent also says that it may be done without very great pain, which to us appears difficult of belief. Baudelocque, in a similar case, introduced a pessary into the vagina, and was enabled to thrust the uterus upward.

The following plan has succeeded best in our hands: it consists in placing the woman on one side, and introducing a rod eight or ten inches long,* furnished at one end with a tampon of linen well greased, into the rectum in order to push the fundus of the uterus from below upward, whilst, with two fingers in the vagina, the os uteri is drawn downward and backward. This simple method originated with M. Evrat, and was devised by him more than thirty years ago in the following case. A woman in the fifth month of pregnancy was seized with some of the unpleasant symptoms which sometimes occur in cases of retroversion, with which she was affected. The attempts at reduction made by several physicians, among others Coutouly, had been ineffectual. M. Evrat, in the presence of his colleagues, placed the woman on her left side, introduced into the rectum a rod furnished with a linen tampon covered with cerate, then introducing two fingers into the vagina he seized the os uteri, and, moving his fingers and the rod in contrary directions, he restored, not without difficulty, the uterus to its normal position. Notwithstanding the tedious exertions used to reduce the uterus, the pregnancy was uninterrupted, reached its full term, and the patient was happily delivered of twins.

Although there may exist no complication, the reduction is sometimes impracticable; at others, it is on account of the adhesions of the uterus with the adjacent parts, as we have seen in old retroversions in aged women—or of the size and incarceration of the organ when pregnancy accompanies the malady. The two first cases are not dangerous. When the uterus is empty, and there are no adhesions, it is sometimes prudent not to persist in reducing it: in two cases in which we failed we have seen, as had been observed by Hunter, and other authors since his time, the displacement naturally and spontaneously disappear by repose, rest in bed, the horizontal position alternately on the sides and belly. In cases of adhesion we should refrain from all attempts at reduction, allay the urgent symptoms, if any exist, and leave the case to nature: the woman lives on as she did previously, with more or less suffering and uneasiness. When pregnancy occurs, we can no longer flatter ourselves with hope; the woman is exposed to the most imminent danger, and every plan should be tried for her relief. Consequently, when the attempts at reduction have been carried as far as prudence dictates, we should not hesitate to have recourse to extreme remedies. Under these distressing circumstances, Sabatier has recommended puncture of the bladder; Hunter, that of the uterus; Purcell, and afterwards Gardien, symphyseotomy or section of the pubes.

Puncture of the bladder can only be useful where the introduction of the catheter is impossible, and it would be frequently ineffectual, for the obstacle to reduction is less the distension of the bladder than the size, incarceration of the uterus, and the projection of the sacro-vertebral angle.

Puncture of the uterus through the posterior wall of the vagina, according to Hunter, is so serious, and its consequences so often fatal, that we should recommend it only after the failure of the attempts at reduction, or the evacuation of the organ per vias naturales, by means of a sound introduced into the os tincæ, and after having exhausted all other resources of our art. This operation has been only lately attempted. It was performed for the first time in September, 1811, by M. Jourel, at Rouen, and then by M. Viricel, at Lyons, in 1813, and in both cases was completely successful. We are acquainted with several operations of a similar nature, which have been attended with fatal results.

The circumstances attending the operations performed by MM. Jourel and Viricel not being the same, and as the first case might leave a doubt on some minds, we think it our duty to quote them both at length.

A woman twenty-three years of age, of a lymphatic temperament, having been several years previously delivered of a healthy child, experienced all the symptoms of a second pregnancy. Six weeks after their first manifestation, in consequence of a revelling bout, in which she was balanced and shaken by several men who held her suspended by her arms and legs, she was attacked by a discharge of blood from the vagina, pains in the groins and lumbar region, a sensation of weight in the perineum, difficulty in walking and going to stool. M. Jourel being consulted after the lapse of fifteen days, advised rest and slightly astringent drinks, and did not again see the patient for a month, during which she resided in the country. At the expiration of this time she informed him that the bloody discharge had ceased

* We employ for this purpose a rod terminating at one end in a sphere. This rod, smaller and more delicate than a drum-stick, receives and holds a tampon made of carded cotton, covered with a piece of fine leather, which can be removed after using it and a new one substituted.

only two days before, but that all the other symptoms had progressively increased, so much so that she had great difficulty in voiding her urine and fæces. She was relieved by means of a catheter and an enema. On the 13th of September, six days after the woman's return, M. Jourel recognized a retroversion of the uterus, emptied the bladder and rectum, and endeavoured, but in vain, to reduce the organ. M. Jourel and three of his colleagues attempted ineffectually to restore the uterus, or to empty it by introducing a catheter into the os tincæ, and then determined to puncture it. This operation was performed through the posterior wall of the vagina with a trocar, and about *a pound of bloody water evacuated.*

The uterus was not reduced: several unpleasant symptoms supervened, which were relieved by proper remedies: the excretion of urine was partly voluntary and *partly involuntary.* Eight days after the operation symptoms of adynamia came on, with a grayish and putrid discharge from the vagina, and an *involuntary and copious flow of urine in the vertical position.* On the 27th of September the neck became straight: on the 3d of October the organ recovered its size and situation: on the 10th the patient was well and went into the country: on the 25th of December the courses appeared, and she has since that time enjoyed excellent health.*

The great quantity of fluid discharged by the operation, the peculiarity of the excretion of the urine during the treatment, the complete absence of a fœtus, of membranes or placenta, or even of any detritis of these parts during or after the operation, might give rise to the supposition that a mistake had been made, and that the bladder had been opened instead of the uterus; but M. Jourel declares that no error was committed, and the reporters have suggested no doubts as to the possible dissolving of the fœtus and its appendages at so early a stage of pregnancy.

In the case of M. Viricel the puncture was made through the anterior paries of the rectum.

Philiberte Corlin, of Tourney, thirty-eight years of age, eighteen months married, in the fifth month of pregnancy, had experienced for about a month great difficulty in urinating, accompanied with violent colics. She was admitted into the Hôtel-Dieu of Lyons for retention of urine. On examination M. Viricel found a retroversion of the uterus; the index finger in the vulva could perceive a tumour through the anterior wall of the vagina: the latter was so strongly pressed against the symphysis pubis that the finger could scarcely be made to enter; it had a direction exactly upward, and the os uteri could not be felt. The bladder was emptied after a very difficult introduction of the catheter; the reduction was not attempted. The suffering of the patient permitting no longer delay, M. Viricel punctured the tumour with a curved trocar through the rectum. About half a pint of clear and inodorous serum was discharged; the belly decreased slightly; the woman was relieved, and experienced but little pain either during or after the operation. On the fifth day, about nine o'clock, A. M., after uterine contractions which lasted two or three hours, a well-formed dead fœtus, of about five months, was expelled. After the abortion the uterus recovered its natural position. After the lapse of a month she left the hospital with no other inconvenience than incontinence of urine, of which she was afterward cured.†

The operation of M. Viricel is perhaps preferable to puncture by the vagina. The development of the uterus during the first months of pregnancy being principally at the expense of the fundus and body of the organ, the parts in which the puncture is made are less dense and resisting than the neck, and on that very account are perhaps less exposed to the consequences of the operation. Moreover, in puncture by the rectum the aperture is made in the most depending part of the uterus, and most favourable for the discharge of the liquor amnii. The results of this method are not always so favourable: we might quote several unfortunate cases; the following, however, furnished to us by the politeness of Dr. Craninx, Professor of Midwifery at Louvain, must suffice.

Retroversion.—Puncture of the Uterus.—Death.—Mary Katharine Holling, of Villebringen, thirty-three years of age, a servant woman, tall and of a strong constitution, had never been sick. Menstruation, which first appeared at the age of fourteen, continued regular and natural. She was delivered twice by the efforts of nature alone, and in a very short time. When this woman entered the Hospital of Louvain, on the 20th of November, 1824, the menstrual discharge had ceased for three months, which circumstance, and the existence of nausea, made her think that she was pregnant. Toward the beginning of October, (about six weeks after the suppression of the menses,) she felt some uneasiness in urinating and in defecation. On the 15th of the same month, whilst at her work, she was suddenly seized, in consequence, as she said, of the impression of cold, with a pain in the hypogastric region, more severe than that of labour, accompanied by considerable tympanitis of the belly. She was obliged to go to bed, and suffered dreadfully all night. On the following day the tympanitis had nearly disappeared, and the suffering was diminished. As she had constipation and retention of urine, she consulted an apothecary, who directed her a purgative and some ptisan, probably diuretic. Alvine and urinary evacuations followed; but the uneasiness first felt at these times persisted. The symptoms being much aggravated, she entered the hospital on the 19th of November, in the following condition. Decubitis dorsal; flexion of the legs on the thighs, and the latter on the pelvis; countenance pale, anxious, and shrivelled; upper eyelids pendent; eyes sunken in the orbits; nostrils dilating at each inspiration; lips pale and dry; teeth fuliginous; speech feeble and interrupted; general emaciation; skin dry and hot; acute continual pain over the whole abdomen, increased on the slightest pressure, extending from the hypogastrium to the perineum, lumbar region, loins, and the upper and inner parts of the thighs; hiccough; frequent vomiting of a deep green clotted fluid; tongue red at the tip and edges, covered in its centre with a yellowish fur; bitter taste in the mouth; immediate vomiting of every thing swallowed; weak and accelerated pulse; respiration embarrassed, frequent, and costal; intellectual faculties unimpaired; complete retention of urine: the introduction of the catheter furnished a thick fluid, tinged with blood, and depositing a large quantity of purulent matter: the canal of the urethra is behind the pubes, in a direction almost vertical.

In order to confirm the diagnosis of a disease, the existence of which was strongly suspected from the enumeration of the symptoms, M. Craninx had recourse to touching.

By the vagina, he found the os tincæ on a level with the upper margin of the body of the pubes; its lips were soft, pretty thick, with a small round aperture between them, allowing the introduction of the finger. At the upper part of the vagina he felt a segment of a sphere formed by the uterus. This was as large as a child's head of full term.

* Bulletins de la Faculté de Mèdecine de Paris, tom. iii, p. 173.

† Finaz, Observations Chirurgicales Recueillies à la l'Hôtel-Dieu de Lyon. (Thèse, No. 78, p. 22. Paris, 1813.)

By the rectum, the finger came in contact with the same body, which rested on the intestine, and depressed so as nearly to obliterate it. The tumour occupied a great portion of the excavation of the pelvis.

The symptoms which had preceded those existing at the time of her admission into the hospital, and the exploration of the genital organs authorized the belief that there was, 1st, a pregnancy of three to four months; 2d, retroversion of the uterus; 3d, consecutive cystitis and peritonitis. The woman being placed in the most favourable position, M. Craninx introduced his fingers into the vagina and rectum, in order to restore the uterus to its natural position, but this attempt, as well as that with a sound in the os uteri, failed completely. The organ remained firm, as it were, impacted between the sacrum and pubes. He prescribed poultices, enemata, an anodyne draught, and leeches, to the most painful points of the abdomen. On the following day the same attempts were renewed, but with no better success. Then, puncture of the uterus appeared to be the last resource to replace this viscus, and save the mother at the expense of the child, if indeed this were not also hopeless. Professors Baud and Lauthier being of the same opinion, M. Craninx performed the operation immediately. In consequence of its inversion the uterus was so near to the vulva, that he used a common hydrocele trocar, which was plunged through the posterior wall of the vagina and uterus. A pint of fluid resembling the liquor amnii was instantly discharged, and the uterus diminished considerably in size. The patient experienced no pain, but said she felt relieved, and with the operator began to cherish some hope. Her countenance brightened and her pulse rose; the surgeon immediately after renewed the attempts at reduction. The uterus, reduced to one-third of its previous volume, was slightly displaced; the os tincæ was brought to a level with the pubic arch, and the fundus elevated a little. The patient was allowed emollient and slightly nourishing drinks. In the afternoon of the same day the pulse became small, the hiccough and vomiting returned, and became more frequent during the evening; the extremities grew cold, and death closed the scene about midnight.

Autopsy. On opening the abdomen, there were found traces of a general peritonitis: effusion, false membranes, adhesions, etc. There was a gangrenous aperture in the bladder, which adhered to the omentum. The uterus, nearly parallel to the superior strait, was precipitated into the cavity of the pelvis, and about the size of one's fist; its anterior surface was directed toward the abdominal cavity. The symphysis having been divided and separated from the pubes, the neck of the uterus was found on a level with the upper part of the pubic arch: the membranes were engaged in its orifice. The latter was about as large as a two-franc piece. The uterus contained a fœtus of three or four months, in the left occipito-acetabular position.* The fundus of the viscus adhered to the rectum, which, accidentally, occupied the right side of the pelvis. The antero-posterior diameter was four inches and four lines. The sacrum was a little less curved than usual.

We would remark that this case, if it were unique, would not militate against the puncture, for it was performed under the most unfavourable circumstances, and when the death of the patient was nearly certain.

Symphyseotomy.—This operation proposed by Purcell and Gardien,† was evidently suggested by the fact that Hunter was enabled to replace the uterus after death, after having divided the symphysis pubis. But should an experiment on the dead subject be tried on the living? We think not. Supposing that section of the symphysis be exempt from danger, or is less to be feared than puncture of the uterus, which is far from being proved, we could not be certain, after the operation, to preserve the pregnancy, or even to reduce the displacement; these considerations alone should cause us to reject this method.

The uterus being reduced, if the woman is pregnant, it will be sufficient to keep her in bed in a horizontal position, rather on her side or even on her belly, if possible, than on her back; to desire her to preserve absolute rest, until the uterus is large enough to render retroversion impossible, that is, until the end of the fifth month; to use no great efforts in urination or defecation; in a word, to avoid all causes which may produce the disease. If the attempts at reduction have been accompanied with much difficulty and violent efforts, and inflammation is to be feared, and, à fortiori, if it exists, we must have recourse to emollient fomentations, poultices, baths, venesection and other antiphlogistic remedies. Sometimes the difficulty or even impossibility of urinating remains after the reduction, owing either to the atony of the parietes of the bladder unnaturally distended, or to inflammation of its neck; in both cases, the catheter must be frequently introduced, as much to evacuate the urine, as to prevent a new retroversion.

When the uterus is empty, in addition to the preceding remedies and precautions, we must use sponges or pessaries of a peculiar shape, which we will hereafter describe, for of all the displacements of this organ, no one is so apt to recur. The use of shower, of fresh or salt water baths, the thermal waters of Plombières, of Barèges, and a fresh pregnancy, are most valuable adjuvants to the completion of a cure.

ARTICLE III.—ANTEVERSION OF THE UTERUS.

Anteversion is a displacement of the same nature as retroversion, but diametrically opposite to it. In anteversion, the uterus, lying horizontally in the pelvis, has its fundus directed toward the symphysis pubis, from which it is separated by the parietes of the bladder, which it depresses, whilst its neck is backward, more or less elevated in the concavity of the sacrum, resting against the posterior wall of the vagina, and immediately against the rectum.

The knowledge of this displacement dates only from the middle of the last century, and is due to the celebrated Levret, who called it *transverse inversion*, and thus expresses himself on this subject:‡

"Not one of the authors with whose works I am acquainted, so much as mentions it; at first, I did not understand it myself, like many others, but the examination of the body of a woman, who died in consequence of the high operation performed to extract a calculus supposed to be encysted in the bladder, opened my eyes; indeed, we found the uterus laying across the pelvis, the os tincæ resting on the middle of the rectum, and the top of the anterior part of its body on the bas-fond of the bladder, pushing the coats of this viscus before it, and making a projection in it internally; a projection which, during the life of the unfortunate patient, had been mistaken for an encysted

* First position of Baudelocque. Trans.

† Bulletins, tom. i. an 13 (1804), p. 36, et Traité d'Accouchemens, tom. i. p. 208. Paris, 1807.

‡ Journal de Médecine, Chirurgie, Pharmacie, etc., par M. A. Roux, (Septembre, 1773,) tom. xl. p. 269.

calculus, which could not be reached by the sound; this error was the more easily induced, as all the medical men who had seen her thought she laboured under the symptoms of stone in the bladder. The cause of this displacement was sought for in the corpse; none other could be found than a slight engorgement of the substance of the anterior wall of the body and fundus of this organ: the round ligaments were larger and shorter than natural.

"I proposed several questions to the assistants touching the commencement and duration of the disease; all that I could learn was, that the woman, thirty years of age, had never menstruated properly; that, more than ten years since, after a fall on her knees, she complained of difficulty in urinating and defecation, and that, although she never had had any children, she had frequently been thought to be pregnant, as much from the irregularity of her courses as from the pains she always felt in the lower belly, especially after being for some time in the erect posture."

This case having excited the attention of Levret, he soon after verified, in the living subject, the existence of this displacement, of which he has given two additional examples.

Anteversion, much less frequent than retroversion, like it, occurs more often in the empty state of the uterus than during pregnancy, when it is excessively rare. However, Chopart, according to Baudelocque, appears to have observed it in a woman in the second month: but as this case is unaccompanied by any details, we may fear that there was some error, and that the normal development of the uterus was mistaken for an anteversion: a mistake the more easily made, because the uterus, naturally inclined forward, presents, in the second month, a development sufficient to maintain it in the direction of the axis of the strait which it will follow in order to rise into the abdominal cavity. In this state, the development of the fundus uteri pushes the posterior wall of the bladder forward and downward, as well as the anterior wall of the vagina through which it may be already felt. If, under these circumstances, the surgeon be not well skilled in touching, and especially if the woman be erect, he will experience a sensation analogous to that produced by an anteversion. We are, nevertheless, far from denying the possibility of anteversion in the two first months of pregnancy; but admitting that it is sometimes seen, it hardly deserves to arrest the attention of the practitioner: since, to relieve it, it is only necessary to keep the patient on her back, at rest in a horizontal position, to desire her to retain as long as possible her urine and fæces, or simply to let the pregnancy progress.

Causes.—The predisposing causes of anteversion are, the inclination forward of the pelvis, the direction of the uterus, which is that of the axis of the superior strait; the laxity of its ligaments, its mobility, and, in short, all the causes of retroversion. As to the exciting causes, we shall see that they are nearly the same, with this single difference, that the pressure must be exerted on the posterior surface of the uterus, in order to thrust its fundus forward and downward, whilst in retroversion the contrary obtains. In Chopart's case, the anteversion resulted from vomiting. In a case reported by Desgranges,* it followed from the repeated pressure of the woman, a silk weaver, on the beam of her loom. In the first case related by Levret, it appeared to have been in consequence of a fall on the knees. Levret attributed it to an engorgement of the posterior paries of the uterus, and the brevity and increased size of the round ligaments; but we think with Désormeaux, that this disposition is rather the consequence than the cause of the displacement.

Symptoms.—The patient feels dull pains in the hypogastrium, accompanied by a sensation of heaviness toward the rectum, frequent desire and great difficulty to urinate. She generally experiences relief when on her back or sides, the muscles of the lower belly being relaxed. In the erect position, she sometimes feels as if something were falling behind the pubes, which occasions, not a complete retention of urine, but strangury, giving rise to the suspicion of calculus in the bladder; and, to confirm this suspicion, the urine is, at times, discharged in jets or per saltum. When the anteversion has existed for some time, the urine becomes red, thick, and deposits a sediment which is sometimes gravelly. When the patient lays on her back, she at times feels the sensation of a body being displaced, and the urine then flows more freely. A sound passed into the bladder meets with a hard, resisting body, feeling, as in one case related by Levret, like an encysted calculus; in another, like a fleshy excrescence, and in that reported by Desgranges, like scirrhus. An examination, per vaginam, dispels all uncertainty; the fundus uteri is found strongly inclined behind the pubes; the neck directed posteriorly toward the concavity of the sacrum, so high, that it is sometimes difficult to reach it with the finger. We may likewise, by introducing the index finger in the rectum, recognize the projection made by the neck across the anterior wall of the intestine.

Progress.—Anteversion may occur suddenly, but its progress is generally slow; it is never so complete as retroversion, and the accidents accompanying it are less serious, owing to the anatomical disposition of the parts. The presence of the bladder behind the pubes prevents the fundus uteri from being depressed as much as in retroversion. The accumulation of urine in the bladder, by pushing backward the posterior wall of this viscus, tends to elevate and keep erect the displaced uterus. The fæcal substances, in their course in the large intestine, by pressing downward on the posterior part of the neck, have the same effect. Thus, all things being equal, the prognosis of anteversion is favourable; we may even say that we are rarely called upon to relieve the accidents caused by this displacement. In a practice of more than twenty years, we have only twice had occasion to perform the operation of reduction of the uterus to remove the symptoms produced by its anteversion.

On the 4th of April, 1816, a lady of fifty years of age, the wife of a clerk in the office of the minister of the interior, excessively corpulent, felt an acute pain in the region of the pubes, groins and kidneys, as, one day, she was bent forward, and endeavouring to pull out a heavy bureau drawer. The same evening she had an incessant desire to urinate, which she could scarcely satisfy, the water only passing in drops. The patient who, on account of her extreme obesity, was obliged to remain in bed in a half vertical posture, or in an arm-chair, passed a sleepless night. On the following morning we were sent for to relieve the dragging and pain in the loins, and the strangury which had greatly increased. From her account, we suspected a displacement of the uterus; before making an examination, as her face was red, her pulse full and frequent, and her respiration laboured, and she was uneasy about her situation, we introduced the catheter, and took ten or twelve ounces of blood from her arm, which relieved the dyspnœa. A small quantity of urine was discharged, and the catheter gave us the sensation of a foreign body, pretty resisting, and not sonorous, in the bladder. On touching, we found the neck of the uterus upward and backward, its orifice directed toward the concavity of the sacrum; the body and fundus of the organ inclined behind the

* Journal de Médecine, Chirurgie, Pharmacie, etc., t. lix., Janvier, 1783, p. 35, et suiv.

pubes, and situated horizontally in the pelvis. We placed the patient on her back, with her legs flexed on the thighs, and the latter on the pelvis. After having hooked two fingers of the right hand in the os uteri, and endeavoured to draw it downward, in order to bring it from behind forward, to the centre of the pelvis, we found that the fundus was exactly applied against the pubes, and that the neck did not yield; we then introduced a sound into the bladder, and with its convexity tried to push the fundus uteri from above downward, at the same time acting in an opposite direction on the neck. These attempts were, at last, successful. The uterus was reduced, not without some pain, and the patient recovered. This lady told us, that a similar accident had occurred to her, about ten years previously, and that she had been relieved in the same manner by M. Evrat, who corroborated her account.

Treatment.—This is simple, and consists in reducing the organ and maintaining it in situ. The reduction is much more easy than in retroversion. In order to execute it, we must, 1st, place the patient on her back, the pelvis somewhat elevated above the thorax, flex the legs and thighs, in order to relax the muscles of the lower belly; 2d, act upon the neck, as has been stated, and on the fundus of the organ, by pushing it with a sound in the bladder, or endeavour to raise the uterus by depressing the hypogastrium, and engaging the fingers behind the pubes, which may be done if the woman be thin, and the abdominal parietes relaxed, as is sometimes seen in women who have had many children, or in whom there is a separation at the linea alba. When the organ is restored, the patient should be left in the position for reduction, wear for some time a pessary *en bilboquet* or *à cuvette*, and use cold baths, douches, and the other remedies we have indicated for the cure of retroversion.

After anteversion, we should treat of obliquities of the uterus; but as these deviations generally occur only at an advanced period of pregnancy, their study is useful, merely as regards parturition, and we shall defer their consideration until the proper time for inquiring into their influence on the progress and termination of this important function.

ARTICLE IV.—INVERSION OR INTROVERSION OF THE UTERUS.

We designate by the names of *inversion*, *introversion*, or still better *intusversion*, a displacement in which the uterus is turned on itself, or inverted, like a stocking, a bag, or a night-cap.

In order that this displacement should occur, it is generally necessary that the organ shall have been previously distended by any cause whatsoever, its parietes softened, its vital properties, and especially its contractility weakened. Thus, influenced by a force which exerts its energy from above downward, the fundus uteri is depressed, thrust inward, passes through the uterine cavity, and escapes from the vaginal orifice of the neck. In this state, the internal surface of the viscus becomes external, the external becomes internal, and forms a smooth cavity, lined by the peritoneum, which presents a superior aperture in direct communication with the cavity of the abdomen of which it forms a continuation.

This disease appears to have been known from the earliest dates. There is, however, so much obscurity in the writings of Hippocrates,* Aretæus of Cappadocia,† Celsus,‡ and Aetius,§ that we are not certain whether these authors mean prolapsus or inversion of the uterus. Galen appears to have understood it better; for he compares the inverted uterus to the scrotum containing the testicles;‖ and, in another passage,¶ the uterus and fœtus to wrestlers, the fall of one of whom causes that of the other.

It is only in modern times that it has been described with clearness and precision. All the writers, from Ambrose Paré to our day, have treated so accurately of the disease, that they have described its most delicate shade. A. Petit, nevertheless, denies the possibility of such a displacement. In the present state of our knowledge, we must be blind to evidence in order to doubt it in the least. Among the works published on this subject, we give the preference to those of Sabatier, on the displacements of the uterus and vagina,** and that of Dailliez,†† which contain a vast number of interesting facts, and from which we have largely borrowed in this article.

Introversion may be *complete* or *incomplete*. When incomplete, it presents various degrees, from the simple depression of the fundus uteri to the point in which nearly the whole of the viscus has passed through the vaginal orifice of the neck. All the degrees intermediate to these two extremes having been observed, writers on the subject have admitted several varieties of the disease; some, among them Sauvages, recognized four; others, in imitation of Leroux, have established three; Levret admitted only two. Agreeing, with this author, that it is useless to multiply subdivisions, and that all those which are not founded on well-marked differences, embarrass rather than benefit science, we should be inclined to admit only two degrees of this affection; complete and incomplete inversion. But as the classification of Leroux has prevailed and been generally adopted, we shall conform to it, and describe three degrees of inversion.

The *first degree* consists in a simple depression of the fundus uteri, without any appearance at the orifice of the depressed part; in this state the organ resembles, according to the comparison of Mauriceau, the *bottom of a glass phial*. This first species has been again subdivided into four others, according to the degree of depression of one of the parietes or margins of the uterus. Such distinctions are too frivolous to demand any attention.

The *second degree* is the incomplete inversion, in which there is not only depression, but projection of the fundus, which engages in the orifice and protrudes into the vagina through the os tincæ, whose lips it separates.

In the *third degree*, or complete inversion, the fundus escapes through the neck, and sometimes occupies the vagina; sometimes, after having escaped through the vulva, it projects between the thighs. The whole organ is inverted, with the exception of the part of the neck constituting the os tincæ, which, being below the insertion of the vagina, cannot be reverted. This portion of the neck forms a kind of cushion or ring, slightly salient, which surrounds the pedicle of the tumour.

In order to become complete, inversion must pass successively through all the degrees of incompleteness. But all the degrees of the

* De naturâ muliebri, sect. v. p. 563, edit. Fœrio. Genevæ, 1657.
† De signis et causis diut. morb. lib. ii. cap. xii. de uteri morbis, p. 84.
‡ De Re Medicâ, lib. i. in præfat. p. 13, in 12mo. Parisiis, 1772.
§ Tetrabibl. iv. Sermo iv. cap. 76, Medicæ artis principes, edition de H. Etienne. Paris, 1567, 2 vols. in fol.
‖ De usu partium corporis humani, lib. xiv. p. 781. Tom. i, edit. of Bale, 1549.
¶ De Facultat. Natural. tom. i. lib. iii. p. 1162.
** Memoires de l'Académie Royale de Chirurgie, in-4, tom. iii. p. 361.
†† Essai sur le Renversement de la Matrice, par A. J. Dailliez. Paris, an. xii. (1803.) Collection des Thèses de la Faculté de Médecine de Paris, in-8.

latter do not necessarily produce complete inversion; for, if the causes which have depressed or inverted the organ cease to act, it may return to its natural situation.

Causes.—These are of two kinds—predisposing or remote, and exciting or proximate. Among the former we include all those which may produce relaxation, thinning and atony of the uterine parietes, such as frequent pregnancies at short intervals, disorganized products of conception, a mole, or hydatids, etc.; the accumulation of gas, liquids, water, blood, some accidental morbid productions, fibrous bodies, polypi, etc. The exciting causes consist in the action of a power capable of depressing, pushing, or drawing outwardly the portion of the uterus which is disposed to yield. The most frequent are:—1st, a too rapid delivery; one in the vertical position; one in which the birth of the child follows immediately the rupture of the membrane, or which takes place without great pains, and as it were by a single effort, as sometimes occurs in women of a feeble constitution, or who are exhausted by misery, an antecedent disease, hæmorrhage, or repeated pregnancy: 2d, immoderate efforts of expulsion on the part of the woman, the natural or accidental shortness of the umbilical cord, especially undue traction on this cord to assist the delivery of the placenta, as may be seen in the cases related by Peu,* Amand,† Mauriceau,‡ Delamotte,§ and Saviard,‖ etc. Introversion should not, however, be always attributed to want of skill in the accoucheur. This accident sometimes happens, notwithstanding all our precautions to prevent it: it results either from a particular disposition of the uterus, or its extreme inertia, assisted by the volume and weight of the placenta, and the efforts of the woman. A large polypus inserted into the fundus of the organ may also produce this displacement.

When this accident succeeds undue traction on the umbilical cord, it occurs suddenly, and is nearly always accompanied by intense pain: the woman exclaims that her entrails are being torn out. The inversion also happens slowly, gradually, so that its progress may be followed as it were day by day. Baudelocque and Ané have seen it supervene twelve or thirteen days after delivery, and thought it commenced at the moment of the delivery of the secundines.

When we examine the empty uterus, the thickness and resistance of its parietes, and the small extent of its cavity, lead to the belief that in this state it cannot be inverted: this opinion is rather generally admitted. Nevertheless, some observations would seem to shake this opinion. In 1774, Puzos read before the Academy of Surgery an essay from which the *Mercure de France* of September of the same year has given an extract. The author of the Mercure says that Puzos, after having spoken of the inversion following delivery, passed to that arising from internal causes, unknown till then, and so independent of delivery that the disease which they produce has been observed in girls above all suspicion, in women who have never had children, in others, whose last delivery dated fifteen or twenty years back, and who had never felt any inconvenience except about the period when the disease had commenced. In order to corroborate his opinion, Puzos related cases which he had witnessed, and added that all the inversions known to have depended on an internal cause happened only at the critical age of the woman, or in persons extremely corpulent. The partisans of the opposite opinion, without denying the facts related by Puzos, have thought that these inversions independent of delivery, instead of being the result of excessive obesity, might ensue from a prolapsus of the uteri, loss of blood, etc. Leblanc, a surgeon of Orleans,¶ has reported a case in support of this last cause. They have also objected that a polypus might be mistaken for inversion of the uterus, and that, in the cases in which there was no error in the diagnosis, it was possible that the woman had some interest in concealing a clandestine birth. Baudelocque, firm in the same idea, chose rather to consider an inversion of the uterus which he met with in a girl of fifteen as a malformation.** Boyer†† declares that, for a long time opposed to Puzos, he has been converted to his opinion by the following case. A woman of from forty-four to forty-five years of age, tall, and quite corpulent, without being excessively so, came one day to his office. This woman, who had always menstruated regularly, had never had fluor albus nor bloody discharges, and was the mother of three children; the youngest, now fifteen years old, complained of a dragging sensation in the lumbar region, and an uneasiness and weight in the pelvis. These symptoms, after having lasted for some time, were followed by the appearance of a tumour in the vagina which soon presented externally. Two surgeons were consulted, who thought it was a polypus, and advised the application of the ligature. Boyer, being consulted, perceived that the tumour was formed by an inversion of the uterus: he dissuaded her from the operation. This tumour, larger than the uterus in its natural state, was of a pyriform shape; its pedicle, short and thick, was embraced by the os tincæ as by a ring: the end of the finger, carried between the os tincæ and the tumour, could only penetrate to the depth of a few lines; a blunt probe went no farther; no other diagnosis could be formed from its sensibility, its appearance, shape, sanguine exudation from its surface at each menstrual period, and the depression above the pubes. Boyer made several ineffectual attempts to reduce the inversion. The idea of the ligature recurred to him; but reflecting on the danger of the operation, he advised the woman to keep her tumour, especially as she otherwise enjoyed excellent health.

After similar cases related by men worthy of all confidence, it would be idle to maintain that the empty uterus, and which has not been previously distended, cannot be inverted; but, on account of the rarity of these cases, and the difficulty of their explanation, it is more prudent to leave the subject undecided.

Signs.—These vary according to the state of the organ, the degree of the disease, the manner in which it happens. In order to properly appreciate these signs, it must be recollected that immediately after delivery the uterus, at first flexible and soft, contracts, hardens, and forms in the hypogastrium a round circumscribed tumour, which can be easily perceived by the hand through the abdominal parietes. When the organ is threatened with inversion, the uterine tumour remains flaccid, soft, and its shape is badly defined. When inversion occurs, this tumour is depressed at one point, flexes itself on its interior, is precipitated into the pelvis, seems to avoid the hand which seeks to grasp it, appears at the vulva suspended between the woman's thighs, and is presented to the sight and the touch under an entirely new and unusual aspect.

When the introversion is in the first degree, and there is merely a depression of the uterine parietes, by placing the hand on the

* La Pratique des Accouchemens, p. 604, et suiv. Paris, 1694.
† Nouv. Observ. sur la Pratique des Accouchemens. Paris, 1715. Obs. 40, 50 and 62.
‡ Observ. sur la Grossesse et l'Accouchement. Obs. 355. Paris, 1738.
§ Traité Complet des Accouchemens. Paris, 1763. Tom. ii. obs. 414.
‖ Recueil d'Observations, Paris, 1784, p. 67.
¶ Précis d'Observations de Chirurgie, tom. i. p. 360.
** Dailliez, loco citato, p. 38 et seq.
†† Traité des Maladies Chirurgicales, tom. x. p. 489. Paris, 1825.

hypogastrium, if the woman be not too corpulent, we find the uterine globe depressed at one point, formed like the bottom of a lamp or cup, whose depth may in some cases be ascertained. The circumference of this cup is horizontal, or depressed forward, backward, to the right, or to the left, according to the inclination of the uterus, and as the depression bears on its fundus, one of its parietes or one of its margins. By introducing the finger into the uterus we can find the depressed point more or less approximated to the orifice. If in this state the causes producing the depression be still in force, or if the assistance of art be not interposed, this first degree passes into the second, and sometimes into the third, that is to say, is converted first into an incomplete, then into a complete inversion.

In the second degree the depression of the uterus is converted into a large and deep cavity, into which the finger easily penetrates; but the aperture gradually contracts, and at last becomes very narrow. These observations can only be made on very thin women, who have borne several children.

In the third degree the inverted uterus appears under the form of a pyriform tumour, occupying the vagina or projecting outwardly. This oblong tumour, of which the large extremity is free and directed downward, does not exhibit the transverse aperture found in the inversion of the vagina, or prolapsus of the uterus.

Symptoms and accidents.—The patient feels but little uneasiness when the introversion consists in a simple depression of the fundus or one of the parietes of the uterus. Such, however, is not the case when the fundus of the organ projects between the lips of the vaginal orifice, constituting the second degree or incomplete inversion. Then the woman experiences a painful dragging in the groins and lumbar region, and an uncomfortable weight in the pelvis. She is tormented by tenesmus, and the efforts she makes to satisfy this illusory sensation frequently determine a complete inversion. Generally, when the introversion is completed, or occurs suddenly, the symptoms are much more marked; the dragging, weight, and nausea more pronounced; the woman feels the lacerating pains of which we have spoken, causing her to say and believe that her entrails are being torn out. Then fainting and syncope supervene; a clammy and cold sweat covers the face and limbs; nervous twitchings and convulsions manifest themselves; and sometimes death closes the suffering scene.

When complete inversion happens immediately after delivery, if the placenta still adhere to the uterus there is no hæmorrhage; but, as this body separates, the blood flows with an abundance and intensity proportioned to the extent of the separation, the softness and flaccidity of the uterine parietes, in a word, to the atony of the uterus. The hæmorrhage, always copious immediately on the separation of the placenta and the inversion, may in some cases be so profuse as to cause the death of the patient.* Generally the hæmorrhage diminishes as the uterus recovers its tone and begins to contract, and, if it becomes dangerous at a later period, it is so less from its abundance than its continuance: it weakens the patient, gradually exhausts and renders her anemic, and sometimes terminates fatally. If the woman be fortunate enough to escape these accidents, it may happen that the unreduced uterus becomes engorged, swollen, and inflamed, and attacked by partial or total gangrene. The partial gangrene affecting the internal surface of the inverted uterus, is more probably the result of improper efforts at reduction than the necessary consequence of the displacement. Women labouring under complete introversion have been known to live many years without much inconvenience. In these cases the uterus undergoes the following modifications:—The first symptoms subsiding, the lochial discharge is established, the emptying of the uterine vessels takes place as in an ordinary delivery, except that it is more tardy, many months elapsing before it recovers its pristine dimensions. More frequently the inverted uterus continues to be the seat of a sanguine, serous or sero-purulent exudation, which undermines and destroys the woman's health at the same time that it effects a kind of atrophy of the displaced organ. The uterus seems smaller than in the natural state, and assumes the shape of a pear pretty uniformly rounded, of which the pedicle, large and short, is enveloped at its superior portion by a cushion, seldom very salient, under which the finger or probe penetrates but a few lines in depth. Under these circumstances particularly, inversion may be mistaken for polypus.

An accident more uncommon, but not less serious than that of which we have just spoken, may also complicate this disease. Thus, at the moment in which introversion occurs, or soon after its formation, a portion of omentum or knuckle of intestine may enter the new cavity formed by the uterus, become strangulated, occasion abdominal pains, hiccough, nausea, vomiting, and all the symptoms regarded until the present time as indicative of inversion itself. Dailliez thinks that if few cases of this species of hernia are on record, it is perhaps because the bodies of all the women who have died of the immediate consequences of introversion have not been examined. Stalpart Van der Wiel† says that a woman having died of inversion of the uterus, half an hour after delivery, a tumour as large as a child's head was found between her thighs, and that this tumour, formed by the uterus, being opened at its lower part, contained the intestines. Baudelocque has observed a case nearly similar. Levret‡ informs us that the sac formed by the inverted uterus, in a woman of seventy years of age, contained a portion of the rectum, bladder, and small intestines, the fallopian tubes and ovaria.

Sterility is also, most commonly, a consequence of inversion. A case, however, communicated to Baudelocque by M. Chevreul, of Angers, shows that conception is not absolutely impossible. The wife of Julian Roussin, a farmer at Chambresai, twenty-eight years of age, was safely delivered of a healthy child in October, 1777; but the midwife, in extracting the placenta, inverted the uterus, and, from ignorance, was contented with restoring it to the pelvis. Ten months afterward, the woman Roussin, whose symptoms had been very trifling, suspected she was pregnant, because she suffered from the nausea and other inconveniences almost inseparable from the first period of gestation. At three months, she felt in the lower belly, and especially toward the loins, slight pains, which increased gradually until the fifth day; they became then very violent, and expelled a considerable mass, which Messrs. Thuilier and Vager, physicians of the place, saw and recognized as an inverted uterus. Without believing the existence of pregnancy, M. Vager tried for three days in succession, in vain, to reduce the organ; not being able to succeed, he again consulted MM. Thuilier and Paroissien, who advised him to return it, but merely to the pelvis, and wait the event. Six days after, the woman, who had abandoned the idea of pregnancy, expelled a well-formed

* A case of this nature was reported by the Translator in the American Journal of Medical Sciences, vol. xix, p. 270. Phila. 1836.

† Observationum Variorum Centuria prior. Obs. 67, p. 291. Lugd. Batav. 1587.

‡ Observations sur la Cure Radicale de Plusieurs Polypes de la Matrice. Obs. 18, p. 132. Paris, 1762.

fœtus, five inches in length, in no wise altered, which M. Vager saw and examined immediately after its expulsion. M. Chevreul thought for a long time that his colleagues had mistaken a polypus for the uterus; but in 1781, he acknowledged his error, after having examined the woman, and ascertained the actual existence of an inversion of the uterus: he then supposed that the fœtus had been developed in one of the tubes. Dailliez, in commenting on this extraordinary case, says that there is nothing which cannot be explained, and which we cannot believe. We do not, so readily, admit this explanation. If conception had taken place in one of the tubes, the fœtus would not have been seen to escape from the vagina, but from one of these ducts, whose orifices, situated near the fundus of the inverted organ, were exterior to the vulva, or in the attempts at reduction, one of the tubes would have been found swollen, and its orifice dilated; this was not the case. We should be inclined to think that there had been at first a simple prolapsus, and that if inversion occurred at a later period it was at the moment of abortion. By adopting this supposition, all wonders disappear. The uterus having been restored to the vagina by the midwife, the conception is natural enough, and the stay of the fœtus after the expulsion of the placenta is readily explained. It may be conceived, that during the effort of abortion, the ovum being ruptured, the fœtus passed into the vagina and remained there, whilst the uterus, being inverted, expelled the placenta; the fœtus, retained by the inverted organ, remained in the cavity of the vagina, until the woman, making an effort from any cause whatsoever, expelled it from the cell in which it was lodged. Whatever value may be attached to these suppositions, the case not having been observed in all its stages by the same individual, is too vague to allow us to admit it is a proof of the possibility of conception in complete inversion.

Diagnosis.—When introversion occurs at the very moment of delivery, the diagnosis is easy. The tumour protruding from the vulva is formed by the uterus; its shape is globular, its size equal, and sometimes exceeding that of a new born infant's head; its colour is of a reddish brown, its tissue soft, spongy, and pouring forth blood copiously; its sensibility of a low degree, but increased by pressure. Ignorant or inattentive persons, however, have mistaken it for the child's head, and torn it away by force.* Others have thought it was some foreign body,† a mole,‡ or a polypus,§ and have treated it as such. This error may be easily avoided by recollecting what we have above said of the signs of the disease. These remarks, however, do not obtain when the inversion has existed for a long time. The uterus, contracted on itself, recovers nearly its original dimensions, and may be readily mistaken for a polypus or prolapsus. In order to distinguish it from these two affections, we should remember that in inversion the sensibility is great, the pedicle thick and short; being squeezed between the fingers, it feels hollow; it is surrounded above by a slightly salient cushion, formed by the lips of the orifice, and under which the finger or probe cannot penetrate far. On placing the hand on the hypogastrium, the cavity of the pelvis feels empty, and the uterus is not to be perceived. If the woman have not passed the age of child-bearing, at each menstrual period there is a more or less copious sanguine exudation. We place but little reliance on the size, shape, and consistence of the tumour, as they may be the same in polypus or an inversion of long standing.

In polypus, on the contrary, the pedicle is generally long, more delicate, and firm: if the tumour originate from the fundus uteri, the neck serves as a kind of envelope or sheath: the finger or probe passed around its circumference penetrates to a much greater depth.

When the polypus arises from the os uteri, or from one of its lips, and the orifice is on the side of the pedicle, examination by the hypogastrium proves the presence of the uterus in the pelvis. Attempts at reduction assist still further the diagnosis, for although polypus is irreducible, it may be pushed back, but soon recovers its former position: whilst, if we succeed in restoring the uterus to its natural situation, the displacement is seldom reproduced.

The diagnosis is more difficult where there exists at the same time polypus and inversion, which may occur when a polypus, developed in the uterine cavity, draws with it the fundus of the organ to which it adheres. In this case, the double tumour has the form of two cones united by their vertices: and exhibits a circular strangulation resembling a band. If the polypus be very voluminous, and have a large base, the point of intersection is slightly, if at all, evident. The shape of the tumour is regularly conical, its adherent apex is concealed by the labia pudendi, and the base loose, hangs between the woman's thighs. The lower part formed by the polypus is brown, or whitish, solid, indolent, having no appreciable cavity: whilst the part forming the pedicle, dependent from the uterus, is of a more lively red: it is flexible, sensible to the touch, and on pressure, communicates the sensation of being hollow within. On depressing the hypogastric region, we find no uterus, and the pelvis appears empty.

In prolapsus, the uterus, covered by the vagina, which it drags down, forms a tumour, of which the base, voluminous and adherent, is above: the apex, loose and narrow, directed downward, exhibits, always, the orifice of the neck.

Prognosis.—Introversion of the uterus is a dangerous disease, frequently fatal on account of its consequences, although not in itself essentially mortal.

Dailliez thinks that it is, perhaps, less dangerous than is generally supposed: he remarks that this disease had been forgotten in the majority of the women who had survived it for many years, or in whom the uterus was merely restored to the pelvis without reducing it. These women experienced no other inconvenience than continual loss of blood, generally not very abundant, after the first few hours: whilst many of those, in whom the reduction had been attempted, perished sooner or later; some during, and some after the reduction: the latter, in convulsions or syncope, frightful from their frequency and duration, and which could not be attributed to the quantity of blood lost: the former in consequence of contusion, laceration, inflammation or gangrene of the uterus. The character of the prognosis depends less on the accidents inherent to introversion, than on the circumstances which precede, accompany, or follow it. If the contrary opinion prevail, it is because the accidents, essentially dependent on inversion, have not been sufficiently distinguished from those which result from its complications, and efforts made to remedy it. The painful dragging in the hypogastrium and loins, which may be diminished by supporting the inverted uterus, or by maintaining it in the vagina, is the only essential accident of introversion, and the hæmorrhage even, all other things being equal, is less copious and dangerous than that which sometimes follows delivery, in inertia of the uterus without inversion.

* Journal de Médecine, par Vandemonde et Roux, vol. xli. p. 40, in-12.

† Memoires de l'Académie des Sciences, annee 1732, p. 30.

‡ Memoires de l'Académie de Chirurgie, in-4, tom. iii. p. 382, and Dailliez, obs. 16, p. 54. Obs. 29, p. 86.

§ Dailliez, obs. 5, de M. Robert de Chalons.

Treatment.—This consists in restoring the organ to its normal situation, and maintaining it in situ.

The best time for effecting the reduction, is immediately after the inversion: but if swelling, inflammation, strangulation, or gangrene exist, or if the woman be much exhausted, these complications must be relieved by the means appropriate to each. In all cases, before proceeding to the reduction, the patient should be placed in a proper position, that is, on her back, so that the pelvis may be slightly raised above the thorax.

If the introversion occur during delivery, if there be only a sensible depression of the fundus, or one of the parietes of the uterus, and the placenta be not yet separated, the woman must be kept in the horizontal position, and no traction should be made on the umbilical cord, but the expulsion of the secundines patiently waited for: her strength should be supported by nourishing soups, or generous wine; and the contractions of the uterus excited, by frictions over the hypogastrium, and the administration of recently pulverized ergot. If these means do not suffice, we must follow the plan which will be indicated for the second degree. If there be separation of the placenta, with or without apparent hæmorrhage, we must, immediately, proceed to terminate the labour.

If the disease exist in the second degree, if the fundus uteri, engaged between the lips of the os tincæ, project into the vagina, having removed the placenta, whose presence or absence requires the same precautions as in the preceding case; we must push the displaced portion from below upward, by introducing two or three fingers, or the whole hand through the os uteri, and with the other hand on the hypogastrium, support the organ, and assist its return to its normal state by frictions, and slight pressure, exerted from above downward on the edge of the kind of cup formed by the body of the uterus.

If the introversion were complete, and the placenta yet adhering wholly or in part, before commencing the reduction, this body must be removed. The fear of hæmorrhage should not deter us, for the diminution of the size of the displaced part, the greater facility with which the reduction can be accomplished, will amply compensate the danger which may arise from this separation. The placenta being detached, the uterus is grasped so that its base may rest on the palm of the hand, and its pedicle is embraced and compressed by all the fingers closed together; a kind of gentle taxis is executed, which gradually restores the parts in the inverse order of their displacement.

Wiardel,* and after him Leroux,† recommended the hand to be wrapped in a dry, soft, and half worn out towel, in order to spare the internal surface of the uterus: this precaution, more embarrassing than truly useful, has been properly rejected by Sabatier and all modern surgeons. These two authors also advise the tumour to be pushed directly upward, by depressing its centre with the fingers closed in the shape of a cone, and persevere in this plan, until the inverted parts have passed beyond the os uteri. Wiardel has figured a boxwood instrument intended for this purpose. This method, which has succeeded in some simple cases, is not free from objections in those which are more difficult. It is likewise much less effectual and rational than that of which we have spoken above.

The reduction being complete, in order to prevent recurrence of the inversion, the hand must be kept in the uterus, until it is, as it were, expelled by its contractions. The woman should be ordered to make no effort which would tend to act on the uterus. If, notwithstanding these precautions, the inertia continues, we must have recourse to the means which we shall indicate in the treatment of hæmorrhage after the delivery of the secundines.

Inversion occasioned by the weight of a polypus, or by the tractions exerted in its removal, generally ceases with the cause which produces it.

All hope of reduction is not lost, even when the inversion is of long standing, or there exist ulcerations, lacerations, inflammation, or even superficial gangrene. This accident must be treated by rest, venesection, baths, emollient applications, the internal use of refreshing drinks, etc. In addition to these means, Desault recommended a methodical compression of the uterus. When the volume and density of the tumour are diminished, cautious attempts at reduction may be made, which are sometimes successful. If, after long continued and at the same time moderate efforts the organ cannot be reduced, the experiment should be abandoned: experience having proved, that there is less danger in leaving the displacement to itself, than in making it disappear by force. Many women have lived for a long time with a similar malady, whilst others appear to have fallen victims to the efforts at reduction.

In order to secure the uterus from the strangulation of the vulva, the irritation of the external air, of the clothes, friction in walking, and the contact of the urine, it is to be returned into the vagina, and there maintained by means of a pessary.

The absolute impossibility of reduction may depend on the size of the tumour, the date of the disease, the density of the organ, the contraction, or occlusion, more or less complete, of the aperture through which the displaced parts must pass. When this last complication does not exist, nature, from the influence of some accidental circumstance, has been known to effect spontaneously a reduction until then regarded as impossible.

De La Barre, a surgeon of the town of Beuzeville, having retired to a chamber adjoining that in which his wife was about to be delivered, had scarcely heard the first cries of his child than those of the mother called him to her side. The midwife had completely inverted the uterus by endeavouring to extract the placenta, and, thinking that it was a false conception, attempted to pull it away, assisted by another matron as ignorant as herself. De La Barre was aware of the nature of the accident, but did not dare to try to remedy it. Ineffectual attempts at reduction, however, were made, and a cathether introduced several times to evacuate the urine. The state of the woman became more and more alarming on account of the persistence of the hæmorrhage. Six months after, in attempting to get out of bed, this lady fell on the floor. At that moment, she felt an extraordinary motion in her belly, accompanied by a very acute pain, followed by syncope. On recovering, she perceived that the tumour had disappeared; the inversion was reduced. This fact, communicated to the Royal Academy of Surgery, was scarcely credited; and it probably would have been forgotten, had not a similar case happened to Baudelocque, several years afterward.

Mad. Boncharlatt's first child was born at Cape Français, in 1782. At the moment of the delivery of the placenta, which was effected by means of the hand introduced into the uterus, she experienced great pain, and felt then, between her thighs, a large tumour, which was instantly restored to the vagina. The patient lost a great deal of blood, fainted several times, and was so much debilitated

* Observ. sur la Pratique des Accouchemens, chap. 30 and 31, p. 11, et seq. Paris, 1764. Edit. 2d.

† Observ. sur les Pertes de Sang, p. 145. Dijon, 1776.

that the accoucheur did not dare to touch the uterus, lest she should die in his hands. After suffering great uneasiness for seven or eight years, Mad. B. came to Paris to consult Baudelocque. This physician examined the tumour, ascertained its nature, and endeavoured, vainly, to reduce it. He prescribed baths and rest. On the evening of the day preceding that fixed for a new attempt at reduction, some friends of Mad. B. obliged her to walk about her room. She struggled and fell suddenly in a sitting position on the carpet. She felt an extraordinary movement and acute pain in the belly, and, for a moment, lost her consciousness. Baudelocque, immediately called, no longer found the tumour which he had examined three days previously. From this period, the patient recovered her freshness and corpulency. Having been a widow for several years, she married again, became pregnant, and was safely delivered at full term. A year after, she died of some acute disease.*

These cases are without doubt extraordinary; but when they have been observed by learned physicians, and corroborated by a man as profound and conscientious as Baudelocque, it is impossible to question their accuracy. They deserve deep attention, for they prove that inversion of the uterus, after delivery, is not always fatal, and that reduction may even occur, without the assistance of art. They should be considered, however, merely as fortunate exceptions, and not inspire too great security, nor be regarded as a rule of conduct to the accoucheur.

Facts, unhappily numerous, have but too well demonstrated the dangers accompanying introversion. Women have perished from the accidents, either primary or consecutive, which result from it. In order to prevent this fatal termination, some surgeons have been induced to recommend the removal of the uterus by excision or ligature. This extirpation, sometimes performed accidentally, at others designedly, has in some cases been followed by success.

Morgagni, in his forty-fifth letter, states that Slevogt, a surgeon of Jena, removed the uterus and fallopian tubes, under the impression that he was merely excising an excrescence from the genital organs, and that the woman recovered perfectly. The dissection showed that the uterus itself had been extirpated. We read in the same letter that Molinette had also successfully amputated this organ in old women; but he has given no proof of it, as in the preceding case, by the dissection of the specimens.

Vieussens† relates the case of Jeanne Bergogneuse, from whom he removed the uterus for introversion. The truth of the account might be doubted, for the woman, who lived ten years after the operation, continued to menstruate. But in the first place, the dissection of the tumour, and then the autopsy of the body, prove that the uterus had been extirpated; only a small portion of the neck of the viscus, hard and callous, remained.

According to M. A. Petit,‡ Bouchet of Lyons tied, for a polypus, the uterus inverted for three years, and by this happy mistake, snatched the woman from the lingering death which threatened her. M. Bouchet, jr., contradicts the assertion of Petit, and states that his father decided on tying the uterus with a perfect knowledge of the nature of the disease. In many cases, it is certain that a polypus has been tied for the uterus.§ In others, the contrary has occurred, as in the following case reported by Boyer:‖—A woman, twenty-four years of age, pregnant for the first time, was happily delivered at full term, on the 6th of July, 1824. The midwife in attendance, desiring to hasten the delivery of the placenta, pulled violently at the umbilical cord, and completely inverted the uterus, which was suspended between the thighs like a large tumour, with the placenta attached.

A young physician being called in, mistook the character of the disease, and thought it was a polypus in which the placenta was implanted. He removed the latter body, and applied a ligature to the tumour, which was pouring out blood. The hæmorrhage ceased, and the tumour was pushed into the vagina as high up as possible. The ligature excited no acute pain, nor convulsions, nor any remarkable symptoms, although now and then drawn tighter by means of a *serre-nœud*.

Eighteen days elapsed without any sensible change in the state of the patient. At the end of this period, she was admitted into La Charité, and placed in one of Boyer's wards. On examination, there was found in the vagina a round soft tumour, but it was impossible to reach its upper boundary, nor even to feel the ligature. Seven days after the admission of the patient, the ligature came away, and the next day the tumour fell spontaneously from the vagina. An accurate inspection of the latter exhibited the orifices of the sinuses of the uterus and the marks of the insertion of the placenta; a recent and puckered cicatrix existed at its upper part. On cutting through this cicatrix, a small cavity, lined by a serous membrane, was displayed. All these circumstances, added to the disposition of the fibres in layers, and the great dilatation of the vessels, left no doubt as to its being a portion of the uterus. The woman requesting her discharge, Boyer recommended her to the care of two students. In a few days, she died at her dwelling. On opening the body, the remainder of the uterus was found, forming a kind of deep funnel, in which were plunged the broad ligaments and fallopian tubes; the ovaria floated on the sides.

On the 26th of July, 1829, M. Récamier removed the uterus for a cancerous affection of this organ, and he succeeded.¶ This unhappy success has been attended with too unfortunate results to be here quoted as an example for imitation. This patient having survived the operation, experiments of the same kind were repeated by several distinguished surgeons; and women, who might have lived for many years, have fallen victims to these rash attempts. We think that in surgery, more than in any other science, there are limits beyond which it is dangerous to pass.

If even extirpation of the uterus ought to be performed, we believe that it would offer a more rational hope of success in cases of prolapsus and inversion of long standing, than in recent displacements, and especially in cancerous affections of the organ.

In the two former cases, the decrease of the calibre of the vessels by the elongation they have undergone, the diminution of the circulation and vitality, and the partial atrophy of the organ which result from it, afford some chance. In the two latter, on the contrary, we meet with the opposite conditions. We should, however, never have recourse to this extreme measure, except in cases in which no possibility exists of otherwise saving the life of the woman.

* Vide Dailliez, loco citato, p. 105.

† Traité Nouveau des Liqueurs du Corps Humain, tom. ii. p. 379, in 4to. Toulouse, 1715.

‡ Recueil des Actes de la Societé de Santé de Lyon, p. 109, vol. in-8. Lyon, an. vi. 1798.

§ Vide Morgagni, Epistola 45.

‖ Loc. cit., vol. x. p. 510.

¶ Recamier, Recherches sur la Traitement du Cancer, tom. i. p. 519 et seq. Paris, 1829.

We believe, for example, that the ligature was indicated, and probably would have succeeded in the following case:*—Marianne Roche, thirty-six years of age, large and well made, was delivered for the second time in December, 1790. Nothing unusual occurred at the time. On the fifteenth day, Marianne, wishing to get out of bed, used some exertion, and experienced a sensation as if a body were displaced and had fallen into the vagina. A physician, and afterward a midwife, considered the disease as a prolapsus of the uterus; rest, the horizontal position, a pessary which could not be retained, and astringent remedies of all kinds, were successively tried without success. Examined at the Hôtel Dieu of Lyons, on the 15th of June, 1791, by Petit, this woman was frightfully pale, weak, and prostrated by a continual discharge of red and white coloured matter. The belly, and especially the hypogastrium, were soft; the urine flowed freely, a slight sensation of weight was felt on the rectum; the pain in the thighs, and colic, although not very frequent, deprived the patient of rest; she fainted very often, and became drowsy in spite of all her efforts to the contrary; her pulse was frequent, but weak. On touching, there was discovered in the middle of the vagina, and posteriorly toward the concavity of the sacrum, a soft, smooth, pyriform body, adhering by a pedicle to the centre of the neck of the uterus, through which it passed freely, and which Petit thought was a polypus arising from the fundus of this organ, and descending through its orifice into the vagina. Four other surgeons then examined the patient; all agreed that the tumour was a polypus, and advised the ligature as the best means of relieving the woman. Consequently, on the morning of the 17th, M. Rey undertook the operation. It was tedious and difficult; the instruments did not penetrate far, and the operator said that he met with some insurmountable obstacle. The ligature was, however, placed and tied; but, at this moment, the woman uttered a piercing cry, which instantly acted like a ray of light on the mind of one of the assistants. *Stop*, said Degranges, *we are mistaken; I suspect an inversion of the uterus.* They stop, examine anew, and this re-exploration leaves them in a state of uncertainty which they resolve to clear up on the morrow, because the exhausted patient required some repose.

The ligatures being removed, the woman, carried back to bed, complained of a colic more violent than usual, which continued all night, and which emollient injections and fomentations could not relieve.

It was proposed to explore the region of the uterus by means of a finger in the rectum, and the convexity of a sound introduced into the bladder. But, on the following day, the patient was so feeble that the surgeons, seeing her death was inevitable, forbore fatiguing her by farther attempts. Five days after, she expired. The autopsy exhibited, in the vagina, the uterus of the ordinary size and firmness, passing entirely through its orifice which sufficiently relaxed to allow the finger to pass completely around it, and forming a groove of seven or eight lines in depth. On the abdominal side was seen a cavity whose parietes were formed by the external surface of the inverted uterus, and on the right and left edges of which rested the ovary and fimbriated extremity of the fallopian tube, on the point, as it were, of falling therein.

If we have condemned the hardihood of individuals who have not hesitated to attack the uterus in situ, and remove it when cancerous or only hypertrophied, as we have seen done, we cannot too deeply lament the timidity which, in this case, arrested the operator. It is probable, that if the ligature had been tightened instead of being removed, the woman's life would have been preserved.

To complete the history of the displacements of the genital organs, we should here speak of those of the vagina; but these being ordinarily symptomatic of those of the uterus, frequently accompany them. When idiopathic, they recognize nearly the same causes, and require a similar treatment; and when partial, they belong to the history of cystocele and rectocele. We will therefore refer, on this subject, to what we have before said on displacements of the uterus, and, for that which we omit, to special treatises on external pathology.

ARTICLE V.—ON THE RETENTIVE MEANS EMPLOYED IN THE TREATMENT OF DISPLACEMENTS OF THE UTERUS.

In every displacement of the uterus, the physical and vital properties of the ligaments and adjacent parts, experience changes and modifications, which rarely permit them to maintain the organ in its original state, unless the displacement has been inconsiderable and of short duration. When the organ has been reduced, and the different precautions already indicated are insufficient to support it, we must have recourse to mechanical means. This part of the treatment is not always easy, has for a long while attracted the attention of surgeons, and exercised their patience and ingenuity. These means are sponges and pessaries.

§ I.—OF SPONGES.

These are substances too well known to require any description here. When about to use them, we should choose the finest, of an oblong shape and medium size. They must be well washed, and freed from the incrustations, small shells and various foreign bodies which they may contain, and which, from their hardness and roughness, might wound the organs of the woman.

The next step is to give them a shape harmonizing with that of the vagina, and rather smaller in size. If they be too large, they would distend excessively the parietes of the organ, increase the relaxation, and impede the flow of the urine and the evacuation of the fæces.

Before introducing the sponge, a waxed thread must be passed through it, in order to be able to withdraw it without pain, to wash and change it at will. To effect its introduction, the patient is placed in the position for the reduction of prolapsus; the labia pudendi are separated by the index finger and thumb of one hand, whilst the other squeezes the sponge to diminish its size, presents one of its extremities at the orifice of the vulva, and causes it to enter following the axis of the vagina. When the operation is performed, an injection of fresh water, with a small proportion of white wine, vinegar or alcohol is thrown in, and is desired to preserve the horizontal position for some time. If the organs have been very much relaxed; if the woman is of a delicate lymphatic temperament, and no inflammation exists, we may have recourse to more astringent, more stimulating injections, such as an infusion of the leaves of the Rosa Gallica, decoctions of tan,

* Actes de la Societé de Santé de Lyon, loc. cit., p. 103 et suiv.

of the roots of the Polygonum bistorta, of the bark of pomegranate or cinchona, pure or mixed with wine or alcohol; solutions of the acetate of lead, alum, sulphate of zinc, etc.

During the first few hours or days the sponge causes some uneasiness and irritation, but the woman soon becomes accustomed to it and feels no inconvenience. It must be frequently changed and washed: without this precaution, dictated by cleanliness, it becomes charged with the fluids which flow from the genital organs, and which, altered by the heat of the situation, become putrid and a source of irritation and offensive exhalations which may exert a baneful influence on the organs and on the woman's health. When the sponge has been introduced uncovered, and remained some time in the parts without having been washed or changed, we have sometimes seen it soaked with a bloody serosity, produced from the irritation of the parietes of the vagina. The points of the internal surface of the organ which are in contact with the asperities of the sponge, become red, inflamed, and the seat of a sanguine exhalation. Small superficial ulcers then supervene, which, from the pain and copious discharge they occasion, oblige us to abandon this remedy. In order to prevent this inconvenience we have been in the habit of enclosing the sponge in a small bag made of fine linen or cambric, provided at its lower extremity with a drawing string: the whole is then introduced into the vagina, and fastened by means of the string to the girdle of the woman. The utility of this precaution is too evident to require explanation.

Sponges are appropriate to relaxation of the uterus in the first and second degrees, and to some kinds of vaginal hernia: they are also indicated when there is tumefaction of the mucous membrane of the vagina, or a hard painful swelling of the urethra. They are not at all suited to prolapsus, retroversion, and anteversion, and we are obliged to use pessaries.

§ II.—OF PESSARIES.

Pessaries are solid bodies introduced into the vagina: they are generally pierced with a hole in the centre to allow the exit of the humours produced by the organs they are intended to support, and have been known from the earliest periods.

The word pessary, *pessarium*, is derived from the Greek πεσσος, a small stone, either because the ancients made them of this material, or more probably on account of the solidity and capability of resistance of these instruments. Whatever may be the value of this etymology, the ancients, commencing with Hippocrates, made use of pessaries to support the displaced uterus, and apply to it the proper remedies. They were composed of a mixture of various medicinal substances, in which were incorporated wax, wool, the fur of the hare, and bits of old linen, in order to give them more firmness and a proper shape. They varied their composition according to the affection to be treated, or the indications to be fulfilled. They had emollient, astringent, and aperient pessaries. The first, composed of white wax and the fat of chickens or geese, the marrow of oxen or deer, or of fresh butter, were employed in inflammation and ulceration of the uterus and vagina: the second were intended to remedy displacements of these organs and leucorrhœa: the aperients were made of honey, artemesia, dictamnus albus, brassica, ruta graviolens, and scammonium, and recommended in constriction of the genital organs and retardation and suppression of the menstrual flux.

The moderns regard pessaries merely as retentive means, and use them only to maintain the organs in the situation they should occupy. If the state of the relaxed or displaced organ requires the use of pharmaceutical remedies, they prefer administering them separately or conjointly, without incorporating them with the materials of which the instrument is fabricated.

Composition.—Pessaries being viewed in this light, the preparations of the ancients were abandoned, and substances sought which were at the same time solid, light, soft, and unchangeable. The moderns have used successively for this purpose cork, the linden and box woods, and the root of the wild grape-vine, horn, leather, ivory, wax, gold, silver, pewter, lead, and tin.* But not finding in each of these substances alone the qualities necessary for a good pessary, they have been united to each other. Thus cork, which is light and elastic, is too porous; it is too soon saturated with the mucous, blood, and other discharges from the woman, to remain for any length of time unaltered. The fluids retained in its interstices become heated, ferment, putrefy, and produce gases whose nature and odour may occasion more or less serious inconvenience. In order to obviate this defect, it has been covered with virgin wax, which, by filling up its porosity, prevents the imbibition of the humours and the alteration of the pessary. For the same reasons the linden-wood pessary has been coated more or less thickly with varnish. Box wood is too dense to produce similar alterations; but its weight is inconvenient in pessaries of large size, and it is only used in those called bilboquet or cylindrical pessaries. The same is true of ivory. Pure wax is not firm enough to make a good pessary, and it is only when spread on wood that it is of any service. The density of the metals is not free from objections, and, as they cannot be made without soldering, they are not exempt from the action of acrid fluids, and, moreover, their high price, especially if of gold or silver, will cause them to be generally rejected.

At the close of the last century a surgical instrument maker, named Bernard, made pessaries of silk, linen, or cotton, stuffed with hair or wool, and covered with a mixture of oxide of lead, some drying oil, as linseed, and perhaps also a certain proportion of caoutchouc. The instruments made in this manner are generally called *gum elastic pessaries.* These are much superior to those which had previously existed: nevertheless, the varnish which covers them is liable to crack, scale off, and does not always protect them from infiltration. The caoutchouc is now used, which combines in the highest degree all the qualities desired. Several artisans dispute the honour of the invention; but in our opinion the credit of having first employed pure caoutchouc in the manufacture of pessaries is due to Juville. His work,† which appeared in 1786, contains a description, plates and cases, which prove that he had successfully used this substance since 1782.

Forms and uses.—The forms given to pessaries have been as various as the substances used in their construction. Some seem to have been purely arbitrary, and to be founded on no principle whatsoever; others have been the fruit of reflection, and based on the ideas formed by their inventors on the modus operandi of these instruments, or the points of support they expected to find in the interior

* M. Moreau seems not to have been acquainted with the cheapest and best material for the formation of pessaries, namely, glass, which has got into extensive use in this country.—Ed.

† Traité des Bandages Herniaires, par Juville, p. 181, et planche xiii. fig. 3 et 4. Paris, 1786, 1 vol. in-8.

of the pelvis. They have been made in the shape of a sphere, an egg, a heart on a card, a ring, a square, a circle, an oval, (Levret,) a triangle, a figure of 8, (Bruninghausen,) a bung, a bilboquet or cup and ball, (Suret,) a cup, a cistern or cylinder, (Smellie,) or an elytroid,* (J. Cloquet,) etc. Some of these instruments are provided with a stem, or a cord, either to support them or assist their removal; the majority of them have not these appendages. Some are perforated, the greater part are not. Of this infinite variety of forms all are not equally favourable; some are bad, and should be rejected; others, though generally good, are not applicable to all cases; it might be even said that each displacement requires almost a peculiar form, and each case a particular pessary. It is because sufficient attention has not been paid to this necessity, that pessaries have not done all the good which was to be expected from them. We will, therefore, examine every form which it may suit to give them for each species of displacement.

The circular or ring pessaries are proper in relaxation and descent of the uterus; their upper and lower surfaces should be scooped out like a cup, to lodge the os uteri and afford an easy exit to the blood and mucus. This shape is the most convenient of all, because this instrument, once in its place, gives no external indication of its presence. In general they give no inconvenience, and do not embarrass the exercise of the functions. There are numerous cases of women who, notwithstanding their use, have continued to live with their husbands and become pregnant. Hence these pessaries are preferred and commonly adopted. At the same time that we acknowledge the advantages of this kind of pessary, we must be careful not to exaggerate them; they do not suit all cases. Where there is precipitation of the uterus, the pessary with a stem, or the cylindrical or bilboquet pessary are preferable: the same remark would obtain in a simple descent of the uterus, if the vagina were immoderately large and distended. In idiopathic inversion, either general or partial, of the vagina, the elytroid or the bung-like pessaries are best. In anteversion or retroversion the pessaries in the shape of a goblet, a tulip, or a cylinder, have a decided advantage over the others, and even they do not always succeed.

Struck by the difficulties experienced in reducing the uterus in retroversion, and keeping in place when reduced, we have for a long time pointed out its causes, and called public attention to this point. In 1829 we were consulted, with MM. Guersant and Desormeaux, by Mad. C———, who, labouring under a retroversion of the uterus, experienced no relief from the use of a cylindrical pessary. We explained to these gentlemen our ideas on this species of displacement, and observed to them that the position of the uterus would be corrected in vain, and the disease constantly recur, if we could not fill up the space comprised between the posterior surface of the uterus and the curvature of the sacrum. We then proposed to have made expressly for this case a pessary on whose upper edge, where it was in contact with the superior posterior part of the vagina, there should be a kind of protection or spur large enough to occupy the space indicated and prevent the recurrence of the displacement. The proposition being adopted, M. Verdier made several pessaries which answered pretty well. We must, however, confess that this pessary sometimes became deranged, and turned on its axis, and obliged us frequently to verify its position by examination. After having used it for several months, we thought it proper to remove it; but, in order to make the cure as certain as possible, we substituted for it during six weeks a gum elastic pessary, of good size, and furnished with a stem. More than eight years have elapsed since the removal of this latter, and the lady, whom we frequently meet in society, has felt no more of her retroversion, and enjoys excellent health.

On the following year, in the month of April, we were requested to see Mad. G——, a woman of twenty-four or twenty-six years of age, and the mother of two children, then affected with retroversion of the uterus. We reduced the organ, and having introduced one of the pessaries which we had had made for the preceding case, we found, in a few days, that the spur which should have been behind, between the neck and the concavity of the sacrum, had been pushed to the right and forward, probably on account of the presence of fæcal matter in the rectum, and that the displacement had returned. We then took a piece of cork about five inches in length, and one inch square, and curved it so that it was convex posteriorly and concave anteriorly; its angles were rounded, its inferior extremity cut obliquely backward, the upper, also, in the same direction, but so as to remove more than an inch from the two anterior thirds of its thickness, in order not to confine the neck of the uterus, nor compress it in this direction, and to leave on the posterior plane a small tongue of four or five lines in thickness and eight or ten in length. It was pierced with a hole throughout its whole length for the passage of the humours of the uterus. This pessary was coated with virgin wax and placed in the vagina. Its application was followed by decided relief: the pain in the loins, at the top of the thighs, the sensation of pressure and weight in the pelvis were dispelled, the patient was enabled to take a few steps in her room without suffering. We advised her, however, to remain in the horizontal position, until we had observed the effects produced by this instrument, before having one constructed in a more workmanlike manner. During this period of waiting, the patient, wearied undoubtedly by her position, called in a fellow practitioner, who, having extracted the pessary we had temporarily introduced, and surprised at the unusual form we had given to it, asked us, one day, what were our motives for so doing. We repeated to him what we had twenty times stated in our lectures, that the ordinary pessaries did not suit retroversion, that they should have a peculiar form, and be so contrived as to fill the space between the posterior surface of the uterus and the concavity of the sacrum; and that, if the pessary did not fulfil this indication, the displacement was constantly liable to recur. Profiting by these suggestions, this physician substituted, with advantage, for our pessary in this lady, a simple flattened gum elastic bottle, such as is found in commerce. We are surprised that this colleague, to whose merit we have always, with pleasure, done ample justice, has thought proper to forget him who first explained these indications to him, and the proper means to fulfil them. In an essay founded on the case just mentioned, he contents himself with observing:† "The disease was understood, and a pessary immediately applied. The physician in attendance, particularly skilled in midwifery and the diseases of women, saw clearly that the ordinary pessaries would not suit the present case; he constructed one of cork, of a new form, which showed that the indication to be fulfilled was properly appreciated: it was a parallelopipedon, thick enough to fill the vagina, and surmounted by a projection, thin posteriorly, to prevent the depression of the body of the uterus in this direction."

We cannot too often repeat, that when retroversion is easily reproduced, it may be owing to an incomplete reduction, the long standing

* *Elytroid*, from the Greek ελυτρον, a sheath, and ειδος, form or figure.—Trans.

† On some displacements of the uterus, and the pessaries most adapted to their use. Memoires de l'Academie Roy. de Med., vol. 2d, p. 320, in 4to. Paris, 1833.

of the disease, the laxity of the parts, the undue curvature of the sacrum, the emaciation of the woman, and particularly to the retroflexion, or curvature of the body of the uterus upon the neck. In order to prevent its return, the pessary must be so constructed as to leave the neck free in front and below, and to thrust upward the posterior cul-de-sac of the vagina, so as to occupy the space comprised between the uterus and sacrum, and by carrying the neck of the uterus upward and backward, it may tend to incline the fundus in a contrary direction.

Displacements of the uterus are not the only cases requiring the use of pessaries, they may also be employed in certain forms of incontinence of urine, as done by Herscher;* and likewise they serve to support a hernia which protrudes through the parietes of the vagina, and sometimes even to cure it.

About twelve years ago, a woman, sixty years of age, came from the country to consult us for dragging in the stomach, colic, and pains in the lower belly; she said, moreover, that she had prolapsus uteri. On examination, we found a hernial tumour, five or six inches long, which projected from the vulva, and was formed by a knuckle of the small intestines, escaped between the neck and anterior wall of the rectum, through a fissure in the vagina. We reduced the hernia, applied a large circular pessary, and the woman has since been well.

We were desired to see in Montholon street, No. 5, a lady, more than sixty years of age, who had in her vagina, between the anterior wall of the neck of the uterus and the posterior part of the bladder, a soft, uneven tumour, of the size of a Guinea hen's egg. This indolent, reducible tumour increased in size in the vertical position, in the efforts of coughing and expiration; it was also formed by a knuckle of small intestine. This lady had frequent desire to make water, and difficulty in satisfying it; she also complained of a dragging sensation in her stomach, and pains in the lower belly. After having ascertained the nature of the tumour, and reduced it, we introduced a pessary, which was left in its place for three or four months. At the end of this time, the hernia having completely disappeared, we desired the patient to discontinue the use of the instrument, which occasioned a very copious white discharge, and to recur to it again if the tumour and uneasiness reappeared. Six months passed very comfortably; but being attacked by a catarrhal affection, to which this lady is subject every winter, the paroxysms of coughing reproduced the hernia and the concomitant symptoms. We were obliged to reapply the pessary, which was worn, this time, for a year, and then removed. Four years have since elapsed, and the hernia remains cured.

Manufacture.—It would be useless to speak of the manufacture of pessaries, if all practitioners of the healing art resided in large cities, or were always provided with the necessary instruments. But as many of them practice in the country, or in small towns unprovided with skilful workmen; and in many cases it is necessary to make at least a temporary pessary, we think it right to point out some simple method of succeeding in this undertaking.

Levret, in his remarks on pessaries, and the best manner of constructing them, advises the following plan. Take a piece of cork, as white as possible, without being too compact, free from decay, holes or fissures; with a cutting instrument give it the form desired, and smooth it with a file; dry it in an oven, then through a hole made in its centre pass a thread, to one end of which a pin or needle is fastened, which must be placed across the hole. To the other end tie a pebble or piece of lead, in order to sink the cork. When the pessary is thus prepared, it is to be soaked for an hour in melted virgin wax. At the end of this time, take it out of the wax, and plunge it instantly into cold water; when perfectly chilled, cut the thread to remove the pin and pebble, and expose it to the air to dry. Add then to the wax one-tenth of its weight of finely crystallized gypsum (sulphate of lime), very clean, freshly calcined, powdered and passed through a silken sieve; stir the mixture with a bone or ivory spatula, to prevent the precipitation of the gypsum, and plunge the pessary into this mixture as often as may be necessary to coat it uniformly to about the thickness of a line.

For convenience in soaking it in the wax, and withdrawing it, it is proper to stick into some point of its circumference, a long needle or pin, which also serves to receive a thread by which it may be suspended to dry after each immersion. Pessaries thus prepared, present small lumps and inequalities on their surface. These inequalities, far from being injurious, assist their retention in the vagina, prevent them from slipping, and being as easily displaced as those which are perfectly smooth.

The wire formerly used in the manufacture of pessaries, may be of great service in the impromptu formation of these instruments. About the close of the sixteenth century, Johannes Bauhinus used silver wire. *Johannes Bauhinus*, illustro principis, Virtimbergici, etc.; archiater, frater meus charissimus ad procidentiam uteri circulos ex filo argenteo rotundo cum furca triuda ex eadem materia parata, confici curat. Hic sine vi in collum uteri introducitur, qui interdum facile, nisi educatur, hæret: sin vero à pondere uteri propellatur, fascia retinendus erit.†

In 1770, Preunel used wire. The pessary which he has described and figured,‡ had the shape of a truncated cone, composed of rings decreasing successively from the base to the vertex. These rings of fine and elastic wire yield to pressure, and return to their original shape when the pressure is removed; the interior of the cone is furnished with a tape, and the exterior with a very soft leathern band. To each side of the base are attached two ribbons, which serve to fix the pessary and withdraw it at will.

Lately, M. Mayor§ has proposed to construct the skeleton of a pessary with wire, and cover it with carded cotton wrapped in oiled silk. The idea is valuable, and deserves to be known, on account of its simplicity, and the facility with which the surgeon or the patient may modify at will the shape and size of the pessary. We take a metallic wire, of iron or brass; we bend the ends in a simple knot, and then make a ring of any size, by tightening more or less the knot. We can give this ring any shape that may be desired. If the metallic circle is to be the rudiment of a simple pessary, the wire is to be twisted spirally round it; if it is to have a stem, the two ends of the wire are approximated, twisted so as to form a cord below the ring, and give by this means, to the framework, the shape of an *umbel*. If it be desirable that the umbel should have more than two radii, a third is fitted to the ring, and added to the two others. The skeleton once made, it is covered with a sufficient quantity of cotton wadding, secured by narrow strips of oiled silk, which are themselves fastened by a few points of suture.

* Haller, Disputationes Chirurgicæ. Disertatio de incontinentia urinæ ex partu, globulis ligneis curanda. Tom. iii. p. 597. Lausaunæ, 1755.

† Gaspard Bauhin in appendice ad partum Cæsareum, Rousseti, p. 488 apud Gynæciorum Spachii, Argentinæ, 1597, in folio.

‡ Haller, Disputationes Chirurgicæ; dissertatio de novo artificio curandi procidentiam uteri. Tom. iii. p. 551, et tab. xxiii.

§ Mathias Mayor, Bandages et Appareils à Pansement, ou Nouveau système de Deligation Chirurgicale, p. 105; édit. 1838, 1 fort. vol. in-8 et atlas in-4. de 16 planches.

Application.—To apply the pessary the woman should be fasting, and placed in the situation for the reduction of a prolapsus of the uterus, the rectum and bladder being empty. The pessary is covered with some greasy or mucilaginous substance; if it be circular, it is held by the thumb and middle finger, the index embracing part of its circumference; if it have a stem, this part must serve as a handle. To introduce it, the operator stands on the right side of the woman, separates the labia pudendi with the thumb and index finger of the left hand; with the right he presents the pessary to the orifice of the vulva, then introduces it slowly from above downward, and before backward, always depressing the posterior commissure of the vulva, until the instrument has entered the vagina. Having reached this canal, its position is changed to a horizontal one, by means of a see-saw motion. With the index finger introduced into the central opening of the pessary, we endeavour to bring the os uteri into this opening; when there, the finger should be slightly withdrawn, and carried round the circumference of the instrument in order to smooth the folds which the vagina might form above and below. In this manner, a pessary may be properly placed, without difficulty or much pain.

When the pessary is adjusted, the woman should be recommended to remain for a day or two in the horizontal position, and keep the breech somewhat elevated. Emollient injections are useful during the first days, on account of the irritation of this foreign body. It also almost always causes heat, slight inflammation, and a more or less copious white discharge, of which the woman should be forewarned in order that she may not be uneasy. When these symptoms have subsided, we may have recourse to injections of cold water, or astringent and styptic decoctions, etc. The woman is then allowed to pursue her ordinary avocations, taking care to avoid all causes which may produce derangement of the organ or of the pessary.

Modus operandi.—It was formerly supposed that to support the uterus, the pessary should rest on the internal surface of the tuberosities of the ischia or on the perineum. Hence the various shapes they have received. This opinion is incorrect. If it were not, the uterus would be too low down, and the inconveniences sought to be relieved would persist. Did it rest on the perineum, women, in whom this part was lacerated could not use it; experience, however, proves the contrary, when the vagina is not too much relaxed. On examination it will be seen that the parietes of the vagina contract on it by virtue of their tonicity, embrace it exactly, and form a sort of groove for it, from which it is, sometimes, with difficulty dislodged. This phenomenon is particularly observed when the woman is young, strong, has not had many children, and has worn a pessary for some time. The parietes of the vagina, distended by the instrument, have so great a tendency to approach each other, that if the pessary remains too long, it may wear through the points with which it is in contact, and give rise to dangerous accidents.

Objections.—Under certain circumstances, every kind of pessary is liable to objections. When the woman is delicate, lymphatic, or excessively emaciated; the vagina immeasurably distended by frequent deliveries, and has lost its tone, the circular pessary cannot be retained; it slips, is easily displaced, and escapes on the least motion; if, to remedy this inconvenience, it is made large, it impedes the excretion of urine and fæces, and cannot be borne: women thus disposed must wear a pessary with a stem, whatever may be the nature of the displacement. The stem of the pessary should be perforated throughout its whole length; otherwise, a portion of the humours of the uterus may collect in the little cup formed at its upper extremity, become altered, and irritate the adjacent parts. It should be long enough to reach the external parts of generation, without projecting beyond them; when too long, it excoriates and irritates the parts with which it is in contact, and exposes the woman to injury in sitting down. To remove this objection, the stem has been made movable by means of an elastic spiral spring, placed between two stems of ivory, one central and solid, the other external and hollow, in the form of a sheath. The terminating bulb moves on the central stem, and may shorten it when meeting a resisting body; it rests on the spiral spring. This modification, however ingenious it may appear, is of very little practical value. The ivory being a hygrometric body, is swollen by the moisture of the parts, and the spring plays with great difficulty. The bilboquet pessary is liable to another objection, that of allowing the neck of the uterus, after some time, to tumefy and become the seat of a fungus, which, engaged between the supports of the ring, renders the extraction of the pessary difficult and painful. The cylindrical pessaries are free from this inconvenience.

Accidents.—When the pessary is well made, and the woman is cleanly, it may be left for several months in the organ. Notwithstanding these precautions, the pessary sometimes becomes offensive, and is covered with incrustations of condensed mucus and a sort of calcareous deposit, which require it to be changed. Women are not unfrequently found, who, neglecting all duties of cleanliness, go so far as to forget that they are wearing a pessary; or, having removed a portion of it, the stem for instance, take no heed of the remainder. This body thus left, becomes the origin of serious accidents. Rousset has related the history of a woman, who, he thought, laboured under inflammation of the bladder or uterus, and was cured by the expulsion of some pieces of decayed cork, the remains of a pessary which she had worn for eighteen years.

Mittelhauser has recorded the following case:* "On the 5th of September, 1712, a countrywoman, fifty-one years of age, consulted Hilscher for a recto-vaginal fistula and incontinence of urine. She stated that ten years previously, she had been delivered of a dead child, after a tedious and painful labour of three days, and that on the 4th day after, incontinence of urine supervened. To remedy this inconvenience, a woman had advised her to introduce into the vagina a ball composed of linen and tow, covered with wax, which had answered a very good purpose for ten years; but having never withdrawn this ball, it had become incrusted with tartar, had irritated and pierced the vagina, and penetrated the rectum. From this period, the fæces escaped from the vulva, and the incontinence of urine recurred. The midwife could not extract the ball; the patient, unable to sit down or rest, came to Hilscher, who withdrew it with the forceps, and applied to the lips of the wound little bags filled with astringent substances, boiled in beer, and cured the fistula."

Morand, in the Memoirs of the Royal Academy of Surgery,† thus expresses himself: "A woman of about sixty years of age, consulted me for an inversion of the vagina, for which a pessary was necessary, and having offered her several of suitable size, she desired me to procure her one of silver. This pessary being adjusted, I lost sight of her for several years, though I had told her of the necessity of an occasional examination. She had suffered for some time with an offensive discharge from the vagina when she sent for me. Having touched her, I found the pessary surrounded by fungous excrescences of different degrees of hardness. I decided on its removal, in which

* Haller, Disputat. Chirurg. Tom. iii. Dissert. 88, p. 599.

† Tome iii. p. 614. Paris, 1788, in-4.

I met with great difficulty. The pessary seemed to be attached and adherent in several places, and I could not withdraw it without some violence, and by tearing some of the mammillæ which retained it. On examining it, I was surprised to find several holes in it, apparently produced by the acrid matters which exuded from the parts. These irregular holes were filled by portions of the internal membrane of the vagina, swollen and elongated into the cavity of the pessary, and had formed there hooded excrescences, which retained a corrupted humour in the cavity of the pessary. The shreds of these excrescences were still in the holes made in the pessary. The extraction was followed by a slight hæmorrhage, and some pain, which soon yielded to appropriate remedies, and injections by means of which this species of local gangrene was removed. But the singular part of the case is, that the operation having made in the vagina a wound nearly semi-circular, a similar cicatrice resulted, which left a strangulation sufficient to maintain the parts in their natural situation, without the aid of any pessary."

In 1810 a woman of about fifty years of age was admitted into the Hôtel-Dieu of Paris, for the accidents caused by a box-wood bilboquet pessary, which she had worn for more than fifteen years, and of which the stem had been broken off for a long time. This woman experienced acute pain in the hypogastrium. On examination, Dupuytren found that the part of the pessary remaining in the vagina had worn through and perforated the recto and vesico-vaginal septa, so that a portion of its circumference was exposed in the bladder, and another in the rectum. To extract this body Dupuytren had recourse to a very ingenious method. He introduced through the vagina into the perforation of the bilboquet a pair of toothed pincers with long handles, similar to those used by blacksmiths and nailers to seize the heated iron; then, separating the handles by short and frequent jerks, he broke the ring from within outwardly, and was enabled to extract one of the fragments by the anus, and the other by the vagina. In about three weeks the woman left the hospital cured of the accidents for which she had been admitted, but not of her fistulas.*

The cases of accidents produced by pessaries forgotten in the vagina might be multiplied ad infinitum. We shall terminate this chapter with an extract from a case published by M. Laroche.†

A peasant from the environs of Laguy, fifty-six years of age, came to Paris in 1808 to consult M. Janin for a descent of the uterus with which she had been long afflicted. This surgeon, after having reduced the uterus and applied an ivory bilboquet pessary, recommended the woman to be very cleanly, and to call on him occasionally to have the instrument cleansed and re-adjusted. The woman was employed in a vineyard, followed her occupation, and neglected this prudent advice. Thirteen years elapsed, when, overcome by the pain and difficulty she experienced in urination and defecation, she again consulted M. Janin. He found more than half the pavilion of the pessary in the rectum, which it had penetrated after having detroyed the recto-vaginal septum. Having vainly attempted to extract the pessary through the rectum, he consulted Percy and M. Laroche, who recommended an enlargement of the fistulous opening to extract it from the vagina. The operation, though painful, was successful. Attention to cleanliness, frequent enemata, baths, and a proper diet, soon produced a change in the patient. The fæces, after having passed in great quantities through the vagina, after a month's time seemed to have resumed their natural course. At this period, by means of a finger in the rectum and another in the vagina, only a small hole could be felt, and a perfect cure appeared about to be taking place.

M. Laroche was kind enough to allow me to examine this pessary after its extraction: the whole moiety of the pavilion, which had penetrated into the rectum, was surmounted by a blackish and offensive mass, covered with asperities. This mass appeared to be composed of concrete excrement, which served as a gangue for an infinity of white, pearly, and lamellated crystals, three or four lines in length and one in breadth, formed apparently of cholesterine. On the inferior extremity of the stem, which rested beneath the meatus urinarius, was a slightly convex incrustation, an inch in length and three or four lines in thickness, formed of uric acid and animal matter: it was a true urinary calculus. The ivory of the pessary had undergone no sensible change.

Extraction.—There is sometimes great difficulty in extracting a pessary, especially a ring pessary, which has remained for a long time in the vagina, and made for itself the groove of which we have spoken. Occasionally the difficulties are more apparent than real, and depend on the manner in which we endeavour to overcome them. We have seen skilful surgeons fail in their attempts, or extract with great labour and much pain to the patient, a pessary which did not hold very tightly. Some surgeons are in the habit of introducing the finger into the centre of the pessary, and drawing directly toward them. Others advise a ribbon to be passed through the opening in the pessary, to tie the ends, and draw on it, gradually increasing our efforts in proportion to the resistance experienced. These methods are improper: the latter generally impracticable, both are liable to serious objections; they may destroy all the advantages obtained from the application of the instrument, and sometimes produce a displacement greater than the original malady.

In order to extract a pessary we should proceed as in its application, but in an inverse course. The woman being placed in the position already indicated, the index finger is introduced between the vagina and pessary, and is made to pass around the whole circumference of the latter, in order to destroy the cohesion which keeps them together. When this resistance is overcome, a see-saw motion is given to it to change its horizontal position and place it edgeways in the vagina; the finger is then hooked into its central opening, and it is withdrawn by giving it a direction analogous to that followed by the head of the fœtus in escaping from the pelvis. A few days' rest are then ordered. In general, when the woman is young and strong, and the vagina has not acquired too great dimensions, the application of the pessary for six or eight months will effect a cure. We have perhaps dwelt long on this subject; but we think that in therapeutics it is not enough in order to obtain success to point out a remedy; we should likewise explain all the circumstances which may modify its action, those which contra-indicate its use, and, above all, teach the mode of employing it.

* This case is reported somewhat differently in Vol. vii. of the Dictionnaire des Sciences Médicales, in the article on Foreign Bodies in the Vagina: it is said that the woman was perfectly cured. I give it here as I observed it, and from the notes of the case, which I took when I was a student attached to the Hotel-Dieu.

† Bulletin de la Société Médicale d'Émulation de Paris. Février, 1822, p. 68.

CHAPTER III.

OF THE LACTIFEROUS GLANDS OR BREASTS.

To complete the description of the female organs of reproduction, we shall now treat of the breasts (mammæ); for, in many respects they may be considered as depending on the organs of generation, and, moreover, execute a particular function—that of providing the nourishment of the new being.

The mammæ are glandular hemispherical organs, situated on the anterior, superior, and lateral parts of the thorax, and intended by nature for the secretion of milk. This position of the mammæ is one of the distinguishing marks of the human species: in the majority of animals they occupy the abdominal region. Two in number in women; in animals their proportion is generally double that of the young which they may produce. They vary greatly in size: very small in infancy and in the male, at the period of puberty in the female they assume a development proportioned to that of the genital organs. They also increase remarkably in pregnancy and during lactation. They generally diminish when the fœtus perishes in the uterus. After the critical age they gradually decrease, and are almost entirely atrophied. They do not always bear a relation to the stature, strength, or even the good constitution of the subject. Delicate consumptive women often have very large mammæ. In fat and lymphatic individuals they are ordinarily very voluminous. In studying these organs we must not confound the gland itself with the adipose tissue which surrounds it. The right mamma is often larger than the left.

Anatomically speaking, the mammæ are composed of the skin, the papilla, and areola, of the mammary gland, of cellular tissue, the lactiferous ducts, of blood-vessels and nerves. The skin covering the mammæ, remarkable for its delicacy, exhibits the tract of the superficial veins: it is smooth, white, and free from wrinkles in young girls.

Papilla.—In the centre of the mamma there is a small elevation, called the papilla or nipple. This elevation, red or brown, greater or smaller, cylindrical, conoidal, covered by a fine but rugose skin, as it were, cracked at its apex, is susceptible of erection. It is sometimes depressed, or so short that the child's lips cannot seize it. In its centre are several depressions, into which the excretory or lactiferous ducts (Ductus Galactophori) empty. Around the papilla is seen an *areola*, or kind of coloured disc, about an inch in diameter. In youth and women of fair complexion it is of a roseate hue, of a darker colour in brunettes and those who have had children, and of an intense black in negresses. Its surface has a cracked appearance, owing to numerous sebaceous follicles which secrete a fluid destined to lubricate and prevent fissures in it at the time of lactation.

Mammary gland.—When the adipose tissue is removed the mammary gland is flattened, and thicker in the centre than at the circumference. It is formed by numerous white lobules, of a pulpy appearance. Its external surface is unequal and areolated: the granular structure, peculiar to the granular tissue, is not very evident, but is more perceptible during lactation. At this period the gland is divided into lobules, composed of agglomerated glandular acini. M. Cruveilhier, who has examined them, has found in them a central cavity, from which he could express a vermiform matter, which was only coagulated caseine. Two other tissues likewise enter into the composition of the gland:—one, of a fibrous nature, after having furnished a complete envelope, sends into its interior prolongations which separate and again unite together its lobes. It must be observed that the cells which it forms do not inter-communicate, which explains the frequency and succession of mammary abscesses. The other, or adipose tissue, occupies the areolæ on the external surface of the mamma, separated by the fibrous lamellæ. This tissue may become enormously developed; the mamma may then be confounded with the fat.

When the mamma of a woman who has died during lactation is dissected, the milk is seen to escape from a multitude of points, which are the openings of the excretory ducts, (*Ductus Lactiferi, Galactophori*). These vessels have two orders of roots: some in the various acini of the gland; the others, according to Muller, in the surrounding adipose tissue, and this explains how M. Donné found globules of pus in the milk of a nurse, before the manifestation of any external signs of an abscess. These ducts converge from the circumference to the centre. Having reached the level of the areola, they form rounded culs-de-sac, about eight or fifteen, and sometimes twenty in number, and unite to form the nipple. After being greatly contracted, they terminate at the apex by as many apertures. According to Bichat, they are lined by a mucous membrane; no valves have been found in them.

The arteries of the gland are furnished by the internal mammary, the intercostals, the thoracic, and particularly by the external mammary. The veins are called from the arteries which they accompany: some are superficial, forming circles around the areola, and exhibit a bluish tint under the skin. A considerable quantity of lymphatics passes from the mammæ toward the axillary ganglia. The nerves are derived from the intercostals and thoracic branches of the brachial plexus.

Development.—About the third month of intra-uterine life the mammæ first appear. At birth they are larger than at a subsequent period. At puberty they acquire the proportions they are destined to maintain for a certain number of years, and which establish a remarkable difference between the sexes. At each menstrual period the mammæ frequently become the seat of a temporary turgescence, which disappears with the cause which produced it.

Uses.—The special object of these glands is to secrete a white fluid, known under the name of *milk*, and intended as the nourishment of the new-born infant.

Anomalies.—The number of the mammæ may vary. It is rare to find more than two in the human female: yet Bartholin* and Borellus have given cases of women who were provided with three. In Cabrol and the *Ephemerides des Curieux de la Nature* may be

* Loco citato, Anatomia Reformata, p. 209.

found examples of four. But these pretended supernumerary glands are generally nothing but masses of adipose tissue surmounted by a simple nipple. Georges Haunsens* speaks of a woman whose left breast was furnished with five nipples, each having its areola, and from each of which milk issued simultaneously when one of them was excited.

At other times one of the mammæ is wanting. Dr. Louisier† mentions having found only one in a lady, whose daughter presented the same conformation. Marandel has presented to the Anatomical Society‡ a specimen exhibiting congenital and complete absence of one of these glands.

The papilla is sometimes so small, flattened, or depressed, that the child cannot seize it, and the woman cannot nourish her infant. At other times it may accidentally be wanting. The skin which covers it is in some cases so sensible and delicate, as to become the seat of cracks, fissures, erythema, or herpes, which may render lactation painful and difficult, if not impossible.

The anomalies of the secretion of milk are as numerous, and not less various. Thus, we have seen it so copious in some cases as to injure the woman's health. At other times it has been entirely absent during pregnancy, and, still more rarely, after delivery. It has been observed before the age of child-bearing, during its continuance, and long after its cessation, without being preceded by conception. Baudelocque§ relates the case of a little girl, eight years old, who, having caused an infant which her mother was nursing to suck her breasts, was enabled to nourish the child for a whole month, during which the woman was curing the fissures in her nipple.

We read in the Recueil des Causes Célèbres‖ of a young negro woman, who, after two days trial of suction, took the place on board of a vessel of a nurse who had remained ashore. In the Transactions Philosophiques, No. 455, is detailed the case of a woman of sixty-five, who nourished her grandson, to whom she had offered her breast to keep him quiet.

Lastly, the secretion of milk has been seen in man. Alexander Benedictus relates a very curious case.¶ M. de Humboldt** saw, in the village of Aurius, a labourer who had nourished his son with his own milk.

Many diseases and organic changes may occur in these glands, but of these we shall not treat here.

CHAPTER IV.

OF THE PRODUCT OF CONCEPTION.

The result of conception is a complex product, differing according to the species of the animal to which it belongs. The analogy, however, which exists between these various products in the different classes of animals is so great, that they are all included under the generic term *ovum*. In the mammalia the ovum is composed of heterogeneous parts, which undergo at every moment of their existence remarkable changes and modifications in their arrangement and volume. Each of the parts constituting it plays during intra-uterine life a part more or less active, but important and necessary.

The human ovum is composed—1st, of a soft, membranous, and vascular envelope; 2d, of liquids; 3d, of a long flexible stem, called *umbilical cord*, and of the new being.

SECTION I.

EXTERNAL ENVELOPE OF THE OVUM.

The external envelope of the ovum is formed by superimposed membranes, and a large vascular mass, to which the name of *placenta* has been given. Physiologists have differed as to the number of the membranes: Bartholin, Fabricius of Aquapendente, Harvey, Duverney, and Sabatier admit only two—one interior, the amnion; the other exterior, the chorion, in which they distinguish two laminæ. According to Haller there are four distinct membranes:—1st, the external membrane of the ovum; 2d, the chorion; 3d, the middle membrane; 4th, the amnion. Roederer counted only three; Hunter, Sandifort, Lobstein, Bichat, and the majority of modern anatomists, admit four membranes in the early months of pregnancy, and only three at its termination. This discrepancy is owing to the manner in which different authors have examined the external membrane of the ovum. Some, considering it as a part of the chorion, have confounded it with that envelope; others have described it separately; others again have seen a distinct membrane in each lamina of the caduca. By carefully examining the disposition of the two laminæ of this membrane, it will be seen that the one adhering to the uterus is uninterruptedly continuous with that covering the ovum: during the progress of pregnancy these two laminæ approach each other and adhere; we are then obliged to admit only three membranes in the envelope of the human ovum. Of these three membranes the external is furnished by the uterus, and is the *caduca;* the two others are constituent parts of the ovum itself, and are called *chorion* and *amnion.*

ARTICLE I.—OF THE MEMBRANA CADUCA.

The external membrane of the ovum has successively received the names of *chorion villosum* (Ruysch); *membrana exterior ovi* and *chorion* (Haller); *membrana caduca seu decidua* (Hunter); *caduca crassa* (Mayer); *membrana mucosa* (Osiander); *epichorion* (Chaussier);

* Percy, Mémoire sur les Femmes Multimames. Journal de Médecine, par Roux, Corvisart, et Boyer, tom. ix, p. 381.
† Thèse in 8vo, No. 55, 12 Novembre, an. 10, p. 9.
‡ Bulletins de la Faculté de Médecine, tom. i. p. 219, 1806.
§ Traité de l'Art des Accouchemens, tom. i. p. 188.
‖ Vol. x, p. 432.
¶ Anat. Corp. Humani. lib. iii. c. iv. p. 599.
** Voyage aux Régions Équinoxiales du Nouveau Continent, t. iii. p. 58.

épione (Dutrochet); *périone* (Breschet); *anhistous membrane* (Velpeau); *adventitious lamina* (de Blainville); *nidamentum* (Burdach); *maternal coat of the ovum* (Meckel), etc. etc. We would willingly adopt this last expression, did we not think it better to preserve that of caduca, given to it by Hunter; an expression, vague indeed, but on that very account in our opinion preferable: 1st, because it presupposes nothing; 2d, because it cannot give an incorrect idea of the arrangement and structure of this membrane, like the words *epichorion, épione, périone,* or *anhistous;* 3d, because it is applicable to all cases, even of extra-uterine pregnancy; 4th, lastly, because it serves to recall to our mind the memory of the great anatomist who first correctly described it.

The caduca is the one which first appears in sight when the ovum has been expelled uninjured, or when it is exposed by an incision into an impregnated uterus. At full term, it forms that grayish, opaque, soft and pulpy layer which adheres to the chorion and covers it as far as the edge of the placenta. In order to see correctly the disposition of this membrane, it should be examined before the fourth month of gestation. It then presents the following characters; it is soft, of a yellowish red colour, opaque, rugose, unequal on its external or adherent surface, smooth and polished internally, and resembling a bag without any aperture. A portion of the external surface of this sac adheres to the internal surface of the uterus at all the points which are not in immediate contact with the ovum; the other portion adheres to the ovum, and covers it in the same manner as the serous membranes cover the viscera which they envelope, or to use a more evident, but less elegant comparison, like a cotton night-cap covers the head to which it is applied. The portion of the membrane which adheres to the uterus, about a line in thickness, is called *caduca uterina;* that covering the ovum, and much thinner, is the *caduca reflexa.*

The internal surface, analogous to that of the serous membranes, smooth and polished, forms a cavity without any opening, called the *cavity of the caduca;* this cavity, more spacious in the early stages of pregnancy, is the seat of an exhalation, not very abundant, which we have pointed out long ago, and which furnishes a serous fluid called recently *hydroperion,* by our colleague M. Breschet, a fluid which, according to this anatomist, is of great importance in the nutrition of the fœtus.

The organization of the caduca is not well marked; it approaches very nearly that of the false membranes accidentally developed in the serous tissues. The vessels which ramify through it are quite apparent. Ruysch has spoken of them in his answer to André, Oltomar, Gœlicke;* Hunter has figured them with great care;† Lobstein has injected them with mercury;‡ and we ourselves have represented them in plate 30, fig. "H," of our Atlas. We cannot, therefore, agree with M. Velpeau in considering this membrane as inorganic.

The membrana caduca is present in all pregnancies; it is always found in the uterus, whatever may be the state of the product of conception, whether intra or extra-uterine, and whether this product be natural or not; it is even found in cases of tubular and ovarian pregnancy, provided the pregnancy be not too far advanced, and have not exceeded five or six months, for we are inclined to believe that it disappears at a later period. We could not find it in the uterus of a woman who died in 1831, at the lying-in hospital, in consequence of ovarian pregnancy, which had exceeded the term of nine months. In 1769, the elder Meckel found it lining the uterus of a woman who died in consequence of a rupture of the tubular pregnancy.§ Chaussier has made the same remark in the different cases of tubular pregnancy which have fallen under his notice.‖ Under certain circumstances, rare indeed, we think that it may be developed without conception. Evrat has several times observed, and we have confirmed the fact, that barren women, after repeated coition, sometimes discharge, at the menstrual periods, portions of membrane analogous to the caduca. This membrane does not belong exclusively to the human species. Hunter pretends that it does not exist in quadrupeds, but only in monkeys, in whom it is very thick. Haller¶ affirms the contrary; he asserts that it is found in all the mammalia, even in those in which a true placenta can hardly be distinguished, as in the hog. Lobstein has observed it in the uterus of the cow and the sheep; since then it has been seen in the rodentia, and in the majority of the mammalia which have been examined.

The formation of this membrane has been successively attributed to the exfoliation of the mucous membrane of the uterus, to a degeneration of the semen; but it appears to us more correct to regard it as the result of an exhalation produced by a peculiar excitement caused by a fruitful coition. The following is our idea of the formation and disposition of this membrane.

The excitement which we have stated, was produced by fecundation, determines on the internal surface of the uterus the exudation of a plastic lymph, which condenses, becomes concrete, and gives origin to a kind of false membrane, the *caduca.* At first, this membrane adheres feebly to the uterus, lines its cavity, closes exactly all its apertures, and forms in the uterine cavity a kind of sac or pouch, which, far from presenting the three apertures indicated by Hunter, sometimes, but accidentally, sends prolongations or appendiculæ into the fallopian tubes or neck, as we have seen in abortive ova expelled during the first two months of gestation. When the ovum is driven by the contractions of the tube into the uterus, it elevates and detaches a portion of the caduca corresponding to the orifice of the tube; arrested by the resistance offered by this membrane, it is implanted or grafted on the orifice of the tube or in its vicinity; this is the usual course; but if the impulsion is stronger, or the adhesion less firm, the ovum slips between the uterus and the caduca, and presents the variety of insertions of which we shall speak in treating of the placenta.

In this state, the ovum may be imaginarily divided into two hemispheres; one projecting and directed towards the cavity of the uterus, is partly covered by that part of the membrane which it has separated, and which forms the *caduca reflexa;* the other, in contact with the part of the uterus from which it has displaced the false membrane, will furnish the elements of the placenta.

The use of the membrana caduca, in the human species, appears to us to be 1st, to prevent the ovum from floating loosely in the cavity of the uterus; 2d, to maintain it in contact with a fixed point of the parietes of this organ, until it has contracted sufficiently numerous and firm attachments to enable the embryo, after being developed during the first stages of pregnancy at the expense of the surrounding fluids, to extract from the blood of the mother, the materials suitable for its nutrition and subsequent growth; 3d, to determine the place of insertion, form and extent of the placenta; 4th, to prevent superfœtation; 5th and lastly, according to Lobstein, to transmit to the chorion and amnion the vessels which furnish these membranes with the elements of nutrition and exhalation.

* Epistola Anatomica Problematica Nova, p. 9.

† Loc. cit. Tab. 5, 15, 19, 24, 26 et 27.

‡ Essai sur la Nutrition du Fœtus. Strasbourg, 1802.

§ Weinknecht, de Conceptione Extra-uterina, etc., apud Schlegel. Lipsiæ, 1796.

‖ Bulletin de la Faculté de Médecine de Paris. Vol. iv. p. 137. 1814.

¶ Elem. Physiol. tom. viii. p. 192.

ARTICLE II.—OF THE CHORION.

The chorion is a membrane, the formation of which precedes the passage of the ovum into the uterus; placed between the caduca and amnion, it constitutes the middle envelope or the second membrane of the ovum. It is transparent, but slightly resisting, and is very analogous to the serous tissue.

The chorion presents two surfaces: one, *external* and tomentous, is in immediate contact with the caduca and placenta; the other, *internal*, separated from the fœtus by the amnion, adheres to the external surface of this membrane by a lax cellular tissue. In the first periods of pregnancy, the chorion and amnion are separated from each other; the space between them is traversed by very delicate lamellæ of cellular tissue, resembling in their fineness the partitions of the hyaloid membrane.* The space between the lamellæ is occupied by a serous and limpid fluid, which disappears in proportion to the approximation of the membranes; a fluid which must not be mistaken for that of the amnion.

The chorion is formed of a lamellated, dense and compact tissue. Ruysch thought it was composed of two laminæ, one external and the other internal; the first, which he called the *velvety chorion*, is merely the caduca reflexa; the second is the chorion, properly so called.

The existence of blood-vessels has never been demonstrated anatomically. Haller† states positively that no one has discovered blood-vessels or nerves; yet Wrisberg‡ affirms that he has seen on the chorion of a placenta at term, a vascular network, originating from the umbilical vessels. Sandifort§ that this membrane receives many vessels from those of the caduca. Notwithstanding these assertions, their existence is still doubtful, and has been admitted only from analogy, and in order to explain its functions, as in the serous membranes to which the chorion bears great analogy. At the points covered by the placenta, the chorion sends prolongations which accompany the umbilical vessels, furnishes them with a kind of sheath, of very firm white tissue, which follow them to their termination. It is generally supposed that the expansion of this tunic forms the cellular web of the placenta. We believe that this web has another origin, which we shall point out hereafter. On the fœtal side, it forms an envelope common to the vessels of the umbilical cord. The ancients thought, that on its arrival at the umbilicus, the chorion was continuous with the skin of the fœtus; this continuation is evident; but these membranes, far from being identical, differ in their nature. A distinct line of demarcation exists where the chorion terminates and the skin begins, and indicates the exact point of separation of the umbilical cord from the body of the child.

The chorion serves as an envelope to the ovum, protects it in its passage from the fallopian to the uterus, furnishes a sheath for the umbilical cord, assists in the production of the placenta, and probably in the exhalation of the fluids contained in the ovum.

ARTICLE III.—OF THE AMNION.

The amnion is the third and innermost of the membranes of the ovum, that which contains the umbilical cord, the fœtus, and the fluid in which it exists.

At full term, the amnion is smooth, diaphanous, more dense and resisting than the chorion and the caduca. The *external surface* is in contact with the chorion, to which it adheres by a lax cellular tissue, which yields readily to any efforts of traction, and permits the membranes to separate from each other. Along the umbilical cord, the adhesion is closer, and the separation can only be effected for an inch or two near the insertion of the cord into the placenta.

The *internal surface* is free, smooth, and polished, corresponds to the fœtus from which it is separated only by a liquid varying in quantity and known under the name of *liquor amnii* or *amniotic fluid.*

The arrangement here described is not identically the same in all periods of pregnancy. During the first month, the amnion, little developed, contains but a small quantity of fluid, and embraces closely the body of the embryo.‖ A considerable space separates it from the chorion. This interval is occupied by the umbilical vesicle and the serous fluid of which we spoke in the article on the chorion. At this period, the amnion has no immediate contact with the fœtal extremity of the umbilical cord; but as the embryo is developed, the amnion extends, diminishes the space between it and the chorion, compresses the umbilical vesicle, elongates its pedicle, thrusts it toward the placental extremity of the cord, and at the same time furnishes a new sheath for the umbilical cord. It then applies itself to the internal surface of the chorion, lines its whole extent, and terminates by adhering to it as above mentioned.

The ancients thought that the amnion was continuous with the epidermis of the fœtus. This opinion was abandoned and again renewed about twenty years since by Mondini, at Bologna. Latterly, M. Breschet has pretended that the amnion was nôt continuous with the epidermis, but furnished the fœtus with an actual envelope. This professor thinks that the desquamation observed in children, for the first three or four weeks after birth, is owing to the separation of the lamina furnished by the amnion. This opinion, plausible enough, does not appear to us demonstrated beyond all doubt. M. Serres goes farther; he asserts, that during the first two months of pregnancy, the embryo is exterior to the amnion, and is not contained in this membrane.

The structure of the amnion is very simple and analogous to that of the chorion and serous membranes; it appears to be formed of a condensed cellular tissue, in which no blood-vessels nor nerves have hitherto been discovered.

Its uses are, as we have stated, to assist in the formation of the membranes of the ovum, to contain the umbilical cord, the fœtus and surrounding fluid.

ARTICLE V.—OF THE PLACENTA.

The placenta, as indicated by its name, is a kind of cake, or vascular mass, situated on the exterior of the ovum, of whose surface it

* Vide plate 29, fig. 5 and 6, of our Atlas.

‡ De Structura Ovi, etc.

‖ See our Atlas, plate 27, fig. 4, 5 and 6; and plate 25, fig. 5, 6 and 7.

† Loc. cit. tom. viii. p. 196.

§ Observat. Anat. Pathol. lib. iii. cap. vi, p. 95.

occupies about one-third. It adheres firmly to the chorion, from which it appears to originate. It is also called *hepar, jecur uterinum*, on account of the functions attributed to it.

This organ belongs exclusively to the mammalia; diffuse in some of the pachydermata, as the hog; multiple and scattered in the ruminantia; it is simple, single, and agglomerated in the carnivora, rodentia, etc.

In the human species, the placenta is single, and generally of a discoid shape, which, however, may undergo various modifications, owing principally to the mode of insertion of the umbilical cord. When the cord is inserted in the centre of the disc, the placenta is said to be *parasol*-shaped; when into the circumference, the placenta assumes an oval form, that of a *kidney* or a *rocket*. It may present other varieties which it is proper to notice. Thus, when it exhibits in the centre a thickness which gradually decreases toward the circumference, it is said to have a *nipple*. At other times, instead of being simple or agglomerated, it is composed of two or more distinct masses; and occasionally, beyond the principal mass, one or several isolated cotyledons are found, forming around so many supernumerary placentas. These cotyledons may be retained in the uterus after the delivery of the secundines, and give rise to troublesome accidents.

In plural pregnancies, the number of the placentas corresponds to that of the ova. Sometimes the placentas are distinct and isolated; but in the majority of cases, they are united by one margin, without, however, any direct communication with each other. At other times, there is an actual fusion, the vessels of one anastomosing with those of the opposite placenta, forming arches visible sometimes to the eye without the aid of injection. This disposition, which we have seen several times, obliges us to place a ligature on the maternal end of the cord, after the delivery of the first fœtus, in order to prevent a hæmorrhage which might be fatal to the remaining one, as has happened more than once.*

The colour of the placenta is of a reddish-gray, more or less intense, according to the quantity and nature of the blood which it contains at the moment of its expulsion: but when it is nearly free from blood, its tint approaches that of rose-coloured granite.

Its diameter is generally six to seven inches, and its circumference about twenty-one. In some rare cases, one of the diameters has attained the length of twelve or fifteen inches. Amand† states that he received one which was eighteen inches in length by five and a half in its greatest width, and resembled very much the tail of a codfish.

The thickness is, in general, in an inverse ratio to the extent, and commonly of about twelve to fifteen lines, rarely more. The thickest point is nearly always at the insertion of the umbilical cord.

The weight varies from one to two pounds, according to its size, and the quantity of blood it contains.

These dimensions vary with the strength, debility,—healthy or diseased state of the mother or of the fœtus, and sometimes also according to the part of the uterus to which the placenta adheres.

The placenta has two surfaces, one *internal* or *fœtal*, the other *external* or *uterine*, and a *circumference*.

The fœtal surface smooth, polished and concave when the ovum is intact, is covered by the chorion which adheres intimately to it, and by the amnion, and affords insertion to the umbilical cord. We may remark there a considerable net-work of vessels, formed by the successive divisions of the great arterial and venous trunks which arise from the cord. When it becomes necessary to introduce the hand for artificial delivery, this anatomical disposition serves to enable us to distinguish the placenta.

The uterine surface, uniformly smooth and polished, adheres to the uterus; the rugose, unequal and deeply grooved appearance which it sometimes exhibits, is accidental: it results from the contractions of the uterus, or the traction made on the cord in the attempts at its extraction. When the placenta has suffered no violence, or is still adherent, the uterine surface is covered by a very fine uniform and delicate cellular tissue, passing from one cotyledon to another, and making the anfractuosities nearly in the same manner as the arachnoid membrane in the convolutions of the brain.

The circumference is in contact with the fold constituted by the caduca uterina, when passing over the ovum to form the caduca reflexa; this fold establishes the line of demarcation between the two laminæ of this membrane. Between the circumference of the placenta and the fold of the caduca, in a kind of fibrinous concretion, or badly elaborated cellular tissue, are found large veins, which surround the placenta with a more or less complete vascular circle, and which on account of this disposition, have received the designation of *coronary sinus* of the placenta.‡ These veins communicate directly, on the one side, with the cavernous tissue of the uterus, which results from the interlacing of the veins or uterine sinuses; and, on the other, they penetrate the tissue of the placenta, by entering through the inequalities of the circumference of this body, into the anfractuosities which separate the cotyledons of which it is comprised.

The placenta results from the agglomeration of lobes or cotyledons, united on the fœtal, but separated on the uterine surface by grooves and anfractuosities which are converted by the cellular layer covering this surface into as many canals. These canals are called *placental sinuses*. M. Velpeau denies the existence of these sinuses; we cannot agree with him. It is evident that the intervals comprised between the cotyledons are filled with an areolar tissue, gorged with blood, studded with innumerable patulous openings which, during pregnancy, anastomose with those of the veins or uterine sinuses.

Some anatomists think that the placenta is formed of two parts, one fœtal, the other uterine or maternal. If this structure is found in some animals, it cannot equally be said to exist in the human species, unless, like M. Jacquemier,§ we give the name of uterine placenta to that lamina of cellular tissue intermediate to the uterus and placenta, and traversed by the utero-placental vessels.‖

Organization.—An analysis of the texture of the placenta, exhibits to us: 1st. Arterial and venous blood-vessels. 2d. Cellular tissue. 3d. According to some anatomists, lymphatic vessels and nerves all firmly adhering to the chorion.

Blood-vessels.—They arise from the successive divisions of the vessels of the umbilical cord. By following attentively some of the principal vascular divisions in the midst of the almost inextricable net-work which they form, it will be perceived that after subdividing two or three times, they group together to furnish the elements of a cotyledon. Each group is composed of a vein and an artery, which proceed together, and subdivide ad infinitum, to form the cotyledon in which they terminate. Each vessel is formed of two coats, one,

* Histoire de l'Académie des Sciences, année, 1727.

† Loc. cit. obs. 88, p. 283.

‡ See plate 30.

§ Anatom. and Physiol. Researches on the Sanguine Vascular System of the Uterus during Gestation, etc. Archives de la Médecine. October, 1838.

‖ For some new researches on the placenta, see Dr. Reid's paper in the Edinburgh Med. and Surg. Journal, vol. 55th.

external, white, and resisting, furnished by the chorion: the other, internal, polished, delicate, less dense than the first, is the continuation of the inner coat of the umbilical vessels. Examined by the microscope, these vessels will be found to form at their extremity tortuous canals which are generally in pairs, and terminate by turning on themselves: so that it is difficult to say whether they anastomose with each other, open into the uterine vessels, or into the placental sinuses. In our opinion these three modes of termination exist. It is certain that if mercury, water, or a solution of gelatine be injected into one of the umbilical arteries, the injection generally returns by the other artery. When the injection meets with any obstacle, it passes into the ramifications of the vein, and then reaches the other artery: so that the whole of the placenta is sometimes injected at once. The same thing may occur when the injection is forced through the umbilical vein. When the placenta adheres to the uterus, the injection does not pass from the umbilical arteries to the vessels of the mother, nor from the vessels of the mother, to those of the placenta; mercury introduced into the umbilical vein penetrates into the uterine veins.

Cellular tissue.—It originates according to some from that of the umbilical cord: according to others from the fibro-cellular sheaths sent by the choroin to the vessels. We think that, like the membraniform cellular layer, which unites the placenta to the uterus, and with which it is continuous, this tissue is owing to the transformation of the plastic lymph effused between the ovum and uterus, after the latter has been stripped of the portion of the caduca which covers the projecting hemisphere of the ovum; a lymph in which the villosities of the chorion, which form the substance of the placenta, are nourished and developed. This tissue is thin, extremely delicate, never contains any fat, and is very easily destroyed by maceration.

Lymphatic vessels.—Some anatomists, Wrisberg* and Schregert among others, admit their existence; and recently, Fohmann of Liege has described and figured them:‡ but, on a careful examination of the engraving, and likewise of some of the specimens injected by Fohmann, as we have had an opportunity of doing, their existence may be doubted. We are of opinion that there has been some mistake, and that this anatomist has taken for lymphatics the cellular tissue into which the mercury had been extravasated.

Nerves.—We may make the same remark concerning the nerves which have been described and figured by Sir Everard Home.§ We are afraid that, deceived by appearances, he has mistaken cellular tissue for nerves. An additional argument in our favour is, that the great majority of anatomists, both ancient and modern, formally deny their existence, and that, like Chaussier and M. Rhibes,‖ we have never been able to follow these nervous filaments beyond the umbilicus of the fœtus. M. Velpeau¶ is incorrect in stating that these two anatomists affirmed that they had seen nerves in the placenta, and, moreover, the section of the cord appears to give no pain to either mother or fœtus. The painful sensation caused by the separation of the placenta when it is artificially removed, must be referred to the uterus and not to the placenta.

Insertion.—This may occur at all points of the internal surface of the uterus; but generally occurs at the orifice of one of the tubes, or in the vicinity toward the fundus of the organ, as Fallopius,** Ruysch, Monro,†† have remarked; sometimes on one of its parietes, more rarely on the internal orifice of the neck.

By remembering what we have said on the disposition and uses of the caduca, it is easy to give a plausible explanation of these varieties of insertion. In all women the fallopian tube does not contract with equal energy: in all the lymph and blood have not the same degree of consistence, plasticity, and organizing force, as may be readily demonstrated by following the progress of inflammation in the serous membranes, in analogous conditions, in different individuals. If marked differences are seen in the formation of cicatrices, why should not the same thing occur in the formation and adhesion of the caduca and of the placenta. Hence it follows, that if the ovum is forcibly driven into the uterus from the fallopian tube, and the membrana caduca does not adhere very firmly; if, in addition, at the moment of the passage of the ovum into the uterus there supervenes some accidental circumstance, such as a moral agitation or physical shock, a blow, or a fall, it may be conceived that the ovum, instead of merely raising that part of the caduca which covers the orifice of the tube, and adhering at this point, as happens in a majority of cases, will separate a more extensive portion of this membrane, be interposed between it and one of the parietes of the uterus, giving rise to an anterior, posterior or lateral insertion. If the impulsion and shock are more powerful, or the adhesion more feeble, the ovum will glide from above downward, between the caduca and the corresponding paries of the uterus, until it reaches the internal orifice of the neck. If the neck be exactly closed, or only obliterated by the *gluten pellucidum* of Hunter, the ovum will be engrafted on the orifice as on any other part of the organ, and as a consequence we have an insertion of the placenta in the os uteri. Lastly, if the os uteri be patulous, or the gluten not sufficiently firm to arrest the ovum, the latter will continue its progress, traverse the orifice, and soon be expelled, constituting an *effluxus* or *effluxion*, an accident which we have several times seen, which occurs more frequently than is generally supposed, and which, until now, has never been satisfactorily explained.

Formation.—When the ovum reaches the uterus, the chorion is covered by numerous villosities, giving it a cottony appearance. This tomentum is formed by a species of granulations, small, white, transparent pedicellated bubbles, which, under the microscope appear to us hollow, and no other than the rudimentary vessels, from which the future placenta originates. If the ovum were in contact at all points of its external surface with the parietes of the uterus, the tomentum would be equally developed throughout. The placenta, instead of being circumscribed, would be scattered, diffuse, and occupy the whole periphery of the ovum, as observed by Santorini‡‡ and William Turnbull,§§ in cases of extra-uterine pregnancy; but the ovum being placed between the uterus and the caduca, is in contact with both, in an extent nearly equal to each of the halves of the small sphere which it represents. In this state, the ovum and uterus each enjoying vitality, these parts are in a condition analogous to those of a recent wound, approximated and kept in contact by means of a uniting bandage. Now two living parts cannot remain long in contact, under these circumstances, with the process of cohesion occurring. An

* Observationes circa Placentæ ac Funiculi Umbilicalis Vasa Absorbentia. Gœtting, 1790.

† De Functione Placentæ Uterinæ, ad Virum Illustrum. T. Sœmmering. Epistola. Erlang, 1799.

‡ Memoir on the Communications of the Lymphatic Vessels with the Veins, and on the Absorbent Vessels of the Placenta and Cord. Liege, 1832.

§ Philosophical Transactions, 1825, part ii. art. 2, p. 66.

‖ Mémoires de la Societé Médicale d'Émulation, 8e année, p. 607. Paris, 1817.

¶ Traité Complet del 'Art des Accouchemens, t. 1er, p. 292. Paris, 1835.

** Geb. Fallopii, Observ. Anat. p. 751.

†† Essays of the Edinburgh Society, vol. ii. p. 155.

‡‡ Santorini. Obs. Anatom. Tab. ii. fig. 3. Lugd. Batav. 1739.

§§ Bulletin des Sciences, publié par la Societé Philomathique. No. 12.

exudation of plastic lymph takes place on their respective surfaces. The uterus, on account of its great vitality, furnishes a copious supply; the ovum, being small in size and of enfeebled vital powers, can contribute but a small proportion. It follows that the villosities of the chorion, at the part of the ovum in contact with the caduca reflexa, not finding in this membrane materials sufficient for their development, become atrophied and transformed into filaments, and serve merely as a bond of union between the chorion and caduca; whilst those of the uterus, finding in the lymph furnished by this organ an ample source of nutrition, become elongated, developed, and transformed into vessels and form the placenta.

Adhesion.—The placenta adheres to the uterus by a thin, delicate, membraniform cellular tissue, produced by the plastic exudation, which we said took place at the point of the uterus, in immediate contact with the hemisphere of the ovum, not covered by the caduca, an exudation in which is developed the tomentum, giving origin to the placenta. Hunter, Chaussier, and a majority of authors have taken this coat for the continuation of the caduca, and supposed that the ovum lodged in the thickness of this membrane. The cellular tissue resulting from this transformation is but slightly consistent; when the uterus contracts on itself, the tissue yields to the efforts of the organ, separation takes place, and the secundines are expelled.

This adhesion is moreover formed by numerous small vessels, arterial and venous, known by the name of *utero-placental.* These vessels, of which the existence is yet doubted by many authors, among them Velpeau,* have been perfectly described and figured by Albinus,† Hunter,‡ and the majority of those who have written on ovology. In our examinations we have always found them, and have figured them in plate 30 of our Atlas, and M. Jacquemier has more recently given an excellent description of them.§ These vessels, extremely numerous and tortuous, with very delicate parietes, are ruptured with the greatest ease.

Anomalies.—Although we have treated of the anomalies of the form, size, thickness, and insertion of the placenta, of the isolation of some of the cotyledons which compose it, there is one which, if it has actually been observed, should not be passed over in silence; we mean the total absence of this body. Dr. Joseph Canby, of Lebanon, Ohio, reports‖ the case of a lady who had several times aborted successively about the sixth month, in consequence of the death of the fœtus, and had nevertheless enjoyed good health during the progress of each pregnancy. She again became pregnant during the year 1816, and was delivered in the eighth month of a dead child, to which there was no placenta; it was attached to the uterus by an umbilical cord terminating in a bulbous extremity: otherwise the child was well formed. In this labour, as in the preceding, no discharge of waters had been observed. This case is so extraordinary, that we quote it with great hesitation. We are afraid that some mistake occurred, for the placenta is a constant organ, and found in all pregnancies.

Morbid states.—Like all organized bodies, the placenta is subject to various diseases. One of the most frequent is the production of white, solid, imperforate cords, more or less numerous, and found generally on the fœtal surface. These cords are produced by the obliteration of some of the vessels of the placenta. At other times, we find, with or without these cords, yellow superficial patches equally impervious to blood, and extending sometimes as far as the uterine surface; they appear to be the result of an adipose transformation of the capillary vessels.

When these cords and patches are few, and occupy only the superficies of the placenta, they do not appear to exercise any influence over the life of the fœtus; but when they are numerous, and extend deeply, even into the substance of the organ, they may impede the development of the fœtus, cause its death, and occasion premature delivery. Under similar circumstances, we have frequently observed that the children were thin and emaciated, and had apparently suffered from deficiency of the elements of nutrition; in some cases, we have been unable to explain otherwise their death and premature delivery.

A more frequent malady is that in which there is deposited in the parietes of the vessels a cretaceous substance analogous to the ossification of the arteries in old people. We have seen placentas in which this alteration was so great that the whole surface appeared to be bristling with friable points, and which could not be separated from the uterus, extracted, or rolled upon themselves, without producing a crepitation arising from the fracture of the vascular parietes; a crepitation sometimes so distinct that it may be very properly compared to the crushing of an egg-shell under the fingers.

Although the life and duration of the placenta is limited to so short a span, it is nevertheless not free from scirrhous degeneration. In 1831, we deposited in the Collection of the Faculty a placenta on whose fœtal surface there was a scirrhous mass as large as a hen's egg. At other times the placenta may become cartilaginous, and osseous according to some authors. Dr. Garin has reported one case,¶ and Monteggia at Milan preserved one which had been presented to him by Mr. Anthony Carestia.** Serous cysts may be developed in the placenta. These cysts, ordinarily not very numerous, are found on the fœtal surface. They do not contain much fluid, although we have seen some whose capacity was more than an ounce. Other cysts are developed at the extremity of the vessels: they resemble in form and size the seeds of the pear, a grape, a pigeon's or hen's egg, etc. They adhere to each other, or to the cluster which supports them, by one or several pedicles. We think, with Soemmering,†† Sandifort,‡‡ Lobstein,§§ and M. Cruveilhier,‖‖ that they result from the transformation of the placental vessels: these cysts have been mistaken for acephalo-cysts and hydatids.

When these cysts are numerous, they may destroy the fœtus and produce abortion. Sometimes no traces of a fœtus are found in the abortive product, but in its place a mass or cluster of vesicles; at others, without effecting the destruction of the embryo, these cysts impede its development and cause its expulsion at a more or less advanced stage of pregnancy.

Uses.—The uses of the placenta are numerous: they all relate to the intra-uterine life and mode of nutrition of the fœtus. We shall examine hereafter the nature and mode of transmission of this nutritive principle. It is sufficient to remark here that the placenta is the organ of communication.

* Loco citato, vol. i. p. 296. Paris, 1835.

† Academicarum Annotationum, lib. i. cap. 10. Leidæ, 1754.

‡ Loco cit. tab. xv. fig. i. et tab. xix. 1774.

§ Archives Generales de Médecine, Oct. 1838.

‖ Medical Reposit. New York, Nov. 1817.

¶ Journal de Med., Surg., and Pharmacy, par Corvisart, Leroux, and Boyer, tom. iii. p. 232.

** Dictionary of Medical Sciences, vol. xlii.

†† Icones Embryonis, explicat. fig. i.

‡‡ Observationes Anatomico-Pathologicæ, lib. ii. cap. 3, p. 85, tab. vi. fig. 6. Lugd. Batav., 1778.

§§ Essai sur la Nutrition du Fœtus, p. 66.

‖‖ Anatom. Pathol. p. 3, et seq. pl. ii. and iii. in folio. Paris, 1829.

SECTION II.

The ovum contains fluids differing in their nature: some are temporary, and found only in the first period of intra-uterine life; these are enclosed in the umbilical vesicle and allantois, if indeed this vesicle exists in the human species; the others are permanent, and found, but in variable proportions, in all the stages of pregnancy. When describing the vesicles which contain the two first, we shall briefly touch on them. In this section the liquor amnii alone will occupy our attention.

ARTICLE I.—OF THE AMNIOTIC LIQUOR.

The amnion contains a liquid in which are bathed the fœtus and umbilical cord. It has received the names of *liquor amnii, water of the amnios*, and *amniotic liquor*.

The water of the amnios varies in quantity and quality. Considered independently, the quantity, at first small, increases successively from the moment of conception until the full term of pregnancy; but, compared to the fœtus, it may be said that this quantity always bears an inverse ratio to the development of the latter. At term its weight is generally estimated at one pound, or one pound and a half. This estimate is far from being exact: sometimes only an ounce of fluid is found; at others as much as eight or ten pounds. This excessive quantity may indeed be considered as the result of a morbid state. In general the abundance of the fluid is in an inverse ratio to the vigour and size of the fœtus and the strength of the mother; so that the greater the size of the fœtus and the strength of the mother, the less copious will be the amniotic fluid, and *vice versâ*.

Physical properties.—The water of the amnios is rarely limpid, transparent, or colourless: it is generally clouded or milky, exhibiting at times a slightly yellow, green, or brown tinge. Slightly viscous and soft to the touch; its density is superior to that of distilled water; its specific gravity is 1.004; its temperature varies from 29 to 31 degrees +0 Réaumur, and it congeals between 2 and 5—0. It sometimes holds in suspension white clots or greenish flakes: the former are portions of the sebaceous covering of the fœtus; the latter, pieces of undiluted meconium. In the brute creation, hairs which have been detached from the body of the fœtus are often seen floating in it. It generally exhales an insipid, nauseous odour, somewhat resembling that of the semen. This odour is sometimes very offensive, analogous to that of putrefied animal matter, and has been improperly considered as an indubitable evidence of the death of the fœtus.

Chemical properties.—Its taste is slightly saline; it is rendered cloudy by heat; turns the tincture of violets green, and yet reddens slightly the tincture of heliotrope. Caustic potash and alcohol throw down a fleecy precipitate, which appears formed by albumen or gelatine, for it gives a brownish deposit with nutgalls, like a weak solution of gelatine. Nitrate of silver affords a very copious white precipitate, insoluble in nitric acid. In 100 parts it contains 98 of water; the remainder is formed by animal matter of which the nature is not determined, but which is supposed to be rather gelatinous than mucous. Hydrochlorate and carbonate of soda, phosphate and carbonate of lime, have been found in it. In the cow it contains, moreover, a certain quantity of a peculiar acid, called *amniotic*. Some chemists assert that they have found oxygen; others, pure air; others, the deutoxide of azote. These last results are disputed. The best analysis of the water of the amnios is that by Buniva and Vauquelin.* As to the animal matter held in suspension, and supposed to contain albumen, it is owing to the cutaneous secretion of the fœtus; it is this sebaceous matter which clouds the transparency of the fluid.

Sources.—Various sources of origin have been attributed to the water of the amnios. Galen pretended that it was derived from the perspiration; Densing and Arantius, from the urine of the fœtus; Rislan, from a mixture of sweat and urine; Bohn, from the fluids of the mammæ; Lister, from the saliva; Drelincourt, from a mixture of saliva, nasal mucus, and urine; Wharton, from the gelatine of the cord; Malpighi, and others, from the glands of the chorion, the capillaries, the lymphatics of the amnion, placenta, etc.;† lastly, from exhalations, as the fluid in the pericardium, peritoneum, and pleura.

Haller has demonstrated the weakness of the foundations of these opinions. It is impossible to sustain them when we remember that the quantity of the amniotic fluid is in inverse ratio to the embryo; and that this fluid exists not only in the cases in which the fœtus has been long since dead, but also in those in which it is completely wanting. Haller did not admit that this water was secreted by the vessels of the placenta, as has been pretended, because it exists in the ova of oviparous animals, in which the fœtus has neither cord nor placenta. The opinion most generally admitted at present is that which considers these waters as an exhalation from the internal surface of the membranes of the ovum, and of which the materials are furnished, if not from the origin, at least during the greater part of the duration of pregnancy, by the vessels of the uterus.

In support of this opinion we may say that, at the moment in which the ovum descends from the fallopian tube into the uterus, it is already furnished with a fluid, and yet does not communicate with the uterus; the fluid is, therefore, probably formed by the membranes as in the ova of the batrachia and other ovipara; but, as the absolute quantity of the fluid increases in the last period of intra-uterine life, it may be supposed to be furnished by the uterine vessels. We are led to this belief because, 1st, numerous vessels pass from the uterus to the placenta, from the uterus to the caduca, and probably from this membrane to the chorion and amnion; 2d, we perceive on the fœtal surface of the placenta very small blood-vessels, which ramify over this surface;‡ 3d, if warm water be injected into the umbilical arteries of the fœtus, as done by Munro, or into the vessels of the mother, as by Chaussier, the fluid transudes, and collects in the form of dew and small drops, on the internal surface of the amnion; 4th, serous effusion is sometimes found between the chorion and amnion; 5th, Haller§ states that a woman having taken saffron, the water of the amnios was coloured by it; 6th, Levret has seen this same water acquire mercurial properties,‖ that of whitening copper, in women who had undergone during pregnancy a course of mercurial frictions.

Uses.—The uses of the liquor amnii appear to be, 1st, to assist in the nutrition of the fœtus; 2d, to protect it, when in the rudi-

* Mémoires de la Soc. Méd. d'Émulation, troisieme année, p. 229 et suiv.

† Haller, Elementa Physiologiæ, tom. iii. p. 203.

‡ Lobstein, Essai sur la Nutrition du Fœtus, in 4to. Strasbourg, 1802.

§ Haller, loco citato, tom. viii. p. 205.

‖ L'Art des Accouchemens Démontré par les Principes de Physique et de Mécanique, t. i. p. 56. Paris, 1766, in-8.

mentary state, from the pressure of the uterus, and, at a later period, from the action of foreign bodies; 3d, to assist its movements; 4th, to prevent the adhesion of its parts. In fact, without the interposition of this fluid during the whole period that the skin of the fœtus is in a gelatinous state, not yet provided with an epidermis, or merely deprived of the sebaceous covering which coats it in the last months of pregnancy, the limbs might adhere to each other, or to the thoracic and abdominal viscera; and in consequence of these adhesions, the hands and feet might resemble those of the web-footed birds. A case appears to support this reasoning, and would be conclusive if analogous facts had not been observed where the liquor amnii had been retained until the birth of the child. Morlanne* speaks of a fœtus of five months, which was expelled, with the forearms adhering to the thoracic parietes, and the thighs to the abdomen, the delivery occurring a month after the discharge of the amniotic fluid; 5th, to weaken the shocks produced by the motion of the fœtus, and prevent the pain which might result from the acute and reiterated percussion on the parietes of the uterus; 6th, to contribute to the development and growth of the fœtus; 7th, to assist in the dilatation of the os uteri during labour; 8th, to lubricate the female organs, and aid the body of the fœtus in its passage at the moment of birth.

SECTION III.

CENTRAL PARTS OF THE OVUM.

The membranous envelope of the ovum contains, besides the amniotic fluid just examined, two other parts which it is essential to understand; they are, first, the vascular stem, which unites the fœtus to its appendages; 2d, the fœtus itself.

ARTICLE I.—OF THE UMBILICAL CORD.

A long, thin, soft, flexible and vascular cord, known by the name of *umbilical cord*, unites the fœtus to the placenta.

Length.—The length of the cord is generally equal to that of the fœtus; sometimes it is a little longer. At birth, it is ordinarily of about sixteen to twenty-four inches, but is susceptible of infinite variety; we shall merely indicate the extremes. L'Heritier has seen a cord fifty-seven inches long, and wound seven times around the body of the fœtus. Mauriceau reports another of fifty-nine.† Evrat has seen one of six feet. Désormeaux, in his lectures, asserts that he had examined one, in the Anatomical Museum of Mayence, of seven feet in length. On the other hand, we meet with them extremely short. Mauriceau‡ relates the case of a woman who was delivered at eight months, of a female infant with a deformed arm, in which the umbilical cord was only six inches long.

Volume.—It is about equal to that of the little finger. When smaller, it is said to be *lean;* when larger, it is called a *fat cord.* In the latter case, its size may equal that of the thumb, the small intestine, or even the arm of a new-born child.§ The difference of size is owing to the absence or accumulation, in the cellular tissue, of a peculiar fluid which has received the name of *gelatine of Wharton.* The volume is not always uniform throughout its whole length; sometimes it is considerable on the fœtal end, and small toward the placenta, a disposition worthy of the greatest attention, because, although this difference is due most generally to the unequal distribution of the gelatine of Wharton, and its accumulation, near the umbilicus, it depends, in some cases, on the presence of a portion of intestine which, like a hernia, protrudes at the base of the cord.

Strength.—This is not always in proportion to its size; a lean is frequently much stronger than a fat cord. The strength depends on the manner in which the vessels reach the placenta. When they remain united, agglomerated as far as their insertion, the resistance is considerable; it is much less so when they separate before reaching this body.

Insertions.—The umbilical cord has two insertions, one placental, the other fœtal. The former does not always occupy the same point; it is generally in the centre of the placenta, but occasionally at some point intermediate to the centre and the circumference; in some cases the cord has been seen passing directly to the membranes, dividing at a certain distance from the placenta, and forming around this organ a kind of vascular girdle, from which the large arterial and venous branches repaired to their destination, like the spokes of a wheel centre in the nave; and other times, the vessels spread out in the form of a goose's foot, a disposition which frequently occurs in the battledore-shaped placenta.

The fœtal insertion is at the umbilicus, and in proportion to the youth of the embryo, its base is larger and nearer to the pelvic extremity. At this point the cord is, as it were, divided: the vessels composing it pass together through the umbilical ring, then separate and reach their respective destination between the anterior wall of the abdomen and the peritoneum. Externally, the envelope of the cord terminates at a greater or less distance from the fœtus, the integuments of the belly advance to meet this envelope, and form on the vessels a kind of prolongation resembling a nipple, at whose vertex the union is effected. The length of this prolongation varies from two to twelve lines. At the point of junction, there is a small circular cushion, which indicates the precise point at which the separation of the cord will take place.

Structure.—This is not identical at all periods of intra-uterine life, nor as simple as it at first sight appears. At birth, the cord is composed, 1st, of arterial and venous *blood-vessels;* 2d, of a small quantity of *cellular tissue;* 3d, of a peculiar fluid called *gelatine of Wharton;* 4th, according to some anatomists, of *lymphatics and nerves;* 5th, of a *double sheath*, furnished by the chorion and amnion. In the earlier stages of pregnancy we find, moreover, 6th, a small body to which the name of *umbilical vesicle* has been given; 7th, vessels called *omphalo-mesenteric;* 8th and lastly, the *allantois* and its duct the *urachus*, if indeed this vesicle exist in the human species.

1. *Blood-vessels.*—They are three in number, two arteries and a vein, all called *umbilical.* The vein is constant, single, without valves, double the calibre of the arteries, with thin, but firm parietes; according to some it arises from the placenta, and others, from the abdominal vena cava of the fœtus. This vein appears to perform the functions of an artery.

* Journal des Accouchemens, vol. ii. p. 16.
† Loc. cit. obs. 401.
‡ Loc. cit. tom. ii. obs. 640, p. 525.
§ Mauriceau, obs. 406, p. 336.

The umbilical arteries, two in number, arise from the hypogastrics of the fœtus, of which they are the continuation; their parietes are thick, resisting, contractile, which circumstance, after the section of the cord, diminishes greatly their calibre, and makes them appear smaller than they really are; one may be wanting, as we have seen in two cases. These arteries appear to perform the functions of veins.

The vessels of the cord have not the same arrangement at all periods of pregnancy. In the early stages, they are parallel;* later, they form a kind of rope or twisted column; commonly, the vein occupies the centre of the column, and the arteries are wound spirally around it. According to *Meckel*, these spirals proceed from left to right, nine times in ten, and once in the contrary direction. Sometimes the arteries, after winding around the vein for a certain distance, run parallel with it, then turn again around this vessel as they approach the fœtus. The spiral disposition of the three vessels around an imaginary axis is sometimes observed, much more rarely that of the vein around the arteries.

This torsion of the vessels belongs exclusively to the human species, and appears to depend on the movements of rotation which the fœtus performs in the interior of the amnion.

2. *Cellular tissue.*—Not very abundant; it is filamentous, free from adeps, with loose cells, which communicate with each other, and are very pervious to fluids, as proved by Rœderer, who plunged one end of a cord into water, and saw the liquid ascend against its own gravity and fill the whole cord.

3. *Gelatine of Wharton.*—This is a viscous, transparent fluid, coagulable by heat and acids, which is infiltrated in the meshes of the cellular tissue, and singularly increases the volume of the cord, a circumstance which must not be forgotten in tying the cord, for it might happen, in consequence of the discharge of this fluid, the vessels being no longer compressed, that hemorrhage might occur several hours after the birth of the child.

Different origins and functions have been attributed to this liquid. Some have considered it as produced by the urinary secretion; others, that it was furnished by exhalation, and contributed to the nutrition of the fœtus. From its physical and chemical properties, we regard it as analogous to the exhalations from the serous membranes.

4. *Lymphatic vessels and nerves.*—We repeat here our remarks on the lymphatics and nerves of the placenta, and that their existence in the cord is far from being demonstrated, and is at least problematical.

5. *Sheath of the cord.*—As soon as the embryo can be perceived, it will be seen to adhere to the coverings of the ovum by a prolongation of the chorion, through which may be observed striæ, which are the umbilical vessels. To this simple sheath, furnished by the chorion, is soon added another, which proceeds from the expansion of the amniotic sac. This second envelope begins by surrounding the cord at its base near the embryo, then covers its whole extent, by compressing and pushing before it the umbilical vesicle as far as the fœtal surface of the placenta. This double sheath, already formed, at the end of the second month, preserves its transparency until the middle of pregnancy; it then becomes consistent, thicker, opaque, and no longer discloses the parts which it contains.

M. Flourens asserts that this sheath is composed of five laminæ; according to this learned naturalist, two laminæ belong to the amnion, and three to the chorion; the external lamina of the amnion is continuous with the epidermis of the fœtus, and the internal with the derma. The first layer of the chorion is continuous with the subcutaneous abdominal cellular tissue, or *facia superficialis*, the second with the aponeurosis of the abdominal muscles; lastly, the third, or sub-chorial cellular layer, with the peritoneum.† According to this ingenious opinion, which only wants demonstration to cause it to be admitted, there is not only continuity of the germ with, but likewise a sort of invagination of the organs of the fœtus in the membranes.

6. *Umbilical vesicle.*—During the first two months of pregnancy, there is, in the substance of the cord, a small spheroidal, oblong body, which adheres to the abdomen of the embryo by a kind of pedicle, and which is called the *umbilical vesicle.* This vesicle, situated in the space between the chorion and amnion, is nearer to the embryo the earlier in the pregnancy we examine it. It is oblong, pyriform, and its maximum development scarcely equals in size a small pea. Loose at its large extremity, it adheres to the embryo by a kind of contracted neck, which dips into the umbilicus; on its external surface it is united to the chorion and amnion by means of very delicate cellular filaments. As the embryo is developed, it is successively seen to take a globular form, remove from the umbilicus, lodge in substance of the cord, and at last lose itself in the fœtal surface of the placenta. Its parietes, of a slightly yellowish tinge, are pretty firm, granular, thin and diaphanous. It contains a sero-albuminous limpid fluid, of which the quantity, always small, is constantly in the inverse ratio of the development of the embryo. The umbilical vesicle enters the abdomen with the vessels of the cord, and opens, according to some, (Blumenbach, Soemmering, etc.,) in the intestine, as is the case with the vitelline (or external membrane of the yelk) membrane of birds, to which it is then analogous; according to others, (Lobstein,) into the bladder, like the allantoid in brutes, of which it performs the functions.

The umbilical vesicle is a temporary organ, which belongs to embryo life, and disappears about the second or third month of gestation. Toward the end of the second, or at latest, during the third month, it becomes flattened, diminished, and of a lenticular shape. After this period, it is empty, toughened, wrinkled, and appears under the form of a small white spot, on the fœtal surface of the placenta, below the amnion, in the separation between the first divisions of the cord, whence it soon disappears, and, only in rare cases, has been found at full term.

Some anatomists have supposed that the umbilical vesicle serves as a reservoir for the urine during intra-uterine life; but if we observe that this vesicle and the fluid it contains exist at a stage in which no traces of urinary organs can be found; that the size and fluidity of the vesicle are in inverse proportion to the development of the fœtus; and if, on the other hand, this vesicle is seen to open in the small intestine, like the vitelline membrane in birds, it is more natural to suppose that its uses relate to the nutrition of the embryo.

7. *Omphalo-mesenteric vessels.*—There are on the parietes of the umbilical vesicle two small blood-vessels, an artery, and a vein, called *omphalo-mesenteric*, which are seen more easily in animals than in the human species. They resemble silky filaments, which,

* See plate xxix. fig. 11.

† Flourens' Cours sur la Generation, publié par M. Deschamps, p. 139, in 4to. avec 10 planches. Paris, 1836.

after ramifying over the parietes of the vesicle, enter the abdomen of the embryo, pass through the circumvolutions of the intestines, and empty, the artery into the superior mesenteric artery, and the vein into the great mesenteric vein.

8. *Allantoid vesicle.*—Near the umbilical vesicle we find, in vertebrated animals, a much larger vesicle, termed *allantoid.* This vesicle, like the preceding, occupies the space between the amnion and chorion. It is very long, almost cylindrical, has two cornua which extend between the chorion and amnion, so as to envelope nearly the whole of the fœtus: it communicates with the bladder by means of a hollow prolongation, called *urachus.* This vesicle contains a yellowish liquid, of a saline taste, and a smell like urine, in which float coagulated, fatty, and viscous substances, forming a deposite which, in horses, has received the name of *hippomanes.* This fluid has some analogy with urine, although not completely identical with it: the communication which exists with the bladder militates in favour of this opinion.

The existence of the allantois is still a subject of controversy among anatomists: admitted by Needham, Littre, Haller, Cuvier, Meckel, M. Dutrochet, etc.; it has been denied by Harvey, Albinus, A. Monro, Hunter, Lobstein, etc.; and, although M. Velpeau has recently described, under the name of *allantois*, the reticulated tissue containing the liquid which we stated occupied the space between the chorion and amnion in the early stages of pregnancy, it now is admitted only by analogy. The following are the reasons on which its existence is admitted:—Because it is found, 1st, in oviparous animals having lungs (reptiles and birds) adhering to the umbilical or vitelline vesicle: 2d, in the hen's egg the first rudiments of the chick are applied immediately upon the yelk, to which they adhere by a vascular circle whose vessels arise from the mesentery: the umbilical vessels do not extend to the yelk, but are distributed to a membrane which communicates with the cloaca, and answers to the allantoid of mammalia: 3d, in the mammalia the two umbilical vessels and allantois are always found: Cuvier thinks that if the existence of the latter in man be denied, it is because in him it adheres too closely to the other membranes: 4th, lastly, if the urachus is the canal which establishes a communication between the bladder and allantois in mammalia, and the cloaca in the ovipara. In man the urachus extends from the bladder to the umbilicus, and although it generally appears under the form of a solid imperforate cord, in certain diseased states it remains open until after birth. Individuals have been seen who, in consequence of congenital imperforation of the urethra, evacuated their urine by the umbilicus, the urachus not being obliterated. Such was the case of the young girl described by Cabrol, and of the child at Auteuil, of which we have previously spoken. From these considerations, until the contrary is proved, we may admit the existence of the allantois in the human species.

Formation.—At the instant in which the germ is visible to the naked eye, it is immediately applied to the envelopes of the ovum. The umbilical cord does not yet exist; but, if the whole be examined by the microscope, the vessels which are to form it will be perceived ramifying to a certain extent over the chorion, from the abdomen of the embryo, as far as the point of insertion of the future placenta. As the embryo increases it removes from the parietes of the ovum, and the cord is formed. The cord is very distinct on the twenty-fifth or twenty-sixth day,* but is then composed only of the umbilical vessels, and the sheath furnished by the chorion. On the following days the umbilical vesicle, the omphalo-mesenteric vessels, the urachus, and the amniotic sheath, complete its structure. The cord is then thick and short, on account of the parts it contains; but, in proportion as the vesicle removes and disappears, the cord becomes more elongated and thin. This elongation continues until the full term of pregnancy in a proportion nearly equal to that of the fœtus, so that, at whatever period of pregnancy it may be examined, it always preserves in length the same ratio to the fœtus. We do not think, with the majority of modern authors, that a part of the intestinal canal ever constitutes an essential portion of the umbilical cord. We have had an opportunity of examining a large number of very young embryos, in which this disposition did not exist. When we have seen it, we have concluded that it was accidental, or dependent on some morbid condition. The torsion of the vessels does not exist at first, and commences only about the third month.† About the end of the second month, or at the latest, in the beginning of the third, the umbilical vesicle, the urachus, and omphalo-mesenteric vessels being obliterated, the elements of the cord are reduced to those which it is to preserve until the termination of pregnancy.

Anomalies.—The cord exhibits, under certain circumstances, various swellings and nodosities. The first are owing to the unequal distribution of the gelatine of Wharton, or to a varicose state of the vessels. The second are sometimes simple knots, which are observed only when the cord is very long. These knots, produced by the passage of the fœtus through one or several folds of the cord, may present a variety of forms. Baudelocque has related some very remarkable cases:‡ they rarely, however, impede the circulation or endanger the life of the child. In some cases, nevertheless, Smellie, Levret, and other accoucheurs, have been in some cases able to ascribe the death of the fœtus to no other cause. Generally, when these knots are found drawn tightly after the birth of a healthy child, it is owing to the traction on the cord made in order to assist the delivery of the secundines.

The cord may also exhibit another kind of nodosity, swelling, or appendiculum, which must not be confounded with varices: these are true hernias, formed by one or two of the umbilical vessels which have departed from the common axis by forming an elbow, a sort of eccentric prolongation of one, two, or three inches in extent, and covered by the sheath of the cord. This arrangement is very frequent, of no consequence, and does not in the least embarrass the circulation. Sometimes we observe, on the surface of the cord, granulations resembling the glands of Pacchioni, and which were supposed to secrete the amniotic fluid. As these granulations are excessively rare, this formation cannot be attributed to them; it is much more conformable both to fact and reason to consider them as purely accidental morbid productions.

At other times the cord is the seat of an induration, to which we can find no better comparison than that of new-born children, known under the name of *induration of the cellular tissue.* A young woman, menstruating regularly, enjoying habitually good health, pregnant for the first time, was delivered naturally about the eighth month, without any assignable cause, of a delicate, and miserable male child, not larger than a fœtus of six months, and which lived only two hours. The umbilical cord was larger than the thigh of this abortion, unequal and hard throughout its whole length: the blood-vessels were but slightly twisted, and at long intervals, the coats of the

* Vide Plate xxix. figs. 5 and 6.

† Vide Plate xxix. fig. 11.

‡ L'Art des Accouchemens, vol. i. Plate vii. p. 255. Paris, 1815.

vein were surrounded by a lardaceous tissue to which they firmly adhered. The calibre of this vessel was considerably lessened, not larger than that of the arteries, and like the latter, remained patulous after the section of the cord. To this cause we attributed the want of development and premature delivery of the fœtus. For a long time we have called the attention of our pupils to the diseases of the appendages of the fœtus, and are convinced, that in many cases, abortion is the necessary and inevitable consequence, of the changes they may experience.

Each fœtus is provided with a single cord as well as with a single placenta. We know of no case of the birth of a fœtus with two cords. When this anomaly has been supposed to exist, it should, in our opinion, be referred to the bifurcation of the cord, or a free anastomosis between the vessels of two twin placentas. Such appears to us to be the fact in the case related by Stalpart Van-der-Wiel,* of a third cord uniting the placentas of twins, without having any direct communication with the fœtus.

Can the cord be entirely wanting? Stalpart Van-der-Wiel thought it might. But he founds his opinion on the case of a child of thirteen months affected with exstrophy, in which nothing proves that the umbilical cord was wanting.† We can imagine the total absence of the cord only in one case, namely, that in which the placenta adheres immediately to the body of the fœtus; and therefore, excepting this circumstance, we believe that there is no well authenticated case of a fœtus existing without an umbilical cord.

Uses.—The umbilical cord is the medium by which the circulatory fluids are transmitted from the placenta to the fœtus, and reciprocally from the fœtus to the placenta.

ARTICLE II.—OF THE FŒTUS.

In physiological language, the fœtus receives different names at different periods of uterine life. The ancients designated the whole product of conception under the name γονή (Hippocrates), *genitura* (Galen), during the first six days subsequent to impregnation, and under that of κύημα, *conceptus*, *germen*, during the nine following days: they also used the expression κύημα, which signifies *fœtus*, to distinguish the new being, at a period when the principal viscera, such as the heart, liver, and brain, as yet shapeless and rudimentary, were apparent; they gave the name of ἔμβρυον, (ἐμβρυω—*pullulo*) to that of which the limbs were already distinct: when motion was first felt in the uterus, they called it νηπιον (*infans*).‡ The expression παιδίον, from παις, *puer*, was applied to it only after birth.

In modern times we use the expression *germ* to designate the new being as long as it is amorphous; that of *embryo* from the moment in which it begins to have a determined form, until the organs and various parts which compose it are sufficiently developed to be easily distinguished by the naked eye, which occurs about the third month of pregnancy. We then apply to it the name of *fœtus* during the remainder of intra-uterine life. When it has broken the bonds which united it to the mother, and is exterior to the uterus, and although it may respire, if it is not completely developed, and is not viable, it is called an abortion. The name of *child* is applied only to the individual which breathes, and exhibits the organic development, and forces necessary to resist the action of external agents, and, in a word, can support life.

Origin.—Notwithstanding the researches of the ancients, the numerous experiments of Harvey, Haller, and modern physiologists, we are as yet ignorant whether, as in the opinion of the ancients, the germ existed before the formation of the membranes; or, as stated by Maupertius and Buffon, the envelopes of the ovum preceded it; or whether these different parts were simultaneously developed.

In our remarks on the development of the embryo, we shall be obliged to give merely approximations based on the assertions of our predecessors, and on the particular cases which we have ourselves observed.

Appearance of the germ.—Great uncertainty still exists as to the period at which the passage of the ovum into the uterus takes place, and the germ appears. Hippocrates§ thought that the germ was visible on the sixth day after impregnation: Haller‖ says, that the chicken appears in the egg at the twelfth hour of incubation; that in the sheep, the embryo is visible only about the nineteenth day, and in the human species, still later. Haller, however, quotes from Santorini, the case of a human embryo, of the size of a millet-seed, and not twelve days old; another from Ruysch, of the same age, and not larger than the head of a pin; lastly, he gives the opinion of Mauriceau, who asserts that a fœtus of eighteen days is like a point. A case published in 1817, by Sir Everard Home and Bauer, would tend to prove that the embryo is visible on the seventh day: but this fact, which produced great sensation in the scientific world, has been differently interpreted by physiologists; admitted as positive and conclusive by some,¶ it has been rejected by others as inaccurate and valueless.** The cause of so much obscurity and uncertainty on this subject, is 1st, the small number of exact and perfect observations on the development of the human ovum; 2d, the want of opportunity to make these observations; 3d, the numerous difficulties we experience in determining exactly the age of the abortive productions procured by chance; 4th, in ascertaining whether these productions are healthy and uninjured, or in a state of physical or morbid alteration; 5th, the rapidity with which the divers parts of the ovum are developed in the mammalia, and especially in man.

General Development of the Fœtus.

Chaussier†† states that at ten days of age, the embryo is a grayish, semi-transparent flake or tuft, which liquefies rapidly, and of which the form cannot be determined. By approximation he estimates its weight at one grain, or five centigrammes. We have never seen so young an embryo; but have examined one of not more than twelve days. A young lady had her monthly discharge in June, 1819, and was married on the very day of its cessation; twelve days afterward, at a ball given to her by one of her relations, she was suddenly attacked by a flow of blood from the vulva. Although the accident was not at all serious, her mother sent for Mr. Evrat. This surgeon

* Observationum Rariorum, Centuria Prior, obs. lxxv., p. 329, et tab. 6. fig. 1. Lugduni. Batav., 1687.
† Ibid. obs. 52, p. 327. Tom. ii.
‡ Hippocrate, Sectio. iv. Aphoris. i.
§ De Natura Pueri.
‖ Elementa. Physiol. Tom. viii. p. 67.
¶ M. Coste. Embryogénie Comparée, vol. i. p. 203.
** M. Velpeau Embryologie, p. 75, in fol. Paris, 1833.
†† Table Synoptique de la Génération, in-fol.

after having addressed a few questions to the young lady, examined the clothes which she wore at the time. From the coagulum he extracted an ovum, which he brought to us, and which we can compare, both as regards shape and size, to nothing more appropriate than a small ripe seed of the Chasselas grape; this ovum was smooth externally, which is rather unusual, for at this period the chorion is generally covered by a tomentum. We, therefore, supposed that this production had been removed by the friction of the body in passing through the genital organs. This ovum was perfectly transparent, except in its centre, where there was an opaque, grayish spot, similar to the seed when seen through the substance of a very ripe white grape. We carried it to Désormeaux to examine it with him. Some peculiar circumstances prevented our doing so at the very time, and it was immersed in alcohol; but when we had leisure to study it, it was corrugated and destroyed. Although this fact has no scientific value, it appears to us to establish the point that the germ is at least visible at this period. Since then, M. Velpeau, more fortunate than ourselves, has described and figured* an ovum of twelve days after conception.

It may be said, that from the moment of impregnation until the twenty-fifth day of intra-uterine life, the human embryo is merely a soft mucous mass, of which the component parts cannot be distinguished by the naked eye. It is only about the thirtieth day that it becomes more consistent and that its development can be observed, and the different organs seen, as it were, successively to expand.

As soon as we can perceive the human embryo, it appears as in the majority of vertebrated animals, to be curved on itself, forming a semicircle or three quarters of a circle, and resembling a small worm or snake. Its size is nearly equal to that of the umbilical vesicle to which it adheres.

Aristotle has compared it to an ant; Burton, to a grain of barley; Baudelocque, to the little bone of the internal ear, called the malleus. The two embryos figured in plate xxvii., figs. 3, 4, 5, 6, 7 and 8, and plate xxix., figs. 5, 6, 7, 8, 9 and 10, were not larger, although they may have dated from twenty-five to thirty days after conception.

If an embryo of twenty to thirty days be examined with a microscope, it will be seen that the head alone composes nearly a third of the totality of the body. The face, much smaller than the cranium, presents anteriorly two indistinct, white spots, turned aside, which are the rudiments of the eyes, and a small transverse fissure for the mouth. On the sides of the trunk, two small obtuse nipples represent the thoracic extremities. There is no neck. The thorax is not open in front, and does not display the heart and its pulsations, as stated by M. Adelon. Our observations completely confirm those of M. Velpeau, who† asserts that the median line of the body is as completely formed on the twentieth day of conception as on the sixtieth. At neither period have we been able to discover the thoracic or even the abdominal organs, entirely exposed. If this structure has been seen in the case of the latter, we think that it could only occur in morbid or abnormal productions. The blood which circulates in the vessels is as yet white; nevertheless, vessels may be perceived whose darker hue can only be ascribed to the colouring matter of the blood.‡ The abdomen projecting in front, adheres inferiorly to the membranes of the ovum by the rudiments of the cord. The pelvic extremity has the shape of a trefoil; the lateral projections are the rudiments of the hip bones and lower extremities; the lower end of the spine, curved forward, resembles a tail or hooked beak.

At forty days, Aristotle compares the embryo to a large ant, and states that the limbs, all the parts, and even the penis if it be a male, can be distinguished.

At forty-five days, its length is from twelve to fifteen lines, and its weight about one drachm and eighteen grains; all its parts are distinct; the head is large and separated from the thorax by the depression of the neck. The eyes are indicated by two black points, the mouth by a small triangular opening. The hands and feet, like little battledores, appear to adhere immediately to the thorax and pelvis. The eyes become more convex, and are surrounded by a palpebral circle. At sixty or seventy days, the loose edges of the eyelids touch each other, and are, as it were, glued together. The nose projects above the upper lip. The depth of the mouth increases, the lips are defined, and the different portions which at first formed them begin to unite.

All writers on the development of the lips are not of the same opinion. Blumenbach thinks that the upper lip commences by a single lobule on the median line, and two lateral symmetrical pairs; these three lobules unite at the height of the two small lateral raphes. This opinion, in which a majority of anatomists coincide, serves to explain the greater frequency of hare-lip on the sides than on the median line. M. Blanden differs from Blumenbach: he thinks that the median lobule of the upper lip is itself formed of two parts, which unite with great facility. He bases his opinion on the circumstance that the median fissure of the upper lip is observed naturally in some animals, particularly in a certain breed of hunting dogs, and in some rare cases of morbid division in man. MM. Velpeau and Cruveilhier deny this position, and allege, as a principal reason, that the upper lip is not found to be divided into several parts at any period of intra-uterine life. Be this as it may, at the sixth week the mouth becomes deeper; the tongue enlarges and grows thinner; the lips are more distinct and separated. The external ear soon acquires its peculiar characteristics; all its parts unfold and incline to the rear of the auditory canal.

At sixty days, or two months, the embryo is two inches long, and weighs an ounce: the fingers are isolated or adhere merely by a transparent gelatinous substance. We can distinguish the three phalanges, which have a tendency to be flexed on the palm of the hand; the shoulder and hip are, as it were, sketched out; the lower part of the spine, which formed a kind of tail, gradually diminishes and disappears; the anus forms a small conical projection, of a yellowish colour, and as yet imperforate. The development of the perineum, pelvis, and hypogastrium, causes the insertion of the umbilical cord to seem to approach the centre of the abdominal projection: the sex is not yet distinct. About this period the umbilical vesicle disappears.

At ninety days, or three months, it is five or six inches in length, and three ounces in weight. The head, although large, bears a better proportion to the rest of the body. The eyelids, very distinct, are closed and glued to each other. The nose projects; the mouth is closed, but perfectly delineated; the thorax is well formed; the vessels of the cord begin to twist and form long spiral turns. The fingers are separated, and the nails appear under the form of thin membranous plates. The lower extremities, flexed on the belly, have a similar

* Velpeau Embryologie ou Ovologie Humaine, planche iv. fig. 1 and 2, in-fol. Paris, 1833.

† Loco citato, p. 75.

‡ See pl. xxix. fig. 10, B. C.

structure. We begin to distinguish the sex; the penis projects in the male: in the female the clitoris, much longer than it will be afterwards, might deceive, but in this case a longitudinal fissure, of which the edges form the labia pudendi, is seen below it; a transverse layer indicates the separation between the anus and genital organs. The skin begins to form, and the new being loses the name of embryo, and assumes that of fœtus.

At a hundred and twenty days, or four months, its length is eight inches, and its weight seven ounces. Its growth is less rapid than in the preceding stages, and its shape becomes more pronounced and distinct. The sex is then very evident: and the muscles are capable of a great deal of motion.

At a hundred and fifty days, or five months, the length is from ten to eleven inches, and its weight sixteen ounces: if born at this period, it can live for a short time. We have seen one of this age which lived five days.

At a hundred and eighty days, or six months, the fœtus is from twelve to fourteen inches long, and weighs two pounds.

At two hundred and ten days, or seven months, its total length is fourteen inches, and its weight three and a half pounds. During the course of this month all its parts acquire more consistence: the skin is not so red, and more opaque; the sebaceous covering is more abundant and thicker; the pupil opens; and the testicles usually leave the abdomen.

At two hundred and forty days, or eight months, the fœtus increases more than an inch in length, and is from sixteen to seventeen inches, and weighs four to five pounds.

At two hundred and seventy days, or nine months, its length is from eighteen to nineteen inches, and, on an average, it weighs from five to six pounds.

We should remark that the measurements and weights here given are merely an approximation, or an average of a large number of observations made by our predecessors and ourselves. Children are frequently seen who differ greatly at birth from the dimensions just indicated. Thus, we find children of seven, eight, or nine, but seldom of ten pounds. The heaviest we have ever known weighed ten and a quarter pounds; its length was twenty-one inches. M. Evrat assures us that he delivered one weighing twelve and a quarter pounds. We have seen this child, which was enormous. Lastly, Baudelocque states that he knew one which weighed twelve and three quarter pounds. Ours of ten and a quarter pounds was so large that it requires all the authority of men so respectable as those just named to enable us to admit the existence of heavier children. Hence, we are of opinion that there is some mistake in the cases of children of fifteen or sixteen pounds, related by some writers,* and that we must treat as fabulous, and as old women's stories, the reports of children weighing twenty or twenty-five pounds at birth. On the other hand, we sometimes meet with children which weigh only four, three, or even two and a half pounds, although they have passed through all the stages of intra-uterine life. The minimum length of a fœtus at full term, measured from the vertex to the heel, is fifteen, and its maximum twenty-two inches.

Individual Development of the Component Parts of the Fœtus.

To the summary enumeration we have just made of the general development of the new being we will add some details on the formation and growth of the different systems and principal organic apparatus. We shall confine ourselves to the simple exposition of facts which are well authenticated and easily verified, not wishing to enter into the discussion of laws so obscure and so much disputed as those of formation and development—a discussion which, however interesting, as it belongs essentially to the province of physiology, would be foreign to a work like the present. Our intention is merely to indicate the transitions through which the fœtus passes before reaching this external state of existence; to point out the marks by which its maturity can be appreciated; and, lastly, to describe more particularly the peculiarities which it should present at the moment of birth—peculiarities of which a knowledge is indispensably required by a host of medico-legal applications, and all the circumstances relating to the mechanism of labour.

We will not decide whether the different systems and organic apparatus are formed successively or simultaneously: we shall merely observe that they do not all appear at the same period. The nerves and blood-vessels are first seen; the intestinal canal soon follows; the sexual organs are next perceived; the apparatus of locomotion is developed more slowly; lastly, subsequently to all the rest, we observe the nails and hair. In this part of our work we shall borrow largely from Haller, Oken, Chaussier, Lobstein, Meckel, Béclard, and from the more recent researches of MM. Serres, Velpeau, and Breschet.

Nervous system.—This system, one of the first to appear, has from the beginning a marked predominance; much more developed at birth than at subsequent periods, it nevertheless preserves a portion of this predominance until the age of puberty.

The spinal marrow first appears; at the commencement it occupies the whole extent of the vertebral canal; until the fifth week it presents the form of a transparent canal; at the third month it is transformed into a cord containing a canal; at the fourth month it begins to be fibrous; at nine months it extends only as far as the third lumbar vertebra.

The encephalon at first seems to be composed of a series of isolated vesicles, continuous with each other; its appearance follows soon after that of the spinal marrow. Toward the fifth week, the nervous matter is deposited at the base of the vesicles; this deposit is made by successive additions from below upward, and from without inward, toward the median line. Nothing is more curious than to follow with Tiedemann† the series of transformations which the encephalon undergoes before reaching its completion. At five months we perceive the first traces of the convolutions of the brain; at six months, they cover the whole surface of the cerebral hemispheres. The nervous mass is at first grayish and very vascular. The cineritious and medullary matter are not very distinct, except at the full term of gestation, and, in some subjects, this distinction is well established only after birth.

The spinal and cerebral nerves appear after the nervous centres. The same is true of the great sympathetic.

Organs of the senses.—These organs are intimately connected with the nervous centres; their development is proportioned to that of

* Millot, Supplément a tous les Traités d'Accouchement, etc., tom. ii. p. 113, et Stark, Archives des Accouchemens, tom. ii. p. 32.

† Tiedemann, Anatomie du Cerveau, tr. de l'Allemand, par A. J. L. Jourdan, 1 vol. 8vo. avec fig. 1823.

the nervous system; at birth they are all capable of performing immediately their proper functions. We may remark, however, that those of the organs which, being purely physical, are intended to transmit to the brain the impressions caused by objects at a distance, those which contribute powerfully in enlarging the circle of our ideas and understanding, such as the eyes and ears, are at birth, except in size, as perfectly developed as in the adult; whilst those which we may call *chemical senses*, which act on bodies applied immediately to their surface, and reveal to us the intimate qualities of these bodies; in a word, those which preside over the functions of nutrition, such as smell and taste, are remarkably imperfect.

Eyes.—The eyes appear about the fourth week, by points at first whitish, and then blackish, and seem to be the external prolongations of the cerebral vesicles; they are covered outwardly by the mucous substance which performs the office of the integuments. About the seventh week, the iris may be distinguished under the form of a narrow discoloured circle; in another week this circle acquires a black tinge, and enlarges. At the ninth week, the eyelids form folds; at the eleventh, they are elongated enough to touch and adhere to each other. From the commencement of the third month is perceived the membrana pupillaris, which closes the aperture of the iris. The study of this membrane, of which the existence is doubted by Velpeau, leaves yet much to be desired. From the sixth to the seventh month, this membrane becomes thin, tears in the centre, and forms the pupil.* At birth the various component parts of the globe of the eye have attained a nearly perfect development, absolutely necessary for the immediate exercise of the function of vision.

Ears.—The organs of hearing, like those of sight, are required to play their part at birth, and therefore, at this period, are so far developed as to render but slight subsequent changes necessary. The ossification of the small bones of the ear commences about the twelfth week, and is completed long before birth. We shall not enter into all the details of the different parts of the internal ear, and will merely state, that at seven months the ossification is nearly perfect. The pinna is developed at the fifth month, the lobes at the sixth. At birth, the membrana tympani is nearly on a level with the orifice of the meatus auditorius externus; this meatus is very short; its bony portions, at first, formed merely by a bony circle. After birth, the osseous circle continues to be developed.

Organ of smell.—The nose begins to project in the course of the eighth week; compared with the other organs it is very small during fœtal life, and even during infancy. The nasal fossæ, which at first adhered to the buccal cavity, separate from it during the third month. At birth, the nostrils are small, narrow, and very widely spread on account of the thickness of the septum narium. The want of development of the maxillary sinuses, causes the floor of the nasal fossæ, instead of being inclined backward and downward, as in the adult, to be horizontal. This disposition explains the tendency of the mucus of the nose to run over the child's lips, in lieu of being directed toward the pharynx.

Organ of taste.—The sense of taste, like that of smell, does not require to be actively exercised immediately after birth, as nature has furnished in the mother's breast a food ready prepared, suited to the digestion of the infant, and to its support until the development of the apparatus of mastication. But if the sense of taste be slightly developed at birth, the organs in which it is located, and particularly the buccal cavity are admirably adapted to the performance of suction. In fact, the posterior opening of the nasal fossæ being very small, the contraction of the tensor and levator palati muscles, in extending the velum pendulum, or soft palate, applies this movable partition exactly against the posterior opening of the nares, and closes it hermetically: the air being unable to penetrate posteriorly, the mouth acts precisely like a cupping-glass. It will be at once perceived, from this structure, why new born infants execute so easily the action of suction, whilst, in the adult, this same action is attended with great fatigue.

Sense of touch.—This sense presents no peculiar arrangement at this age; but the large size of the nerves, the delicacy and vascularity of the skin, the thinness of the epidermis, explain the sensibility of touch in children.

The foregoing observations on the development and predominance of the nervous system, and the activity of the organs of sense after birth, account for the sensibility, mobility, and turbulency which mark the period of early infancy. This exquisite sensibility causes the most innocent external agents to become sources of the most acute and often painful sensations, and explains why the slightest shock, opposition, or disturbance, produces in the infant considerable agitation, and excites cries, tears, and all the manifestations of the most acute pain. To this same cause may be attributed that energy and agility which enables children to pass whole hours in crying, walking, or running, without any appearance of fatigue.

To this predominance of the nervous system, that is, to the great development of the encephalon and its appendages, must be attributed the greater frequency of diseases of the brain and its membranes, in the early years of life; to these same causes must we refer the frequency of convulsive movements in children; movements which are popularly considered as a necessary consequence, and for which mothers constantly from physicians, and too often from empirics, receive curative or preservative remedies. We cannot too often repeat here our daily remarks, that these convulsions, far from being a necessary disease, are only the epiphenomena of maladies frequently very different, and that, far from requiring a constant, uniform and identical mode of treatment, they often demand special remedies, according to their exciting causes, or the diseases which have preceded or accompany them.

In fact, if a child be affected with acute meningitis, inflammation of the brain, acute irritation of the gums in difficult dentition, or worms in the intestinal canal, it will be attacked by convulsions; we frequently see the same thing occur at the commencement of an eruptive fever, such as variola, rubeola, scarlatina, or if a thorn or pin be thrust into its finger. Is it not evident that if, in these different cases, a general treatment can be employed to combat the convulsive movement itself, or, still more frequently, to remove its effects, that we must, in the first place, apply a special remedy to the cause, of which the convulsions are only the effect, and to the diseases of which they are only the prodromi or forerunners? Lastly, convulsions, that baneful appendage of the diseases of childhood, are only the consequences of an organic structure peculiar to that interesting age.

Sanguine vascular system.—We have been unable, on account of its early formation, to follow the development of this system in the human embryo, and hence have been obliged to study it only in the incubated egg. The appearance of the blood-vessels follows closely that of the nerves. The vessels are seen to originate from the cicatricula by reddish points, which gradually unite so as to form

* Voyez pour la Mécanisme, J. Cloquet. Mémoire sur la Membrane Pupillaire et sur la Formation du Petit Cercle Artériel de l'Iris. 1818, in-8, fig.

a simple groove in the substance which contains them: the vascular parietes are soon developed and form a venous net-work which detaches the omphalo-mesenteric vein, and is directed toward the embryo. At the end of this vein is seen the *punctum saliens*, or first rudiment of the heart; and from this point starts the aorta, of which the largest branches pass towards the venous net-work, in order thus to form a very simple vascular circle. Reasoning from analogy, we may suppose that a similar arrangement is met with in the human embryo. In fact, it resembles very much the structure we observe about the fourth or fifth week. We see a large heart receive a vena cava and give out an aorta: the former appears to be the continuation of the omphalo-mesenteric vein which proceeds from the umbilical vesicle, and which, before opening into the vena cava, ramifies for the greatest part in the liver. The aorta sends some branches to the parts of the embryo already formed, and terminates in the omphalo-mesenteric artery. The appearance of the umbilical vessels appears a little later. When treating of the circulation of the fœtus, we shall describe in detail the arrangement of the sanguine vascular system and the modifications it undergoes after birth.

Lymphatic system.—Our knowledge of the formation and disposition of this system in the first stages of intra-uterine life is excessively limited. At birth the lymphatics are numerous and well developed: the ganglia appear less abundant than in the adult; many of them seem to be yet only in the state of a plexus. This imperfect condition of the lymphatic system does not accord with the active share attributed to it by some physiologists in the nutrition of the embryo and fœtus.

Osseous system.—The bones appear at first under the form of gelatinous, then of cartilaginous moulds, soft, without cells or medullary cavity. They have from the commencement the shape they are to preserve, with the exception of the epiphyses, which are of a later date. Afterward points of ossification appear in the centre of the cartilages, and extend in parallel lines in the long, and in divergent radii in the broad bones. Ossification seldom begins by a single point in each bone, but by a certain number, which subsequently unite. This number varies: generally the long bones begin by three points of ossification—one for the body, and one for each extremity. Each vertebra presents also three points—one for the body, and two for the processes. The innominatum is formed in infancy of three pieces—the ilium, ischium, and pubes.*

The broad bones of the cranium are thin and membranous; their ossification radiates from the centre to the circumference; at birth they are not even in immediate contact, and leave between them membranous intervals, (*commissures, fontanelles.*) They have no diploe; their surface is spongy, vascular, and takes the place, as it were, of diploe, which explains the formation of the bloody effusions which we occasionally observe on these bones, either on the interior or exterior of the cranium.

The bones appear in the following order:—the cartilaginous rudiments of the bodies of the vertebræ† and the ribs are visible from the third to the fifth week; in the seventh we find a great part of the skeleton cartilaginous. During the seventh week also, the first points of ossification of the clavicles and lower jaw appear. During the third month the base of the cranium is cartilaginous; the vault, as yet membranous, soon becomes more consistent and exhibits points of ossification in all the broad bones. In the following months the ossification continues regularly; but its progress is much less rapid than in the first four months of gestation. At birth the bones of the carpus and tarsus are completely cartilaginous. The cartilage of the inferior epiphysis of the femur is the only one which at birth contains an osseous nucleus. The constancy of this osseous point is of great value in legal medicine to determine the age of the fœtus.

The bones of the fœtus are much more vascular than those of the adult. The gelatinous constituent predominates; this excess continues for a long time after birth, whence it follows that the bones of the fœtus, and even of young subjects, are softer and more flexible than those of adults, and that they resist, in a manner, by yielding to external violence rather by their elasticity than by their solidity. Hence fractures are exceedingly rare in the fœtus; they are also uncommon in young children, notwithstanding the activity and romping which, at this age, expose them to frequent falls. The flexibility of the bones of the fœtus is of undoubted advantage in labour; it permits the cranium, the thoracic and pelvic parietes, to be diminished in a greater or lesser degree, and this facilitates the delivery, and renders it less difficult and dangerous both to the mother and child. We have seen, in some cases, quite a large portion of the vault of the cranium depressed for a long time, without fracture or injury to the child's life. It must not, however, be supposed that fracture cannot occur under these circumstances. When there is a marked disproportion between the size of the fœtal head and the pelvis, fractures may be produced by the action of the uterus and its appendages alone, or, still more frequently, by that of the instruments which are sometimes used. Fractures may also occur during labour in consequence of mismanagement; the former affect the bones of the cranial vault, the latter those of the limbs.

But it is important to remember, especially in forensic medicine, that all fractures which may be found in the fœtus are not to be attributed to the injuries or causes just mentioned; for, extraordinary and strange as it may appear, cases of fracture have been met with where the fœtus was still enclosed in the mother's womb, shielded from all external violence.

Malebranche‡ says, "that there was an idiot in the Incurable Hospital, whose body was broken in the same places as those of criminals on the wheel. This man was born in that condition, and was then more than twenty years old." Malebranche attributed the cause of this accident to the imagination of the mother, who had been present at the execution of a criminal condemned to be broken alive. The blows received by the wretch acted with such force on the imagination of this mother, and by a counter-stroke on the tender and delicate brain of the fœtus, that it was born, not only idiotic, but with its bones broken in the same places as those of the criminal.

Nicholas Hartzzoeker§ adds to the preceding, from the report of a footboy, that of a noble Parisian lady, who, having accidentally witnessed a similar punishment during her pregnancy, was delivered of a girl all broken. This girl was alive in 1692, and thirty-two or thirty-three years of age.

Bidloo stated to W. G. Muys, who relates the case,‖ that a woman of Leyden, in the seventh month of pregnancy, having gone expressly to Harlem to see a robber executed on the wheel, brought forth a child, the bones of whose limbs were broken like those of the robber: Artuûm ossa simili profecto ratione ac isti latroni diffracta.

* See pl. ii. fig. 3.

† See pl. xxix. fig. 10.

‡ Recherche de la Verite, liv. ii., ch. 7, 4 vol. in 12mo. Paris, 1674.

§ Suites des Conjectures Physiques. Amsterdam, 1708.

‖ See the Preface of his Treatise de Musculorum Artificiosâ Fabricâ, 1751.

If these cases existed alone in science, they would elicit no attention, for they have neither sufficient accuracy nor authenticity to produce conviction; in fact, the two last are mere hearsay, and that of Malebranche was neither seen nor described by any anatomist of his day. Since that time, undeniable and more correctly observed cases have occurred. Amand, called by his colleague Biget, on the night of the 10th of October, 1691, to assist a noble lady, who aborted at the fourth or fifth month, thus expresses himself:* "We were greatly surprised at the melancholy condition in which we found the child: in the middle of the forearms, thighs and legs, there were impressions similar to those made by the iron bar on the limbs of criminals condemned to be broken on the wheel; at these points, the parts of this fœtus moved, as in the natural articulations of the arms, thighs and legs. The bones were evidently separated, as if they had been designedly fractured, and were held together only by the skin." If this case leave any doubt on the mind of the reader, the same cannot be said of those collected and reported by Chaussier.

In 1803, at the hospital of la Maternité, Chaussier saw a child born after a quick and easy labour, without any violence having been exerted, in which there were forty-three fractures, in the cranium and other parts of the skeleton. Some of them were recent, others exhibited the commencement of callus or of reunion, some even were entirely consolidated.†

The same author has observed, in the same hospital, a still more remarkable case. The child, in this second observation, was expelled after an extremely easy and short labour. It was feeble and of a bluish tinge, and dying soon after birth, attracted our attention from its great shortness and unusual mobility in the continuity of the bones. On examining the skeleton, one hundred and thirteen fractures of the different bones of the cranium, thorax and limbs, were found. Some were recent, others beginning to unite, and some entirely consolidated.‡ I do not know if the skeleton of this child has been preserved, but I am in possession of an engraving which represents with great fidelity these lesions. It is evident that, in these two cases, the fractures could not be attributed to any external violence, nor to the delivery; the process of reparation observed in some of them, must silence all doubt on that subject. No one would now dare to ascribe these injuries to the influence of the maternal imagination. Their cause must be sought in certain organic predispositions, which may exist in the fœtus as in the adult, and which proceed either from some internal defect, or from some peculiar alteration of the nutrition of the bones. An extreme friability of the osseous system must be admitted, or a kind of diathesis which prevented the fœtus, as it were, from moving without being broken.

Fibrous system.—It is not more precocious in its development than the osseous; it remains for a long time soft and extensible; this disposition, and the cartilaginous state of the articular extremities of the bones, explain the laxity of the articulations in the fœtus, and account for the immoderate flexion of which they are capable. Thus the fœtus may be born folded double, the lower limbs firmly applied against the anterior surface of the trunk; it may undergo considerable and various inflections, without being fractured or luxated. It is only near the period of birth that the fibrous system exhibits its future characteristics.

Muscular system.—The muscles appear at first under the form of a homogeneous, whitish mass, in which neither fibres, tendons nor aponeuroses can be perceived: but, toward the third month, the fibres become distinct, and the tendons may be easily distinguished from the fleshy portion. After birth, the muscles are much softer, and paler than they will be in the adult.

Cellular system.—The cellular tissue is transparent, rose-coloured, infiltrated with serous fluid, and free from adipose matter during the three first months of intra-uterine life. Some parcels of fat may be perceived in the course of the fourth. About the sixth month, the adeps is deposited in considerable quantity in the cells adjacent to the periphery of the body: from this period the fœtus changes greatly in form; the skin, which was flaccid, wrinkled, transparent and red, becomes tense and opaque; the limbs, which were thin, become rounded, and acquire a greater size as they approach the termination of gestation.

Cutaneous system.—The tegumentary surfaces, until the second month, consists of a thin layer of a mucous, and then of a gelatinous appearance; from the second to the third, the skin begins to form; it is then extremely delicate, transparent, soft, and easily torn; it has the aspect of a mucous membrane; its hue is roseate; this membrane gradually becomes thick and firm; at five months it is very vascular, and retains its transparency and rosy colour. At six months it is opaque, and resisting, and assumes its proper character.

The nails appear, in a membranous state, at four and a half months; they become horny toward the sixth; and, during the seventh, acquire a greater degree of consistence and hardness.

The epidermis appears, at the fifth month, on the soles of the feet, and palms of the hands. At the same period, the hairy scalp, the eyebrows, and eyelids exhibit small projections pierced in their centre by a hole for the passage of white, silky, and extremely fine hairs, which are visible at the end of the fifth month, and in the beginning of the sixth. About this time the surface of the body is covered with a fine down, which falls off at term, or soon after birth. The hairs, at first white and short, elongate, acquire more size, and a tint of darker hue; at the seventh month, in some cases, they are thick, long, and quite dark.

About the end of the fifth month, a white, thick, unctuous, caseous covering is deposited in the vicinity of the great articulations, the axillæ and groins; toward the end of the eighth, this coat covers nearly the whole surface of the body. The degree of maturity of the fœtus may be correctly ascertained from the state of the skin and its dependencies.

Respiratory apparatus.—This apparatus, the functions of which begin only after birth, is composed of three principal and very distinct parts, namely: *the larynx, the trachea, and the lungs*, in which we comprise the *bronchi*, without reckoning the glandular bodies in the vicinity, such as the *thyroid* and *thymus*, of which we shall treat subsequently. In the fourth month, the cartilages of the *larynx* and *trachea* are completely formed; in the fifth they are filled with mucus. In the fœtus at term, the epiglottis is still very soft; the larynx small; the glottis very narrow, and not completely developed until puberty. This disposition renders the inflammation of the air passages very dangerous in childhood. Tumefaction of the mucous membrane alone will frequently embarrass the respiration, and produce suffocation: but when false membranes are formed in the larynx and posterior fauces, the glottis is almost entirely obliterated, and death follows as an inevitable consequence, as is too frequently proved by the fatal termination of croup.

* Nouvelles Observations sur les Accouchemens. Obs. 8, p. 92. Paris, 1715. † Vide the Report of the distribution of the Prizes at la Maternité, p. 62. Paris, 1810.
‡ Chaussier, Memoire sur les Fractures et les Luxations survenues a des Fœtus encore contenus dans la Matrice. Bulletins de la Faculté, vol. iii. Paris, 1813.

Lungs.—They are not visible until the sixth week; they then appear to be constituted by the aggregation of a certain number of vesicles. At three months, their lobes are separated by deep grooves; each lobe is composed of lobules distinct from each other; these lobules soon unite, and no trace of them is found at birth. In the fœtus at term, which has not yet respired, the lungs are thrust toward the vertebral column, and leave exposed a large portion of the pericardium. Their tissue is red, compact, hard, does not crepitate, and sinks in water. When respiration has occurred, remarkable and rapid changes take place; the sudden development of the lungs distends the parietes of the thorax in every direction, and gives the chest a peculiar shape; they partly cover the pericardium; their colour is much darker, they are lighter, and crepitate on pressure. Their specific gravity is less than that of water.

Thyroid body.—This body, to which the name of *gland* has been given, although it has no excretory duct, increases rapidly until the sixth month: from this period, it ceases to grow so fast; its development then follows that of the other parts. Its shape is more round, and its relative size is larger than in the adult.

Thymus.—The thymus is a body of glandular appearance in the anterior mediastinum, behind the sternum and in front of the trachea and great vascular trunks of the thorax: divided into two lobes at the superior part, it frequently extends as far as the thyroid. It is of a rose colour, and composed of granulations resembling those of the salivary glands: these granulations contain a whitish, thick fluid; but no excretory duct can be found. The thymus begins to appear about the third month: it increases considerably until the term of gestation: after birth, it remains, for a time, stationary: but before the end of the first year, it begins to diminish, and at last entirely disappears, so that remains of it are rarely found in a child of ten or twelve years.

The uses of this organ, like those of the thyroid, are as yet unknown: they relate, probably, to intra-uterine life, although those now attributed to them are hardly well enough established.

Apparatus of digestion.—The whole length of the intestinal canal can be perceived at the end of the first month;* at this period it is uniformly cylindrical, from the pharynx to the anus; and everywhere straight, except at the point at which it meets the pedicle of the umbilical vesicle, and there it forms a well-defined angle. We may also begin to perceive some traces of the mesentery.

Toward the end of the second month, the stomach is yet vertical, the small intestine begins to form some convolutions: the large intestine does not exceed in size the small; it is always straight. The cæcum is somewhat more developed. The anus looks merely like a dimple which appears imperforate.

In the third month, the stomach takes a more transverse direction, the duodenum is very large and scarcely separated from it, the convolutions of the small intestine are more marked. The large intestine has increased in capacity at the upper part, it passes, at first, transversely, and then downward; at the end of the third month, it begins to be directed upward. About this period, villosities and folds can be perceived on the mucous membrane. The anus has the appearance of a patulous aperture, behind the genito-urinary fissure.

At the fourth month, the stomach is transverse, and the greater portion of the pyloric valve is formed. The cæcum is fixed, the ascending colon approaches the position it is to occupy: the longitudinal folds of the rectum begin to appear.

In the fifth month, the villosities of the stomach and small intestine are more distinct: the valvulæ conniventes are more manifest, the pouches in the great intestine begin to appear. The sigmoid flexure of the colon is evident: the anus contracts, and the intestinal canal has acquired, very nearly, the form it is to preserve through life. At birth, the large intestine, distended by meconium, is proportionably larger than the other parts of the digestive tube. Whenever in examining the body of a dead child, which is not imperforate, if meconium be found in the intestine, we may be sure that the child has lived but a short time, for this matter is generally expelled in the first twenty-four or thirty-six hours after birth.

Salivary glands.—They appear in the third month under the form of vesicles, grouped around the ramified excretory ducts, the trunk of which is directed toward the mucous membrane of the mouth.

Pancreas.—We perceive the first traces of the gland during the third month. At first, the size of the pancreas is considerable in proportion to the other organs. At the fourth month, the granulations are in close apposition, and the excretory duct is very large. From the sixth it ceases to increase so rapidly. The pancreas, at first vertical, follows the movement of the stomach and becomes horizontal.

Liver.—The liver may be seen at the end of the first month, it is very large, and alone forms nearly a third of the body of the embryo: subsequently it continues to increase considerably, but its relative size diminishes. It occupies at first the whole of the upper part of the abdominal cavity. At the fourth month, it extends on the right as far as the crista of the ilium, on the left it descends lower down. At the sixth month it is more elevated, and pushes the diaphragm before it.

Gall-bladder.—It appears about the commencement of the third month, under the form of a canal, which advances from the liver toward the intestine. At the fourth it contains a limpid mucus, which soon becomes greenish. In the fœtus at term, the gall-bladder is lodged in a depression deeper than that which receives it in the adult.

Spleen.—It appears about the seventieth day: and remains very small during the whole of fœtal life; its colour is much less dark than in the adult; it even retains a whitish tinge until birth, at which period its volume is absolutely and relatively much smaller than in the adult.

Corpora Wolffiana.—These are organs, two in number, situated in front of the lumbar portion of the spinal column, having only a temporary existence, at least in man and other mammiferous animals. The corpora Wolffiana exist before the kidneys and genital organs: they have already reached their maximum development when the latter begin to appear. The form of these bodies is elongated: they are composed of a great number of small tubes, which terminate at right angles, in a pretty large duct which opens at the side of that of the opposite organ into the sinus-urino-genitalis. In the human embryo, the greater part of these bodies is atrophied at the end of the eighth week. In the female, however, some remains of these are occasionally found after birth. The structure and large size of these organs, in the early stages of fœtal life, lead us to the supposition that they undoubtedly serve for some important secretion, but the nature and intention of this secretion are as yet unknown.

* See Plate 27, fig. 4, and 7, c. and d.

Renal capsules.—They are much more developed in the fœtus than in the adult. The renal capsules appear in the seventh week: they are situated in front, and slightly inside of the corpora Wolffiana. Their outline is imperfectly defined: they touch each other at their lower extremity, and are formed of a granular tissue. Their size, in the ninth week is double that of the kidneys. At four months they are not larger than these organs; at six, their surface is unequal, a brownish fluid is found in their interior: at birth, they have only one-third of the volume of the kidneys; in the adult they are atrophied and withered.

Kidneys.—These may be first perceived toward the end of the seventh week; at this period they are hidden behind the renal capsules. At first the structure of these organs is granular: in the beginning of the fourth month, they are composed of seven or eight separate lobes; at the sixth the separation exists only on the external surface. This structure, lobulous exteriorly, continues for some time after birth.

Ureters.—At first very large, they are visible at the same time as the kidneys, and open into the cloaca common to the genital organs, the urachus, and the inferior extremity of the intestinal canal in which the ducts of the corpora Wolffiana terminate: but this common cavity soon undergoes remarkable changes. By the formation of the perineum, the urino-genital groove is separated transversely. The part of the cloaca into which the ureters are inserted, is gradually isolated by being directed forward: at the eighth week the canal of the urethra and the bladder may be distinctly seen: the latter resembles an elongated dilatation of the urachus, which, at the third month, is yet open to the umbilicus: but from this date it rapidly disappears, and gives the bladder a more globular form. After birth, however, the bladder is higher than it is intended to be subsequently, and retains for some time its conical form.

Genital organs.—At their first appearance it is impossible to distinguish the sex, so analogous is the conformation of the genital organs, either externally or internally; but we should not conclude from this resemblance that all embryos are originally of the feminine sex, as has been asserted by some anatomists, and that the male genitals result from a more advanced development of those of the female. We think that the difference of sex is essential and primary, and that it exists before our senses can appreciate it. In the seventh month we perceive, in front and slightly on the outside of the kidneys, two elongated bodies, which are the testicles or the ovaria. From these two bodies extend two prolongations, which are the epididymis, of which the continuation forms the beginning of the vas deferens or the fallopian tube. In front of the urino-genital orifice we see a tubercle, which is the penis or clitoris; below and externally there is on each side a fold, which will constitute the scrotum or the labia pudendi. The uterus does not exist as an organ distinct from the sinus-urino-genitalis until about the end of the second month. A prolongation on the median line, to which the fallopian tubes correspond, is formed at the upper part of the sinus: this tuberculated prolongation is the first rudiment of the uterus, whilst the part of the sinus which proceeds from it is transformed into vagina. From that time the sexual characters are very distinct, and become more and more marked.

Testes.—They retain a considerable relative size until the fourth month, but less than that of the ovaria. The vas deferens descends at first directly into the pelvis; the inferior extremity of the testicle, and the commencement of the epididymis, afford attachment to a fibro-cellular cord which passes through the inguinal ring, and is the *gubernaculum testis* of Hunter.

The testes, like the ovaria, abandon the situation they originally occupied on the level of the kidneys. At the fourth month they are sometimes below these organs; at the sixth they are beneath and inside of the psoas muscles; at the seventh they appear at the internal orifice of the inguinal canal, through which they pass during the eighth; at term they are at the bottom of the scrotum. Wrisberg* has ascertained that of ninety-seven boys: in sixty-nine both testes were in the scrotum at birth; seventeen had one or both in the groins; eight, one only; and three, both in the abdominal cavity. This progressive descent of the testicle is explained by the successive shortening of the *gubernaculum* of Hunter. The peritoneum, placed in front of the testicles, accompanies them in their progress, and forms the tunica vaginalis by being inverted like the finger of a glove. The testicles also carry with them some fibrous lamellæ, from the edges of the ring and the inferior margin of the internal oblique muscle, to form the cremaster, etc.

Penis.—Until the third month the projecting tubercle in front of the pubes cannot be said to be a penis or a clitoris: at this period a groove is seen on the lower surface of the penis, which closes to form the urethra, of which the orifice is then at the extremity of the glands, whilst previously it was near the root of the corpora cavernosa. At the fifth month an annular fold is formed around the base of the glans; this fold, destined to constitute the prepuce, soon extends sufficiently far to cover and project beyond the glans. This disposition of the prepuce continues for a certain time after birth. The two cutaneous folds of which the scrotum is composed unite on the median line so as to form the raphe.

Ovaria.—They enlarge very much until the fourth month, when they lose the appearance of a bunch of grapes; at the third month they begin to descend; at the fourth they are already some lines below the kidneys; at the sixth they are in the pelvis.

Clitoris.—It is very long until the end of the third month, giving rise to the opinion that more boys than girls were prematurely expelled at this period; but, if these abortions be examined with a microscope, we shall soon perceive, as already remarked by Morgagni, that this idea is without foundation; for in a great number of these abortions a vertical fissure may be seen below the clitoris, indicating the aperture of the vulva and revealing the sex. At this stage the ligaments surrounding the clitoris grow rapidly, and form a prepuce which at four months covers it completely: the projecting margins of the inferior surface of this prepuce, which constitute a sort of groove, are still farther developed and become the *nymphæ* or lesser labia.

Labia pudendi.—They are but slightly developed at the fourth month: at birth they hide the clitoris, but the nymphæ always lap over them.

As regards the remaining parts of the genital organs, we shall confine ourselves to the remarks already made on them, without entering into more minute details.

ARTICLE III.—DIMENSIONS AND DIVISIONS OF THE FŒTUS AT FULL TERM.

As the fœtus is obliged to traverse the tunnel-shaped passage formed by the pelvis, it is important, in studying the mechanism of

* Commentationes, p. 179.

labour, to understand the dimensions of each of its constituent parts, or at least, of those which from their size may present an obstacle to its progression through the pelvic cavity. This knowledge is also useful in medico-legal questions.

We have stated that the length of the fœtus at term, measured from the vertex to the soles of the feet, was generally eighteen or nineteen inches. Taking as an average, after the example of Chaussier, a child of six pounds in weight and eighteen inches in length, we shall find from the vertex to the umbilicus, ten inches four lines; from the umbilicus to the heels, seven inches eight lines; from the vertex to the pubes, eleven inches nine lines; from the clavicle to the lower end of the sternum, two inches three lines; from the lower end of the sternum to the pubes, six inches.

It follows from these measurements that, in a child at term, the umbilicus, far from corresponding to the middle of the length of the body, as stated by Chaussier, is sixteen lines below that point. This remark, of the accuracy of which we are certain, appears to us of importance in legal medicine. M. A. Duvergie has previously called attention to this point, and asserted that the middle of the body was somewhat above the umbilicus;* since then he has fixed this centre at seven and a half lines above the umbilicus:† but, from our researches on this subject, which were communicated to the Royal Academy of Medicine on the 28th of September, 1837, we are convinced that this middle point is at about ten lines above the insertion of the umbilicus.‡ Considered in its totality, the fœtus presents three parts remarkable for their size and firmness: these are the head, thorax, and pelvis. The upper and lower extremities, compared with each other, are nearly equal in length: they both enjoy great flexibility on account of the looseness of their articulations, permitting the legs and thighs to be closely applied to the anterior surface of the fœtus in presentations of the pelvis, and the arms to be elevated and rest on the sides of the head whenever the arms or head are to be last expelled.

If we consider the fœtus, in regard to labour, we find it wound and curved on itself, forming an ovoid mass, of which the great diameter is only ten or eleven inches, that is, little more than one half of the whole length assigned to it when extended. In this point of view, we cannot adopt the plan of modern accoucheurs, and divide the fœtus into trunk and limbs, since the latter being flexed and closed together, form, as it were, a constituent part of the trunk to which they adhere, and of which they are merely the appendages. We prefer dividing it, imaginarily, into three distinct parts, namely: 1st, a *cephalic extremity*, formed by the head alone; 2d, a *pelvic extremity*, comprising the pelvis and lower limbs; 3d, a middle part, furnished by the *torso* or *trunk*, properly so called, the pelvis being excluded.

I. Cephalic extremity, or head of the Fœtus.

Head.—The head is the most voluminous, solid, and least reducible part of the body of the fœtus. It is composed of two parts, the cranium and face, of the same number of bones, and same parts as in the adult.

The *cranium*, which is again subdivided into vault and base, forms a spacious cavity, intended to contain a soft, vascular, and voluminous cerebral mass. The *vault* is formed by the frontal, as yet in two pieces, the parietal, the squamous portion of the temporal, and the posterior part of the occipital bones. The imperfect state of ossification of these bones leaves between them greater or less membranous intervals, called *commissures* or *fontanelles*, and gives to this part of the cranium a flexibility and mobility, which, in labour, permits the size of the head to undergo a reduction always useful, and sometimes indispensable to the birth of the child. The *base*, which unites the cranium to the face, is pierced with numerous foramina, for the passage of the nutritious vessels of the brain, the nerves and spinal prolongation which arise from the encephalon: it is formed by the cribriform plate of the ethmoid bone, the horizontal portion of the frontal, the sphenoid, the petrous portion of the temporal and the lower part of the occipital, parts whose more advanced ossification affords a firmness and solidity which opposes reduction and renders impossible all compression; an admirable arrangement, without which a child could not be born without being exposed to more or less serious lesions, such as paralysis, the loss of one or more of the organs of the senses, or sometimes even death.

The *face* is formed as in the adult, superiorly by the two bones proper of the nose, the unguiform, the malar or zygomatic, the superior maxillary, the palatine, the inferior turbinated bones, the vomer, on the median line, and as yet cartilaginous, and inferiorly by the lower maxilla. The face, in the fœtus, is remarkably narrow, in consequence of the want of fulness of the buccal and nasal cavities, and of development of the sinuses.

Commissures.—The name of commissures is given to the narrow membranous intervals, which act as sutures. Those which it is important to distinguish and study, are three in number.

1st. The *median* or *sagittal* commissure, situated in the space between the two pieces of the frontal and the two parietal, extends from the root of the nose to the superior angle of the occiput; in front, it is crossed at right angles, by the *fronto-parietal* or *coronal*, and behind, it terminates at the *occipito-parietal* or *lambdoidal*.

2d. The *fronto-parietal*, called also *anterior*, *transverse* or *coronal*, extends from the extremity of one of the greater wings of the sphenoid to that of the opposite side, filling up the interval between the superior edge of the frontal and the anterior edge of the parietal bones.

3d. The *occipito-parietal*, usually called *lambdoidal*, from its resemblance to the Greek letter *lambda*, unites the upper edge of the occiput with the posterior edges of the parietal.

* Duvergie, Medecine Legale, vol. i. p. 304, 1st edit. 1836.

† Ibid. vol. i. p. 545 and 546, 2d edit. 1840.

‡ Of a hundred and five children which we measured with the greatest care at birth, ninety-four had reached the full term, and eleven were prematurely born, from the sixth to the eighth month. Of the ninety-four at term, four had the insertion of the umbilicus precisely in the centre of the length of the body. Of the remaining ninety this insertion was below the centre. The extreme variation was from one line to two inches. Many exhibited a difference of six, twelve, and eighteen lines; by adding all these differences we have found an average of nine lines and twelve-hundredths. Of the eleven premature children, one of seven months had the umbilical insertion in the middle of the body, and its brother, (for they were twins,) about fifteen lines below. The nine others varied from three to twenty-four lines. The average in these ten children was ten lines and seven-tenths.

If we may be allowed to draw any conclusions from this small number of facts, we should say that the umbilical insertion at birth is generally below the middle of the body, and that it rarely exactly bisects it; that a similar arrangement is seen in premature births, whence we may conclude that the growth of the lower parts of the trunk is less slow than is generally imagined. Lastly, we may state that the umbilical insertion alone can furnish merely vague inferences, and no results sufficient to accurately determine the age of the fœtus or the child.

The *temporo-parietal* or *squamous* commissures, are too thickly covered by the soft parts to be recognized by the touch, and scarcely deserve a passing notice.

Fontanelles.—This is the name given to the large membranous spaces, of various forms, which result from the want of ossification of the angles of the bones, and which are found at the points of intersection and junction of the commissures. The fontanelles are six in number: two on the median line of the cranium, form a part of the vertex; the other four, two on each side, are on the lateral and inferior parts of the skull.

The *anterior, bregmatic* or *frontal* fontanelle, is at the intersection of the sagittal and fronto-parietal commissures. It is a sort of oblong, quadrangular space, in the shape of a lozenge, of which the extent, always in an inverse ratio to the ossification of the angles of the parietal and the two pieces of the frontal, varies in different subjects. Generally, the fontanelle extends farther between the two pieces of the frontal, than between the parietal bones.

The *posterior* or *occipital* fontanelle, situated at the junction of the sagittal and lambdoidal commissures, is triangular, and very narrow; it exists distinctly only in a fœtus which has not reached maturity. At full term, in the majority of children, it consists merely in a kind of triangle formed by the meeting of the two commissures, and in which the occipital portion always slides beneath the parietal, however slightly the head may be compressed. This remarkable disposition, which we are not aware has been noticed previously, is sufficient, in practice, to enable us to distinguish the occipital extremity from the frontal, even in those anormal and excessively rare cases, in which the occiput, divided in the median line, has no superior angle, giving to the occipital the form and appearance of the anterior fontanelle.

The inferior and lateral fontanelles are situated, one anteriorly at the point of union of the greater wings of the sphenoid with the fronto and temporo-parietal commissures, and is called *temporal;* the other, posteriorly, is found at the junction of the mastoid region, with the temporo-parietal and lambdoid commissures, and is designated by the name of *mastoid.* The knowledge of these fontanelles, deeply situated, covered by aponeuroses and thick muscles, can be of no practical utility.

The commissures, and particularly the fontanelles, serve, in practice, to determine the relations of the head with the different points of the circumference of the pelvis, and to mark the various positions of the vertex.

Shape and division of the head.—The head of the fœtus, separated from the trunk and viewed as a whole, represents an ovoid, irregularly flattened in different directions, furnishing for our consideration five regions, three extremities, two circumferences, and seven diameters.

Of the regions.—The *first superior* is known by the names of *bregmatic, oval superior, and vertex,* and is bounded by an imaginary line which, starting from the external occipital protuberance, and extending over the sides, would traverse the parietal protuberances to terminate in front at the median commissure by dividing, into two equal parts, the frontal protuberances. This region comprises the vertex, and is marked by the presence of the sagittal, coronal, and lambdoidal commissures, and particularly by the bregmatic and occipital fontanelles. It is this region likewise which most frequently presents at the os uteri.

The *second inferior* or *base*, bounded by another, which, starting from the same point, would pass laterally over the mastoid process, the auditory canal, the angle and lower edge of the inferior maxilla, and terminate in the chin. This region, marked in the skeleton by the great foramen of the occipital bone, the basilar process of this bone, the body of the sphenoid, the posterior opening of the nostrils, the palatine vault, etc., presents at the os uteri only in the case of expulsion of the fœtus by the feet, or in decollation; it may then be easily known, not by the presence of the occipital foramen, but by the unequal, lacerated surface, and especially the sort of stump formed by the first cervical vertebræ, which still adhere to the occipital bone.

The *third anterior*, or the *face*, bounded by a line which, originating from the median commissure, would bisect the frontal protuberances, would follow the outer edges of the orbits, the malar regions, extend to the angle of the lower jaw, and terminate on the median line of the chin. This region, which sometimes presents at the os uteri, is characterized by the forehead, orbits, nose, mouth, and chin.

The *fourth* and *fifth* lateral or *temporal regions* comprise the space between them and the lines which bound the vertex, the base, and the face. They are much better marked on the fœtus by the zygomatic arch and external ear, than by the lateral and inferior fontanelles. These regions rarely present at the os uteri.

The three *extremities* are, the *occiput* behind, the *forehead* above and in front, the chin below and in front.

The two *circumferences* are—1st. *The greater*, measured by a line drawn from the external occipital protuberance over the sagittal commissure, the nose, mouth, chin, great occipital foramen, and terminating at its point of departure. This circumference divides the head into two equal parts, and is from fourteen to fifteen inches in extent. 2d. The *smaller circumference* is measured by a line which, dividing transversely the great occipital foramen, passes behind one of the condyles of this bone, over the parietal protuberances, and terminates behind the condyle of the opposite side. This circumference is from eleven to twelve inches in length.

Diameters of the head.—The knowledge of the different diameters of the fœtal head is very important, as, by comparing them with those of the pelvis, we can calculate the chances of a favourable or unfavourable termination of the labour.* They are *seven* in number.

1st. *Occipito-mental diameter.*—It extends from the external occipital protuberance to the point of the chin. This diameter, which is the greatest, and is also called the oblique, is generally five inches in length.

2d. *Occipito-frontal*, four inches and three or four lines long, called also antero-posterior, is represented by a line drawn from the occipital protuberance to the space between the two pieces of the frontal bone, on a level with the eminences of this bone.

3d. *Cervico-bregmatic*, is measured from the back part of the neck to the centre of the anterior fontanelle, and is three and a half inches long.

* See Plate xxxi. figs. 2 and 3.

4th. *Vertical*, improperly called *trachelo-bregmatic.*—It is represented by a line traversing the head from the vertex to the anterior portion of the great occipital foramen: its length is three and a half inches.

5th. *Bi-parietal*, is also called transverse, and is measured by a line drawn from the centre of one parietal protuberance to that of the opposite side. In the head, stripped of the soft parts, this diameter is three inches and four lines long; whilst in a child at term, the cranium being covered with the soft parts, it is three inches and eight lines in length: such at least is the result of our examination of several hundred heads very carefully measured, and of that of M. Dubois.

6th. *Bi-temporal.*—It is represented by a line extended from the root of the zygomatic process of one side to that of the opposite, so as to measure transversely the base of the cranium: its ordinary length is two inches and six or eight lines. It is the smallest of the diameters of the head, the only one which is constant or incapable of reduction.

7th. *Fronto-mental*, extends from the forehead to the chin, and is three inches and a half long. In face presentations this diameter is opposite to the transverse diameter of the pelvis when the face engages in the superior strait, and to the antero-posterior of the inferior strait when the head has executed its movement of rotation.

Articulation of the head with the vertebral column.—The head rests on the vertebral column by means of the atlas and dentata, and the latter on the remainder of the cervical column. The articulation of the occiput with the atlas is a firm ginglymus, of which the excessively limited movements can take place only in the direction of flexion and extension. The articulation of the atlas with the dentata being by means of plane, orbicular surfaces, allows very limited movements of rotation and lateral inflexion. The head executes, however, on the cervical column pretty extended movements in different directions: the extent of these movements must not be attributed solely to that which occurs in the articulation of the occiput and atlas, or of the atlas with the dentata, but to that which takes place in the series of articulations of the different vertebræ forming the cervical column. The movements of the head on the vertebral column are the compound product of the addition of the sum of the partial movements of the cervical vertebræ on each other.

The head can execute movements in four different directions:—those of *flexion*, *extension*, *lateral inclination*, and *rotation*. There is an extent or limit which cannot be exceeded to these movements, of which the knowledge is so necessary for the explanation of the mechanism of labour. This limit must never be lost sight of when the fœtus is expelled by the feet. From forgetfulness or ignorance of this important maxim, inattentive or unskilful accoucheurs have had the mortification of delivering children still-born, which but a moment previously were full of life and health.

1st. *Movement of flexion.*—It is very extensive, and is limited only to the obstacle presented by the neck or upper part of the sternum to the depression of the chin.

2d. *Of extension.*—Although slightly less extensive than the preceding, it is arrested by the meeting of the occiput with the back part of the neck.

3d. *Of lateral inclination.*—It may be carried so far as to apply one side of the head or one ear to the corresponding shoulder.

4th. *Of rotation*, or *the pivot-like motion.*—This is the least extended of all, and the only one to which nature has opposed no evident barrier, and for that very reason is it so easy and so dangerous to carry it beyond its limits. This very circumscribed movement cannot, without danger to the life of the infant, exceed one quarter of a circle, or, to speak more accurately, we will say that the face of the child cannot be turned to the right or left beyond the corresponding shoulder. The value of this remark will be seen when we give the rules for the disengagement of the head when this part is expelled last.

II. Pelvic extremity of the Fœtus.

We comprise under this denomination not only the pelvis, but also the lower extremities. The pelvis, properly so called, is, in the fœtus, remarkably small, and formed of bones in a very imperfect state of ossification. The pelvic cavity is, as it were, merely rudimentary: the hips are narrow; their *iliac* diameter, or from the middle of one crista ilii to that of the other, is three inches. The large diameter of this extremity, called *bi-trochanterial*, or from one trochanter to the other, is three inches and three or four lines, that is to say, equal to or somewhat smaller than the bi-parietal diameter of the head.

III. Torso or trunk of the Fœtus.

The trunk, although constituting a voluminous mass, is composed of numerous soft parts and independent movable bony pieces, of which the majority are separated from each other by considerable spaces, allowing changes in its form and direction. The thorax, very short, almost entirely cartilaginous, enjoys great flexibility; its cavities are narrow, on account of the quiescence of the lungs; it has two diameters.

1st. The *acromial* or *transverse diameter*, measured from the top of one shoulder to that of the other, is four and a half inches long, but may be readily reduced to three and a half, on account of the mobility of the shoulders and ribs, and the compression they will bear without injury.

2d. The *dorso-sternal* or *antero-posterior*, is measured from the spinous process of the last dorsal vertebra, to the ensiform cartilage of the sternum, and is three and a half inches long.

The abdomen, very large, on account of the smallness of the pelvic and thoracic cavities, projects greatly forward, and alone forms nearly two-thirds of the trunk: the spinal column, arched forward, allows the trunk to bend in different directions, a condition indispensable to its safe passage through the tunnel or curved canal of the pelvis.

Attitude and position of the Fœtus in utero.

As soon as the human embryo can be perceived, it will be seen curved on itself, with the cephalic extremity near the coccyx, forming a semi-circle, having an anterior or ventral concavity, and a dorsal convexity, which position continues during the whole course of intra-uterine life. If we examine, in the uterus, a fœtus at term, we find it, as it were, rolled on itself like a ball, forming an ovoid whole, with the head flexed on the chest, the feet on the legs, the legs on the thighs, the latter on the pelvis: the knees slightly separated to receive

the forehead or face, the heels closed together and applied against the ischia, the fingers flexed on the wrists, the forearms on the arms, and the latter on the sides of the trunk.*

This, although the habitual disposition of the fœtus, is liable to variation: thus, on opening the bodies of women who have died during pregnancy, the feet are sometimes found crossed saltier-wise, the arms and forearms folded cruciformly on the chest, instead of being on the sides of the trunk and face; at other times, the hands are extended and glued to the sides of the head, and lastly, one of the arms may be extended parallel to one side of the trunk.

Does this demi-flexion of the fœtus depend on a primordial law, or on the superiority of the flexor over the extensor muscles? The former opinion appears to us more rational, for this inflexion exists from the beginning, at a period when no traces of the muscles can be discovered.

The ovoid formed by the fœtus, thus curved on itself, is in perfect unison with the shape of the cavity which contains it. Struck by this beautiful harmony, Hippocrates, with great justice, compared the fœtus contained in the uterus, to an olive enclosed in a long-necked phial; and from that had deduced the general laws of natural labour, and foreseen those which guide us in artificial delivery. This ovoid presents two extremities and several diameters. The larger extremity formed by the pelvis and lower extremities, generally occupies the fundus of the uterus: the smaller, formed by the head, coincides with the neck of this organ. The vertical diameter, which is the largest, is usually ten inches long: the transverse and antero-posterior are each five to six inches in extent.

Position.—Is the position of the fœtus in utero fixed and invariable? We think that its position, without being absolutely fixed, is well determined at the two extremes of intra-uterine life, that is, in the first, and in the last month of pregnancy, but that it enjoys great mobility during the intermediate periods.

So long as the amniotic sac is small, embraces almost immediately the embryo, contains but little fluid, is separated from the chorion, and adheres to this membrane merely by the sort of chalazium of which we spoke, page 76, described by M. Velpeau under the name of *corpus reticulatum*, and considered by the author as the allantoid, the embryo, or rather the germ excessively small, and delicate, could not be displaced without danger of being broken or ruptured, or sustaining some injury which might influence its future development: hence, during the whole of the first month of gestation, the position of the embryo is nearly fixed, and if it moves, it must be as a whole, following the impulsion communicated to the entire mass of the ovum, to the membranes and fluids, in which it is, as it were, cradled and suspended as in a hammock.

As the amnion extends and approaches the chorion, as the quantity of amniotic fluid increases, as the umbilical cord elongates, and as the embryo augments in size, its position is no longer fixed: it probably begins to perform movements of rotation in the direction of the axis of the umbilical cord; and to these movements the spiral torsion of the umbilical vessels has been attributed. Subsequently it moves in every direction: and it is only when the development of the fœtus is nearly complete, when the vertical diameter of the ovoid it resembles is greater than the antero-posterior and transverse diameters of the uterine cavity, that is, in the last two months of pregnancy, that it assumes a more fixed and nearly invariable position—that which, in an immense majority of cases, it is to present at birth. Generally this position is as follows: the head rests on the os uteri; the hips and feet are toward the fundus of the organ; the back is turned toward the anterior paries of the abdomen of the mother; and the belly toward the lumbar vertebræ of the latter.

The opinion here given has not always been received. The ancients and some moderns, among others Levret,† thought that in the first periods of pregnancy the fœtal head was above, the hips below, and the belly in front; and, at the approach of delivery, that it performed a see-saw or somerset-like movement, which brought the head below, the hips above, and the back in front. When the pelvic extremity presented, they said that the see-saw movement had not taken place. They based their opinion on the peculiar movements executed by the fœtus about the seventh or eighth month, and on the diminution of the abdomen of the woman. This opinion, vehemently attacked by Baudelocque, cannot now be sustained. If this somerset can sometimes occur, as Levret states he has seen, it can only be accidentally, in some very rare and peculiar cases, such as a very small fœtus, surrounded by a large quantity of fluid, contained in a spacious cavity, where it enjoys great mobility. Except under these circumstances, observation, experience, and reason reject the idea of this see-saw or somerset-like movement. Thus, at whatever period of pregnancy we may examine, per vaginam, a woman in whom the fœtus can be distinguished, in the great majority of cases we shall find the head toward the os uteri: the same thing occurs on opening the body of a woman who has died during gestation. Lastly, if we compare the diameters of the ovoid formed by the fœtus with the extent of the uterine cavity, we shall see that this movement becomes, not indeed absolutely impossible, since the parietes of the uterus are very extensible, but at least exceedingly difficult; for it would be necessary for the vertical diameter of the fœtus, already nine or ten inches in length, to pass through the antero-posterior or transverse diameters of the uterine cavity, of which the length is only six or seven inches.

To what causes must we attribute this position of the fœtus and the greater frequency of the presentation of the head at the os uteri? Some have ascribed it to the laws of gravity, and to the anatomical structure of the female parts and of the fœtus: others, to a sort of antagonism of polarity, which causes the head of the fœtus to be directed toward the lower parts of the mother, whilst the feet are toward the head of the latter: and others again, to the laws of instinct.

This position may be explained by the laws of gravity, and in a purely mechanical manner. Thus the back of the embryo, by virtue of its convexity and weight, should lodge in the most concave part of the uterus, which is the anterior surface; it can adapt itself more accurately to this surface, which coincides with the anterior, soft wall of the abdomen, whilst the lumbar column and a portion of the viscera of the mother, which project posteriorly, accommodate themselves more easily to the unequal surface of the anterior region of the fœtus. Again, as the umbilical cord is inserted into the embryo, very near to the coccygeal extremity, which is but slightly developed, whilst the head, thorax, and upper part of the abdomen having, in the early stages of fœtal life, a much greater size, the head would naturally fall toward the lower part of the uterus, and in the direction of the orifice of this organ. This phenomenon is

* See Plate xxxviii.

† Levret, L'Art des Accouchemens, etc. Paris, 1776.

the mechanical result either of the vertical or the horizontal position of the mother, because in both cases the os uteri, in consequence of the inclination forward of the pelvis, is always the most depending part of the organ, and the cephalic half of the fœtus being at once depending and more heavy, will naturally incline toward and rest on the neck of the viscus. This mechanical explanation would be satisfactory and readily admitted, 1st, if the insertion of the umbilical cord were the same at all periods of intra-uterine life; 2d, if this cord were shorter than one half of the body of the fœtus; 3d, if the placenta were always inserted into the fundus of the uterus; so that the fœtus would be constantly fixed to the fundus of the organ, and suspended in the amniotic fluid by a very short cord. But of what value is this explanation when we recollect that the cord is generally much larger than the fœtus; that the placenta is frequently inserted at different points of the uterine parietes, and sometimes over the os uteri; circumstances under which the fœtus assumes likewise the position we have assigned to it? How can this mechanical explanation be applied to the mammiferous quadrupeds, in which gravity cannot influence the position of the fœtus, and in which the latter affects the same disposition as in the human subject, since, in them also, the head is directed toward the os uteri?

This explanation not being sufficiently exact and satisfactory to every mind, other causes of this phenomenon have been sought for. The celebrated Ambrose Paré* thought that the fœtus felt the air, and endeavoured to get its head out first. Mauriceau† was of opinion that it turns its head downward merely to be able to be expelled more easily. Autenrieth‡ states that the embryo affects a position inverse to that of the mother, because its head, by virtue of its central part, is attracted by the lower region of the mother, especially of the womb. Burdach§ thinks that if this conclusion is correct, we should presume that the direction of the spinal surface of the embryo toward the visceral surface of the mother, and *vice versâ*, depends equally on the attraction exerted on each other by the opposite pole. Lastly, and more recently, M. Paul Dubois‖ has asserted that it results from an instinctive tendency. But the experiments and reasoning on which he forms his opinion are not satisfactory to us. Even whilst admitting them as exact and conclusive for the human species and the mammiferæ in general, they do not explain the same phenomenon in birds; nor why the larger end of the egg, to which, at a later period, the head of the embryo corresponds, escapes first from the oviduct. If this instinctive tendency be granted as the consequence of the fecundation of the egg, we ask why the same thing occurs in eggs lain by females, which have never been impregnated? We will observe, in conclusion, that if the mechanical explanation be insufficient, it is at least the most probable, and if it be not granted, we shall be satisfied with stating the fact, without attempting to explain it, and will simply say that it is the result of a primordial law which governs all organized beings; of that law which, in vegetables for example, directs the root toward the centre of the earth, whilst the plumula constantly rises toward heaven; that is, toward the air and light, whatever may be the original direction given to the seed.

ARTICLE IV.—FUNCTIONS OF THE FŒTUS.

Our knowledge of fœtal life is as yet very circumscribed. Entire organic apparatuses are in a state of complete repose: some, such as the organs of the senses and respiration, enter upon the performance of their functions only at birth; others remain dormant until puberty. As regards the functions of relation, we can appreciate only the muscular movements of the fœtus. The assimilative organs alone enjoying much activity, will be the objects of our study. We shall therefore examine, 1st, nutrition properly so called; 2d, respiration, if it exist; 3d, the circulation; 4th, the various kinds of secretion.

§ I.—NUTRITION OF THE FŒTUS.

This is the most important of all the functions of the fœtus, and has for a long time peculiarly attracted the attention of physiologists. In order to conceive the activity of nutrition during intra-uterine life, it will be sufficient to recollect that after fecundation, the impregnated ovum which leaves the ovarium for the uterus, weighs only five centigrammes (or nearly one grain), whilst the same ovum at full term weighs at least eight pounds, or four kilogrammes, that is, nearly 80,000 times more. We know that the mother is the fountain from which spring the elements of this prodigious increase; but if we attempt to pass beyond this general proposition, and determine the nature of the nutritive elements, or by what means they pass from the mother to the new being, our inquiries must cease, or we are met by numerous opinions, often contradictory, of which the most probable and conformable to anatomical structure, are not free from powerful objections. This circumstance alone proves that many points relating to this important question, are still unsettled. The different fluids contained in the ovum, such as the water of the amnion, the substances enclosed in the umbilical vesicle and allantois, the gelatine of the cord, the materials transmitted by means of the placenta, and recently, the fluid contained in the cavity of the caduca, have been, successively, considered as aiding in the nutrition of the fœtus. In order to display as perfectly as possible the opinions of various authors and the most interesting facts relating to this important question, we shall, after the example of Lobstein, examine, 1st, if the fœtus be nourished by the surrounding fluids, and particularly by the liquor amnii? 2d, if by means of the placenta? 3d, lastly, if it receive nourishment from both of these sources at once?

Before proceeding any farther, we will observe, that as regards nutrition, the duration of intra-uterine life must be divided into two distinct periods: the first, which is the shorter, begins with the impregnation of the germ, and terminates when the placenta is sufficiently developed to perform its part; this period comprises nearly the whole of the first three months of pregnancy; the second, much longer, embraces the six last.

First Period. Nutrition of the fœtus previously to the complete development of the placenta.—We may positively assert that, during the whole of this period, the nutritious juices do not pass immediately from the uterus to the embryo. No direct communication can

* Œuvres Completes, chap. xiii. p. 696, 11th edit. Lyon, 1652.

† Maladies des Femmes Grosses, p. 203.

‡ Dutrochet, Memoires, tom. ii. p. 60, et seq.

§ Burdach, Traité de Physiologie, vol. iv. p. 5. Paris, 1839.

‖ Memoires de l'Academie Royale de Médecine, vol. ii. p. 265, 1832.

then be supposed to exist between the two organisms. The penetration, of which the mechanism is not understood, must be effected in a similar manner as in the animal membranes and organized tissues. We shall not attempt to determine whether this interchange is the result of absorption, endosmosis, or the influence of electro-magnetic phenomena, lest we should become involved in discussions which, in the present state of science, can end only in hypotheses. We will merely remark that the rapid growth of the ovum and embryo, during the first stages of gestation, sufficiently attests the facility and freedom of this penetration. We shall express the unknown cause which thus transmits the nutritious juices of the mother to the new being, by saying that the effect of the vital activity produced in the ovum by the act of fecundation, is not only to develope new parts, but likewise to extract from the adjacent parts the elements fitted for this development. The organization of the ova of mammalia, during the period, resembles that of certain entozoa without special organs and ducts which open outwardly, and which are nourished by absorption alone.

The chorion appears to be the medium through which the nutritious juices reach the ovum. But do they penetrate indiscriminately at all points of this membrane, or only at the villosities which cover it? Although the latter are unprovided with canals, and form solid prolongations, their spongy structure and termination in vesicles lead us to the belief that they are the most active agents of absorption: they may be, with great propriety, compared to the roots of vegetables. During this period, a portion of the external surface of the chorion is in immediate contact with the internal surface of the uterus, the other with the caduca reflexa, so that the villosities may absorb at once on a part of the internal surface of the uterus, and in the cavity of the caduca, which contains constantly a certain quantity of serous fluid, if we admit the opinion of M. Breschet, that the hydroperione serves to nourish the fœtus.

It is generally supposed that the umbilical vesicle plays a temporary part in the nutrition of the fœtus; this opinion is founded on the analogy which exists between it and the vesicle of the yelk of the egg in birds. If this were true, the mass of nutritious matter contained in these vesicles might be compared to the fecula of the cotyledons, which, in seeds, surround the vegetable embryo, and are intended to nourish it until the radicle and plumule are evolved. The umbilical vesicle and its contents, as well as the entire ovum, increase greatly previous to the appearance of the embryo and vascular system; this increase can be effected only by imbibition or absorption; the production of the fluid of the vesicle cannot be ascribed to the omphalo-mesenteric arteries, as supposed by some writers,* for these vessels are formed subsequently to it. At present we have no positive knowledge of the physical and chemical characters of the fluid of the umbilical vesicle, nor of the changes which take place in it at the various periods of its existence. We have, consequently, no direct proof of its analogy with the vitellus of birds, although this analogy is generally admitted. The fluid of the umbilical vesicle may reach the embryo in two ways, one direct, by the free communication of the vesicle with the intestine; the other indirect, in which the omphalo-mesenteric vessels act as absorbents. An argument in favour of this supposition is, that the pedicle of the umbilical vein is obliterated at an early period, and that the latter contains, still, a certain quantity of fluid, which gradually decreases, whilst the omphalo-mesenteric vessels are not obliterated until a much later stage, when the umbilical vesicle is withered; it is then natural to suppose that the omphalo-mesenteric veins absorb the fluid of the umbilical vesicle. The observation of M. Mayer,† who found, in the human embryo, the vein of the umbilical vesicle filled by a fluid analogous to that of the vesicle itself, would tend to confirm this opinion.‡

The various opinions advanced on the origin and uses of the fluid of the allantois are not entitled to serious consideration, in consequence of the uncertainty of the existence and physiological intention of this membrane in the human species; some, with Harvey, Lobstein, Oken, M. Dutrochet, etc., regard it as a nutritious substance, whilst the majority of other physiologists look upon it as an excrementitious fluid, which, at the same time, in the human being cannot be urine, since the allantois has disappeared when the kidneys begin to form.

The importance assigned to the liquor amnii in the nutrition of the fœtus, is based on the following considerations: This liquor is nutritious, for it contains albumen, osmazome, and some salts; its quantity increases from the commencement until the middle of the life of the embryo, and at a later period diminishes; it contains less albumen at the termination of pregnancy than in the beginning.§ The fluid absorbed by the chorion before the formation of the placenta, can reach the embryo only through the amnion, and it is rational to conclude that, during this first stage, the liquor amnii and fluid of the umbilical vesicle, are the principal alimentary substances. Lobstein quotes analogy; all animals originating from an egg, and having no communication with the mother, have an amniotic fluid; he observes that the eggs of the amphibia, for example, those of the frog, the salamander, etc., contain a limpid water, in which the embryo swims; the eggs of fishes and insects also contain this water, which diminishes in proportion to the approach of birth. It is contrary to the laws of absorption to think that an organized body can remain immersed in a fluid without absorbing a portion of it, especially when the epidermis is but imperfectly formed. If the principal use of the liquor amnii is to protect the fœtus, it does not follow that it may not at the same time play an important part in its nutrition. Lastly, Weydlich supported for fifteen days a new-born calf on it, and the animal throve as well as if it had taken milk.

Admitting the liquor amnii to be a nutritive principle, the question arises, as to the mode in which it reaches the embryo, whether by the digestive tube, or by the cutaneous surface. According to the first opinion, based on the authority of Boerhaave,‖ the liquor amnii descends through the mouth and nostrils into the stomach and intestines, where, mixed with the bile and pancreatic juice, it is elaborated before being absorbed by the chyliferous vessels. Boerhaave thought that the property of redeeming the blood resided in the lungs alone; as these organs are not in action in the fœtus, he attributed the colouring of the blood to the agency of the placenta; the umbilical vein receives from the mother red blood, recently subjected to the action of the lungs, and the umbilical arteries return the blood which can no longer serve for the nourishment of the fœtus. Thus chylification takes place in the fœtus itself, at the expense of the liquor amnii, and its sanguification is performed in the lungs of the mother. The partisans of absorption by the gastro-intestinal mucous membrane, found their opinion on the following facts. Heister saw, in the ovum of a cow, which he froze, an uninterrupted piece of ice, extending from the

* Bichat, Anatomie Descriptive, vol. iv. p. 342.
‡ Burdach, Physiologie, vol. iv. p. 39.
‖ Boerhaave, Institutiones Medicæ, § 682. Parisiis, 1747.
† Mayer, Nova. Act. Nat. Cur. Tom. xvii. p. 538.
§ Lobstein, loc. cit. p. 103.

lips to the stomach of the embryo. Boerhaave saw* the chyle moving in the lymphatic vessels of the mesentery of a child, the parietes of whose abdomen had been lacerated during parturition. Osiander found, in the intestines of the human embryo, lanuginous hairs, which could have been conveyed thither only by means of the amniotic fluid. M. Oken has seen globules of meconium in the liquor amnii, and at the same time, in the throat, pharynx, and stomach of fœtal pigs.† The same thing has been several times remarked in the human fœtus which has perished during the process of labour. During the last stage of incubation, the fœtus of birds as well as of mammalia, may be seen to excite movements of deglutition or respiration, during which the amniotic fluid appears to be swallowed. Lastly, in this theory, the meconium is regarded as the residuum of digestion.

The reasons on which this theory is based, do not appear to us sufficiently numerous or solid, and are far from being free from objections. In fact, the embryo has already acquired some size before any traces of the orifices of the intestinal canal can be perceived. During the first stages, the organization of this canal is not enough advanced to perform a function so complicated as that of digestion. Lastly, to the friends of this theory we would oppose an unanswerable argument, that of the development of fœtuses born with complete occlusion of the mouth and nostrils, and œsophagus, the numerous examples of acephalous and astomatous fœtuses; lastly, the regular development and plump condition of some which have no stomach.

But if these objections lead to the belief that there is error or exaggeration in the function, attributed to the liquor amnii, they do not prove the impossibility of the introduction and absorption of a portion of this fluid in the intestinal canal; they only prove that in the above cases of monsters, the mode of absorption indicated is neither unique nor indispensable, and might be supplied by another. The question is then reduced to the inquiry whether the penetration of a portion of the amniotic fluid into the stomach is a natural or purely accidental occurrence.

An attentive examination of the digestive tube, and principally of the liquid contained in the stomach of fœtuses which have died before or during labour, proves, 1st, that, generally, the liquor amnii is not mixed with the gastric mucus, from which it differs greatly; 2d, that the parietes of the œsophagus are ordinarily covered by a slight gelatinous coat, whose presence excludes the idea of the passage of any fluid, for this coat could not have resisted, and would have been carried along with it; 3d, lastly, that the mucous membrane of the larynx and bronchi is also covered with an analogous coat, which proves that the liquor amnii traverses neither the air tubes, nor the upper part of the digestive apparatus. The approximation and contact of the parietes of the pharynx, œsophagus, and lips of the glottis, oppose probably the penetration of the amniotic fluid; for, in still-born embryos, the mouth is frequently open, and the nasal fossæ must afford a free passage to this fluid, as far as the entrance of the pharynx. This opposition, however, is not completely insurmountable; sometimes the water of the amnios is found in the stomach and in the air passages, as may be easily verified in children who, having expelled their meconium before birth, discharge water and mucus tinged with this substance, or who, having perished during labour, exhibit traces of it even in the bronchi and stomach. This phenomenon appears to us to resemble a morbid state, which sometimes precedes and occasions the death of the fœtus, and is produced by the embarrassment of the circulation through the cord and placenta, bearing a great analogy to asphyxia. The circulation and innervation being impeded by the compression of the circulatory organs, the dying fœtus makes efforts of respiration which draw the amniotic fluid into the air passages. In our opinion, to the same cause must be referred the movements of deglutition and inspiration, first observed by Harvey in the chick contained in the egg, then in the mammalia, by Haller, Béclard and others. This interpretation seems to us to explain the majority of the facts brought forward in favour of the deglutition of the liquor amnii.

The preceding reflections will excuse us from refuting the opinions of Roederer, Winslow, Scheel, etc., according to some of whom, the liquor amnii reached the lungs, either mechanically, or by the respiratory movements, to be there absorbed and serve as nourishment, or, according to others, to contribute to an aquatic respiration which separates the oxygen from the amniotic fluid, in which it is not demonstrated that this gas exists. If the water of the amnios serves to nourish the fœtus, if it cannot be swallowed and digested at all periods of intra-uterine life, we must, of necessity, admit that it is absorbed by the cutaneous surface, as this is the sole medium through which absorption can be regularly and continually conducted. The experiments of De Brugmans confirm this supposition. Brugmans extracted from the belly of the mother the fœtuses of ewes, cows, and bitches. By dissecting their skin, and holding it between his eyes and the light, he could perceive a great number of lymphatic vessels, filled with a transparent fluid. He repeated the same experiment on the fœtuses of rabbits, which had reached the middle of gestation, having previously applied ligatures to their limbs with the same result. Lastly, he opened the belly of another rabbit, and began by dividing one cornu of the uterus, and collecting in a vessel the water contained in the membranes; he then opened the second cornu, extracted from it a fœtus, to the fore-legs of which he applied a ligature, and then immersed it in the amniotic fluid withdrawn from the first cornu. Although this fœtus gave no signs of life at the moment of its extraction, the lymphatic vessels of the limbs to which the ligaures had been applied soon became very apparent, and filled with fluid, whilst those of the hind legs were scarcely visible. The lymphatic vessels disappeared on the removal of the ligature.‡ This last experiment would alone have but little weight, because the distension of the lymphatics might be produced by the cause which developes engorgement in all the parts under the influence of circular compression. Lobstein has seen and injected the lymphatics of human fœtuses, and remarks that they are as numerous as in the adult, and that the ganglia are larger. Venous absorption, during intra-uterine life, is not clearly proved; the results of the experiments of Magendie on this subject are not satisfactory; if this absorption occurs in the adult, it probably likewise takes place in the fœtus.

The presence of the sebaceous covering of the skin, and the viscidity of the amniotic liquor have been urged as objections to this theory. The sebaceous covering can oppose no obstacle to absorption; it is found only in the last stage of pregnancy, and then is neither sufficiently abundant nor spread over the surface to absolutely prevent absorption. If the viscidity of the amniotic fluid renders it less penetrable, this disadvantage is more than compensated by the laxity of the tissues of the embryo, the absence of the epidermis during

* Boerhaave, Prælectiones in Instit. re Med. tom. v. p. 350, § 2. † Burdach Physiologie, vol. v. p. 45.

‡ Van den Bosch, De Naturâ et Utilit. Liquor. Amn. In syllogе operum minorum. Ed. Schlegel, tom. i. p. 464, et seq.

the first periods of life, and later by the thinness of this membrane. The small proportion of nutritive matter in the liquor amnii, the alteration and premature discharge of this fluid, with preservation of life, prove merely that it is not the only source from which the fœtus derives the elements of nutrition.

Although the absorption of the amniotic fluid is not proved by direct observation, the conditions of the fœtus immersed in it are such, that it is hardly possible to doubt this absorption, and that it decreases in activity in proportion to the approach of the termination of pregnancy, at which period it nearly altogether ceases.

Oken and some other physiologists suppose that the amniotic fluid is imbibed and elaborated by the mammary glands, whence it is carried into the thymus, the thoracic duct, and the sanguineous system. We mention this opinion merely to show how easy it is, in the present subject, to form theories without the least foundation.

The fluid of the umbilical vesicle and the water of the amnios must be considered as the principal sources of the nutrition of the fœtus before the formation of the placenta. After this period, one of these sources is entirely extinguished, the other loses its importance and becomes more and more secondary in proportion to the progress of gestation.

Second Period. Nutrition of the fœtus through the medium of the placenta.—Hippocrates, Aristotle, Galen, etc., admitted but one mode of nutrition, and considered the umbilical cord as the only channel by which the nutritive elements reached the fœtus. As soon as the materials of the umbilical vesicle are entirely or nearly exhausted, and the absorption of the amniotic fluid is about to diminish rapidly, the nutrition of the fœtus seems to take another direction. The placenta and cord once formed, become the necessary and indispensable channels of nutrition, a fact confirmed by daily observation. Do we not see that compression of the cord during labour, when sufficient to arrest the circulation of the blood, soon produces the death of the fœtus? This continuous action of the placenta, of which even the momentary suspension is fraught with the greatest danger to the fœtus, is a powerful argument in favour of the opinion that this organ acts like abdominal gills, and peforms the function of true respiration. If the placenta were merely the medium by which the nutritive matter passes from the mother to the fœtus, the results of the momentary interruption of its action could be neither so rapid nor so evident; for nutrition is an intermittent function, and death from inanition does not occur until after the lapse of some time. We have already remarked, when treating of the anomalies of the cord, that we gave but little credence to the cases of absence and obliteration of this part, with preservation of life. We think that Lobstein* has not been sufficiently rigorous in regarding as conclusive the two cases of this nature, related, one by Osiander, and the other by John Mason Good.

Since the nutritive matter does pass from the uterus to the placenta, let us now examine how this passage is effected. The utero-placental vessels, that is, the arteries and veins which are the continuations of the arteries and veins of the uterus, appear to be the medium of communication. The existence of these vessels, denied by some anatomists, is a scientific fact, established beyond all doubt. Their communication, or rather their continuity with the vessels of the uterus, whose characters they preserve, is quite as certain, and their distinction into arteries and veins most marked and easily demonstrated. Discrepancy can exist, therefore, as to their mode of termination. Two opinions divide physiologists. Some have admitted a continuity of tissue between the uterus and placenta, and anastomoses between the vessels of the two organs; the others have considered the placenta merely as juxta-posited to the uterus, and the vessels of the two systems closed at their extremities, without any direct communication with each other. In the opinion of the former, the blood, impelled by the general circulation, passes naturally from the mother to the fœtus, which returns it, deprived of its nutritive principles, to her by means of the umbilical arteries. Among the latter, some admit that the most tenuous elements of the blood, absorbed by the radicles of the umbilical vein, alone reach the fœtus; and lastly, others think that the placenta performs a respiratory action, and extracts the oxygen of the maternal blood.

In the present state of our knowledge, can the question of the direct communication of the uterine with the placental vessels, or their entire independence, be definitively decided? If we consult authorities, we shall find that Ruysch, Haller, Wrisberg,† Reus,‡ Hunter, etc., were not able to inject the vessels of the placenta from those of the mother, and reciprocally: that other physiologists, as Cowper, Vieussens, and Meckel the elder, have succeeded. Béclard and Dugés obtained the same results with coloured tallow, etc. Lastly, M. Flourens,§ quite recently, in a series of delicate experiments, has injected, in several species of animals, the vessels of the placenta from those of the uterus, and reciprocally.

We will remark, in the first place, that many of the cases quoted in favour of a direct communication are not decisive; the injected utero-placental vessels have more than once been taken for true anastomoses, because, in fact, several penetrated deeply into the tissue of the placenta, following the prolongations of the cellular tissue, which is moulded exactly on the uterine surface of this organ. Others have considered accidental extravasations in the lobes of the placenta as evidences of communication; but these criticisms are not applicable to all cases of this nature. The experiments of M. Flourens prove incontestably that we can throw certain injections from the vessels of the mother to those of the fœtus, and reciprocally. Should we hence conclude, with the Secretary of the Academy of Sciences, that this passage necessarily proves the existence or direct communication by means of true anastomoses? The learned and judicious M. Burdach considers such an inference as a literary anachronism.‖ In a work of which we have already spoken, in which M. Jacquemier has endeavoured to establish exactly the termination and characters of the utero-placental vessels, this author remarks that M. Flourens never saw the anastomoses which he admits—that if the injections of mercury and coloured liquids penetrated to the fœtal vessels, it is not necessary to grant direct anastomoses to explain the passage of these substances through the organized tissues, as similar injections escape by the mucous and cutaneous surfaces, etc. They traverse the serous and fibrous envelopes of the parenchymatous organs. To take an example from the very subject under consideration, we may state that Monro, when injecting tepid water into the umbilical arteries of the fœtus, has seen this same water distil guttatim from the internal surface of the amnion, and that Chaussier has observed the same

* Lobstein, loc. cit. p. 104, 105.

† Wrisberg, Commentaria, p. 339.

‡ Reus, Novæ Observ. Circa Structuram Vasorum in Placenta.

§ Flourens, Cours sur la Génération, l'Ovologie, l'Embryologie, recueillis et publié par M. Deschamps, 1836. One vol. in 4to, with ten plates.

‖ Burdach, Physiologie, vol. iii. p. 559.

phenomenon when injecting the vessels of the uterus.* To explain this occurrence, they did not imagine the existence of vessels opening on the internal surface of the amnion. Thus, the apparently most conclusive experiments performed with injections by no means prove a direct communication between the vessels of the uterus and those of the placenta.

Facts of a different kind would also seem to prove that the communication is not direct. Wrisberg, Roederer, and Osiander have seen human ova expelled without laceration of the membranes, in which no hæmorrhage took place from the external surface of the placenta, although the fœtal heart continued to pulsate for more than fifteen minutes. Numerous similar experiments have been made in various species of mammiferous animals, and the same phenomena have been constantly observed. An attentive examination of the utero-placental vessels will show us that these vessels terminate suddenly before becoming very small. Those which penetrate between the inequalities of the external surface of the placenta, and which at first sight appear continuous with the tissue of this organ, terminate in the same manner.

In the description of the cord and placenta we denied the existence of lymphatics in these parts: the same remark will apply to those supposed to exist between the uterus and placenta by Lauth. This anatomist has, moreover, subsequently retracted this opinion.† It is, therefore, useless to examine further the physiological uses attributed to these vessels.

Notwithstanding the independence of the two circulatory systems, the passage of fluids from the mother to the fœtus is a constant and well-ascertained fact. When M. Magendie injected an emulsion of camphor into the veins of a pregnant female, in fifteen minutes he found the blood of the fœtus impregnated with the odour of camphor. The transmission of variola and syphilis from the mother to the fœtus, are facts of the same nature so frequently demonstrated that they no longer admit of doubt. This transmission takes place not only by the placenta, but also by the whole surface of the ovum, and from the influence of vital action, as proved by the following experiment. Mayer injected cyanuret of potassium into the trachea of a pregnant rabbit, and discovered this salt, by means of chloride of iron, not only in the liquor amnii, but also in the fœtal placenta and in the different organs of the embryo. When he injected, in the same manner, a liquid coloured green by indigo and saffron, he found it in the water of the amnios and the intestines of the embryo.‡ The saffron and mercury taken internally by pregnant women have been found in the liquor amnii.§

What is the nature of the nutritious juices transmitted to the fœtus through the medium of the placenta? This important question has not been decided. We are reduced in this subject, as in many others, to the enumeration of opinions and to the exposition of error, without being able to indicate the truth. To admit, with some physiologists, that the blood of the mother passes unchanged from the uterus to the placenta, is to give the preference to a hypothesis which has some probability, although far from being proved. Thus, it is impossible in the early periods of pregnancy, when the difference of the fœtal and maternal blood, and the separation of the uterine and placental vessels, are evident. But if the blood cannot pass unchanged, as in a system of continuous veins, there is no reason why the most refined elements should not reach the placenta: every thing, on the contrary, seems disposed favourably for this kind of penetration. The uterus, by the development of its vascular system, contains a large quantity of blood, which is carried by the utero-placental vessels as far as the terminal villosities of the umbilical vein: the two systems are separated merely by very thin membranes, so that absorption by the terminal extremities of the umbilical vein seems more easy and as incontestable as that which we have admitted by the villosities of the chorion before the development of the placenta. Besides, the passage of fluids from the mother to the vascular system of the placenta, without direct communication, should not surprise us, though we may not be able to explain it in a satisfactory manner. Is it not by nearly a similar mechanism that the amnion is filled by a fluid which is constantly renewed? Observation and experiments have been as yet unable to obtain separately the fluids absorbed by the placenta. Are these fluids purely serous, or do they still retain the apparent characters of blood, from which they differ only by a greater tenuity of elements? In the present state of science, this question cannot be answered.

Many physiologists deny to the placenta the property of transmitting to the fœtus the nutritive juices, and consider it as an organ exclusively intended for hæmatosis. This opinion leads us to examine what has been said of the respiration of the fœtus. We begin by stating that the existence of this function in the ovum and fœtus is, in our opinion, at least problematical, and founded on analogy rather than on irrefragable evidence.

§ II.—RESPIRATION OF THE FŒTUS.

The physiologists who admit respiration in the human fœtus base their opinion on the idea that this function seems to be a necessary attribute of every organized being. During germination the vegetable ovum absorbs oxygen from the air, diminishes its quantity, and exhales carbonic acid. The same phenomenon occurs in the ovum of insects.‖ The ova of birds exhibit, in several species, peculiar arrangements for the admission and preservation of the atmospheric air. The uses of the air-chamber found in the large end of birds' eggs, between the layers of the testaceous membrane, are known to every one. The shell of those eggs which have no chamber, as, for example, in the saurians, is much thinner and more permeable to the air. Since respiration seems to be so general a fact in the ova of oviparous animals, it has been supposed to be as constant in those of the mammalia. But in the ova of mammiferæ it can only be produced by a liquid, and not by a respirable gas held in reserve, for everywhere the ovum is in immediate contact with the uterus; no space exists for the lodgment of air, and no observer has ever proved its presence. This hypothesis being admitted, it has been endeavoured to determine by analogy, and still more by observation, what were the special organs of this respiration in the ova of mammiferæ, and the manner in which this function was performed. Although these researches have not been thus far attended by very satisfactory results, the physiological importance of the subject constrains us to expose what has been said on this topic. In this examination we shall follow the order we adopted in nutrition, and suppose that this function occurs both before and after the formation of the placenta.

* Adelon, Physiologie, vol. iv. p. 409, 2d edit. 1829.

† Lauth, Manuel de l'Anatomiste, p. 598, 2d edit. 1836.

‡ Burdach, Physiologie, vol. iv. p. 36 and 41.

§ Haller, Elementa Physiologiæ, tom. viii. p. 205, and Levret, Art of Midwifery, p. 56, 3d edit. 1766.

‖ Burdach, loco citato, vol. iv. p. 69.

1st. *Respiration of the embryo previously to the formation of the placenta.*—M. Geoffrey St. Hilaire admits that the fœtus breathes by all the pores of the tegumentary surface, like the aquatic insects, and that it separates the oxygen from the surrounding water.* This opinion, which supposes the presence of oxygen in the amniotic fluid, seems to be strengthened by the researches of M. Lassaigne, who thought he had discovered in the amniotic fluid a gas analogous to atmospheric air.

Some modern physiologists have supposed that they had found cervical gills in the human fœtus. M. Retké has described some small fissures on the sides of the neck of young embryos, which he considers as the branchial apparatus of the human embryo. In this hypothesis respiration would take place by means of the liquor amnii, but at a certain point, and not over the whole surface of the body. We regard the existence of gills in the human fœtus, or even of lateral fissures in the neck, as erroneous, or at least extremely doubtful, and have seen nothing resembling them in the embryos which we have examined. Moreover, it will suffice to show how little credit is to be attached to the various opinions which assign so important an office to the water of the amnios, to state that this fluid is unfit for respiration, as it contains neither atmospheric air nor free oxygen. M. Lassaigne himself, after additional researches, is of the same opinion. M. Serres has just read to the Academy of Sciences a memoir, in which he attempts to prove the existence of a branchial respiratory apparatus in the human embryo during the three first months of its development. According to this anatomist, the respiratory apparatus of the human embryo is composed of two layers of the membrana caduca, of fluid contained in the cavity of this membrane, and of villosities of the chorion of a peculiar order, which, after having traversed the caduca reflexa, come in contact with the above-named fluid. M. Serres admits the vascularity of the villosities: he says he has seen with the naked eye, by the microscope, the injected arteries and veins of the villosities. The reticulated and perforated structure of the caduca reflexa permits the villosities of the chorion to reach the fluid which constantly moistens them, and respiration takes place by means of the numerous vessels with which they are provided. In proportion as the embryo is developed, a portion of the villosities is transformed into placenta, and then begins the second period of fœtal respiration in the uterus.†

We cannot foresee the fate of this theory: as regards ourselves, we think it our duty at the present time to state all our objections. We do not believe that the villosities of the chorion traverse the caduca reflexa; at least, we have never seen their extremities project into the cavity of this membrane. The reticulated, pointed appearance of not only the caduca reflexa but also of the caduca uterina, is not owing to the passage of the villosities: there is in this reticulated arrangement only the semblance of foramina, as may be seen even by the naked eye. Another point in which we differ from M. Serres is the vascularity of the villosities of the chorion. Our own researches have always shown them free from vessels: seen under the microscope, they present a vesicular and not a vascular appearance.‡ It is true that those which assist in the formation of the placenta become vascular, and the others atrophied. Lastly, is it demonstrated that the hydroperione is better adapted to aquatic respiration than the liquor amnii itself? We can, therefore, regard the opinion of M. Serres only as a road opened to new researches. We shall avail ourselves of every opportunity which occurs to us of examining very young human ova, in order to verify the assertions of M. Serres, and change our opinion if we see sufficient reason for so doing.

If, during this period of fœtal life, there were respiration, or any thing resembling it, this function would probably be performed by the umbilical vesicle and its vessels; for, according to M. Baer,§ the formation of red blood in the mammiferæ begins in the umbilical vesicle, as he has proved in the embryo of the dog. If the action of oxygen be presumed from the first colouring of the blood, it seems to us that this gas should be absorbed with the fluid of the umbilical vesicle, and this vesicle would be at the same time an organ of nutrition and respiration. When the functions of the umbilical vesicle cease, the placenta is sufficiently developed to perform in its turn the functions of nutrition and respiration.

Respiration of the fœtus after the development of the placenta.—Fœtal respiration is much less problematical during this period than the preceding: it has even sufficient probability to induce many authors, after serious and profound study, to consider the placenta as an exclusive respiratory apparatus. To this number belong Mayow, Duverney, Valisneri, Cheselden, Hérissant, Boerhaave, and Jampert, quoted by Meckel.‖ Since then this opinion has been defended by Schreger,¶ Lobstein, J. F. Meckel, and several others. The reasons upon which these writers found their opinion are not entirely conclusive, but they possess a value which cannot be overlooked.

Thus the lungs in the adult, and the placenta in the fœtus, receive the blood from which the secretions and nutrition of the body are derived, and which requires to be renewed: there is great analogy between the pulmonary and placental circulations. According to this theory, the blood contained in the vessels of the uterus would come in immediate contact with that which circulates in those of the placenta, and act the part of atmospheric air, by means of the oxygen which it contains. The presence of free oxygen in the blood, either arterial or venous, has been proved by too accurate analyses to admit of any doubt.** The respiration in the eggs of birds is placed beyond contradiction, by the evident changes in the blood; that of the arteries is of a deep red, whilst that in the veins is vermilion. If similar changes occur, they are not so easily understood, in the ovum of the mammalia, for it is impossible to distinguish any difference of colour between the blood of the umbilical vein and arteries. The researches of Muller seem, however, to have settled the question; if the blood of different embryos of the mammiferæ has exhibited no variety of colour in the trunks of the umbilical vessels, this variety appeared manifest in the delicate ramifications of these same vessels. But what is more important, he has ascertained a chemical difference between the two bloods. That of the umbilical vein coagulates less rapidly that that of the arteries; the coagulum of the former, when exposed to the air, was soon covered by a thick membrane, whilst that of the other remained for a long time gelatinous; lastly, the former gave off oxygen gas by heat; it acquired a darker hue in carbonic acid gas, so that it acted more like arterial blood than that of the umbilical arteries.†† If these observations were confirmed, the placental respiration would be a certain and evident fact. It must, however, be confessed that this

* Geoffrey St. Hilaire, Philosophie Anatomique, Monstruosities Humaines, p. 538. 1822.

† Gazette Medicale, July 6th, 1839.

‡ See Plate xxix. fig. 4.

§ Baer, De Ovi Animalium Epistola, fig. 7. Repertoire d'Anatomie et de Physiologie, 1829.

‖ Manuel d'Anatomie Générale, descriptive et Pathologique. Paris, 1825, t. iii. p. 793.

¶ Schreger, de Functioni Placentæ Uterinæ.

** Lecanu, Études Chimiques sur le Sang. Thèse de Paris, 1387.

†† Burdach, Physiologie, vol. iv. p. 77.

respiratory action is not very distinct, since the blood of the umbilical vein undergoes such slight changes, that this may be denied, or at least disputed.

The placenta, whilst performing a function analogous to that of the branchial respiration, may also contribute to nutrition; these two functions do not interrupt each other; they should even tend to act in harmony. This organ, acting on the blood contained in the utero-placental vessels, may absorb not only the most delicate elements of the blood, as oxygen gas, but likewise more coarse alible substances, as we have admitted, when speaking of nutrition by the placenta. Thus, at all periods of fœtal life, respiration would seem united and confounded with nutrition: both are performed through a similar mechanism, by means of true absorption.

If we endeavour to form an idea of the transformations experienced by the absorbed matter, in contributing to the formation and increase of the organs, we shall be obliged to confess our total ignorance of the subject. There is nothing in the fœtus which resembles digestion, such as it exists after birth. We do not know if absorption is exerted upon substances proper to be assimilated, or if these substances undergo previously a peculiar elaboration in the placenta, liver, or elsewhere. The hypotheses at present in vogue upon this subject, do not appear to us worthy of discussion.

§ III.—BLOOD AND CIRCULATION OF THE FŒTUS.

It appears evident that the embryo in the human species, as well as in birds, forms its own blood, and is a powerful argument in favour of this idea, that this fluid is perceived from the beginning of the evolution of the fœtus, before the appearance of the vessels which are to contain it, and the development of the circulatory system. Secondly, the physical and chemical properties of the blood of the fœtus differ from those of the mother's. It is of a darker colour, more fluid, less coagulable, the colouring matter is browner, and the fibrine less abundant. The microscopic globules are larger, and thereby resemble more nearly the blood of the batrachians, evincing a less elevated and less developed organization. According to MM. Prevost and Dumas, the globules of the fœtal are once again as large as those of the maternal blood. M. Denis says, that it contains less water and more globules than that of the mother. Fourcroy, who had analyzed it, had already remarked that its crassamentum was soft, reddened but slightly when exposed to the air, contained but little fibrine, and lastly, that no phosphates could be found in it. If we add to these considerations the fact that the progression of the blood is caused by the action of the fœtal heart, and that it is independent of the maternal circulation, we shall necessarily arrive at the conclusion that there is no direct communication between the mother and fœtus, a logical inference admitted by our reason in the first stages of the life of the embryo, but which the facts observed by Cowper, Vieussens, Meckel the elder, and Chaussier, and recently confirmed by the experiments of M. Flourens, reject, at least in the later periods of intra-uterine life. We publish this opinion, notwithstanding the objections we have raised against these experiments, because, in our own researches on this subject, and in the injections we have made, we have always seen, 1st, the uterine arteries passing directly into the placenta, into which we have several times been able to follow them to a great depth, and terminating in the groups of vessels formed by the divisions of the umbilical veins; 2d, the uterine venous sinuses anastomosing with the sinuses of the placenta, in which terminate the groups of vessels formed, for the greater part, by the divisions of the umbilical arteries; lastly, because we cannot explain, otherwise, the rapid death of the fœtus in certain cases of uterine hæmorrhage during parturition.

Circulation of the fœtus.—Whatever may be the mode of communication between the uterus and placenta, it is evident that the progression of the blood in the vessels of the fœtus is independent of the maternal circulation, and depends on the influence of the fœtal heart. We shall point out the difference of this function between it and the adult organ.

Anatomical structure.—We remarked, when speaking of the cord, that the umbilical vessels which compose it, after having passed through the umbilical ring, separated from each other, to repair to their several destinations.

Umbilical vein.—This vein, surrounded by a fold of the peritoneum which it elevates and separates from the anterior paries of the abdomen, takes a direction upward, slightly inclined to the right, toward the anterior edge of the liver. Having reached the lower surface of this organ, it lodges in the longitudinal fissure, of which it occupies the whole length; it extends to the posterior margin of the liver, and under the name of *ductus venosus* or *Arantii*, opens into the inferior vena cava, below the point of junction of the hepatic veins. (Veines sus hepatiques.)

In the middle of its passage through the liver, the umbilical vein meets the transverse fissure, and opens into the vena portarum. The trunk, resulting from this union, is subdivided into several branches, which are distributed to the liver and send their effete blood into the hepatic veins.

It is important to understand the disposition of the umbilical vein at its junction with the vena portarum. These vessels form, by their union, an angle more open in proportion to the early age of the fœtus; at birth, it is nearly a right angle. The obliquity of the junction of the vena portarum and umbilical vein is very favourable during fœtal life, for the circulation then passes from left to right in the portion of the vein lodged in the transverse fissure. Whilst, on the contrary, it is useless after birth, as the circulation takes place from right to left.

Heart, and vessels which arise from it.—The auricles, the aorta and pulmonary arteries of a viable fœtus, are very different from their subsequent structure.* The inter-auricular septum exhibits a large opening called the *foramen of Botal*, or *ovale*, establishing a free communication between the auricles. The size of the foramen ovale is in inverse ratio to the age of the fœtus. At full term, it frequently has the form of a pretty narrow oval slit, and occupies the inferior posterior part of the septum. Toward the commencement of the fourth month, the valve intended to close the foramen of Botal, and form the floor of the fossa ovalis, is very distinct; it seems to originate from the posterior half of the opening of the inferior vena cava. The Eustachian valve is large enough at this period to separate the orifice of the inferior vena cava from the cavity of the right auricle; this valve is directed obliquely toward the foramen of Botal, apparently extending the inferior vena cava into the left auricle. The Eustachian valve diminishes as the termination of pregnancy approaches, whilst the valve of Botal increases; in consequence of this double change in opposite directions, the vena cava inferior, at last,

* See Plate xxxii. figs. 3 and 5.

opens directly into the right auricle. At a later period, the valve of the foramen of Botal overlaps it, and after birth, these parts adhere to each other.

The pulmonary trunk is divided into three branches; of which two, small on account of the inaction of the lungs, are the two pulmonary arteries; the third, called the *ductus arteriosus*, preserves nearly the same size as the trunk even at its origin, and establishes a communication between the pulmonary artery and aorta near the termination of the arch, below the origin of the left subclavian: so that, the aorta may be said, in the fœtus, to originate from two roots, one from the left and the other from the right ventricle.* From the internal iliac arteries arise two umbilical arteries, which, after being reflected behind the abdominal parietes, advance under the peritoneum, coast along the bladder and urachus, and reach the umbilical ring where they are agglutinated to the vein, to form the cord. The low degree of development of the arteries distributed to the lower extremities and the organs contained in the pelvis, by contrast causes the size of the umbilical arteries to appear larger, and at this period of life, they may be considered as the two principal divisions and termination of the aorta.†

The peculiarities of the structure of the circulatory vessels being known, let us examine how the circulation is effected. On this subject we cannot do better than to adopt the excellent description of it by M. Martin Saint-Ange.‡

The blood carried from the placenta by the umbilical vein reaches, in a pure state, the left lobe, the lobulus spigelii, and the ductus venosus: it penetrates the right lobe mingled with the blood of the vena portarum. This distribution explains the great development of the left lobe of the liver in the fœtus. The blood carried by the umbilical vein, the vena portarum, the hepatic artery, and ductus venosus, is poured by the latter and by the hepatic veins into the portion of the inferior vena cava below the diaphragm, where a second commingling takes place.

The blood having reached the fœtal heart takes the following direction. Supposing the auricles contracted and empty: the diastole following immediately, the blood flows into the auricular cavities by the two venæ cavæ, the coronary and pulmonary veins. The left auricle not being sufficiently filled by the blood brought by the pulmonary veins, seeks a further supply from the right auricle through the foramen of Botal. Whilst the left auricle thus receives the quantity of blood necessary to fill it, the mixed blood from the two venæ cavæ and the coronary veins enters the right auricle.

Does the blood pass directly into the left auricle through the foramen of Botal, without mixing with that of the superior vena cava? This question has for a long time divided physiologists; and remarkable as it may seem, this difference of opinion has not ceased with an accurate knowledge of the anatomical structure: for on the one hand, we find Sabatier maintaining that this mixture does not take place, and on reading his essay we are almost disposed to embrace his opinion; and, on the other, Bichat and Magendie asserting its actual occurrence.

An examination of the Eustachian valve, of which the development is in an inverse ratio to that of the adjacent organs, readily demonstrates its uses. In the early stage, it almost completely covers the foramen of Botal and the orifice of the two venæ cavæ, whilst at a later period it leaves them exposed. From this arrangement, it clearly follows, that it is intended in man, 1st, to assist the mixture of the blood of the two venæ cavæ. 2d, To direct the greater part of it into the left auricle. 3d, To prevent its reflux into the inferior vena cava, on the contraction of the auricles.

It is, indeed, difficult to suppose that the two fluids should remain separated in a cavity which they both reach at the same time: but the direction of the two venæ cavæ, the relations of the foramen of Botal with the inferior cava, lead us to think, that this mixture, if it takes place, is incomplete, and that the greater part of the blood poured out by this vein, passes directly into the left auricle, where the pulmonary veins discharge but a small quantity.

The auricles, stimulated by the blood they contain, contract, their cavities are emptied, in order to fill those of the ventricles, and the blood tends to return by the apertures which have afforded it egress; the right auricle drives it toward the venæ cavæ, that this reflux is partly arrested by the Eustachian valve. The left auricle, in its turn, sends the blood toward the foramen ovale, but the valve of Botal presents an opposition to its reflux, the more vigorous in proportion to the age of the fœtus. In this manner the blood of the auricles, being prevented from regurgitating, passes into the ventricles through the auriculo-ventricular apertures which afford it a free and easy channel.

The ventricles, in their turn, contract as soon as they have received the blood of the corresponding auricles, and send it into the arterial trunks which arise from them. The reflux of blood into the auricular cavities is prevented by the mitral valve, placed at the left auriculo-ventricular orifice, and the tricuspid, at the right. The greater part of the blood of the left ventricle driven into the ascending aorta, is distributed by means of the innominata, the primitive carotid, and left subclavian arteries, to the upper extremities and the head, whence, after having contributed to the nutrition of the parts, it returns to the right auricle by the superior vena cava. The excess of this blood follows the arch of the aorta, below which it meets that brought by the ductus arteriosus.

The blood of the right ventricle penetrates into the pulmonary artery, is distributed in a small proportion to the lungs, and passes by means of the ductus arteriosus into the descending aorta, where, mixed with that portion which could not be admitted into the ascending aorta, it is distributed to the inferior parts of the trunk. The reflux of blood into the ventricles, during their diastole, is prevented by the simultaneous depression of the six sigmoid valves, placed three together, at the origin of the pulmonary arteries and aorta.

Lastly, the use of the two ventricles is to propel the blood into the aorta, whilst after birth the left ventricle alone performs this office. The united action of the two ventricles gives the general circulation more energy, a condition necessary to insure a rapid circulation through the placenta and umbilical vein, where a retarded motion so frequently becomes fatal to the fœtus. The greater part of the blood propelled into the descending aorta returns to the placenta by the umbilical arteries.

To recapitulate: the placental radicles extract from the uterine sinuses by absorption, imbibition or endosmonis, perhaps even directly

* For further details see Sabatier Anatomie, vol. iii. p. 386, 1791. Second essay on the circulatory organs and blood of the fœtus.

† See Plate xxxii. fig. 2.

‡ Martin Saint-Ange. Circulation du fœtus, in 4to. 1836.

the materials which the placenta modifies so as to render fit for the nutrition of the fœtus. The blood of the placenta is transmitted to the fœtus by the umbilical vein, a portion passes in a pure state into the left lobe of the liver, the lobulus spigelii, and ductus venosus, another portion is mixed with that of the vena portarum, and is distributed to the whole of the right lobe of the liver. These two portions are then conducted by the hepatic veins into the part of the vena cava below the diaphragm, where they meet the blood carried by the ductus venosus, the vena cava itself, and that of the veins of the diaphragm: thence it passes into the right auricle, combines with the blood of the superior vena cava and coronary veins, and is directed (in a greater or less quantity, according to the age of the fœtus) into the left auricle through the foramen of Botal, where it meets the blood proceeding from the pulmonary veins.

The simultaneous contraction of the auricles impels the blood which they have received into the corresponding ventricles. The contraction of the right ventricle causes a small quantity of it to pass to the lungs, and a large proportion to the ductus arteriosus. The contraction of the left ventricle impels it into the aorta, where it meets below the arch the blood of the ductus arteriosus. The two bloods thus mingled are propelled, by the united action of the two ventricles, into the inferior part of the trunk. A large proportion of this blood, having reached the bifurcation of the iliac arteries, passes into the umbilical arteries to be modified in the placenta, and there to extract the materials necessary for the support of life.

We shall not discuss the numerous questions which relate to the general circulation, and will merely add a few words on the relative frequency of the movements of the heart in the fœtus. These movements are very rapid, and produce two distinct sounds, which, though very close together, can be easily recognized; but the distinction into clear and dull sounds is perceived with some difficulty. The two sounds are in general more clear, feeble, and much more frequent than in the adult. M. Jacquemier, our house surgeon at the Maternité, found the average number of pulsations of the fœtal heart to be a hundred and thirty-two per minute: the extremes were a hundred and sixty and a hundred and eight.*

Modifications of the uterine and fœtal circulation during labour.—The first effects of the uterine contractions are to determine the shortening of the fibres, the diminution and contraction of the parietes, and the universal decrease of the cavity of the uterus: therefore, these changes cannot take place without producing others in the reciprocal relations of the constituent parts of the uterus and contained ovum. The uterine vessels, being compressed, decrease, their calibre diminishes, and, as they cannot undergo a retraction equal to that of the uterine fibres, their direction changes, their flexuosities increase, and the circulation through the parietes of the uterus is evidently modified, diminished, and slackened. The ovum, embraced on all sides by the uterine parietes, which contract and tend to expel it, at first resists, is then detached, and at last yields to the impulsion: but, during the struggle between the ovum and the expelling power, the membranes and the placenta, being extended, pressed outwardly by the uterus, inwardly by the fœtus and the amniotic fluid, experience changes which it is important to examine.

The placenta, diminished by a double pressure, can no longer receive the blood and the materials which it drew from the mother: if it still receives the blood which comes from the fœtus, it cannot transmit it to the uterus; hence arise numerous modifications in the fœtal circulation, which vary infinitely according to the slow or rapid, feeble or vigorous progress of the process of labour. During the contractions the uterus allows a smaller quantity of blood to pass in proportion to the energy and continuance and degree of shortening of its fibres: it therefore follows that if, in the first contractions, which are generally feeble, some fluids pass from the uterus to the placenta, a period occurs at which all communication between these organs ceases.

The placenta, no longer receiving any fluids from the uterus, cannot return to it the blood proceeding from the umbilical arteries: this blood, the residuum of fœtal nutrition, analogous to the venous blood of the adult, unfit for the support of life, is then obliged to return to the fœtus in the same state in which it left it, that is, without having undergone the alteration it should have experienced in the placenta. The contraction ceasing, the circulation again takes place as before the commencement of labour, and continues in the same manner during the whole time that the fœtus remains entire. But when the bag of waters is ruptured, and the amniotic fluid discharged, the contractions become more acute, longer, and closer together: the relations of the uterus and placenta change again; the former has diminished in proportion to the extent of dilatation of its orifice and the quantity of fluid discharged. The placenta, flaccid, soft, not retractile, cannot follow the reduction of the uterus, and folds on itself: its harmonious relations are at an end: in the interval of the contractions, it can no longer send blood to the uterus: then the placental tissue becomes congested, the vessels are filled and distended, and soon can no longer receive the blood contained in the umbilical arteries: the latter are engorged, in their turn, and can no longer admit that conveyed to them by the divisions of the aorta: the aorta itself, not being emptied, can no longer receive the blood sent by the heart, and so on, there gradually supervenes an irregularity and perplexity in the general circulation, and a congestion of the whole sanguine vascular system of the fœtus. If this state continues, visceral congestion ensues, the vessels are ruptured, effusions take place under the pericranium, or are more deeply seated, and death is frequently the inevitable result. The fœtus is then born with a swollen, tumefied, and livid face, resembling a subject asphyxiated by carbonic acid gas: in short, perfectly apoplectic. If the contractions, on the contrary, have been very slow and not energetic, the fœtus, receiving no blood and constantly sending it out, is exhausted, and exhibits a condition of paleness, softness, flaccidity, and more or less complete anemia.

These phenomena and their causes being known, a host of therapeutic indications may be thence deduced, applicable either to our conduct during the progress of labour, or to the child at its birth. Thus, it may be easily seen that under certain circumstances it will be useful to endeavour to retard the progress of the labour, in others to accelerate it: that, in some cases, the preservation of the child will be owing to the promptness with which blood is taken from it, and that, in others, its life can be saved only by husbanding the little that remains.

Changes much more remarkable occur at the moment of the establishment of respiration. The umbilical vein, receiving blood no longer, can carry none to the liver or to the right auricle of the heart. The air penetrating the trachea and bronchi, dilates the lungs, and renders their vessels permeable to the blood. The pulmonary arteries, attracting all the blood sent by the right ventricle into the pulmonary

* Jacquemier, de l'Auscultation appliquée à la Grossesse, thèse de Paris, 1837.

trunk, the functions of the ductus arteriosus cease; this canal, reduced to a state of inaction, becomes contracted, and finally obliterated. The pulmonary veins, distended by an abundant rich blood vivified by the action of the atmospheric air, pour it into the left auricle, and close the inter-auricular septum by shutting the valve down on the foramen of Botal. The umbilical arteries no longer admit blood, and the circulation ceases in the cord; in short, the blood assumes the route it is destined to follow through the whole of the after life of the individual; nevertheless, should accidental circumstances suspend momentarily the respiration, the blood is seen to regain the course it followed before birth, as sometimes happens when immoderate crying, or swaddling clothes drawn too tightly around the chest, prevents the dilatation of the lungs; which explains the necessity of applying a ligature very firmly to the portion of the umbilical cord adhering to the infant. From a neglect of this precaution, children have sometimes perished soon after birth, of hæmorrhage from the umbilical cord.

Temperature of the fœtus.—Our ideas on this subject are not very exact. From the experiments of Haller, Hunter, and especially of Autenreith, it would appear that the temperature of the fœtus was 27° of Reaumur, whilst that of the mother was 30°. The experiments of M. Edwards corroborate this opinion. This observer has remarked, that many mammiferous animals are born cold-blooded, and that even in those born with warm blood, the faculty of generating heat is always, at birth, at its minimum.* The changes of chemical composition in the fœtus are, probably, unaccompanied by any remarkable disengagement of caloric. The fœtus must, therefore, receive from the mother the heat necessary to its life and development. This heat reaches it from the whole internal surface of the uterus, and we cannot understand why Lobstein supposes it to be only from the placenta. The liquor amnii should protect it against inequalities of temperature. If, notwithstanding, the temperature of a dead, being greater than that of a living fœtus, it must be admitted that the latter has a peculiar temperature; that it not only generates caloric, but also that it possesses, in itself, the means of refrigeration.

§ IV.—EXCRETIONS OF THE FŒTUS.

Intestinal mucus, meconium.—We find, at an early period, in the intestinal canal of the fœtus, a substance which varies in its qualities at different stages of intra-uterine life. About the middle of this life, it is whitish and mucous, but subsequently becomes of a greenish yellow, more consistent and viscid; its colour assumes a more and more dark hue, especially in the large intestine. At full term it fills the great and large intestines even to distension. This substance, known by the name of *meconium*, is a production common to the secretion of the liver and intestine. In monsters deprived of a liver, Meckel found merely a white and viscid mucus. Its smell and colour resemble those of the bile. Vauquelin, on analysis, found it to be composed of one-third of water, one-third of a substance *sui generis*, of vegetable nature, some hundredths of mucus, and a small quantity of bile. The discharge of the meconium does not take place until after birth, although it may sometimes occur during labour; but this depends either on a vitiated position of the fœtus, or on the suffering state in which it is placed. We shall explain elsewhere the causes of the premature issue of the meconium and the practical indications which may be drawn from it.

Urinary secretion.—During intra-uterine life, but little urine is formed. At term, the bladder is filled, but not distended by it. Like the meconium, this fluid is evacuated only after birth; for, if it were otherwise, some of its constituent principles would be found in the liquor amnii, and the canal of the urethra would not be filled with mucus if urine had passed through it.

Sebaceous matter.—The skin of the fœtus is covered, at birth, by a peculiar substance of a dead white colour, viscid and fatty, which, from its chemical composition, holds a mean between fibrine and adeps, and resembles adipocire.† This matter, called *sebaceous*, does not exist in all the stages of fœtal life; it begins to appear about the sixth month; at first in the axillæ, the groins, the hairy scalp, then on the back, the lumbar region, and external parts of the limbs; their internal parts and the anterior surface of the trunk are generally more free from it. No traces of it can be found in the cord and membranes of the ovum. There is no foundation for the opinion that this coating is a precipitate of the liquor amnii. It proceeds from the secretions of the sebaceous follicles of the skin of the fœtus, which are much more developed at this, than at a later period of life.

§ V.—FUNCTIONS OF RELATION OF THE FŒTUS.

The state of the fœtus in utero has been compared to that of sleep. In this condition, does it enjoy instinctive or intellectual faculties? We shall carefully avoid approaching this metaphysical discussion, which would lead us, fruitlessly, far from the end we aim it, and will merely remark that the sensibility of the fœtus is but slightly developed: that the organs of the senses are in a state of absolute repose; and that of all the acts of animal life, locomotion is the only one which is at all manifest.

* Adelon, Physiologie de l'Homme, 2d edit. vol. iv. p. 414. 1829.

† Buniva and Vauquelin, Annales de Chimie, vol. xxxii.

PART SECOND.

FUNCTIONS OF REPRODUCTION.

We designate by the terms *functions of reproduction* or *generative functions*, the series and succession of acts by means of which organized and living beings produce new individuals, similar in all respects to those from which they originated. *Generation* is the name given to these functions when viewed collectively.

It is not our intention to study in detail the series and succession of acts necessary for the accomplishment of these divers functions; and we shall confine ourselves to the exposition of those which are the peculiar attributes of the female sex. As each act requires certain conditions for its performance, let us begin by examining those which indicate an ability on the part of the individual to fulfil them.

CHAPTER I.

OF PUBERTY.

This interesting period in the life of a female is announced by numerous changes and important modifications which occur gradually and simultaneously in her physical and moral character. All the organs which assist in the performance of the generative functions become remarkably developed. The pelvis enlarges and widens, its inclination forward diminishes, the pubic region is rounder, more prominent, and covered with hair, the hips are more projecting, inclining outwardly, the pelvic cavity enlarges, and acquires the dimensions which we have assigned to the adult female. The ovaria increase rapidly: from being long, flattened and smooth, as they formerly were, they become larger, oval, rounded and embossed. The fallopian tubes are elongated, their fimbriated extremities are widened, and the fimbriæ which terminate them increase in size. The uterus receives more blood, its tissue becomes redder, the body and fundus are rounded and more developed than the neck, so that the latter appears proportionally shorter and narrower. The vagina is wider and more dilatable, its vascular network receives more blood, and its mucous membrane is thrown into a greater number of folds. The labia pudendi become fuller, more rose-coloured, and more sensitive. The mammæ are rounder, project in front of the thorax, the nipple becomes more salient, more sensitive, and the areola of a darker hue. Of all these changes, the most remarkable is undoubtedly the establishment of a new function, on the free performance of which depend ordinarily the cheerfulness, appetite, plumpness, freshness, and, in a word, the good health of the young girl.

ARTICLE I.—ON MENSTRUATION.

Definition.—This function consists in the discharge from the sexual organs, of a greater or less quantity of blood, periodically and once in every lunar month.

Synonymes.—This function has received different names, either on account of its periodicity, or the interval which separates each evacuation, or the uses attributed to it, or lastly, the influence which it is supposed to exert over the woman's health. Thus it is known by the name of *Courses, Monthly periods, Flowers, Being unwell, Menstrual flux, etc.*

All well-made women are, with few exceptions, subject to this evacuation from puberty until the critical age or turn of life, which, in them, is the beginning of old age. This inherent law of the female organization, cannot be regarded as the result of civilization. We doubt very much if ever there was a time when women were free from this inconvenient tax. Notwithstanding the reasons adduced by Roussel* to prove that this evacuation is unnatural, and that it is an artificial necessity contracted in the social state; notwithstanding the reports of travellers† quoted by him, of women who live under the arctic pole, in the Brazils, on the shores of the Orinoco, and many savage tribes who do not menstruate, it is clearly proved, in modern times, that all women are subject to this evacuation, whatever may

* Roussel, Système Physique et Morale de la Femme, 5th edit. p. 113, 1813.

† Haller, Elementa Physiol. Lausannæ. Tom. vii. lib. 28, sect. 3, p. 137, 1778.

be their colour, the countries they inhabit, the latitudes in which they have been observed, and the social institutions under which they live. The ancients even supposed that the females of some animals were governed by the same law. Aristotle thought that all warm-blooded quadrupeds, that is, the mammiferæ, discharged blood every month from the genital organs. If it be true, that in some species of animals belonging to the quadrumana, the carnivora, the pachydermata, the ruminantia, and cetacea, and even in some fish as the ray, the tench, and the surmullet,* a sanguineous discharge from the vulva is observed during the amatory season, we should most unjustifiably strain the analogy, did we assimilate it to the menstrual flux.

Prodromi, eruption, and progress.—The eruption of the menses sometimes occurs without any well-marked prodromi; it is generally preceded or accompanied by a sensation of numbness, and weariness in the limbs, heaviness in the head, heat in the lumbar region, tension in the hypogastrium, pelvis, and upper part of the thighs, sometimes by a slight pruritus in the vulva or its vicinity, at others, by colic, attended in some cases by more or less intense nervous phenomena. At the same time the pulse becomes stronger, fuller, more frequent, and sometimes irregular, and at last a mucous or sero-sanguineous discharge takes place from the vulva to the great relief of the patient. This discharge lasts, in this way, for several hours, rarely more than a day: it is soon succeeded by pure blood, which distils guttatim, and varies greatly in abundance, colour, consistence and duration. It generally flows more copiously about the middle, than the commencement and end of the period; at these two points it is not so red. In some women, however, the blood has, from the beginning the consistence and colour which it preserves during the whole time that the evacuation lasts. As the blood flows the sensation of tension and pain diminishes, the pulse loses its force, the woman is weaker, the eyes become dull, appear buried in the orbits, a bluish or livid circle forms around the eyelids, a serous discharge similar to that preceding the eruption succeeds the sanguineous evacuation, and in a short time the menstrual flux ceases.

The period of the first appearance of the menstrual flow varies according to a host of circumstances, which depend on climate, mode of life, and education. Generally, it is more precocious when the climate is warm, the habits of life sedentary, the food of animal and succulent substances, the social relations more numerous and frequent, the imagination more lively, and the education more refined. In the equatorial regions the first eruption of the menses appears from the ninth to the twelfth years; in temperate climates and in large cities, from the twelfth to the fifteenth.

In country girls, and those who inhabit mountainous and northern countries, it occurs generally from fifteen to twenty years of life; these data, however, are liable to numerous variations. Thus in Asia, Africa, and even in the temperate zones, cases are related of girls menstruating at seven and eight years, and of others, only at twenty-four or twenty-five. M. Brierre de Boismont, in a prize essay before the Royal Academy of Medicine, has shown that of six hundred and six women, menstruation occurred two hundred times between the ages of fourteen and fifteen, two hundred times from seven to thirteen inclusively, and two hundred and six times from sixteen to twenty-three. From his observations, the greatest number of country women menstruate at fifteen; the city girls belonging to the working classes about the same time: but in the former the proportion is greater after fifteen years, and the contrary in the latter. We must make a distinction as regards the girls of the working classes, whose mode of life, manners, and habits are superior to their condition; their menstruation resembles that of young people in the middling classes, who generally menstruate at fourteen years of age; in young girls of the highest rank of society, who are excitable and nervous, the menstrual flux appears generally at from twelve to fourteen.

Anomalies.—We shall consider the instances of girls who are reported to have menstruated from the moment of birth,† or from two, three, or four years of age, and of those who have never laboured under this evacuation, not as exceptions to the general rule, but as morbid cases, and foreign to the law which governs mankind. We believe that the true eruption of the menstrual flux, is that sanguine evacuation which supervenes when the young girl has already acquired the greater part of her growth, when the genital organs begin to be covered with hair, when the pelvic cavity presents the proper dimensions, when the breasts begin to project in front of the thorax, in short, when all nature's organs are in a state of perfect harmony, and fitted to play the part of which the manifestation of the menstrual flow is only the prelude. Dr. Le Bean, of New Orleans, has reported the case of a child of that city, four years of age, who menstruated, and whose breasts and pelvis were sufficiently developed, as to exhibit the conditions necessary to maternity.‡ Every sanguine evacuation which occurs before this period, should be combated by proper remedies; for if nature be allowed to persist in this vitiated course, great injury must result to the individual.

As to women who have never menstruated, that is owing to some malformation, or malorganization, or, as is stated, to an arrest of development in some of the genital organs. We cannot too earnestly call the attention of young physicians to this point, and warn them to be very cautious, especially when consulted as to the propriety of allowing young girls thus situated to enter into the married state. We are aware, that cases are related of women who, though they never menstruated, married and became mothers; and of others who never menstruated except during pregnancy. In the first case we believe that they were married too early; and the second are so very rare, that all the weight of the respectable authors who have related them is necessary to enable us to give them full and entire credence. A woman of fifty-four years of age died at the Hôtel-Dieu. She had never menstruated, and yet had been most anxious for children. She had neglected no means likely to produce the desired effect, not even pilgrimages. After death Drs. Duplay and Vigla examined with great care the sexual organs: the external and middle parts were well formed, the vagina was of the natural dimensions, the uterus resembled that of women who have never borne children: the orifice was small but well made, the two lips separated, the ovaria appeared natural, with the exception of a small cyst in the left one.

Duration.—The duration of menstruation varies in different women: in some the evacuation lasts only for a few hours, others for several days, and others again as long as eight or ten days: but, in a healthy woman, the usual duration is from four to five days. Generally, the first eruptions of the menstrual flux are not so long and copious, and the intervals between them greater and more irregular than

* Haller, loc. cit. tom. vii. p. 138.

† We have seen several who soon after birth have discharged blood from the vulva, but never supposed that they menstruated, for the discharge ceased never to return.

‡ Annales de Hygiène et de Médecine Legale, vol. x. p. 181.

they become subsequently. Thus, when a young girl begins to menstruate, and especially in those who commence early, the first eruption lasts only for a few hours, or one or two days; an interval of two, three, four, six, or even twelve months may elapse before the second eruption—a fact which should not be forgotten, in order to avoid, in the hope of assisting their return, using unseasonable remedies in a delicate constitution, which merely requires repose. M. Brierre de Boismont has observed that, in seventy-six women whose first menstruation had been irregular, the average period of regular return was eighteen months. The interval between the cessation of one menstrual period and the return of the following is ordinarily from twenty-one to thirty days. We sometimes, however, see women who are regular every fifteen days; others, only every six weeks or two months; but these rarely enjoy good health.

Quantity.—The quantity of blood lost by a healthy woman at each period, and fixed by Hippocrates at twenty ounces, is indeterminate: we can never arrive at any precise estimate, which must always be the result of approximation, 1st, because the discharge occurs slowly; 2d, because it is difficult to collect the blood; 3d, because this liquid is always more or less mixed with the fluids which lubricate the passage over which it flows, and thus increase its weight; 4th, because this quantity varies according to the constitution of the woman, her mode of life, climate, and passions. Generally speaking, brunettes with dry fibres, and nervous, those who lead an idle life, whose habitual food is very succulent, who inhabit warm countries, or have gone there temporarily, menstruate more copiously than those under opposite circumstances. The former lose eight, ten, or even sixteen ounces of blood at each period: women of more northern latitudes lose hardly three or four: lastly, in France we may fix as the average four to six ounces as the quantity evacuated at each period. We are acquainted with a lady who, having gone to an island in the Mediterranean situated in the forty-third degree of north latitude and eighth of east longitude, found her menstrual flux increase to an alarming degree: she became pregnant and aborted, and was attacked with uterine hæmorrhage which nearly proved fatal. On her removing on the following year to a burning rock in the Atlantic, situated in the sixteenth degree of north latitude and eighth of west longitude, the same accidents were renewed. This lady, during a residence of six years, could never carry her child to full term: she aborted several times in succession, and each time with a most frightful hæmorrhage. After her return to France she again became pregnant, and this pregnancy, like those which had preceded her voyages, was perfectly regular and natural, and she gave birth to a fine healthy boy. From this period the lady has been like other women: she menstruates regularly, and has recovered the health which she had lost in warm climates. On the other hand, we must state that country girls who come to reside in large cities, especially in Paris, are affected in an opposite manner; in them the menstrual discharge sometimes diminishes in a remarkable manner, or even disappears entirely for several months. We have observed this fact constantly in the hospital of La Maternité, where there arrive annually from all parts of France sixty to eighty female pupils of all classes and ages, all or nearly all of whom experience, after their entrance into the establishment, some derangement in the menstrual discharge: a third, perhaps one half of them do not menstruate for several months. Thus, the majority of those who enter the infirmary for advice, and of whom we inquire, Are you regular? or, Are you near your time of being unwell? answer, I have seen nothing, or I have seen only once or twice since my residence in the institution.

Qualities of the blood.—The blood which flows during menstruation is generally viscid, blackish, less coagulable than that proceeding from other parts: it has generally the odour and temperature of venous blood, but is slightly less consistent. Hippocrates* says that this blood is red like that of the sacrificial victims; and that it coagulates quickly when the woman is in good health. Aristotle is of the same opinion.

Pliny, Fernel, Lamotte, and the majority of the Arabian physicians, attribute injurious qualities to the menstrual blood. This opinion, advanced by respectable men, is even at this day quite popular. Thus, many persons think that this blood contains the germ of different contagious or hereditary diseases, such as the plague, small-pox, scrofula, etc.; others, that it exhales a poisonous principle which can arrest vegetation, and destroy flowers and trees; that this principle, which has the power of exciting love, is fatal to the male; lastly, others imagine that the odour disengaged from a woman during the menstrual flux can spoil sauces, coagulate milk, etc.: of all these opinions the last only has some show of reason, and appears to be founded on facts, if indeed it cannot be proved to be a mere coincidence.

In fact, it may be conceived that in uncleanly women, who neglect washing themselves or changing their linen during this evacuation, it may be conceived, we repeat, that the blood, changed by its mixture with the mucus which lubricates the sexual organs, may be decomposed, pass into the putrid fermentation, acquire acrid qualities which irritate the parts with which it is in contact, and exhale an offensive odour capable of injuring and spoiling animal fluids deprived of life and placed in this putrid atmosphere. In this way we may explain the alteration of milk or other fluids which remain for a long time in the vicinity of these women, as also the development of diseases in men who, under similar circumstances, have connection with women at the time of their courses. Except under these conditions, we are of the opinion of Hippocrates, and believe that the menstrual blood does not contain in itself any principles more deleterious than that flowing from any other part. We are acquainted with several women who have conceived whilst menstruating, whose husbands have felt no ill effects from the connection, and whose children were as healthy and well-formed as those which were conceived under other circumstances by the same women.

Lastly, we may assert, with Haller, and the majority of modern physiologists, that the menstrual blood of a healthy and cleanly woman does not differ at all from that drawn from a vein of this or any other woman, except that it may be slightly more viscid, on account of its mixture with a certain quantity of mucus.

Seat.—The seat of the menstrual flux is easily ascertained, and yet respectable men have for a long time disputed the organ from which it originated. Thus some, basing their opinion on exclusive or imperfectly observed facts, such as the existence of menstruation during pregnancy; its absence in a woman affected with itch, in whom the vagina, as they say, was filled with the disease; the flow of the catamenia in others, in whom the orifice of the uterus was closed; lastly, its continuance in a woman whose uterus has been removed by amputation, etc., pretended that they originated in the vagina from the internal surface of the vulva. Others, and a large majority, bearing in mind facts which are constant and can be daily verified, have with more propriety located the source of the catamenia in the

* Maladies des Femmes, livre i. parag. 11th.

cavity of the uterus itself. It is clearly proved that the blood flows from the uterus; and hence, when this organ is occupied by the product of conception, the catamenia ceases, and yet the vagina is free. In cases of prolapsus of the uterus the blood is seen to flow from the orifice of the neck, and not from the parietes of the vagina. The same thing may be observed by examining with a speculum a woman while menstruating. In inversion the blood distils from the internal surface of the inverted uterus: in cases of congenital or accidental occlusion of the os uteri the blood accumulates in the interior of the organ, distends it, and occasions great suffering. We have now under our care a woman whose os uteri is closed in consequence of a laborious delivery, and the separation of gangrenous sloughs from the parietes of the vagina, and in whom the menstrual discharge has not reappeared, although she is young, and all the inferior part of the vagina is uninjured; but at the return of each period she labours under the symptoms produced by the retention of blood in the uterus.

It appears, therefore, clearly demonstrated that the seat of the catamenia is in the uterus, and if, in cases of pregnancy or other rare cases, blood has been seen to escape from the external surface of the labia pudendi or vagina, they should be considered as anomalies and exceptions which serve only to confirm the general law. We should be disposed to class them among the morbid states, in which the menstrual discharge takes place by unnatural channels, such as the nostrils, ears, lungs, stomach, hæmorrhoids, the meatus urinarius, the breasts, umbilicus, by perspiration, a cicatrix, the stump of an amputated thigh, the saphœna, etc. Among the pupils in the lying-in hospital in 1837, there was a Mad. B——, who, constantly sick, was very irregular: whenever suppression of the menses occurred, a sanguine exhalation took place from the nipples sufficiently copious to stain her chemise and upper garments. The exhalation lasted twenty-four or thirty hours, and produced decided relief.

The integrity of the uterus does not seem to be indispensable to the performance of menstruation; for the woman in whom Vieussens amputated the uterus, continued to menstruate, although only a hard and callous portion remained.* Dr. Deweest relates the case of a young woman who menstruated regularly until her death, the healthy portion of whose uterus was only about the size of one's finger nail; all the rest was highly diseased.

Origin or *source.*—The question as to the species of vessels which furnish the catamenia has for a long time occupied physiologists, and as yet no satisfactory solution has been given. Thus, some attribute this function to the uterine veins or venous sinuses, on account of the black colour of the menstrual blood, the swelling of the veins in women at this period, the considerable development of the uterine veins, the large size of the venous apertures on the external surface of the uterus, and on the analogy of this discharge with that of hæmorrhoids.

The majority of the moderns think the blood of the catamenia is arterial, and that it proceeds from a true exhalation. They found their opinion on the circumstance that injections thrown into the uterine arteries transude into the cavity of the organ; that it is easy to conceive of congestion by means of the arteries, whilst it is difficult to admit it by the veins, where there can only occur a stasis of the blood when any obstacle prevents its return. From these data they conclude that the menstrual blood is furnished by the arteries.

Without wishing to approach this question, and whilst admitting that the cause of the menstrual flux may be compared to the sanguineous exhalations which sometimes take place from the nasal, gastric, intestinal, or pulmonary surfaces, that is, that it results from congestion followed by exhalations, we cannot believe that its mechanism is the same. We base our opinion on the difference of organization: in fact, we think that sufficient attention has not been paid to the arrangement of the uterine vascular system: this system has a special organization, closely resembling, if not identical with, the erectile tissue. We think, therefore, that the congestion of the uterine vessels at the menstrual period may be compared to the turgescence which supervenes in the corpora cavernosa during erection. If the congestion is moderate, as in the ordinary condition of life, the blood flows back into the torrent of the circulation, as in the corpora cavernosa on the cessation of the erection: but, if this congestion be very great, the blood not being retained in the internal surface of the uterus by a fibrous membrane as in the corpora cavernosa, it transudes both by the exhalant orifices of the arteries and the patulous mouths of the venous sinuses, which communicate with each other and with the arterial extremities by means of lateral pores. The discharge continues as long as the fluxion, and diminishes or disappears entirely with the latter.

Causes.—It is equally difficult to assign the causes of the menses, as to determine those of their periodical return. Shall we say, with Aristotle, Galen, and some moderns, that they depend on the influence of the moon? with Vieussens, Verheyen, that they are the result of a ferment in the uterus? with Haller and the modern physiologists, that they are the consequence of plethora, etc.? Of all these systems the last is undoubtedly the most rational; for it is evident that, without either a local or general plethora, the discharge does not occur, and that all the causes of this plethora promote their appearance and continuance. All causes, on the contrary, which may prevent this plethora, such as loss of blood, abstinence, diarrhœa, debilitants of all kinds, retard or prevent their return.

Admitting the truth of one or other of these systems, a difficulty still remains to be solved, namely, their periodical return. If it depended on the moon, why do not all women menstruate at the same time? Which of the phases of this planet presides over this function? If it depends on a ferment or plethora, why do they occur only every month? In cases of general plethora, why does the menstrual discharge cease before the entire removal of the former?

Without wasting time on the examination of these systems, we shall simply state facts, and remark, that plethora is necessary to produce the catamenia, as the plethora or congestion of a secreting organ is necessary to excite its functions. In this case, the plethora is no more the cause of the secretion, than it is of the menstrual flux in the other; it is only one of the conditions required for the performance of one or other of these functions. Whilst admitting that the causes of the menses, like those of their periodicity, are yet unknown to us; that this evacuation is the result of the female, and peculiarly of the uterine organization; that the menses pass through this organ, as the perspiration through the skin, or the serum through the pericardium, pleura, and peritoneum, etc.; we think that this cause is not to be sought in the uterus itself, but perhaps in the influence exerted by the adjacent organs. Perchanc, esufficient attention has not been paid to the part played by the ovaria in the execution of this important function, and yet experience has proved that removal of the ovaria

* Traité Nouveau des Liqueurs du Corps Humain, vol. ii. p. 175.

† Cyclopædia of Practical Medicine, vol. iii. p. 110 et seq.

caused the disappearance of this discharge, as in the case quoted from Percival Pott. Dr. Gendrin has just announced an opinion worthy of attention. According to him, the menstrual hæmorrhage is merely the periodical phenomenon of a function which commences at puberty, and ends at the critical age of woman. This function consists in the production and development of vesicles in the ovary; it brings periodically a vesicle, and consequently, a mature ovum to the surface of the ovary, there to be expelled, or destroyed by the phlegmasia or rupture of the vesicle. This last act, being the termination of the formation and evolution of each vesicle and ovum which it contains, cannot be continued; it is accomplished at regular periods; to it belongs the hæmorrhagic turgescence of all the genital apparatus of which the menstrual flux is the result. M. Gendrin cites, in support of his opinion, a number of anatomical facts which prove that in girls under the age of puberty, the ovaries are but slightly developed, and that the Graafian vesicles do not exist. The researches of this physician have also demonstrated to him the absence of the Graafian vesicles, and the more or less complete atrophy of the ovaries in women who have passed the critical age. M. Gendrin, on the contrary, has always found the Graafian vesicles in the ovaries of menstruating women; he asserts that the larger these vesicles are, the nearer they approach the surface of the ovaries. He has also recognized the existence of cicatriculæ, of which the colour varied from a red to a yellowish tinge, according to the greater or less lapse of time from the catamenial period.* A very interesting essay on the same subject has just been published by M. Negrier, professor at Angers.†

The catamenia, under peculiar circumstances, may be suspended or arrested without injury to the woman's health. These circumstances are pregnancy, lactation, and the change of life (age de retour.) With the exception of these three conditions, the interruption of this function is generally either the cause or the effect of disease.

Under the heads of pregnancy and lactation, we shall treat of the anomalies which may be presented in those states by the subject under consideration.

Change of life.—Of the change of life, vulgarly denominated the critical period, on account, undoubtedly, of the ailments, weakness, languor, infirmities and chronic diseases which at that time assail some women, it may be said that it harmonizes with the causes and period of the first menstruation. It recurs sooner if the first eruption of the menses has been precocious, and *vice versâ*. The majority of women cease to menstruate at from forty-five to fifty-five years of age; this rule, however, is liable to numerous exceptions; we frequently find women in whom the catamenia have ceased at the age of thirty-six or forty years, or even younger; and, on the other hand, in some it is continued until sixty, eighty, and even one hundred and six years.‡

Of one hundred and thirty-six women examined by M. Brierre de Boismont, the cessation of the catamenia occurred at from twenty-one to seventy-two years; this latter number relates to a very interesting case, worthy of being detailed here. Miss de W———, seventy years of age, was admitted into the hospital of Le Rochefoucauld, under the care of M. Bouvier. During the two years which she spent in this institution, her physician remarked with surprise that she menstruated regularly, and hence she became the object of the attentive examination of himself, the sisters, and various assistants in the house. Every month the catamenia appeared for several days. She died in August, 1837, and the autopsy of her body was made by MM. Bouvier and Brierre de Boismont; the hymen, unruptured, formed a kind of diaphragm; the os uteri was soft, the two lips projecting; its transverse opening had an extent of three lines; the longitudinal diameter of the body of the organ was twelve millimètres, and its transverse, fifteen; the interior of the body and neck was smooth, whitish and unchanged; the fallopian tubes were healthy, and admitted a silver wire; the ovaries were developed like those of a girl of fifteen or sixteen, and the left one contained a small cyst.

This critical period of a woman's life is announced by irregularity in the menstrual flow, sometimes twelve, fifteen, or eighteen months before their final cessation; at each period a remarkable decrease takes place in the quantity evacuated, without irregularity in its periodicity. At other times, the flow is immoderately prolonged, and lasts ten, twelve, or fifteen days in each month, and sometimes so copiously as to obtain the name of metrorrhagia. After an uncertain length of time, all discharge ceases; two, three, four or six months elapse without the appearance of the catamenia; the woman thinks them gone forever, as is occasionally the case; but they generally reappear two or three times in an irregular manner in the following year, to return no more.

In the former case, the pulse becomes fuller, and the woman grows fat; some even look young again; nearly all, however, are tormented by heaviness in the head, dimness of vision, palpitations, suffocation, and numbness in the limbs; in short, the unequivocal symptoms of plethora supervene, and require an appropriate treatment. Thus the woman should be put upon a mild regimen, rather vegetable than animal, the use of fresh and slightly acidulated aqueous drinks; she should be enjoined to keep the bowels soluble, and take pedestrian exercise in the open air, to lose small quantities of blood three or four times in the course of twelve or eighteen months, taken by a lancet, from the arm rather than from the foot, or by means of leeches, experience having taught us that it may be dangerous to provoke the uterus when nature abandons and loses its empire over this organ. In this manner we may dissipate or diminish the symptoms of plethora, and prevent the accidents which might result from it.

In the second case, on the contrary, the woman grows rapidly weaker, her appetite diminishes, nutrition is deficient, emaciation supervenes, the lips become pale, the cheeks faded and wrinkled; the breasts disappear, the skin hardens, and assumes a brown, yellowish and earthy hue; the eyes lose their vivacity and brilliancy, and sink in their orbits; a livid arch surrounds the eyelids; every thing announces a rapid progress toward old age, decrepitude, and, in some cases, even death.

This woman requires other cares; during the sanguineous evacuation she must preserve the most absolute rest, and a horizontal position: keep around her a pure and fresh atmosphere, and observe a substantial, though not exciting diet; soups, strong broth, animal jellies, are preferable to other food; the use of farinaceous drinks mixed with a few spoonfuls of good wine, should not be neglected: the same remark applies to the acids and astringents combined with opium: lastly, in pale and anemic women, the gaseous, and chalybeate

* Traité Philosophique de Médecine Pratique, par Gendrin. Tom. ii. p. 17. 1839.

† Negrier, Recherches Anatomiques et Physiologiques, sur les Ovaires dans l'espèce humaine, considerés specialement sons le rapport de leur influence dans la menstruation. 1 vol. 8vo. 1840.

‡ Haller, loco citato.

waters, and the martial preparations produce beneficial effects. We should remove, as far as possible, all causes of irritation, sorrow or grief, and keep the bowels in a soluble state. If these means fail, and the life of the woman be in danger, we must have recourse to the more energetic measures, which will be indicated in the treatment of uterine hæmorrhage.

Notwithstanding all we have above said concerning the critical period, it must not be supposed that all women, without exception, are thus affected; some are fortunate enough to pass over this age, without, as it were, being conscious of it; others, again, especially those whose menses were habitually very copious, hail this period as the harbinger of returning health. It sometimes happens that the catamenia, after having disappeared, return again after the lapse of several years, giving rise to the belief of a recurrence of youth: but if we carefully examine this pretended secondary menstrual evacuation, we cannot be deceived in women who have passed the critical age: we shall see that it differs essentially from the primary, first, in its want of periodicity; second, its duration is variable at each appearance; third, because the nature and quality of the blood are not always the same; fourth, because it is always, at least in the cases we have observed, symptomatic of some organic change in the uterus or adjacent organs.

Uses of the Catamenia.—First, they proclaim the fitness for impregnation: women are more fruitful in proportion to the regularity of this function, whilst in the contrary case, they rarely bear children. We speak here only of those in whom no apparent malformation of the genital organs exists: second, they serve to relieve the state of plethora manifest in women in the interval of the menstrual periods: third, they contribute, during pregnancy, to the nutrition and increase of the product of conception; and during lactation, to furnish the mammæ with materials for secretion during the whole period of this process.

ARTICLE II.—OF AMENORRHŒA.

Amenorrhœa consists in the absence, suspension, or suppression of the catamenia. In its strict etymological sense, the word amenorrhœa should be applied to all the periods in a woman's life, in which there is no menstrual evacuation; but its pathological acceptation is not so extensive. This word is never used to express the absence of this evacuation previous to puberty; during pregnancy or lactation; nor after the change of life; nor that resulting from any mechanical obstacle, as in certain cases of occlusion of the genital passage; for then, although the discharge does not occur, there is neither suppression nor suspension, but merely retention of the menstrual blood. We shall, therefore, use the term amenorrhœa to express a peculiar morbid state, characterized by the absence and suppression of the menstrual flux. We may, in this manner of regarding the subject, establish three varieties of the malady, viz: first, *Unavoidable amenorrhœa*, which depends on a vitiated organization of the uterus, as the absence of the rudimentary state, or want of development of this organ. Second, *Symptomatic or consecutive amenorrhœa*, which is the consequence of acute or chronic diseases, deep seated organic changes, which have injured the woman's constitution, as in the last stages of pulmonary consumption, etc. Third, *Accidental amenorrhœa*, which is sometimes produced by various and fortuitous causes during the most robust health.

We shall not discuss the two first—first, because unavoidable amenorrhœa, depending on a vitiated formation, requires no treatment, and is incurable; second, because consecutive amenorrhœa belongs more particularly to the history of the diseases of which it is the result, than to the subject under consideration; and therefore we merely mention it here. We shall investigate the third species, or accidental amenorrhœa alone, which in our opinion is the only one which deserves a place in a nosological table.

Causes.—Amenorrhœa may be produced by a number of causes which have been divided into *predisposing* and *incidental.*

The *predisposing causes* depend on the general constitution of the individual, a peculiar state of the uterus, of education, habits of life, and residence. Generally, we find predisposed to amenorrhœa—First, pale, lymphatic women, of a nervous and irritable temperament; those in whom the uterus is endowed with great sensibility, and who have menstruated precociously and with difficulty: those who are under opposite conditions, whose uterus is, as it were, inactive, deprived of energy and sensibility, have menstruated at a late period of life, not very copiously, and without any nervous agitation or phenomena. Second, women who, in consequence of an idle, indolent, and sedentary physical education, have a delicate and feeble constitution, whose muscles are weak, and incapable of regular and continued exercise, in whom the lymphatic system predominates; whose moral education, badly directed, has given a marked energy to the nervous system, exalted the sensibility, and favoured the development of all the passions, the fruits of an ardent and often a lascivious imagination. Third, women who are exhausted and worn out by a debilitating regimen, fasting, penances, grief, misery, the immoderate use of tea, coffee, watery and tepid drinks, prolonged wakefulness at parties, balls, and theatres; the workwomen of large cities who frequently spend whole nights at their employment: Fourth, and lastly, women who inhabit low, damp, badly ventilated apartments, deprived of the rays of the sun, and often of light.

The *incidental causes* are numerous and various; some act slowly and gradually, others rapidly and instantaneously; the latter exert their influence at the menstrual period itself, and suddenly arrest the discharge. These causes may be physical, moral, and are sometimes unknown. In one hundred and thirty-two women, observed carefully by M. Brierre de Boismont, suppression occurred in the following proportions, viz:—From physical causes, fifty-three; moral causes, fifty-seven; unknown causes, twenty-two. Among physical causes, we include blows, falls, fatigue, excessive labour, indigestion, the improper use of acrid irritating medicines, drastic purgatives, excessive coition, venesection, and an acute and sudden pain. Of all the physical causes, that which most frequently produces suppression of the menses, is unquestionably the action of cold, whether this action be sudden or partial, as the immersion of the hands or feet in cold water, or slow and general, by impressing the whole surface of the body, as in a walk in the open air, in cold, foggy or rainy weather. Habit, however, blunts the susceptibility or destroys the noxious influence. The authors of the Encyclopedia state the remarkable fact, of the women employed in sea bathing, who menstruate regularly, and sometimes at the very moment when they are in the water; in some women also, immersion of the hands in cold water will hasten the menstrual period: but these are exceptions, which do not invalidate the general rule. The moral causes are, all the vivid affections of the mind, which leave a profound and durable impression, such as grief, sorrow, fear, anger, in short, all the passions, and even the abuse of pleasure. Lastly, the physical and moral

causes sometimes combine to produce suppression. We should observe here, that the presence of all these causes is not indispensable; that one of them alone is sufficient to excite the disease.

Symptoms.—These are local or general. The local symptoms are the sudden or permanent suspension, or suppression of the menstrual evacuation, a sensation of heat, uneasiness and weight in the hypogastrium, uterine pains, slow or acute, partial or general inflammation of the uterus and its appendages, such as leucorrhœa, hypertrophy, induration of the neck or body of the organ, etc., the swelling of the belly and breasts, with or without the secretion of a serous or lactescent fluid. The general symptoms are numerous and various; they are rarely peculiar to amenorrhœa, and most generally only the forced accompaniments of the disease to which the amenorrhœa gives origin. Thus we meet with the symptoms of the fevers or other diseases which accompany or follow amenorrhœa. In robust constitutions, phlegmasiæ of the parenchymatous organs, of the serous and mucous membranes, and of the skin then supervene. In nervous temperaments, we have the neuroses, as melancholy, hypochondria, mania, hysteria, sometimes epilepsy, general or partial convulsions, and a host of nervous phenomena which vary according to the organic systems they affect. Thus, sometimes there is simple heaviness of the head, at others more or less intense cephalalgia, vertigo, or coma; sometimes spasms of the organs of respiration, of the heart, stomach, or intestines, which produce aphonia, a convulsive cough, palpitations, cardialgia, vomiting, nervous colic, loss or depravity of appetite, pyrosis, bulimia, general pallor, greater or less sensation of cold; and when the disease lasts for a long time, more or less rapid and complete emaciation. In weakened or deteriorated constitutions, chronic diseases, chlorosis, and organic alterations supervene. Lastly, whatever may be the constitution of the patient, we sometimes see vicarious discharges, and especially hemorrhage from the nose, mouth, stomach, intestinal canal, hæmorrhoids, the pulmonary vessels, the nipples, etc., taking the place of the natural evacuation.

Diagnosis.—This is based on the fact of the suppression of the catamenia, and the secondary phenomena which accompany or succeed it. It is not so easy to establish the diagnosis as would appear at first sight, because, for proof of the absence of the menses, we generally have only the patient's word, and it must be remembered that this word, and still more, that of her companions or friends, are not entitled always to absolute confidence, for either through ignorance, interest, or some other motive, they frequently endeavour to deceive us and themselves by attributing to amenorrhœa, ailments which depend on another cause, sometimes to incipient pregnancy. Before deciding, it is very important to examine the causes of the suppression and ascertain whether the existing symptoms can be referred to amenorrhœa alone or to some other affection. If they date from the suppression of the discharge, and increase or are renewed at each menstrual period, they may be supposed to be produced by amenorrhœa.

Prognosis.—This may be established after ascertaining the causes and duration of the disease, and the accidents and complications which may be present. Thus, a recent amenorrhœa occurring in a healthy young girl, from some physical cause, is less serious than one of long standing, produced by the action of moral causes on an exhausted or diseased subject, and accompanied or quickly followed by fever, inflammation, neuroses, or organic lesions.

Duration.—It is as variable as the causes which affect it; sometimes it lasts one, two, or three months; at others it continues for several years, and may become permanent.

Termination.—This disease generally terminates in the restoration of the menstrual flux and the return of health, and sometimes by the production of an acute disease; at others by that of chlorosis, or some organic change in debilitated patients. Lastly, in some cases the economy becomes habituated to the privation of this excretion, and health returns; but ordinarily, the constitution is undermined, the symptoms increase in intensity, and death releases the sufferer.

Treatment.—This may be prophylactic or curative. The prophylactic treatment consists in an appropriate physical and moral education, in the judicious and methodical application of the rules of hygiene, either to modify the temperament of the young girl, or to remove the influence of predisposing or incidental causes. The curative treatment must be so varied and modified, that each particular case requires, as it were, a peculiar treatment; and, therefore, we shall here confine ourselves to general indications.

The means to be employed depend, generally, on the nature and causes of the amenorrhœa. When accidental, the first indication is to restore the menstrual flux. Hence, we should use pediluvia, hip baths and fumigations, leeches to the vulva, or blood-letting from the feet. When it depends on an asthenic condition, hygienic measures, pure and dry air, exposure to the sun, nutritious food, the chalybeate waters mixed with generous wine, exercise on foot, gymnastics, and the thermal waters, have a happy influence. In this case, it is often necessary to associate medicinal agents with the resources of hygiene, and the filings, the subcarbonate, lactate, ulmate and all the soluble salts of iron may be used with advantage. Sometimes amenorrhœa depends on a strong and plethoric constitution; the loss of blood is then to be preferred to all other remedies. The use of emmenagogues, of which the majority are derived from the drastic purgatives or stimulating aromatics, requires great caution, and without wishing, with some, to entirely proscribe them, we must confess that they have more than once given rise to dangerous symptoms. In nervous women, we may derive advantage from antispasmodics, added to tonics and the bitters. In inertia of the genital organs, when the woman is strong and well made, marriage is the best remedy that can be advised. Emmenagogues are equally useful in this variety of amenorrhœa.

Symptomatic amenorrhœa presents no special indication to be fulfilled; it is the diseased organ which demands relief. Nevertheless, if the suppression occur suddenly, accompanied by dyspnœa, suffocation and hæmoptysis, we should endeavour to restore the catamenia, of which the return frequently has a happy effect on the organic disease. If it be owing to congestion of the uterus, we should prescribe for strong plethoric women, venesection, baths, emollient drinks, poultices, and a mild regimen; for pale, feeble and lymphatic women, decoction of gentian or hop, and the bitter wines, added to a strengthening and tonic diet.

CHAPTER II.

ON GENERATION.

Generation is at the same time the most important and most recondite of all nature's operations. It occupies only a portion of the existence of animated beings; and is only *perfectly* accomplished, when the individuals have acquired their *maximum* development; it appears to be the end proposed by nature in endowing them with life: for it is no sooner effected, than the individuals languish and die, as may be observed in many vegetables and insects.

Without generation, the existence of organized bodies would be merely ephemeral and momentary. However numerous and various they might be, they would soon have disappeared from the surface of the earth! By means of this function life is formed, developed, supported, and propagated: by it living beings cover the surface of the globe we inhabit, penetrate into its cavities, people the waters which fertilize and surround it, and rise into and spread through the circumambient atmosphere: by it individuals and nations are perpetuated: struggling incessantly with the destructive hand of Time; it restores the losses produced by Death; lastly, rekindling constantly the lamp of life, it maintains the equilibrium necessary to the harmony of the world.

The ancients represented love as a god, his eyes blindfolded, with a torch in his hand, inflaming the world with his own fire; they merely expressed and painted, under the form of an ingenious allegory, the immutable truth we now advance: *without generation, there is no life.*

The means used by nature for the propagation of life, are numerous and varied; they differ according to the classes of beings to which they are applied. They generally appear more simple as the organization of the individual produced is more elementary; more numerous and complex in proportion to the intricacy of the organization. Thus, from the spontaneous generations admitted by Rudolphi and Bremser, considered as probable by Lamark and Geoffrey, to the generation by the most complex fecundation, we find numerous varieties which may be referred to the groups in the following table.

1st. Spontaneous generation.—Doubtful—unknown. Intestinal worms.

2d. Generation resulting from an individual, by division or separation of its parts.
- 1st. By simple division of the individual, each fragment produces a new individual. *Fissiparæ.* Vegetables, cuttings of trees, animal infusoria.
- 2d. By separation of a vegetable product, either on the exterior or interior of the individual. *Gemmiparæ.* Vegetables, buds of trees, some polypi. *Gemmæ.*

3d. Generation by impregnation. It requires the connection of the sexes, and presents numerous varieties, according as the sexes are:

1st. United in the same individual.
- 1st. Hermaphrodism, with the sexes united in a common envelope. One individual is sufficient. Many vegetables, some mollusca.
- 2d. Hermaphrodism, with the sexes separated on the same individual. Monœceous plants.
- 3d. Hermaphrodism, with the sexes separated in the same individual, but requiring the connection of two similar individuals, and even reciprocal impregnation. Gasteropodous mollusca, worms.

2d. Separated on different individuals.
- 1st. Without approximation. Parents and offspring remain unknown to each other. Dioœceous plants, fishes.
- 2d. With approximation without copulation. Parents know each other, the offspring ignorant of them. Batrachia.
- 3d. With approximation and copulation. The majority of insects; the reptilia, chelonia, sauria, ophidia; birds and mammalia.

This last mode of generation offers great varieties, differing according to the mode of development of the fecundated product.
- 1st. By incubation. Insects, the greater part of reptiles and fishes.
- 2d. By external incubation; birds.
- 3d. By internal incubation in the parts of the mother, without adhering to them. Some of the ophidian, and ovo-viviparous animals.
- 4th. By an organ of gestation, to which the impregnated product adheres, from which it derives the greater part of its nourishment, and from which it separates after a certain time. All the mammiferous animals.

The generation of man belongs to the last and most complicated of the foregoing classes. It comprises a series of acts, a succession of distinct phenomena, which may be referred to the following: 1st, the production of principles which contribute to the formation of the new being, including the formation and secretion of the male and female germs; 2d, the approximation and contact of these germs or principles, which consists in *copulation;* 3d, the combination of these principles, the animation or vivification of these germs, constituting *impregnation;* 4th, the incubation, expansion, development and preservation, during a certain time, of the impregnated product, constituting *gestation* or *pregnancy;* 5th, the expulsion of this product from the maternal receptacle, or *parturition;* 6th, the education and alimentation during the early periods of life, or *lactation;* 7th, lastly, the isolation and separation of the offspring from the parent, or *weaning.*

However attractive may be the study of these different groups of phenomena, that of the three first would evidently be misplaced in a work like the present. We shall therefore leave to physiologists and physiological treatises, the task of determining, 1st, what are the principles furnished by the male and the female in the act of generation, in what organs these principles are formed, what is their nature, and what are the properties which they enjoy, or by which they are characterized; 2d, in what manner the approximation and contact of these principles are effected; 3d, lastly, how they become animated, and acquire their ultimate development.

We shall be satisfied to display the phenomena of this function which belong exclusively to the woman, namely, pregnancy, parturition, lactation, and weaning.

CHAPTER III.

OF PREGNANCY IN GENERAL.

We designate by the term *pregnancy* that peculiar condition of the woman from the moment she has conceived, until the product of conception is expelled from her organs. The word *gestation*, used by some modern writers as synonymous with pregnancy, has a more extended meaning; it is applied to all the mammiferæ; the expression *pregnancy* is exclusively applied to the human female. Thus, when the female of any mammiferous animal has been impregnated, and carries within her the product of fecundation, we say that she is *big* or *heavy*, that she is in a state of *gestation*. When speaking of a woman, the common expression is, she is *pregnant*, in the *family way*, etc.: that there is *pregnancy*.

From the definition just given, pregnancy comprises the succession of phenomena, which supervene from the time of impregnation until maturity, or the expulsion of the product; that is to say, until the new being is sufficiently developed to resist the influence of external agents, and exist when separated from the uterus of the mother. But as the product of conception or impregnated ovum is not developed in the spot in which it was formed, and as it is obliged to pass over a greater or less space, in order to reach the gestative organ, it does not always reach, uninjured, its destination; it is sometimes retained in the organ in which it was produced and vivified; at others, it swerves from or is arrested in its progress. Lastly, it generally reaches the uterus safely, producing differences in the seat, progress and termination of pregnancy, and imposing on us the necessity of establishing distinct varieties of it. Whenever the impregnated ovum reaches safely the cavity of the uterus, and is there developed, the pregnancy is said to be *uterine, good* or *natural;* when elsewhere, it is called *extra-uterine, bad, unnatural.*

If, apart from the definition just given, we consider only the symptoms which ordinarily accompany pregnancy, we shall divide it, after the manner of some old authors, 1st, into true pregnancy; 2d, into false pregnancy. True pregnancy comprehends all pregnancies properly so called, all those in which there is any product of conception whatever, without regard to the situation in which this product is developed. False pregnancy comprises the various pathological conditions which, foreign to conception, have nevertheless signs common to it and pregnancy, and sometimes deceive the patient and her friends. This division, however, is neither physiological nor correct, and is liable to the serious objection of collecting under one head affections totally different in their origin, progress and termination, which should not exist in a scientific classification. Therefore, we do not admit of false pregnancy, and will make a separate class of the divers morbid states which, entirely foreign to pregnancy, simulate it more or less.

We divide pregnancy, according to its location, into uterine and extra-uterine. Extra-uterine pregnancy comprises all those in which the product of conception is developed out of the uterine cavity. Each of these great divisions may be subdivided into, 1st, fœtal pregnancy; 2d, afœtal pregnancy.

Uterine pregnancy is subdivided—1st, into simple pregnancy, when it contains but one fœtus; 2d, into multiple pregnancy, when it contains two or more; 3d, into mixed or sarco-fœtal, when it contains at the same time a fœtus and a mole, or false conception; 4th, lastly, into complex, when there exists at the same time a disease of the uterus or of its appendages, or an extra-uterine pregnancy, a very rare case, but which has happened. Afœtal pregnancy comprises, 1st, false conceptions; 2d, moles; 3d, hydatids.

Extra-uterine pregnancy is likewise divided into fœtal and afœtal: each one is then subdivided into different species, according to the location of the development of the product of conception, and is designated by the names *ovarian, abdominal, tubular, utero-tubular,* and *interstitial,* as the product is developed in the ovarium, in the abdomen, fallopian tube, uterus and fallopian tube, or in the substance of the uterus itself.

- PREGNANCY.
  - Uterine,
    - *Fœtal,*
      - Simple, one fœtus.
      - Multiple, composed of two or more fœtuses.
      - Mixed or sarco-fœtal.
      - Complex, with morbid state of the uterus or appendages.
    - *Afœtal,*
      1. False conception.
      2. Mole.
      3. Hydatids.
  - Extra-Uterine,
    - *Fœtal and Afœtal,*
      - Ovarian.
      - Abdominal.
      - Tubular.
      - Utero-tubular.
      - Interstitial.

We know of no example of extra-uterine multiple pregnancy, which leads us to the belief that in the majority of cases twin conceptions are the result of several impregnations.

ARTICLE I.—OF UTERINE PREGNANCY.

We will begin by describing simple uterine pregnancy, as it is the most frequent and natural type of all the varieties of this function. Some of the signs of pregnancy are peculiar to it; others are common to it and various pathological conditions: the knowledge of both is of great practical utility. Many circumstances may occur in life, when it becomes necessary to ascertain precisely the existence or non-existence of pregnancy.

Curiosity alone sometimes induces women to ask advice concerning their situation; sometimes they are actuated by more serious motives: it is a nurse who, having exposed herself to conception, is afraid of giving her child a milk of bad quality; a widow, the heiress of a large fortune if she bear a child, desires to know her fate; a sick woman, who attributes her sufferings to pregnancy, or vice versâ; another, who, in consequence of illicit connection, is uneasy, and is anxious to know in time to hide her fault, or at least to save appearances at the expense of her virtue; lastly, in still more serious cases, pregnancy is sometimes pleaded in stay of execution in women capitally condemned, and we are called upon to decide upon its existence. Under these different circumstances, the physician cannot study too profoundly the signs of pregnancy. We cannot too earnestly caution young practitioners against giving full credence to the ipse dixit of women, who, in this situation, often endeavour to mislead us. Some do it designedly when it is their interest to deceive; others, in good faith, sometimes do so unknown to themselves, from the very natural desire to hear us express an opinion favourable to the idea which occupies their minds: we have seen some who, from this motive alone, insisted on facts which supported their cause, and denied or were silent as to those which could oppose or destroy it. The woman's own account can only be viewed in the light of a hint; our conviction and judgment must depend on the irrefragable testimony of our senses alone. These considerations will explain our reasons for the following, perhaps minute, details.

Although pregnancy is a functional and consequently a physiological condition; although in many women it is accompanied by no disturbance of the animal economy, and in some sickly individuals it is characterized by a return of health, it must be confessed that in the greater number it is attended by the derangement of various functions, peculiar, sympathetic, local, or general phenomena, manifested sometimes in the totality of an organic system, at others, in one or several organs belonging to the same system of organs, or to different organic apparatuses. These phenomena are so many signs which assist in the presumption or the recognition of pregnancy.

These signs are divided—1st, into *rational*, which are more correctly termed *common* or *equivocal signs*, because they are found when pregnancy does not exist, and hence cannot be called rational; 2d, into *sensible signs*, appreciable by some of our senses.

The *equivocal signs* consist in the production of some local, sympathetic, or general phenomena. The *sensible signs* are those which we can perceive by means of the eye, ear, or finger. Let us examine each of them separately.

§ I.—EQUIVOCAL SIGNS OF PREGNANCY.

We shall divide them—1st, into the signs which lead to the presumption that pregnancy has recently taken place; 2d, into those which announce its existence for a greater or less length of time.

1st. *Signs of recent conception.*—These are numerous, but so uncertain and fugitive that, in a majority of cases, they escape our observation. Thus, we include among the first the voluptuous sensation experienced by the two individuals in the performance of the venereal act; the dryness of the penis; the retention of the semen by the female; a sensation of borborygmus which affects some women after a fecundating coition; a vermicular motion which is said to be felt in one of the iliac regions, extending towards the centre of the pelvis; the swelling of the whole body, and especially of the neck of the female; a general spasm, sometimes so violent as to excite vomiting and syncope; sometimes a sort of horripilation which seems to radiate from the uterus to all parts of the body; the elongation and occlusion of the neck of the uterus; the circular instead of the transverse shape of its orifice; the anxiety, depression, and gloom, which some days afterward attack the woman; the paleness and elongation of the features and alæ nasi; the bluish discoloration, infiltration, and laxity of the eyelids; a dull, languishing, lack-lustre countenance. All these signs are not only uncertain, for they are often absent, but also equivocal, as when they exist they may depend on accidental circumstances unconnected with conception. Thus, women who abandon themselves with most ardour to the venereal act, who experience during its performance the most voluptuous sensations, spasms, and nervous agitation, are precisely those who conceive least readily: cold women, as they are vulgarly called, on the contrary, are impregnated with the greatest ease. Admitting as exact the swelling of the neck pointed out by Democritus, the contraction and occlusion of the orifice of the uterus remarked by Hippocrates and confirmed by Delamotte, we would observe that we rarely know the dimensions of the neck before conception, and still more rarely the degree of opening of the uterine orifice, so that we cannot compare them with the conditions presented after a fecundating coition. And again, has not this circular form, indicated as a sign of pregnancy, been found in women who have never conceived, and even in children of four or five years of age? We may, therefore, conclude that there are no certain signs of recent conception. We will merely remark that where a woman has already had children, and experiences after coition phenomena resembling those which occurred in antecedent conceptions, there is reason to believe that she is again pregnant. These signs will then be individual, peculiar to the woman who has felt them, and by no means applicable to the generality of females.

2d. *Signs which announce that pregnancy has existed for a greater or less length of time.*—We shall divide them into three series: A, local signs; B, sympathetic signs; C, general signs.

A. *Local signs.*—Of all the common signs which characterize pregnancy, that which first attracts the attention of the woman, and on which we repose most confidence, is undoubtedly the cessation of the menstrual flux. In fact, whenever a healthy woman menstruating regularly, runs the risk of conception, and afterwards experiences, without any other known cause, a suppression of this evacuation, followed by no particular change in her health, we are, if not absolutely certain, at least very strongly inclined to suspect pregnancy. Many authors, however, consider this as a very equivocal sign; 1st, because suppression can occur without pregnancy; 2d, because women have conceived before the first eruption of the catamenia, during an accidental suppression, or even after the natural suppression resulting from age; 3d, because some women have menstruated during the two or three first months, others during the whole period, and others again, only during the months of their pregnancy; 4th, lastly, because, according to Deventer and Baudelocque, women who had never menstruated were regular only during pregnancy. To this we would answer, that far from considering every suppression after coition as a sign of pregnancy, we acknowledge, that it may frequently occur without conception; but in these cases we generally observed more or less serious derangement in the exercise of the functions, and in the general health of the woman. The second objection, far from invalidating, corroborates our opinion. As regards the third, notwithstanding the perfect unanimity prevailing among writers, we are afraid

that it is founded on inaccurate or incomplete observations. We have seen several women who said they were, or had been regular during pregnancy; but whenever we have been able to examine, follow, or even question these women, we have been led to believe that these pretended catamenia were only some accident of pregnancy; 1st, because we have rarely seen the evacuation of blood coincide exactly with the usual periods of menstruation; 2d, when this coincidence existed, the nature, quantity, and physical qualities of the blood, exhibited a marked difference, which we likewise observed in the duration and mode of the evacuation, and distinguishing it clearly from the ordinary catamenia. Admitting that we have been mistaken, and that some women do menstruate during pregnancy, we should say of these facts, as we have a right to say of those related by Deventer and Baudelocque, that they are so few in number and so extraordinary, that they can only be considered as rare exceptions to a general rule. In this respect, our conviction is so sincere, that if the vital were as constant, and regular in their manifestation as the physical phenomena; if the observations of learned men and close observers did not command respect; if one man were able to see all for himself; in short, could we decide from the only cases we have hitherto seen, we should not be afraid to establish as a general rule, that every menstruating woman is not pregnant. In our opinion, therefore, of all the common signs of pregnancy, the most valuable is incontestably the suppression of the menstrual flux.

B. *Sympathetic signs.*—These phenomena are principally manifested in the digestive system. Some women lose their appetite, have a perverted, depraved taste, which leads them to desire and eat acid, acrid, irritating, sometimes putrid, offensive, and indigestible substances, such as coal, chalk, etc.; others have a decided penchant for wine, and spirituous liquors; some suffer from continued ptyalism, so copious as to expectorate in the course of twenty-four hours a quantity of mucus mixed with saliva equal to one or two litres, (the litre is a little more than a quart). We have seen women who, notwithstanding this abundant expectoration, preserved their freshness and plumpness: others, on the contrary, soon emaciate rapidly. Some women suffer excessively from toothache, though the teeth are apparently sound. The majority are affected by dislikes, nausea, and vomiting of various nature, according to the time of day, or the state of fulness or vacuity of the stomach. In general, the vomiting which occurs in the morning is composed of fluid, viscid, ropy substances, resembling the white of eggs, either uncoloured, or tinged more or less yellow, according to the quantity of bile they contain: these substances are insipid, acid or bitter. The vomiting which follows a repast occasions the rejection of the food.

This state of discomfort and uneasiness, which generally accompanies the two or three first months of pregnancy, is succeeded by a better appetite, which is sometimes so craving, that sleep is interrupted by it; we have known women who were obliged to rise at night to take food. The digestion is then easy and rapid, accompanied frequently by constipation, hæmorrhoids, and sympathetically, by more or less intense headache. It is not uncommon to see the vomiting return during the last two or three months of pregnancy.

All these gastric phenomena do not depend on the same cause. The vomiting in the early period seems to be owing to a sympathetic action, or rather a sort of nervous irradiation which extends from the uterus to the adjacent organs, an action we can understand and explain in the following manner: the uterus being a centre of attraction during pregnancy, and constantly changing in size, during the three first months, is impeded in its development by the resistance of the bones of the pelvis: incarcerated, as it were, in the pelvic cavity, it reacts forcibly on all the abdominal viscera, by means of the numerous ramifications of the great sympathetic, from the hypogastric plexus of which its nerves chiefly originate. This nervous irradiation, the consequence of the compression and exaltation of the sensibility of the uterine nerves, extends to the solar plexus, reaches the epigastric centre, causes antiperistaltic contractions of the stomach, and consequently, vomiting. But when the uterus has abandoned the pelvic cavity, and passed into that of the abdomen, which takes place from the third to the fourth month, this organ being in contact with the muscular, soft and extensible parietes of the abdomen, is more at ease, and less compressed, and therefore reacts less forcibly on the adjacent organs; the nervous or sympathetic phenomena cease. The woman then recovers her appetite, her digestion is improved, nutrition is more active, her plumpness more considerable. The vomitings which occur about the eighth month, appear to be rather the result of a mechanical cause: they proceed from the compression of the fundus of the uterus upon the stomach, and the opposition presented by this compression to the free development of the viscus. We are led to this opinion from the circumstance, that in the first months of pregnancy, nausea and vomiting occur at all times of the day, and principally in the morning, whatever may be the state of the stomach, and in the latter periods generally when the stomach is distended by food. We might quote in proof of this explanation, the fact, that we have frequently prevented or arrested this latter vomiting, by desiring the woman to take at two or three repasts, the quantity of food she took at one.

C. *General signs.*—In consequence of the greater activity of nutrition, it will be imagined that the pulse may become more frequent, strong, full, and hard; that, according to the remark of Borden, it may be at the end of pregnancy contracted, intermittent, and, as it were, convulsive; that the artery may be more tense and resisting; the blood more plastic, and buffy; the respiration more hurried, the temperature of the body more elevated, and all the secretions more copious and odoriferous. But whilst admitting the reality of these signs, we must remark that in the majority of cases, and particularly in the first stages of pregnancy, they are so indistinct and fugitive, and may exist under such various circumstances, that we place but little reliance on them.

Of all the changes produced by pregnancy, the most remarkable, in our opinion, is the modification which supervenes in the nervous system. This modification is such, that it exalts the sensibility, renders women more susceptible and more liable to the action of physical and moral agents; it changes their character; from being kind, confiding, gentle and gay, it causes some to become hasty, irascible, jealous, peevish, and taciturn; in others, it gives more activity to the intellectual faculties, and disposes them to the development of nervous affections; it stamps its seal on the diseases of pregnant or lying-in women, renders their progress more rapid, their disorders more numerous, serious, and the more dangerous, inasmuch as there is less time to prevent, understand and relieve them; it constitutes that peculiar state called *puerperal*, a state which conception produces, and pregnancy developes, which the pains of child-birth increase, which continues during the child-bed state, extends to and diminishes during lactation, and ceases only when the woman has resumed her usual habits of life. This puerperal state, to which we cannot too earnestly solicit the attention of young physicians, explains the readiness with which pregnant women and those in child-bed, are affected by the prevalent diseases, and epidemics; and the rapidity and violence of their attacks. This state has frequently suggested to our minds, the comparison of a pregnant woman, and especially one just delivered, to a dismantled and defenceless fortress, which yields without resistance to the first enemy who appears at its gates.

It follows, from the preceding remarks, that the rational or equivocal signs may, by their individual value, and their reunion, furnish a more or less plausible presumption of pregnancy, but can never determine with certainty its existence, because these signs are common to conditions other than pregnancy, and pregnancy may exist without them.

§ II.—SENSIBLE SIGNS OF PREGNANCY.

We shall subdivide these signs into three series: A, *visible*, or those which we can ascertain by the eye; B, those furnished by the ear, or *audible;* C, those made evident by the touch, or *tangible.* Before entering upon the examination and discussion of each of them, we should observe that some of them proceed from the mother, others from the fœtus itself. The former, although very valuable, are likewise uncertain and equivocal; the latter, on the contrary, being exclusively peculiar to pregnancy, cannot lead us into error, and are consequently the pathognomonic signs of this state.

A. *Visible Signs.*

1st. *Size of the breasts.*—When a woman has conceived, she feels a pricking in her breasts; the mammæ become the centre of congestion, or a sort of fluxion; they increase in size, become round, tense, and hard; they appear to be detached and separated from the pectoral muscles, and are more movable on the thorax. In consequence of their tumefaction, the nipple becomes more salient, sensitive, and sometimes even painful; it is often the seat of a serous, yellowish, or milky exudation; the areola increases in proportion to the size of the gland, and becomes of a darker colour; the skin becomes tense, thin, and more transparent; the veins are more apparent, and resemble bluish lines.

Although these signs are met with in many pregnancies, they are neither constant nor exclusive, and therefore cannot assist in characterizing this state. They are frequently wanting in pregnant women, and may be present in others who are not so. They may appear in greater or less number, if the uterus be the seat of some morbid state, or merely of suppression of the catamenia. We have seen them supervene in consequence of suppression from occlusion of the uterus or vagina, in cases of polypi, and fibrous or other tumours, etc. The same may be said of the secretion of milk. Cases are related of young virgins, in whom this secretion has been established in consequence of titillation or suction of the nipples. Among the facts of this nature, recorded in works on legal medicine and midwifery, one of the most remarkable is that of a little girl of the town of Alençon, eight years of age, deaf and dumb, who, by applying frequently to her breast the mouth of a child of a few months old, which her mother was suckling, ended in having enough milk herself to support the child for a whole month, during which the mother was unable to nurse it on account of fissures in her nipples. This little girl had a great deal of milk of excellent quality, which she could easily express by jets, on the sixteenth of October, 1783, when she was exhibited to the Royal Academy of Surgery. On the same day, she expressed more than a spoonful at Baudelocque's house, in presence of more than sixty pupils.*

2d. *Size of the abdomen.* The most evident sign, that which strikes most the popular eye, and from which it generally pronounces on the pregnancy of a woman, is the development of the abdomen. But when we reflect on the numerous and various causes which may produce it: when we remember that the accumulation of fat in the omenta, and abdominal parietes; the presence of air, water, or blood in the intestines, peritoneum, or uterus, the growth of fibrous, encysted, scirrhous, or other tumours, in the uterus, its appendages or any other viscus of the abdomen may occasion this development, it will be seen that this sign alone would be of little value to the physician. However, although the development of the abdomen appears under different conditions, and does not belong to all the stages of pregnancy, as it is constant in all pregnancies which have advanced beyond the third month, it becomes of vast importance, especially when we have been enabled to observe and follow it attentively.

As soon as a woman has conceived, instead of the belly projecting, there is generally a sort of retraction of the anterior wall of the abdomen, which seems to approach the vertebral column, a disposition which has given rise to the common proverb, *Dans ventre plat, enfant il y a.* (In a flat belly suspect a child.) But soon, that is, toward the end of the third month, the belly projects, the hypogastrium becomes round, a slight saliency first takes place on the median line, grows slowly and gradually, ascends successively from the pelvic to the umbilical and epigastric regions, leaving the iliac fossæ and flanks empty, depressed, and as it were sunken. The umbilicus is thrust forward to the distance of some lines, or even an inch. The belly inclining more forward and downward, as the abdominal parietes are more lax, causes these phenomena to be more marked and evident, all other things being equal, in those women who have had a great number of children, than in those who are pregnant for the first time. In the latter, the belly is generally less projecting, larger and more uniform: which circumstance induces women to say and believe that the *pregnancy is in the small of the back*, and that the delivery will be more tedious and painful than if *it were in the belly.* When the phenomena occur as we have just stated, the size of the belly furnishes very strong presumptions in favour of pregnancy; but under these circumstances, as in many others, in order to be certain, the sense of touch must assist that of sight, as we shall show hereafter.

3d. *Colouring of the vulva.*—M. Jacquemin having observed that, among the public women daily submitted to his examination, those who were pregnant exhibited a livid violet hue of the vulva, has established this sign as peculiar to pregnancy;† but this colour, which in fact exists in pregnant women, manifests itself under other circumstances; we have several times seen it in women affected with tumours of encysted ovarian dropsy, and are convinced that it will always be present whenever there is, in the pelvic cavity, any obstacle to the venous circulation. This colouring appears to be owing to the stasis of the blood in the plexus pampiniforme of the vagina and the veins of the vulva, in consequence of the compression of these vessels by the distended uterus. The proof of this remark is, that this violet hue appears only in an advanced stage of pregnancy; it becomes more intense in the erect or sitting position, and greatly decreases or entirely disappears in some women when they have been in the recumbent posture for any length of time.

* Baudelocque, l'Art des Accouchemens, tom. i. p. 188, in 8vo. Paris, 1815.

† Parent Duchâtelet, De la Prostitution, etc. 1ere edit. tom. i. p. 217.

4th. *Colouring of the skin.*—In some pregnant women, the skin, more especially that of the face and neck, assumes a yellowish, brownish, earthy, and sometimes, though rarely, a dead white colour; this colouring appears under the form of irregular stains or spots, of greater or less extent, which occasionally cover partially the forehead, cheeks, part of the neck or breast, sometimes one half of the face, whence it has received the name of *mask*. The change of colour in the skin is sometimes very great, and occupies a large portion of the body. In the beginning of 1839, we had in the lying-in hospital a young woman of twenty-two or twenty-three years of age, whose dark hair formed a fine contrast with the whiteness of her skin and the freshness of her complexion, and who, during her pregnancy, had undergone a kind of metamorphosis; a black colouring matter appeared in such abundance on the skin of her body, that on the morning of her delivery, on which we first saw it, this young woman resembled a negress, with the limbs, head and neck of an European. The line of demarcation was so distinct, and produced so singular an effect, that we were desirous of having her full length portrait taken; but having rapidly recovered, and being impatient to return home, we could not put our intention into execution.

This alteration of the colouring of the skin, which generally disappears after delivery, far from being constant in pregnancy, is but seldom seen. Analogous alterations are also frequently seen in women of a fair and delicate complexion, who expose themselves to the rays of the sun, and the irregularities of the seasons and atmosphere; in those who have red blotches, stains called *hepatic*, and freckles, and yet who are not pregnant: hence, this sign has but little value.

B. *Audible Signs.*

When Laënnec had demonstrated the utility of auscultation applied to the diagnosis of thoracic diseases, some physicians conceived the happy idea of extending it to the study of other affections, and particularly to that of pregnancy. MM. Mayor and Fodéré had already attracted attention to this point in obstetrical science.* It was reserved for one of the friends and pupils of Laënnec to verify its advantages and make evident the signs which had hitherto escaped observation.

The signs indicated by M. Lejumeau de Kergaraded† consist in the perception of two different sounds, which are heard when the uterus is distended by the product of conception. Of these two sounds, one, analogous to the murmur of the respiration, but more feeble, less extended, has been called by M. Kergaraded *placental bruit*, and afterwards *bruit de souffle;* the other, more clear, resembling the ticking of a watch, only more rapid, has been named *bruit à double battemens,* (double pulsations,) or *sound of the fœtal heart.*

1st. *Bruit de souffle.* (*Placental sound.*)—This sound, isochronous with the pulsations of the mother, may be compared to that heard in certain affections of the heart which have not been yet accurately determined, to that of the carotid arteries in chlorotic girls, of the great arterial trunks when compressed to a certain degree, or still better, to that produced by varicose aneurism and certain erectile tumours. This sound, which has been the subject of controversy among French and foreign accoucheurs, is now proved to be undeniably true. In order to perceive it, it is only necessary to apply the ear or stethoscope over certain points of the abdomen of a woman who has passed the first month of pregnancy, and chiefly towards the lateral parts of the uterus. This sound becomes more audible as pregnancy advances. It can be heard distinctly about the middle of pregnancy: yet Laënnec, M. Delens,‡ and Kennedy,§ say they have perceived it before the end of the third month, which we must confess we never have. Its continuance, strength, and extent, vary very greatly. Sometimes it is readily perceived, at others the most careful exploration cannot detect it. It may be feeble, strong, confined to a small spot, or spread over a large extent of surface; sometimes it varies its situation.

M. de Kergaraded attributed this sound to the utero-placental circulation, and thought that it was produced by the passage of the blood from the uterus to the placenta, and that it was heard at the place of insertion of the latter. But on the very day of the publication of the essay of M. de Kergaraded we proved to him that this could not be correct, for one of the women in whom he heard the *souffle* just before labour, having been delivered of a putrid child, the placental circulation could not have existed, and some other explanation must be found. Struck by this fact, we continued our researches, and, after having ausculted a great number of women, discovered that the *bruit de souffle* was especially heard toward the lateral parts of the uterus: that precisely at these points were united the great arterial and venous trunks which are distributed to this organ. From that time we were inclined to think that this phenomenon depended on the circulation in the substance of the uterus itself during pregnancy; that this *bruit de souffle*, analogous to that produced by varicose aneurisms, was the result of the free anastomoses and numerous communications between the uterine vessels during pregnancy. This opinion, which we have always maintained, has been recently confirmed by the facts observed by our colleague, M. Dubois, who has perceived the *bruit* after delivery—a peculiarity observed by M. Carrière twenty-four hours after the termination of labour.

Nevertheless, the explanation which we here give, as well as that of M. Jacquemier, who attributes this *bruit* to a particular state of the blood,‖ does not entirely satisfy us, for it is not applicable to all the cases in which the phenomenon is observed. The *bruit de souffle* has been observed in some women after delivery, in others with tumours in the pelvis, and in pregnant women a change in position will frequently cause this *bruit* to cease or entirely disappear. Thus, M. Jacquemier, who has made many observations in our wards at the Maternité, has arrived at the following result:—In two hundred and fifty-seven pregnant women, he has heard sixty-two times the *bruit de souffle;* and in a hundred and thirty recently delivered, he has heard the same *bruit* twenty-three times. He has also remarked that in pregnant women, in whom he has remarked the *bruit de souffle* in the recumbent position, it could not be heard when they were on their knees and elbows. It appears to us more natural to attribute this *bruit* to the compression of the aorta, or its principal branches, by the distended uterus, and the consequent embarrassment of the circulation. This more general explanation is applicable to all the cases in which the phenomenon can be distinguished.

The *bruit de souffle* is not so valuable a diagnostic sign as is supposed; but, on account of its frequency in pregnant women, its

* Mayor, tom. ix. Bibliothèque Universelle de Genève, p. 248. Fodéré, tom. lvii. du Dict. des Sc. Med. p. 602.

† Mémoires sur l'Auscultation Appliquée à l'Étude de la Grossesse, etc., par M. Lejumeau de Kergaraded. Paris, 1822.

‡ Laënnec, Auscultation Médicale, tom. ii. p. 458, edit. 2de.

§ Dublin Hospital Reports, vol. v. p. 260.

‖ Jacquemier, De l'Auscultation Appliquée au Systeme Vasculaire des Femmes Enceintes, des Nouvelles Accouchées et du Fœtus. 1838.

existence is a strong presumption in favour of pregnancy. In no case does it appear to us to throw any light on the point of insertion of the placenta, nor on the important question of the life or death of the fœtus.

The second sound, known by the name of *sound of the fœtal heart*, is easily distinguished from the preceding: it consists in a rapid double pulsation, resembling very closely the sound produced by the motion of a watch. If the ear be applied to the abdomen of the woman, a hundred and twenty or a hundred and forty pulsations per minute may be counted, differing from the mother's pulse in being more frequent and rapid. These pulsations are sometimes so rapid that it is impossible to count them; then, without any appreciable cause, they return to their natural type. Does the fœtus then experience sensations which may modify the circulation? This phenomenon renders it probable.

The intensity of the heart's movements being subordinate to the development of the organ by which they are produced, their sounds cannot be heard in the first months of pregnancy, on account of the smallness of the heart and the quantity of fluid contained in the uterus. They may be perceived about the fourth and a half or fifth month, but often even after this time we cannot detect them when there is a great quantity of fluid interposed between the fœtus and the ear of the observer, as happens when the sternal region of the fœtus is turned forward. In order to perceive them readily, the dorsal or one of the lateral regions of the trunk should be applied against the anterior wall of the abdomen. It is, therefore, evident that the pulsations of the fœtal heart are not always heard; a certain number of concurrent circumstances must be present, which, however, is very frequently the case, for in two hundred and twelve pregnant women M. Jacquemier has heard two hundred and one times the double pulsations.

Whenever this sound can be heard, it is a valuable sign, for it determines beyond doubt, both pregnancy and the existence of the fœtus; but is the absence of this sign after the sixth month, an index of the death of the fœtus? No, it would at most only furnish grounds for suspicion. Dr. Bodson, in a Memoir sent to the Royal Academy of Medicine, entitled "Auscultation applied to the Practice of Midwifery," supposed, that auscultation might not only render the diagnosis of pregnancy more easy, and inform us of the life or death of the fœtus, but by allowing us to hear the pulsations of the fœtal heart, during the whole duration of a long and tedious labour, enable us to observe the various shades of strength or debility, of slowness or rapidity of the fœtal circulation, and furnish us, consequently, with precise indications as to our mode of conduct, in trusting or not to the unaided efforts of nature. Observation proves that, when the fœtus is in a state of suffering, there is debility and slowness, or excessive frequency of the functions of the fœtal heart, intermittence and irregularity of their rhythm, absence of the second sound, entire cessation of the phenomenon during the uterine contraction, and slowness of its return after the pain. But whilst acknowledging the existence of these facts, the reporter, M. P. Dubois, has been careful to remark that the continuation of the fœtal circulation proves nothing more than the continuation of intra-uterine life, and may be considered only as a presumption in favour of the possibility of life after birth.*

It has been proposed to discover by means of auscultation, the presence of more than one child; and though we have several times succeeded, by this method, in cases of twin pregnancy, we must remark, that the presence of more than one child in the uterus can only be strictly inferred when, after having heard the double pulsations of the fœtal heart at two distinct points of the abdomen, there is a want of isochronism between these double pulsations, because, in a great number of women with only one child, they are frequently heard over the whole globe, or over a great extent of the uterus, sometimes at two very remote points of the abdomen, rendering the diagnosis of this kind of pregnancy difficult by means of auscultation alone. Some individuals, among others M. de Paul, formerly a resident pupil of the Maternité, have endeavoured to ascertain and determine the position of the fœtus by the applications of this method, but their observations are not borne out by experience.

More recently, M. Naegèle, the younger, has described a *bruit de souffle*, which he attributes to the pulsations of the umbilical cord, and compares it to the sound of the carotids in chlorosis: lastly, M. Stoltz has indicated a rustling noise which is heard only after the death of the fœtus, and appears, to him, to proceed from the decomposition of the liquor amnii.

C. *Tangible Signs.*

The signs furnished by the touch are numerous, and exceedingly valuable in the practice of midwifery. Before indicating these signs, it is important to explain the operation by means of which they are perceived.

Of the touch.—The touch is a complex operation, which consists in the action and simultaneous concurrence of the two hands, one of which placed on the abdomen embraces and depresses a portion of the viscera contained in this cavity, whilst a finger of the other introduced into the vagina or rectum, explores the organs inclosed in the pelvis.

The touch is useful, not only in midwifery, but also in surgery and the practice of medicine. In fact, if by the touch we can ascertain the natural or the vitiated conformation of the pelvis, the existence of morbid productions developed in the pelvic cavity; if it assists us to determine the state of emptiness or fulness of the uterus, the duration of the pregnancy, the actual progress of labour, to follow its various stages, pronounce on the slow or rapid, easy or difficult termination of parturition; if it teaches us the manner in which the secundines will be expelled; if, when the product of conception is removed, it assures us that this organ is neither prolapsed, deviated, inverted, in a word, that it is in a normal condition, it also enables the physician and surgeon to appreciate and determine the seat and nature of the lesions and alterations which may affect the uterus, its appendages, the vagina, bladder, rectum, and the majority of the organs contained in the pelvis. Roussel,† therefore, was wrong in decrying the utility of the touch.

There are general as well as special rules for the performance of this operation. The former comprise the precautions which relate to the woman, to the operator, and to the nature of the signs we are desirous of ascertaining: the latter relate to the mode of exploration of each particular organ.

General rules.—To be perfect in the touch, the practitioner should be ambidexter. He should not wear a ring of any sort on his

* P. Dubois. De l'Application de l'Auscultation à la Pratique des Accouchemens. Rapport fait à l'Academie de Médecine.

† Système Physique et Morale de la Femme, in 8vo. p. 155. Paris, 1813.

fingers. He introduces indifferently into the genital organs a finger of either hand: the index is generally preferred, because being separated from the thumb and other fingers, it penetrates more deeply and with greater facility. As it is necessary, however, to reach sometimes a great depth, some have recommended the use of the middle finger alone, as being longer, or in conjunction with the index. Although the middle is actually longer than the other fingers, the manner in which it is inclosed between the index and ring finger renders its employment more inconvenient than useful. We know of but few rare cases in which the union of the two fingers may be useful, but generally, we think it better to use the index alone, because when we explore bodies so small as the os uteri, with parts which are not in perfect harmony, the perception is sometimes double: and when the eye cannot assist and rectify the errors of the finger, we are liable to form a confused and inexact idea of the shape and size of the parts we are examining. The finger nail should be short, well rounded, and never longer than the finger, because, then, the touch is more delicate, easy and certain, and if the woman be irritable or the uterus diseased, a projecting nail might give pain or produce some injury. The finger should be coated with some fatty or mucilaginous substance: this precaution facilitates its introduction, renders it less irritating, and preserves the operator from the absorption of any virus with which the woman may be infected, especially if there be any excoriation of the finger. On this account greasy are preferable to mucilaginous substances, as they adhere more firmly to the skin and do not wash off. The best are those which possess a certain degree of hardness, as fresh butter, lard, various kinds of pomatum, because it is easy to cover the finger to any requisite degree of thickness; whilst different substances, such as the oils, do not possess this advantage, and, moreover, are more apt to soil the clothes and the furniture.

The touch is performed in the erect, sitting, or recumbent posture. The position to be given is not arbitrary, but dependent of the nature of the signs to be ascertained, and the peculiar state of health of the woman. Thus, when we wish to know if the uterus is prolapsed, displaced, if it be heavy, and frequently to perceive the motion of *ballottement*, the patient must stand erect. She should be recumbent, with the head and chest elevated and inclined forward, the legs flexed on the thighs, the latter on the pelvis so as to relax all the muscles of the lower belly, whenever we wish to ascertain the size of the uterus, the period of pregnancy, the existence of a tumour, etc. Lastly, in some very rare cases, as in certain states of debility, dyspnœa, dropsy, in which the vertical position cannot be maintained, or the horizontal would be attended by suffocation, we are obliged to give the woman a posture, as it were, mixed, to make her sit upon a chair so that the weight of the body may rest on the sacrum, and that the vulva may project clear of the seat.

The position of the operator depends on that of the woman. Thus, when the woman is erect or sitting, the accoucheur stands in front of her, with one knee on the ground, or seated on a low chair; in either case, he will introduce between the woman's limbs the knee corresponding to the finger he proposes to employ; this knee, in a state of demi-flexion, serves as a solid rest to the elbow, and prevents the hand from trembling, so that the examination can be made with certainty and ease. If the woman lies down, the operator will stand, or, still better, seat himself on a chair of convenient height, placed at the right side of the patient if he intends to use the right hand, and *vice versâ*. The finger is then to be introduced in the following manner. The woman being properly covered, in whatever position she may prefer, we follow with the extended hand the internal surface of the corresponding thigh, until the radial edge of the index finger has reached to the level and just below the symphysis pubis. In the horizontal position, instead of following one of the thighs, we prefer carrying the hand beneath the flexed ham directly to the vulva. Having reached that point, the thumb is separated, elevated and placed in front of the pubes; the pubic arch rests on the metacarpo-phalangeal articulation of the extended index, whose free extremity is naturally in contact with the groove resulting from the separation of the labia pudendi at their termination in front of the posterior commissure of the vulva. In order to penetrate into the genital organs, it will be sufficient to raise the end of this finger by slightly depressing the wrist: it then passes with ease into the vagina. By following any other plan, we are liable to get astray, or succeed only after fumbling and groping, as unpleasant to the woman as disagreeable to the operator. Persons unaccustomed to touching should proceed with great caution, if they are desirous of avoiding mistakes, and omitting none of the indications which may be drawn from this mode of examination. When the finger has penetrated the genital organs, we should appreciate correctly the state and disposition of each of its organs. We begin by seizing each of the labia pudendi with the thumb and index finger, in order to ascertain its size, firmness, and healthy or diseased state. The palmar face of the index should then be directed behind the symphysis pubis, so as to touch and recognize the urethral canal, which, generally swollen in pregnant women, presents a sensation of a more or less voluminous cord, fixed below and movable above. Carrying the finger still deeper, we explore the *bas fond* of the bladder, and reach the cul-de-sac of the vagina, in the middle of which is the neck of the uterus. This neck, which may be circumscribed by a circular motion of the finger, is known by a single projection, free and divided at its apex into two lips by a transverse fissure. It is important to possess accurate notions of the size, thickness, sensibility, firmness, direction and absolute length of the neck; the disposition of the lips which form the os tincæ, the extent and form of the fissure, which constitutes its vaginal orifice, on the size and weight of the uterus, which may be raised on the end of the finger, in order to judge of its weight. The palmar face of the index is then directed backward, to ascertain the regularity of the curve of the sacrum, and the state of the rectum. By carrying the finger from right to left, we acquire precise ideas of the structure of the pelvic cavity, and the resistance of the sacro-ischiatic ligaments; arriving, then, at the inferior posterior part of the vagina, we there meet a kind of collar which, generally swollen in pregnant women, is formed by the hæmorrhoidal veins. Lastly, by withdrawing the finger, we judge of the length, thickness and integrity of the perineum, and ascertain whether it has or has not suffered from some injury or laceration in preceding deliveries.

We do not think it necessary to devote separate paragraphs to the consideration of abdominal and anal exploration, because, from the definition above given, the former is only the complement of the touch, properly so called, and the latter is not indispensable in the practice of midwifery; and both, taken collectively or separately, are insufficient without an examination per vaginam, to establish a certain and indispensable diagnosis of pregnancy. However, as these explorations are very useful, as they are sometimes employed in medicine and surgery, as the manner of performing them varies according to the nature of the signs we are desirous to ascertain, we shall, in a few words, point out the circumstances under which they may be advantageous.

The abdominal exploration, as a complement of the touch properly so called, is indispensable, whenever we wish to know the volume of the uterus, the period of pregnancy, or a disease affecting one of the organs contained in the pelvis. This exploration, assisted by percussion, is also necessary, but performed in another manner, when it is required to determine the location of a tumour, or any collection

of fluid in the belly. In the former case, the woman should lie on her back, the head inclined on the chest, the legs flexed on the thighs, the latter on the pelvis, in order to relax the abdominal muscles. Having introduced a finger into the vagina or rectum, with the ulnar edge of the other hand, we depress the anterior paries of the abdomen, so as to push it toward the vertebral column, and to be able with the palm of this hand to circumscribe and embrace between it and the finger in the vagina or rectum, the organ or tumour we wish to explore. In very fat women, in those of powerful constitution, and in nervous, irritable females, whose abdominal muscles contract on the slightest touch, it is sometimes very difficult to perform this kind of examination; but by proceeding slowly and cautiously, and especially by diverting their attention by questions foreign to the subject, we may sometimes succeed in repressing or preventing these spasmodic contractions, and in making all the necessary investigations. In the latter case, the woman being in the same position, the operator applies the palms of both hands at two points of the abdomen, more or less distant from each other, so as to confine, and seize, as it were, the organ or tumour of which he is anxious to determine the size or alteration. This mode of examination, analogous to that applied to divers other parts of the body, is frequently employed.

The examination per anum is so disagreeable to the majority of women, and its results are so little exact and satisfactory, that it is rarely used in midwifery. We ourselves have recourse to it only in some exceedingly rare cases. This remark, however, does not obtain in surgery; this mode of examination, either alone or in conjunction with that of the abdomen or vagina, is very useful in establishing the diagnosis of diseases of the anus, rectum, recto-vaginal septum, the uterus or its appendages, and, in the male, in certain affections which may be seated in the bladder or the vicinity of this organ.

The signs furnished by the touch concern the uterus and the fœtus itself: the former relate to the size and situation of the organ, the latter to the spontaneous movements of the fœtus, or to those we communicate to it in its mother's womb.

1st. *Signs relating to the disposition of the neck, size and situation of the uterus.*—These signs vary according to the degree of pregnancy. In a well formed woman, in whom the progress of pregnancy is uninterrupted by any accident, we observe the following:

In the two first months, the neck is slightly depressed; it is inclined forward: its length, size and density, present no remarkable change; according to A. Leroy, its heat is augmented; Mauriceau remarked that the neck was more acute; Levret that the posterior lip, which is generally the shorter, became elongated, and on the same level with the anterior. Hippocrates says that the vaginal orifice is closed, Stein that it is rounded. These signs would be more valuable, if they were more constant, more marked, less fugitive; if, in the empty uterus, the disposition of the neck were the same in all women; lastly, if they were observed only in pregnancy. But this is not the case; each or even many of these signs are present under circumstances foreign to pregnancy, which fact destroys or materially impairs the confidence we should be disposed to place in them. In fact, as long as the uterus is loose in the pelvic cavity, and increases in size and weight, it may be conceived that the fundus, finding more room in the concavity of the sacrum, has a tendency to be directed backward, whilst the neck is depressed and directed forward toward the pubes. The remark of A. Leroy is explained by the increased nutrition of the uterus; that of Levret by the straightening of the organ and its inclination in an opposite direction, thereby changing the position of the plane of the two lips in the empty state; those of Hippocrates and Stein by the increase of the fundus of the organ.

It is certain that during the first two months the uterus is rather heavier, less movable, and consequently more stationary. If we touch a woman who is not irritable nor very fat, we can, by forcibly depressing the hypogastrium, ascertain, by one hand on the abdomen and the finger of the other in the vagina, a very evident increase of size of the uterus.

At the third month the volume, weight and fixedness of the uterus increase, owing to an uniform regular development of the fundus of the organ, which tends to occupy the whole free space between the bladder and the rectum. At this period the fundus begins to project in the hypogastrium; it extends beyond the margin of the pelvis: the neck is directed more backwardly, because the uterus, in order to ascend from the pelvic into the abdominal cavity, is obliged to follow the direction of the axis of the superior strait. We may then elevate or depress the uterus in the direction of this axis; the oscillatory movements forward, backward, or laterally, being, if not impossible, at least very difficult and limited: if we succeed in carrying the neck forward or backward, it will be by communicating to it an inflexion in the direction of the force applied. The hand, placed on the hypogastrium, informs us that the fundus remains immovable, and does not obey the motion communicated to the neck. Another sign not pointed out by writers, and which we consider of great value, is the following:—At three months it is impossible to pass between the symphysis pubis and uterus the finger introduced into the vagina in order to meet the hand on the hypogastrium, as may be done in the majority of women at two months, sometimes at four, by raising slightly the uterus, and especially in thin, unirritable women, whose abdominal parietes are much relaxed. This sign, which we have always observed in pregnancy, is wanting in the various diseases of the uterus, and generally in the case of tumours developed in the pelvis. It proceeds, as we above remarked, from the uniform development of the fundus uteri, which occupies the whole space between the symphysis pubis and the promontory of the sacrum.

At four months, the ascending movement of the uterus continuing, the fundus extends four fingers' breadth beyond the symphysis pubis; the neck, slightly more elevated, preserves the direction it had at the third, and, although it does not contribute so sensibly to the enlargement of the uterine cavity, nevertheless, by carrying the finger in front of the neck and behind the bas fond of the bladder, we may, by depressing the hypogastrium, recognize an obscure fluctuation, and often even perceive the movement of *ballottement*.

At five months, the fundus uteri is about two fingers' breadth below the umbilicus. The hypogastrium, projecting and rounded, no longer allows the woman to conceal her situation; she, moreover, distincly feels the motions of the fœtus. The vagina is elongated and narrowed; the neck, more elevated, is reached with greater difficulty; it is now perceived to turn upwardly; *ballottement* is more readily performed.

At six months, the fundus uteri is at the height of the umbilicus, which, instead of being depressed as previously, begins to project beyond the integuments; the vagina, elongated and contracted, exhibits only a few slightly projecting wrinkles at its lower portion; the neck, situated nearly on a level with the superior strait, turned out at its upper part, is sensibly shorter, less firm, and larger than in the preceding months. The movement of ballottement is so easily effected that it may be perceived even by persons unskilled in touching. At that period it is frequently possible to determine the presentation of the fœtus.

At seven months, the fundus uteri extends two fingers' breadth beyond the umbilicus; the distended abdominal muscles become painful at their insertions, especially in women pregnant for the first time. These pains, which are not constant, appear momentarily at irregular periods, are felt in the groins, more especially at the base of the thorax, and more frequently on the right than on the left, probably on account of the more frequent right lateral obliquity of the uterus. The whole of the *anatomical neck* has disappeared and assisted to form the uterine cavity; we can distinguish merely the projection formed by the os tincæ more or less voluminous and softened. The position of the fœtus at that time is generally that which it will retain at birth.

At eight months, the fundus uteri rises into the epigastric region; the skin of the belly, immeasurably distended, cracks in every direction, and exhibits livid wales, (like the marks left by a switch,) in the groins and over different parts of the abdomen. The os tincæ softens and commences to disappear.

At nine months the belly sinks; the respiration becomes more free, the woman more gay; the fundus uteri returns to nearly the position it occupied in the seventh month; the os tincæ is effaced and disappears. Reduced to the thickness of a few sheets of paper, it only awaits the first efforts of uterine contraction to yield entirely, open, and dilate.

However regular may be the development of the uterus, it must not be supposed that it never deviates from the course we have just delineated: the limits here given must be merely considered as the average of a great number of observations. In some women the fundus uteri rises more or less, according to the shape and capacity of the belly and pelvis, and especially according to the greater or less resistance of the abdominal parietes. In some also the neck yields at an earlier, in others at a later period, thus producing variations in the duration of pregnancy.

The development of the uterus in consequence of pregnancy may be confounded with the following affections:—hypertrophy; inflammatory, scirrhous, cancerous, or tuberculous inflammation; fibrous tumours; polypi; uterine tympanitis and the various watery and bloody collections which may take place in this organ; tubular dropsy; acute or chronic inflammation of the ovaries, and the scirrhous or encysted tumours which generally result from it. Notwithstanding our desire to point out here the differential diagnosis of these various morbid states, and to give a complete and exact description of the signs which characterize them, as we are accustomed to do in our lectures, the fear of wandering too far from our subject compels us to refer the reader to the various pathological treatises on these affections. We will simply remark, 1st, that these various affections can scarcely be mistaken for an incipient pregnancy; for, when it has passed the third, and, à fortiori, the fourth month, the signs derived from the fœtus may be perceived, and a mistake is not easily made: 2d, that the development of the uterus in these different morbid states is never so regular, except in hypertrophy, nor so considerable as that resulting from pregnancy: 3d, that it is almost always accompanied by partial swelling of the neck or body, with induration, softening, inequalities, and exaltation of sensibility: 4th, that in a majority of these affections the catamenia, far from being suppressed, flow more copiously; there is often a continual discharge of blood, mucus, sanguineous, or sero-purulent serum, more or less offensive, which does not generally occur in pregnancy: 5th, that the uterus frequently adheres, by one or more points of its circumference, to the adjacent parts, thus depriving it of the mobility it enjoys in pregnancy: 6th, and lastly, that, in the affections which might lead us into error—such as tympanitis, dropsy of the uterus, collections of blood, certain encysted tumours of the ovaries—the causes, seat, progress of the disease, shape of the tumour, weight of the organ, occlusion of the neck, and fluctuation without ballottement, will generally enable us to form a correct diagnosis. Thus, a hypertrophy, of which the development may be regular, never becomes sufficiently large to deceive us beyond the second month: tympanitis is never so considerable as to sensibly diminish the weight of the organ, and in the cases of this affection which have fallen under our notice, the expulsion of gas by the vulva, when we touched, raised, or compressed the uterus, revealed to us immediately the nature of the affection. In hydrometra and sanguineous collections, the occlusion of the neck, fluctuation with absence of stethoscopic signs, the various motions of the fœtus, and especially of ballottement, do not permit us to mistake these different diseases for pregnancy.

2d. *Signs furnished by the fœtus. Motions of the fœtus.*—The fœtus can execute in the womb two kinds of motions: the former, produced by the action of the fœtal organs themselves, are *active motions:* the latter are foreign to the organs considered separately, but inherent to the whole mass of the fœtus, and depend on the displacement of this mass, when in the different positions of the woman's body, it obeys the laws of gravity, or yields to some external impression. These are *passive motions* or *motions of ballottement.*

Active motions.—These motions are the result of the contraction of the muscles of the fœtus; and their intensity is proportioned to the development of the locomotive apparatus. So long as the muscular and nervous systems are in a rudimentary state, these active motions cannot take place: but so soon as the muscles, the cerebro-spinal axis and the nerves arising from it, are sufficiently developed, they begin to be perceived. At first, the percussion exerted against the abdominal parietes, by the delicate limbs of the fœtus, through a large quantity of fluid, is so weak, that the woman is unconscious of them: they are distinctly perceived about the fourth month of utero-gestation, and increase in strength with the growth of the fœtus.

The first movements of the fœtus are felt in the hypogastrium, on a level with one of the iliac fossæ, generally on waking in the morning, or soon after retiring at night, when the woman rests on her back. These periods and this position should be chosen if we wish to perceive them.

This sensation is at first so delicate, as to be compared by some women to the titillation produced by the *claws of a spider.* This feeling becoming soon more distinct, indicates that slight shocks take place in the uterine cavity; these shocks subsequently become so strong and sudden as to be easily perceived by the hand laid on the abdomen, and in some cases elevate the abdominal parietes and clothes so as to be visible to the eye.

The characters of the motions of the fœtus are so distinct and so marked, that when they have been once clearly felt and observed, it is difficult to mistake them for those which might proceed from the accumulation of gas in the intestines, or spasm of some of the abdominal muscles or viscera: nevertheless, we must confess that nervous, sickly and hysterical women, and those about the change of life, sometimes experience in the belly motions analogous to those of the fœtus. When these motions coincide with a suppression or cessation of the catamenia, an enlargement of the belly produced by obesity, or flatulence, it is evident, that such an error may arise, and that women, in

these circumstances, may think themselves pregnant when such an occurrence is impossible. It should be remembered that similar mistakes have been made by experienced women, who have had several children, and even by well-informed physicians.

In order to perceive the active motions of the fœtus, the woman should be laid on her back, the abdominal muscles relaxed, one hand should be applied to the hypogastrium, depressing slightly the anterior wall of the belly, and waiting patiently for their manifestation: we shall soon feel one or several short blows, irregular both as regards their strength and the interval between them. These motions may sometimes be excited, by applying suddenly, according to the advice of Morgagni, the hand made cold by immersion in water, or by any other means.

Many circumstances may advance or retard the manifestation of these motions, increase or diminish their intensity, suspend them for a greater or less length of time, or cause them to cease entirely: the principal of these are; 1st, the rigour or debility, disease or death, of the fœtus; 2d, the quantity of fluid which surrounds it; 3d, the sensibility of the uterus.

When the fœtus is vigorous and the uterus very sensible, the motions are perceived sooner: the contrary obtains if the uterus is less sensible, or contains a large quantity of water. In the majority of a very large number of examinations made by ourselves, we have perceived the active motions of the fœtus at the one hundred and tenth day after conception. Some nervous women have assured us that they have felt them at ninety days or three months, but we must confess that we have never been able, as in the preceding case, to verify or contradict the exactness of their assertion. Women gifted with less sensibility, do not perceive these motions until four and a half, five, six, or even seven months: lastly, in some very rare cases, they have reached the full time without ever having been conscious of them. Levret, De la Motte, Bourbon, Baudelocque, and other writers, relate similar facts; we have also, in the preceding pages, collected and reported several. It sometimes happens, but *rarely*, that the motions of the fœtus after having been felt as usual, during a longer or shorter period of time, suddenly cease, either to appear no more, or to be manifest a few days before birth. Complete cessation of the active motions should inspire great uneasiness as to the existence of the fœtus, for, under these circumstances, it it is seldom born alive.

We may conclude from the preceding remarks, 1st, That the active motions of the fœtus, when they are present, are indubitable signs of pregnancy and of the vitality of the fœtus; 2d, that it is, however, possible to confound them with other motions produced by various morbid states; 3d, that the period of their manifestation is too variable to assist in determining precisely the stage of pregnancy; 4th, that their absence is no proof against pregnancy; 5th, that their entire cessation, without absolutely indicating the death of the fœtus, is always to be regarded with great suspicion.

Passive motions or *motions of Ballottement*.—These motions being the result of physical laws, are independent of the muscular force and vitality of the fœtus: they take place whether the fœtus be alive or dead; their manifestation, founded on the difference between the specific gravity of the fœtus and that of the liquor amnii, requires the former to possess a certain size and weight; therefore, they cannot be produced in the early stages of pregnancy; or, if they are, the impulse accruing from them is too feeble to be appreciated.

In order to form an exact idea of the manner of executing the ballottement, and of the value of this sign, we must understand correctly the conditions necessary for its performance.

Ballottement can take place only when a solid body surrounded by a fluid of less specific gravity, is contained in a cavity large enough to allow it to move about freely; hence it follows, that these conditions which are found in none of the morbid states which might be mistaken for pregnancy, are precisely those in which the fœtus is found in the uterus.

In order to make ourselves more clearly understood, let us suppose that a solid, a sphere, for example, of greater specific gravity than distilled water, such as a marble ball, be placed in a glass tube sufficiently large to allow it to enjoy free motion; and that this tube, suspended vertically, open above and closed below by a diaphragm of parchment, be filled with water. The weight of the fluid and the ball bearing on the parchment diaphragm, will cause a projection outwardly, of which the centre as the most depending part, will be occupied by the marble ball. If, with the palmar face of the finger, applied beneath the parchment, we strike from below upwards, we shall communicate to the ball an ascending movement proportioned to the degree of force employed. As long as the impulse is superior to the resistance of the fluid and the weight of the ball, the latter will continue to ascend; but, at the moment at which this power is exhausted, the sphere, obeying the laws of gravity, will displace a quantity of fluid equal to its own volume, and to that which it had displaced during its ascent, and will return to its original situation, with a rapidity proportioned to its size, and modified also by the resistance of the fluid; the shock communicated, by the return of the ball, to the parchment and mediately to the finger, constitutes the motion known by the name of *ballottement*.

Applying, now, this comparison to pregnancy, we observe that the fœtus in utero is in a situation precisely analogous to that of the ball in the tube. If, by striking the most depending part of the uterus, we give an impulsion to the fœtus, we must momentarily displace it; and when, obeying gravity, it returns to the place it occupied, it must produce a shock, and consequently, the motion of *ballottement*.

In order to perceive the ballottement, the operator places the woman in the erect position, with her shoulders leaning against some solid body, as a wall or piece of furniture, so as to cause the abdomen to project. He then introduces a finger into the vagina as far as the os uteri, and applies at the same time the other hand on the abdomen, so as to include the uterus between the two, which must act together. The elbow rests on the knee, for the reasons above given; and, with the palmar face of the finger placed in front of the os tincæ, on the *anterior* and *not* on the posterior segment of the neck, as is directed in many works on midwifery, he strikes the uterus lightly from below upward, so as to raise the fœtus and remove it from the situation it occupies there; after a short time, with the hand on the abdomen, he presses the fundus of the organ from above downward, to accelerate the descent of the fœtus and increase the intensity of the returning shock, which is to be received by the finger. This last precaution is particularly useful when we wish to try ballottement at an early stage of pregnancy, at four months, for example. At this period, we prefer the horizontal to the erect position, because then the presenting part of the fœtus, pushed forward by the promontory of the sacrum, occupies in the uterus the space comprised between the os tincæ and symphysis pubis. We may also, in some cases, in the recumbent position, perceive a kind of ballottement by striking the abdominal parietes, as in a case of ascites, to feel the fluctuation.

Women who carry in utero an inanimate fœtus, experience another sort of ballottement. It consists in the sensation of an inert mass,

which is displaced and moved to the right or left side of the belly, whenever the female changes her position in bed. This sensation, often mistaken for the active motions of the fœtus, leads many women to say and believe, when their child is born dead, or perhaps half decomposed, that they felt it move shortly before delivery.

The movement of ballottement is manifest at nearly the same period as the double pulsations of the heart; it is more constantly and easily perceived than they; it exists always, whether the fœtus be dead or alive, and as it belongs to pregnancy alone, it is a pathognomonic sign of this state.

Recapitulation.—From the minute and comparative examination first made of the signs of pregnancy, it follows that, 1st, no one sign can determine with certainty a recent conception; 2d, the certainty of pregnancy cannot be acquired by the signs called *rational* or *equivocal;* 3d, among the sensible signs, those furnished by the eye are insufficient; 4th, the audible and tangible signs, and those derived from the fœtus, can alone characterize this state; 5th, among the last, the active motions of the fœtus may, if not lead into error, at least be mistaken for other movements produced by divers morbid states; 6th, the double pulsations of the heart, which at once denote pregnancy and the vitality of the fœtus, are sometimes wanting, and are never heard when the fœtus is inanimate; 7th, lastly, the motion of ballottement is the most constant, and best of all these signs, because, like the double pulsations of the fœtal heart, it belongs only to pregnancy, exists when these pulsations are absent, and even when the fœtus is deprived of life.

From the preceding observations, we may conclude that, in order to decide with certainty on the existence of pregnancy, we should always wait until the fifth, or, at least, the fourth month, because the signs derived from the fœtus are manifest only at that period. We may add that it is frequently necessary to wait much longer, because at that age the motions of the fœtus are so feeble and indistinct, that they leave the mind still in doubt. Therefore, we would advise the physician, in difficult cases, in those where pregnancy is complicated with a disease which may simulate it, and especially in cases relating to medical jurisprudence, when it becomes necessary to answer affirmatively before a judge or court, never to give a decided opinion without having distinctly perceived the double pulsations of the fœtal heart, or the ballottement. But in ordinary cases, not requiring such great accuracy, we are of the opinion of Baudelocque, and believe that an experienced practitioner can pronounce much more readily, by basing his diagnosis less on the rational signs, than on the changes which have occurred in the uterus. It has hence happened to us, as undoubtedly to many others, to decide on the existence of pregnancy at the third or even at the end of the second month, and the event has confirmed the accuracy of our diagnosis.

To determine the stage of pregnancy.—The medical man is consulted not only to know if a woman be pregnant, but also frequently to determine the stage of her pregnancy. In order to solve this question, the physician must call to his assistance all the commemorative, equivocal and sensible signs he can collect; he should compare them together, examine them well, in order to draw more or less exact inferences, which, notwithstanding all his caution, will be only approximative, unless he should meet one of those very rare and exclusive cases, in which he is generally not consulted, of pregnancy following a single connection.

In order to arrive at a satisfactory result, we begin by ascertaining the number of menstrual periods which have been passed over without any appearance of the catamenia; the number of days elapsed since the cessation of the last evacuation is counted; the number of days and menstrual periods is compared with the first manifestation of the motions of the fœtus, if any have been felt; comparing then these data with the signs furnished by the touch, we may determine, within a few days, the stage of pregnancy.

To determine the sex.—"In all ages," says Désormeaux,* "that active spirit of inquiry which leads men to penetrate into futurity, has excited in them the desire to ascertain the sex of a child long before its birth. Motives of vital interest sometimes lend additional energy to this curiosity." It is not surprising, therefore, that, from the most remote antiquity, the signs capable of throwing light on this subject have been sought for most anxiously. In the writings attributed to Hippocrates, we find the following aphorism: Mulier prægnans, si marem gestat, coloratior est; si fœminam, minus colorata;† that is to say, a woman pregnant with a male child is more lively and gay; that she has neither dislikes, nausea nor vomiting, nor blotches; in short, that she enjoys better health than the female pregnant with a child of the opposite sex. Unfortunately, facts of daily occurrence contradict these assertions. Another of his aphorisms is: Mares fœtus uteri dextrâ parti, fœmina sinistra magis gestantur.‡ But if we observe the conformation and disposition of the uterus, which in eight cases of pregnancy out of ten, is inclined to the right, it will be easy to assign its true value to this remark of the Father of Medicine. This aphorism, like the preceding, has given rise to hypotheses with quite as slight foundation. It has been pretended that the whole right side of a woman pregnant with a boy was stronger, more developed, more disposed to motion than the left; that she always turned to the right when attempting to rise from the recumbent position, and in walking always started with the right foot. Lastly, it has been supposed that the right ovarium was devoted to the production of male, and the left to that of female germs; in accordance with this theory, we might procreate at will boys or girls, if, in the connection of the sexes, we could impregnate at pleasure the right or left ovarium.

This system, revived in modern times, is now completely abandoned, because it is contrary to observation. In fact, in animals with a bifurcated uterus, as the carnivora and rodentia, where the product of conception is developed rather in the tubes than in the cavity of the uterus itself, we find equally males and females in both tubes. The human species also furnishes facts which overthrow this system. We have related some remarkable cases at page 47, among others that of the woman B——, who, having a bilobed uterus, had conceived a girl in the right and a boy in the left half of this organ; and that of a woman who, having only the left half of a uterus, had nevertheless given birth to children of different sexes. The production of male germs cannot, therefore, be attributed to one rather than to the other ovarium. Were we permitted to advance an opinion or an hypothesis on so obscure a subject, we should say, from some experiments on domestic animals, from a great number of observations in the human species, from the remarks made in confidence to us, and also from the result of advice which we have given in some cases, that the production of the sex appears to us to be determined by that one of the two individuals who, during the performance of the act of generation, is relatively possessed of a higher degree of vital energy, an energy which is far from being always in harmony with the stature of the individual.

In conclusion, we can say nothing positively as regards the procreation of the sexes, nor the signs by which they may be known

* Dictionaire de Médecine, en 20 vols. Paris, 1824, art. Grossesses. † Aphor. 41, sect. 5. ‡ Aphor. 47, sect. 5.

when enclosed in the uterus. The only remark we can make is, that women who have given birth to several children of different sexes have stated that they felt, in the pregnancy of boys, a series and succession of phenomena which they did not observe with girls, and which were so marked that they could accurately foretell the sex of the child. These differences do not exist in all women: when they are present they do not always bear on the same phenomena, and do not in all women belong to the same sex: thus, one female enjoys better health when pregnant with a girl, another with a boy: these differences, therefore, have a purely individual interest and application, and can lead to no general conclusions.

Duration of pregnancy.—The duration of pregnancy is of nine months, or two hundred and seventy days. Is this period invariable, fixed, and absolute? About the middle of the last century this question excited a learned and animated discussion among French physicians. This discussion has given rise to a multitude of essays, in which, through a controversy not always characterized by courtesy, we find some rare and curious facts, which unfortunately do not all possess the degree of accuracy and authenticity necessary to carry conviction into critical and judicious minds. What is the consequence? As we often see, each one adheres to his original opinion. Louis, Bouvart, and their party, whilst admitting the possibility of births before the period of two hundred and seventy days, would not allow that pregnancy could be extended beyond that term. Petit, Lebas, and their partisans, maintained by facts which, as we have said, are not all exempt from criticism, by reasons based on analogous occurrences in animals, that, since certain causes might hasten the period of maturity of the product of conception, that others might likewise retard it: they consequently admitted the possibility of retarded births.

Without wishing to enter upon the discussion of *precocious* and *retarded* births, in a medico-legal point of view, since the French laws admit the legitimacy of a child born on the one hundred and eightieth day after marriage, and the three hundredth after the dissolution of this compact, we think it our duty, with the hope of throwing some light on this subject, to select, from a number of cases which we have collected, the following.

The wife of one of our most respectable magistrates, already the mother of several children, had menstruated for the last time on the 8th of April, 1834: conception may, therefore, have taken place on the 9th. About the end of May this lady, not having menstruated, and feeling, moreover, since the month of April, certain signs which led her to suppose that she was pregnant, came to consult us as to the propriety of undertaking a journey at some distance from Paris, to meet her mother who resided in the country. From the presumed date of conception, we thought it prudent to advise her not to undertake this journey until after the lapse of the third menstrual period, which she did. Having gone into the country, her mother thought she ought to lose some blood, but this the young lady would not consent to without having previously asked our opinion. She, therefore, wrote to her husband, under the date of August 15th, in the following words. "My mother desires me to be bled, but I have neither dizziness nor headache: I have felt my child from the beginning of August: in short, I am so well that I will do nothing without the advice of M. Moreau. Go, therefore, and ask him, etc." We answered that a bleeding was never a matter of indifference; that, if the lady was as well as she represented herself to be, she ought to make no change in her mode of life, but reserve the bleeding for a more advanced period of pregnancy, if symptoms of plethora should supervene. This advice was followed. In the latter part of August the husband, taking advantage of the vacation in the court, went to see his wife in the country, and ascertained for himself that the fœtus was performing motions which daily became more vigorous.

We had occasion to see this lady in November, shortly after her return to Paris. From her calculation and our own, we judged that she would be delivered about the 3d of January. In the first days of January she was attacked with such frequent acute and regular abdominal pains, so much resembling the pains of labour, that she thought her delivery was close at hand, and sent for us. After an examination per vaginam, we assured her that she was not in labour; that she had been probably mistaken in her calculation, for the neck of the uterus, instead of having disappeared, was elongated, and would probably resist any efforts of expulsion for more than a month to come. We then verified our calculation; the letter written on the 15th of August was shown to us, and all the preceding circumstances carefully detailed. We took a note of it. We persisted in our assertion; a warm bath and an emollient enema relieved the pains; all went on well.

She was very comfortable for eight days, when new pains as regular and acute as those she had felt eight days previously, reappeared. The father of the young lady, as well as all her family, conceived that she was in labour, came for us himself, and took us to see his daughter. On our arrival, a new examination confirmed our previous opinion, that the period of delivery was yet remote. But as the pains in the uterine region were accompanied by severe pain in the head, quickening and fulness of the pulse, we thought it advisable to take some blood and apply over the belly a poultice moistened with laudanum, to confine the patient to strict diet and the use of cool and slightly acidulated drinks. She was bled in the arm to twelve ounces with some relief. The family being uneasy, begged us not to leave the patient, and to pass the night in the house, which we did in order to quiet their fears, although convinced that our presence was unnecessary. The next morning the abdominal pains had not ceased, the headache being more severe, in consultation with the family physician, our esteemed friend M. Bailly, she was again bled to sixteen ounces, compresses saturated with vinegar and water were applied to the forehead, and the narcotic poultices to the belly renewed; these remedies gave some relief. The following day the patient being no better, ten leeches were applied behind the mastoid processes, a gentle laxative of half an ounce of oleum ricini was administered, which caused the evacuation of some hardened fæces which had resisted the daily administration of enemata. This young lady suffered still for several days; but from this moment she no longer felt the motions of her child. The latter part of January and all the month of February elapsed without pain or the reappearance of the motions of the fœtus; a circumstance which gave us great uneasiness as to the life of the child. On the night of the 2d of March, 1835, she was attacked with uterine contractions, and was delivered that day, to our great satisfaction, of a vigorous and healthy female infant.

If we examine the circumstances accompanying this case, we shall see, in the first place, that if conception took place immediately after the cessation of the catamenia, that is, on the 9th of April, the motions of the fœtus were felt at one hundred and ten days, or three months and twenty days, the earliest period at which, up to the present time, we have ever been able to ascertain their appearance. From this supposition, the duration of pregnancy must have been three hundred and twenty-eight days, or eleven months minus two days:

consequently, twenty-eight days beyond the period fixed by law. If conception occurred between the last menstrual period and the first suppressed epoch, that is from the 9th of April to the 2d of May; if, indeed, it took place only on the 2d of May, the day preceding that on which the first suppressed epoch should reappear, the ordinary duration of the catamenia in this lady being from five to six days, the motions of the fœtus must have been felt at ninety days or three months. But we should remark, that if it is strictly possible that conception can have taken place at so late a period, that appears to us improbable, 1st, because we have no authentic example of the manifestations of the motions of the fœtus at so early a period: 2d, because this lady felt already in the course of the month of April signs of pregnancy, which afterward continued and proved to be correct. Again, even under *this* extreme supposition, the duration of the pregnancy must have been of three hundred and four days, or more than ten months. To these considerations we would add that this lady, having had several children, was not likely to be mistaken as to her situation, nor the nature of the motions she felt in her uterus; motions which gradually became more intense, and which she continued regularly to perceive until the disturbance in the month of January. Lastly, the case is one of an excellent mother, the correctness of whose conduct is beyond the reach of scandal; of a woman who belongs to the most honourable rank of society, who had left neither her husband nor her family, and who, consequently, had *no interest* in shortening or prolonging her pregnancy, and who, moreover, was ignorant that pregnancy could extend beyond nine months. This fact, in our opinion, should satisfy the most sceptical mind, and without the fear of being taxed with an absurd credulity, we consider it as a well authenticated example of retarded birth. Nevertheless, notwithstanding this fact and similar ones which might be produced, we are far from condemning the law: on the contrary, when we reflect on the numerous abuses which might occur, the disturbances which might arise in families, and consequently in the whole of society, if the law had admitted the legitimacy of birth at a more remote period, we acknowledge with pleasure the great wisdom which presided over its enactment: for in truth, to be good, it is not always necessary that a law should be just in every case, but it must be suited to the greatest number; and when, forseeing exceptions, it furnishes the means of producing them and including them in the common law, it has reached, as nearly as possible, perfection. In this point of view Article 315 of the Civil Code cannot be improved.

Sympathetic affections which supervene during the course of an ordinary pregnancy.—Pregnant women are sometimes subject to sympathetic affections requiring the assistance of art. Those for which the accoucheur is most frequently consulted are odontalgia, ptyalism, acidity, nausea and vomiting, dyspepsia, constipation, hæmorrhoids, varices, plethora, dyspnœa, and other lesions of respiration or innervation.

Odontalgia.—The odontalgia which affects pregnant women is in a majority of cases merely neurosis; sometimes it proceeds from congestion of blood on the painful side of the jaws. The special and distinctive characteristic of this disease is the soundness of the teeth: the pain which accompanies it is generally intermittent, and seated on one side of the face. When the pain is very acute, it extends from the alveolar processes to the adjacent parts, that is to the face, temple, and ear, following the nervous filaments of the seventh pair.

This disease often yields, as already remarked by Mauriceau, to general or local blood-letting; sometimes we derive good effects from general baths, the local use of narcotics, the administration in the form of a gargle of antispasmodics, especially of camphor, either alone or combined with opiates. When this affection continues, M. Imbert, Surgeon in Chief of the Charité at Lyons, gives Méglin's pills* in the dose of four, six, or even ten per diem; and as soon as it assumes an intermittent type, he administers quinine and arrests the disease.† Under these circumstances it is always useful to carefully keep the bowels soluble, and even to have recourse to mild laxatives, if enemata are insufficient.

Ptyalism.—Ptyalism is caused by a superabundant secretion of saliva. It consists in an almost continual expectoration of a viscid and ropy liquid, as disagreeable as annoying. It is neither dangerous nor painful. Aromatic infusions, such as those of tea, chamomile, fennel or aniseed, or some of the labiate plants, are recommended for its relief. When ptyalism is obstinate, some practitioners have recourse to venesection, gentle purgatives, the use of absorbent powders, such as calcined magnesia, powdered crab's eyes. Désormeaux advises the patient to keep continually in her mouth some sugar candy or gum Arabic. Lastly, in some cases astringents are useful.

We think that, in so slight an affection, active remedies should be employed with great caution, especially as their use is not always free from danger. Murat‡ relates the case of a young woman in whom the suppression of ptyalism, by the use of astringents, was followed by a fatal attack of apoplexy.

We may remark that ptyalism, like the nausea and vomiting which accompany it, generally ceases spontaneously about the third or fourth month: but when it exceeds this period, it ordinarily continues until the end of pregnancy.

Acidity.—Under some circumstances, this appears before or after meals; women suffer, at that time, from acid, nidorous eructations having, sometimes, a most intolerable taste. The remedies to be used are the bitters, the infusion of chamomile flowers, centaury, generous wines, and absorbent medicines, particularly calcined magnesia.

Nausea and vomiting.—Of these we have already spoken; when moderate they are not dangerous, and terminate naturally between the third and fourth month. If the vomiting be very frequent, it occasions pain and an agitation which, in some cases, may oppose the progress of pregnancy and produce abortion; at other times it interferes with the nutrition of the woman, and gives rise to emaciation and consequent sensibility which may, in some rare cases, prove fatal.

In the sympathetic vomiting of the first months of pregnancy, we may derive advantage from the use of calcined magnesia, alkaline lozenges of vichy, a few grains of powdered columbo, or a plaster of theriaca§ moistened with laudanum. When the tongue is covered by a yellowish coat, and the mouth is clammy and bitter, when there is thirst, want of appetite, and the skin is dry and warm, with constipation, we must have recourse to cool and slightly acidulated drinks, and gentle laxatives. If the vomiting be accompanied by redness of the tongue, pain in the epigastrium, frequency of the pulse, and, à fortiori, by fever; venesection, or a few leeches to the epigastrium, will

* Méglin's Pills.—R. Extract Hyoscyam. Nig.; Ex. Valerian, officinal; Ex. Fumariæ. officin. āā ʒi. M. f. in pilul. No. xlv.—Tr.

† Imbert (de Lyon) Traité Théorique et Pratique des Maladies des Femmes, 1 vol. in 8vo. p. 400. 1840.

‡ Dictionnaire des Sciences Medicales. Tom. xix. p. 450.

§ The theriaca is now superseded by the confection of opium.—Trans.

generally arrest it. In nervous women, and those of a feeble constitution, debilitated by preceding diseases or privations, we may use with great benefit ice, iced effervescent drinks, and sometimes rich wines, like those of Spain, Roussillon, or Madeira.

Dyspepsia.—The digestion may be slow and difficult: this state, which constitutes dyspepsia, may be continuous, or may alternate with natural digestion; constipation is then generally present. No fixed rules can be laid down; we must ascertain if the dyspepsia proceeds from the sympathetic action of the uterus, from some disease of the digestive organs, or from general or local debility. In the first case, we must wait or administer antispasmodics; in the second, apply the remedies appropriate to the affection. When the dyspepsia is asthenic, tonics and internal and external stimulants are useful: the best remedies are exercise, frictions, salt water or river baths, and the sulphureous waters.

Constipation.—This is frequently observed during pregnancy: it often occasions insomnia, cephalalgia, and an uncomfortable heat, and should be treated by enemata, laxatives, and gentle purgatives. If the constipation be habitual, we must resort to chicken and veal soup, and to a vegetable diet.

Hæmorrhoids.—In fat women hæmorrhoids appear to result from the pressure exercised by the uterus on the rectum, and the accumulation of substances in the large intestines, for they frequently disappear spontaneously after delivery. When they give great pain, or are very large, we endeavour to return and keep them in situ by a tampon: if this cannot be done, the intestine should be emptied, and then baths, poultices, emollient and narcotic lotions, inunction with tranquillizing balsam,* or the unguentum populi, are of great service. When these different means procure no relief, many physicians recommend a few leeches around these tumours. Désormeaux asserts that he never derived any permanent benefit from their use. Some women find great comfort from the use of an easy chair.

Varices.—In the latter stages of pregnancy the veins of the lower extremities frequently become varicose: we must then resort to gradual compression by means of a dog's skin stocking, or a canvass gaiter, laced tightly on the outside of the limb, to arrest or moderate their increase, or prevent their rupture, which is invariably followed by hæmorrhage, and even, as in the following case, by death.

C———, fifty years of age, had been for four years employed as a servant in the kitchen of the lying-in hospital. This woman, rather tall, enjoying good health, pregnant for the sixth time, had numerous varices in the legs and thighs. On the 5th of February, 1836, being about eight months gone with child, she went down into the kitchen about four o'clock in the morning, according to custom, to attend to her work. She struck the external malleolus of the left foot against one of the steps of the stairs; one of the varices was ruptured, and the blood flowed copiously. She endeavoured in vain to stop it; syncope supervened; and, at five o'clock, when her fellow servants entered the kitchen, they found her extended on the floor almost lifeless. She could give an account of what had happened to her, but had lost so much blood as to render all assistance useless. She was attacked with fainting, vomiting, and convulsive motions, and expired at half past six, A. M., exhibiting no other lesion than that of the external saphena vein.

Œdema.—Œdema generally affects the feet, extends sometimes to the legs, thighs, and even to the labia pudendi, which it distends enormously, so as to occasionally produce gangrene, as we have observed: at other times, but more rarely, it attacks the whole body. In the first case it is owing to the compression of the vessels of the pelvis by the distended uterus when the woman is standing or sitting, as is proved by the diminution or cessation of the infiltration when she has been for some time in the horizontal position; in the second, it is produced by a kind of plethora or serous effusion. Partial œdema may be relieved by rest in the horizontal position, the use of diuretics, gentle laxatives, and sometimes by scarifications. Venesection is generally useful in anasarca.

Plethora.—This may be considered as the most common inconvenience: it is marked by headache, flashes of heat in the face, vertigo, dyspnœa, drowsiness, and hardness of the pulse. When these symptoms exist, venesection is the remedy above all others. Sometimes signs of congestion appear in the abdomen: then the kidneys and loins are painful, the belly is swollen and tender, and a small quantity of blood sometimes escapes from the vulva. This uterine congestion is particularly manifest at the periods coinciding with the ordinary duration of the catamenia, or from the influence of physical or moral causes. Venesection, a milk diet, and exercise, suit these cases, and to these remedies we may add cooling drinks and a refreshing regimen.

* Tranquilizing balsam. (Baume Tranquille.) Take of the green leaves of Hyoscyamus, Cynoglossum, and Tobacco, each one pound; boil them in three pints of wine down to two pints; strain, and add as much olive oil; boil again over a very gentle fire down to one half; let it settle, and then decant it.—Trans.

PART THIRD.

EXPULSION OF THE PRODUCT OF CONCEPTION.

After having remained for a greater or less length of time in the cavity of the uterus, and there undergone the whole or only a part of the changes necessary to its complete development, the product of conception is expelled from that organ. This expulsion constitutes a function which, considered in a general manner, that is, in its application to the whole of the mammalia, is designated by the name of *parturition.*

When the period of maturity of the ovum arrives, this function is usually performed. It may, however, sometimes occur previously: sometimes also, but rarely, subsequently. In animals, the expulsion which happens before the period of viability of the fœtus, is called *abortion;* and *parturition* when it has passed through all the phases of intra-uterine life. In the human species we apply the term *effluxion* to any expulsion during the first seven days of pregnancy, because the ovum, having contracted no intimate adhesions to the uterus, is expelled without pain to the mother, and sometimes even without consciousness on her part of the event. The term *miscarriage* or *abortion* designates the expulsion which takes place previous to the viability of the fœtus. We call a delivery *premature* which occurs from the one hundred and eightieth to the two hundred and seventieth day; and *delivery properly so called, timely* or *at term*, that which supervenes on the two hundred and seventieth day after conception, that is, when the fœtus has reached its perfect development. Nevertheless, as women rarely know the precise moment at which they conceived, and as they may err in their reckoning, this term is extended to every expulsion which may happen from the two hundred and seventieth to the two hundred and eightieth day. Lastly, labour is said to be *tardy* or *retarded* when it occurs beyond this time.

Labour being the final result of pregnancy, the goal which nature endeavours to attain, we shall commence its study at once; that of the various expulsions of the products of conception, effluxion and abortion, which are merely anomalies in the progress and duration of pregnancy, will be examined hereafter.

OF LABOUR.

I.—*Definition of Labour.*

Very few authors have attempted to define labour, and those who have given an explanation of it, do not agree in the use of terms. Mauriceau calls by this name the emission or extraction from the uterus of the infant at full term. Désormeaux merely paraphrases this simple definition by saying that it is the expulsion or extraction of the fœtus from the uterus where it was developed during the period of gestation. Others place no value on the period of pregnancy. Thus, in the opinion of Maygrier, labour is the exit of the infant and its appendages from the uterus; in that of Gardien and Madame Boivin, the spontaneous expulsion or extraction of the infant and its dependencies; in that of M. Velpeau, a function that consists in the expulsion of the ovum from the mother's organs. Many of these definitions have the fault of being too general, and some, the latter especially, are applicable equally to abortion and effluxion. Were we to endeavour to give as general a definition of labour as possible, we would say, that it is a function which consists in the expulsion from the mother's organs of the whole of the product of conception, when it has reached maturity; but this definition, applying equally to animals and to the human species, should be reserved for parturition. Confining ourselves then to the human species, taking no account of precocious or retarded births, or of the life or death of the fœtus, we shall say that labour is a function which consists in the *expulsion of the fœtus at term, and its appendages, from the mother's organs.* This definition, short, clear, and being, moreover, inapplicable, except to the object defined, appears to us preferable to the preceding ones.

II.—*Conditions necessary to Labour.*

In order that labour may be effected according to the definition of it just given, the concurrence of a certain number of circumstances or conditions, relating both to the mother and the fœtus, is necessary.

In the mother, it is required,

1st. That the pelvis should possess the proportions requisite to allow the fœtus to pass; for if the dimensions be too small, there is an insurmountable obstacle, and natural labour becomes impossible.

2d. That the uterus should enjoy contractile force sufficient to overcome the obstacles which might oppose the progress of the fœtus.

3d. That the axis of this organ should be parallel to that of the superior strait.

4th. That the os uteri, vagina, soft parts constituting the vulva, and those lining the interior of the pelvis, should be pliant enough to allow the proper degree of extension and dilatation. It may be easily conceived, that if the os uteri be scirrhous, or if there are frænula or cicatrices in the vagina, engorgements or tumours in the pelvis, labour may be impeded.

5th. That the woman should have moral and physical energy sufficient to support the fatigues of labour, and assist the efforts of the uterus; for if she is weak or pusillanimous, she will not exert the voluntary muscles, and the uterus, being left to its own efforts, will either expel with great difficulty or not at all, the product of conception.

In the fœtus, the conditions are less numerous, but equally essential. It is required:

1st. That the fœtus should be contained in the uterus; it being evident that, in cases of extra-uterine pregnancy, its expulsion per vias naturales cannot take place.

2d. That its size should be proportioned to the extent of the apertures and the cavity of the pelvis through which it must pass; if it is monstrous, if it is too large, if the size of one of its parts is disproportioned, or it is affected with hydrocephalus, hydrothorax, or ascites, natural labour cannot be accomplished.

3d. That it should be properly situated; that is, that it should present to the orifice of the uterus one of the two extremities of the ovoid which it represents. The necessity of this condition has not escaped the old observers. Hippocrates compares the fœtus contained in its mother's bosom to an olive enclosed in a bottle, in such a manner that if one end of the olive presents at the neck of the bottle, it will easily pass, whereas, this would be impossible in any other position.

When all these conditions are present, the expulsion of the fœtus takes place in a more or less rapid and easy manner, by the efforts of nature alone; in a word, the labour is *natural*. When one, and à fortiori, several of them are absent, the expulsion is impeded, embarrassed, and sometimes even rendered impossible without the assistance of art: the labour is then said to be *artificial*.

III.—*Classification of Labour.*

If labours are not always effected in the same manner, if they present remarkable and evident differences, they cannot be included in one and the same table, and hence arises the necessity of establishing distinctions between them, in a word, of classifying them. This truth has been felt from the dawn of the art; but, during a long series of ages, no other classification was known than that founded on the manner in which the function was performed. When the efforts of the woman alone were sufficient, the labour was called *natural;* when extraneous aid became indispensable, it was distinguished by the term *non-natural*. Such was the plan followed, after the example of Hippocrates, by Guillemeau, Mauriceau, Amand, Dionis, Portal, Deleurye, etc. This simple division was at last found to be insufficient. Delamotte called *natural*, those labours which terminated by their own efforts, the fœtus presenting the head or breech; *laborious*, those which, notwithstanding the advantageous position of the child, required the aid of art; and *unnatural*, those in which any other part than the head or breech presented. Smellie thought the labour *natural* when the head presented; *laborious*, when the passage of the head could not be effected without assistance; and *unnatural*, when it was necessary to bring down the feet, or deliver the body before the head. According to Millot, the presentation of the head constitutes labour, *properly so called*, that of the breech *irregular natural* labour; the necessity of a recourse to the hand alone, or to instruments, *artificial* labour; and that of making an artificial passage for the child, *unnatural* labour. Denman called that labour *natural* in which the unaided efforts of the woman were sufficient; *unnatural*, when any other part than the head presents; *laborious*, when it lasts for more than twenty-four hours; and *irregular*, when requiring the interposition of art, without regard to its duration. In addition to *natural* labours, which require no definition, Flamant admitted the *non-natural*, when the hand alone, or instruments, became necessary, but without injury to the mother or child, and *unnatural* (*contre-nature*) which required the application of cutting instruments to the mother, the fœtus, or to both. Labours have been divided into *manual*, in which the hand sufficed; *mechanical*, requiring the use of instruments; and *mixed*, in which nature required merely a change of the position of the fœtus. I shall not mention other unimportant divisions, which, with slight differences, may be included in some of the preceding.

All these classifications were founded in the manner in which the labour terminated, pointing out, at most, as an accessory fact, the part of the fœtus which presented, but without endeavouring to determine the relations of this part with the different points of the circumference of the superior strait of the pelvis. To Solayrès* the credit is due of having introduced this mode of consideration. When Sauvages wished to extend to medicine the methodical classification which he had so beautifully applied to various branches of natural history, Solayrès proposed an analogous one for labours. He divided them into three classes, in the following manner:

First Class. *Natural* labours, terminating by the efforts of nature alone.

This class comprises two orders, founded on the duration of labour; each order including genera, based on the part presenting; and each genus, species distinguished by the relations of the presenting part with different parts of the pelvis.

Order I. Labours which terminate in from six to twenty-four hours at furthest.

First Genus. Presentation of the occiput, which may correspond:

1st Species. To the symphysis pubis.
2d Species. To the promontory of the sacrum.
3d Species. To the left acetabulum.
4th Species. To the right sacro-iliac symphysis.
5th Species. To the right acetabulum.
6th Species. To the left sacro-iliac symphysis.

Second Genus. Presentation of the feet, the heels being situated:

1st Species. Opposite to the pubes.

* Dissertatio de Partu Viribus Maternus Absoluto. Paris, 1771. This edition is extremely rare. Siebold has published a new one with notes, at Berlin, in 1831.

2d Species. Opposite to the sacrum.
3d Species. In front and to the left.
4th Species. In front and to the right.

Third Genus. Presentation of the knees, the thighs being turned:
1st Species. Toward the sacrum.
2d Species. Toward the pubes.
3d Species. To the right side.
4th Species. To the left side.

Fourth Genus. Presentation of the breast, the back being turned:
1st Species. Toward the pubes.
2d Species. Toward the sacrum.
3d Species. In front and to the left.
4th Species. In front and to the right.

Order II. Labours of which the duration is more than twenty-four hours. The number of genera and species is the same in this order as in the preceding.

Second Class. Labours which cannot possibly be terminated without the application of the accoucheur's hand, whether aided or not by the efforts of the mother.

This class comprises four orders, founded on the regions of the body, which presents four orders of genera established on the part which is engaged; and lastly, each genus is divided into species relating to the situation the part may assume. These considerations being then identical with those on which the division of the preceding class was based, there are also four species, in each genus of each order, except in the second genus of the first order, which comprises six as above.

First Order. Presentation of the anterior part of the body, abdomen or feet.
1st Genus. The feet.
2d Genus. The abdomen.
3d Genus. The face.
4th Genus. Anterior part of the neck.
5th Genus. Anterior part of the thorax.
6th Genus. Anterior part of the abdomen.
7th Genus. Anterior part of the pelvis.
8th Genus. The knees.

Second Order. Presentation of the posterior part of the body.
1st Genus. The occiput.
2d Genus. The neck.
3d Genus. The back.
4th Genus. The loins.
5th Genus. The breech.

Third Order. Presentation of the right lateral surface of the body.
1st Genus. Right side of the head.
2d Genus. Right side of the neck.
3d Genus. Right shoulder.
4th Genus. Right flank.
5th Genus. Right hip.

Fourth Order. Presentation of the left lateral surface.
1st Genus. Left side of the head.
2d Genus. Left side of the neck.
3d Genus. Left shoulder.
4th Genus. Left flank.
5th Genus. Left hip.

Third Class. Labours which cannot be terminated without the use of instruments.

Here the principle presiding over the establishment of the orders is not the same throughout. In the three first only the characters are drawn from the parts to which the instruments are applied, and the genera from the peculiar situation of these regions.

First Order. Labours requiring the use of the fillet.
1st Genus. Presentation of the feet.
2d Genus. Presentation of the knees.
3d Genus. Presentation of the breech.
4th Genus. When the head is retained in the uterus after the extraction of the body.

Second Order. Labours requiring the forceps.
1st Genus. Vertex.
2d Genus. Base of the cranium.
3d Genus. Face.
4th Genus. Occiput.

5th Genus. Right side of the head.
6th Genus. Left side of the head.
7th Genus. Breech.
8th Genus. Abortive fœtuses.

Third Order. Labours requiring the action of penetrating or cutting instruments on the body of the child.

1st Genus. On the child's head, the body being still in the uterus.
2d Genus. On the child's head detached from the body.
3d Genus. On the abdomen swollen from any cause.
4th Genus. On the thorax, if unnaturally large.
5th Genus. Deformities of the fœtus requiring separation.
6th Genus. Twisting of the umbilical cord.

Fourth Order. Labours requiring the action of penetrating or cutting instruments on the body of the mother, in order to give passage to the child.

1st Genus. Inflammatory tumours in the mother.
2d Genus. Chronic tumours in the mother.
3d Genus. Excessive narrowness of the pelvis and extra-uterine pregnancy.

This classification has been the model of nearly all those which have been proposed in modern times, at least in France. Baudelocque, the pupil of Solayrès, adopted it, modifying it slightly, at least in some of the presentations and positions, by filling up some points which his master had, as it were, only sketched, and especially by striking out face presentations from the number of those which prevent the possibility of natural labour. In this way he established eighty-four different positions of the child's head in the mother's organs. The principal objection to this classification, is its infinite multiplicity, and its liability to produce confusion in the mind. But, looking at the subject in the same point of view as Solayrès and Baudelocque, far from finding it too extensive, we might, on the contrary, say that it was too limited, for there is not a single point of the surface of the child's body which may not, under certain conditions, present at the orifice of the uterus: so that, if this consideration were assumed at the starting point, we might establish as many species, as there are, in the child's body, places presented to the more or less dilated os uteri. Criticism, to be correct, must be directed to some other point. The following is Baudelocque's classification.

Order I. Natural labours.

1st Species. Presentation of the vertex.
1st Position. Occiput behind the left acetabulum, (3d of Solayrès.)
2d Position. Occiput behind the right acetabulum, (5th of Solayrès.)
3d Position. Occiput behind the symphysis pubis, (1st of Solayrès.)
4th Position. Occiput before the right sacro-iliac symphysis, (4th of Solayrès.)
5th Position. Occiput before the left sacro-iliac symphysis, (6th of Solayrès.)
6th Position. Occiput before the promontory of the sacrum, (2d of Solayrès.)

2d Species. Presentation of the feet.
1st Position. Heels behind the left acetabulum.
2d Position. Heels behind the right acetabulum.
3d Position. Heels behind the symphysis pubis.
4th Position. Heels in front of the sacrum.

3d Species. Presentation of the knees.
1st Position. Front of the legs behind the left acetabulum.
2d Position. Front of the legs behind the right acetabulum.
3d Position. Front of the legs behind the symphysis pubis.
4th Position. Front of the legs before the sacrum.

4th Species. Presentation of the breech.
1st Position. Sacrum behind the left acetabulum.
2d Position. Sacrum behind the right acetabulum.
3d Position. Sacrum behind the symphysis pubis.
4th Position. Sacrum in front of the promontory of the sacrum.

Order II. Unnatural labours requiring the assistance of the hand of the accoucheur.

1st Species. Presentation of the feet. Four positions, as in the preceding order.
2d Species. Presentations of the knees. Four positions, as in the preceding order.
3d Species. Presentation of the breech. Four positions, as in the preceding order.
4th Species. Presentation of the vertex. Six positions, as in the preceding order.

5th Species. Presentation of the anterior plane of the body.
1st. Of the face.
1st Position. Chin in front of the promontory.
2d Position. Chin behind the symphysis pubis.
3d Position. Chin behind the right acetabulum.
4th Position. Chin behind the left acetabulum.

2d. Of the fore part of the Neck.
1st Position. Head resting on the pubes.
2d Position. Head resting on the sacrum.
3d Position. Head in front of the left iliac fossa.
4th Position. Head in front of the right iliac fossa.
3d. Of the Thorax.
1st Position. Abdomen above the sacrum.
2d Position. Abdomen above the pubes.
3d Position. Abdomen upon the right iliac fossa.
4th Position. Abdomen upon the left iliac fossa.
4th. Of the Abdomen.
1st Position. Thorax above the pubes.
2d Position. Thorax above the sacrum.
3d Position. Thorax upon the left iliac fossa.
4th Position. Thorax upon the right iliac fossa.
6th Species. Presentation of the posterior plane of the body:
1st. Of the Occiput.
1st Position. Vertex resting against the projection of the sacrum.
2d Position. Vertex above the pubes.
3d Position. Vertex behind the left acetabulum.
4th Position. Vertex behind the right acetabulum.
2d. Of the back of the Neck or Nucha.
1st Position. Ear on the edge of the pubes.
2d Position. Ear on the side of the projection of the sacrum.
3d Position. Ear at the bottom of the left iliac fossa.
4th Position. Ear at the bottom of the right iliac fossa.
3d. Of the Back.
1st Position. Loins above the sacrum.
2d Position. Loins above the pubes.
3d Position. Loins behind the right acetabulum.
4th Position. Loins behind the left acetabulum.
7th Species. Presentation of the lateral plane of the body.
1st. Of the side of the Head.
1st Position. Vertex above the pubes.
2d Position. Vertex above the promontory.
3d Position. Vertex at the bottom of the left iliac fossa.
4th Position. Vertex at the bottom of the right iliac fossa.
2d. Of the side of the Neck.
1st Position. Ear on the pubes.
2d Position. Ear on the base of the sacrum.
3d Position. Ear on the left iliac fossa.
4th Position. Ear on the right iliac fossa.
3d. Of the Shoulder.
1st Position. Side of the neck on the edge of the pubes.
2d Position. Side of the neck on the upper edge of the sacrum.
3d Position. Side of the neck on the left iliac fossa.
4th Position. Side of the neck on the right iliac fossa.
4th. Of the side of the Thorax.
1st Position. Axilla on the pubes.
2d Position. Axilla at the base of the sacrum.
3d Position. Axilla at the bottom of the left iliac fossa.
4th Position. Axilla at the bottom of the right iliac fossa.
5th. Of the Hip.
1st Position. Breech to the base of the sacrum.
2d Position. Breech against the pubes.
3d Position. Breech at the bottom of the right iliac fossa.
4th Position. Breech at the bottom of the left iliac fossa.

Order III. Laborious instrumental labours.
1st Species. Application of instruments to the body of the child.
2d Species. Application of instruments to the body of the mother.

Gardien has differed from Baudelocque only in a few unimportant points. He divides labours into three classes, *natural*, *mixed*, and *unnatural*.

The first class is precisely that of Baudelocque as regards the number of species and positions. In order to assist the memory, Gardien has given special appellations to the six positions of the vertex. He calls the first, *left occipito-acetabular;* the second, *right occipito-acetabular;* the third, *occipito-pubal;* the fourth, *right occipito-sacro-iliac*, or *left fronto-acetabular;* the fifth, *left occipito-sacro-iliac*, or *right fronto-acetabular;* and the sixth, *occipito-sacral*, or *fronto-pubal*. These terms have since been preserved, and similar ones devised for all the positions.

The second class includes labours which nature cannot, generally, terminate by her own efforts, but which come under her laws, when the complication which rendered them impossible is remedied. Such are those in which, on account of a vitiated direction of the expulsive powers of the uterus, the head, instead of flexing forward, is turned upon the back, and presents the forehead and face to the strait. Such is likewise the presence of one of the sides of the head, or of the nucha.

As to the third class, that of unnatural labours, it is composed of two orders.

Order I. Artificial labours, in which the hand is sufficient to extract the child.

Order II. Labours accidentally unnatural, in which the hand is sufficient.

There are the six species, in which the head presents the occipital region, or in a state of inversion; all the cases of the second class, when the head cannot be reduced to its natural situation; lastly, deliveries by the feet, knees, and breech, when some accident will not permit us to trust to nature.

Section 2. Labours essentially unnatural, in which the hand is sufficient.

First Genus. Presentation of the lateral surface of the trunk.

1st Species. Feet to the right side.
2d Species. Feet to the left side.
3d Species. Feet towards the sacrum.
4th Species. Feet above the pubes.

Second Genus. Presentation of the back.

1st Species. Head in the left iliac fossa.
2d Species. Head in the right iliac fossa.
3d Species. Head on the symphysis pubis.
4th Species. Head on the sacrum, or on one side of it.

Third Genus. Presentation of the anterior surface of the trunk.

1st Species. Head in the left iliac fossa.
2d Species. Head in the right iliac fossa.
3d Species. Head in the symphysis pubis.
4th Species. Head on the sacrum, or on one side of it.

Fourth Genus. When the arm and hand are expelled.

Order II. Labours in which an instrument is necessary to extract the child.

First Genus. Instruments which act without injuring the continuity of parts of the mother or child.

First Sub-Genus. When the head presents first, eight species, viz. the six recognized in natural delivery by the head, and two when the head is situated transversely.

Second Sub-Genus. When the trunk is already expelled. The number of species corresponds to that of delivery by the feet.

Second Genus. Instruments which affect the integrity of the parts of the mother:

1st Species. Gastrotomy.
2d Species. Hysterotomy.
3d Species. Gastro-hysterotomy.
4th Species. Symphyseotomy.

Third Genus. Instruments which divide some parts of the fœtus:

1st Species. Instruments which evacuate the water in cases of hydrocephalus, hydrothorax, and ascites.
2d Species. Employment of the perforator and application of the crotchet.
3d Species. Instruments suited to extract the trunk when remaining in the uterus.

Flamant endeavoured to simplify the classification of Baudelocque. But his own was still very complicated, as may be judged by the following table.

Order I. Natural labours, which terminate by the sole efforts of the mother's organs, or in which nature is sufficient even when circumstances may render them tedious and difficult.

First Genus. Presentation of the head:

1st Species. Occiput above the left acetabulum.
2d Species. Occiput above the right acetabulum.
3d Species. Occiput above the symphysis pubis.
4th Species. Occiput above the right sacro-iliac symphysis.
5th Species. Occiput above the left sacro-iliac symphysis.
6th Species. Occiput above the sacro-vertebral symphysis.

Second Genus. Presentation of the feet:
1st Species. Heels to the left side of the pelvis.
2d Species. Heels to the right side of the pelvis.
3d Species. Heels to the symphysis pubis.
4th Species. Heels to the sacro-vertebral angle.

Third Genus. Presentation of the knees:
1st Species. Forepart of the leg to the left.
2d Species. Forepart of the leg to the right.
3d Species. Forepart of the leg to the front.
4th Species. Forepart of the leg to the rear.

Fourth Genus. Presentation of the breech:
1st Species. Sacrum to the left.
2d Species. Sacrum to the right.
3d Species. Sacrum to the front.
4th Species. Sacrum to the rear.

Order II. Non-natural labours, which require the application of the hand alone, or with instruments suitable to assist the extraction of the fœtus without affecting the continuity of its parts or of those of the mother.

First Genus. Head, arrested at the superior or inferior strait, or impacted:
1st Species. Occiput at the internal part of the left acetabulum.
2d Species. Occiput at the internal part of the right acetabulum.
3d Species. Occiput at the internal part of the symphysis pubis.
4th Species. Occiput at the internal part of the right sacro-iliac symphysis.
5th Species. Occiput at the internal part of the left sacro-iliac symphysis.
6th Species. Occiput at the internal part of the sacro-vertebral symphysis.
7th Species. Occiput at the internal part of the left side of the pelvis.
8th Species. Occiput at the internal part of the right side of the pelvis.

Second Genus. The feet:
Four Species, which are the same as in the first order.

Third Genus. The dorsal plane, or posterior surface of the trunk:
1st Species. Head on the right iliac fossa.
2d Species. Head on the left iliac fossa.
3d Species. Head on the sacrum or its sides.
4th Species. Head on the symphysis pubis.

Fourth Genus. The sternal plane, or anterior surface of the trunk:
Four Species, like the above.

Fifth Genus. Left lateral plane:
1st Species. Sternal plane corresponding to the sacrum of the mother.
2d Species. Sternal plane corresponding to the pubes of the mother.
3d Species. Sternal plane corresponding to the left side of the mother.
4th Species. Sternal plane corresponding to the right side of the mother.

Sixth Genus. Right lateral plane:
1st Species. Sternal plane corresponding to the pubes of the mother.
2d Species. Sternal plane corresponding to the sacrum of the mother.
3d Species. Sternal plane corresponding to the right side of the mother.
4th Species. Sternal plane corresponding to the left side of the mother.

Order III. Unnatural labours, which require the application of cutting instruments to the fœtus or to the mother, or to both.

First Genus. To the fœtus:
1st Species. Extraction of the whole of the fœtus with the crotchet.
2d Species. Extraction of the trunk remaining in the uterus.
3d Species. Extraction of the head remaining in the uterus.
4th Species. Extraction of the dead fœtus.
5th Species. Amputation of some monstrous parts.
6th Species. Paracentesis for hydrocephalus, hydrothorax, or ascites.

Second Genus. To the mother:
1st Species. Vaginal hysterotomy.
2d Species. Gastrotomy.
3d Species. Abdominal hysterotomy.
4th Species. Pubic synchondrotomy.

Third Genus. All the possible combinations of operations performed on the mother and on the fœtus.

Madame Lachapelle has also reduced the numerous species of Baudelocque. The following table exhibits the fundamental positions which she admits: we have omitted the enumeration of the varieties which she points out in each.

First Genus. Presentation of the vertex:
1st Species. Occiput to the left and forward.
2d Species. Occiput to the right and forward.
3d Species. Occiput to the right and backward.
4th Species. Occiput to the left and backward.
5th Species. Occiput to the left transversely.
6th Species. Occiput to the right transversely.

Second Genus. Presentation of the breech:
1st Species. Loins to the left.
2d Species. Loins to the right.
3d Species. Loins to the front.
4th Species. Loins to the rear.

Third Genus. Presentation of the feet:
Four Species, in which the heels occupy the same positions as the loins in the above genus.

Fourth Genus. Presentation of the knees:
Four Species, in which the breech occupies the same positions as the heels in the third genus.

Fifth Genus. Presentation of the face:
1st Species. Forehead to the left.
2d Species. Forehead to the right.

Sixth Genus. Presentation of the right shoulder:
1st Species. Head to the left.
2d Species. Head to the right.

Seventh Genus. Presentation of the left shoulder:
1st Species. Head to the left.
2d Species. Head to the right.

A remarkable attempt at simplification was made by M. Naegele, of Heidelberg: we shall present a summary of his classification, from the last edition of his Manual:

First Class. Natural labours.
A. By the cephalic extremity.
First Genus. By the cranium.
1st. Ordinary.
1st Species. The right parietal in front: the small fontanelle turned to the right, and more or less to the front.
2d Species. The left parietal in front, the small fontanelle turned to the right, and more or less to the rear.
2d. Extraordinary. When the head corresponds to the antero-posterior, transverse, or oblique diameter, when the small fontanelle is to the left and backward, or to the right and forward.
Second Genus. By the face.
1st Species. Right half of the face in front, the forehead turned to the left.
2d Species. Left half of the face in front, the forehead turned to the right.
B. By the pelvic extremity.
Third Genus. By the breech.
1st Species. Back turned toward the anterior paries of the uterus.
2d Species. Back turned toward the posterior paries of the uterus.
Fourth Genus. By the feet.
1st Species. Toes turned backward.
2d Species. Toes turned forward.

Second Class. Irregular labours, requiring the interposition of art.
1st. The labour is difficult, or cannot be accomplished by the sole efforts of nature.
1st Species. Malposition of the child.
2d Species. Malformation or excessive size of the child.
3d Species. Malformation of the pelvis.
4th Species. Anomalies of the expulsive forces.
2d. The labour is not more difficult than usual.
1st Species. Too rapid progress of labour.
2d Species. Procidentia and other anomalies of the cord.
3d Species. Concretions, hæmorrhage, etc.

We were one of the first in France to engage in this new reformation, which consisted principally in assuming as a base, not only the parts of the infant which may successively present at the abdominal strait, but also the various possible relations of the whole surface to which belong those points accessible to the finger, with any particular portion of the circumference of this same strait.

This plan adopted several years since by us in our lectures, has been followed by M. Paul Dubois, who, in the classification which he published in 1834,* admits three genera of presentations of the fœtus, capable of further subdivision into regular or irregular, viz:

* Journal des Connaissances Medico-Chirurgicales. Fevr. 1834.

First Genus. Presentations of the cephalic extremity.
1st. Presentation of the vertex.
1st Position. Left occipito-lateral.
2d Position. Right occipito-lateral.
2d. Presentations of the face.
1st Position. Right mento-lateral.
2d Position. Left mento-lateral.
Second Genus. Presentation of the pelvic extremity, that is, of the feet, knees or breech.
1st Position. Left sacro-lateral.
2d Position. Right sacro-lateral.
Third Genus. Presentation of the trunk.
1st. Presentation of the right lateral region.
1st Position. Left cephalo-lateral.
2d Position. Right cephalo-lateral.
2d. Presentation of the left lateral region.
1st Position. Right cephalo-lateral.
2d Position. Left cephalo-lateral.

We will now explain our own classification, and which that of M. Paul Dubois resembles very closely.

We make, in the first place, two great classes; one for natural labours, which can be accomplished by the efforts of nature alone: the other for artificial labours, in which the more or less active interposition of art is necessary.

Natural labours are divided into three orders, according to the part of the fœtus presenting at the orifice of the uterus. Under this point of view, it is necessary to establish divisions in the body of the infant. Therefore, we admit with M. Dubois three very distinct parts, which are, 1st, the cephalic extremity, comprising the head as far as the shoulders; 2d, the pelvic extremity, comprising all the lower part of the body as far as the hips; 3d, the region between these two extremities, that is, the trunk or torso. In midwifery, the simple fact of the presence of any region whatever of the fœtus at the superior strait constitutes what is called the *presentation*, and the relations of the various points of this region, with the various points of the entrance of the pelvis, establish the *position*. The presentation serves to distinguish the genus, and the position marks the species.

The first order of natural labours comprises the presentations of the cephalic extremity, excepting always the relative position of the head of the fœtus and the pelvis of the mother. To the second belong all those of the pelvic extremity or of the breech, knees, and feet. The third comprises those of the trunk. The first order is divided into three genera, which include, the first, presentations of the vertex, the most frequent of all: the second, those of the face, which are infinitely less common than the preceding; the third, those of the lateral parts of the head, the most rare of all, and merely variations of the preceding.

In the first genus we recognize four species according as the occipito-frontal diameter of the head, or the one most approaching it, corresponds to the antero-posterior diameter of the pelvis, is directed toward the pubes or toward the sacrum, or according as this same occipito-frontal diameter is in the direction of the transverse diameter of the pelvis, the head is situated transversely or obliquely, so that the occiput is in contact with one or other of the ilia. In fact, as regards these last two species, it it is evident that the occiput may correspond to all the points of each semi-circumference, and therefore it would be necessary to admit as many varieties as there are points, but this would be an useless multiplicity to study, without any practical advantage. We reduce them to six, namely, two directly transverse and four oblique, according as the occiput is to the right or left, or as it occupies either anteriorly, or posteriorly, some point of each of the quarter circles bounded on one side by the antero-posterior, and on the other by the transverse diameter of the pelvis.

As to the second genus, the face presentations, we admit only two fundamental positions, that in which the chin corresponds to the right side of the pelvis, and that in which it corresponds to the left, with varieties established on the same principles as those of the left or right occipito-iliac.

Lastly, the third genus which includes the presentations of the sides of the head, comprises two sub-genera, one for the right and one for the left side. Each sub-genus contains three varieties, founded on the position of the lobe of the ear, according as it corresponds with the symphysis pubis, the vertex being toward the promontory of the sacrum, or with the right side of the pelvis, the vertex being to the left, or with the left side of the pelvis, the vertex being to the right.

In the second order, dedicated to presentations of the pelvic extremity, we establish three genera, for the breech, feet and knees. We place in the first rank breech presentations, because they are fundamental and more frequent: those of the feet and knees are merely varieties, the mechanism of the labour being the same. We retain in the first genus, the four species admitted by Baudelocque. In our opinion, M. Paul Dubois has erred in admitting only the right and left positions: he has omitted precisely those, very rare indeed, which present the most practical difficulty, and which, on that account, should have been retained. We shall be governed by the same motives in the second and third genera.

The third order comprises the presentations of the trunk, or torso, and its varieties. We should observe that these presentations, which essentially belong to artificial labours, may accidentally, in exclusive cases, terminate by the sole efforts of nature. We have made, in natural labours, a separate order of them, which we will designate by the term of labours accidentally natural. This order contains two genera—1st, presentations of the right side; 2d, presentations of the left side. Each genus contains two principal species—1st, left cephalo-iliac; 2d, right cephalo-iliac.

Labours of the second class, which we call *artificial*, are quite numerous. They comprise those in which accidents may endanger the life of both mother and fœtus, or in which obstacles prevent the progress of the latter. There are three orders: in the two first the mother and fœtus are well formed; in the third, one or other is mal-formed.

The first order comprises labours in which we are obliged to interfere on account of some accident occurring either to the mother or fœtus, thus establishing the two genera.

To the second order may be referred labours essentially artificial. Here there can be but one genus, characterized by the presentation of the trunk of the fœtus. But this genus comprises two sub-genera, founded on the side of the trunk which presents, and each sub-genus two fundamental species relative to the correspondence of the head with the right or left side of the pelvis. Each of these species may be subdivided into several varieties, according as the shoulder, flank, or side approach more or less to the centre of the pelvis, or as they may be directed transversely, or slighly upward or downward. But all these and other sub-divisions admitted by Baudelocque and some others who have followed him, tend only to embarrass the theory, and have no practical use, since the mode of conduct applicable to the varieties is the same as that required by the fundamental species of each from which they arise.

In the third order are comprehended, in two genera, labours which nature cannot accomplish unaided, because there is malformation either of the mother or of the fœtus.

Lastly, an appendix, which might strictly form a fourth class of labours, embraces four different modes of termination of pregnancy, founded on the anomalies which this state may present in its location, progress, or products, and on the lesions of the gestative organs.

The following table exhibits a synopsis of our classification.

First Class. Natural labours.

Order I. Presentation of the cephalic extremity.

First Genus. Presentations of the vertex:

1st. Position. Left occipito-iliac.

1st Variety. Direct or transverse: left occipito-iliac.

2d Variety. Oblique: left occipito-anterior, or left occipito-acetabular.

3d Variety. Oblique: left occipito-posterior, or right fronto-acetabular.

2d Position. Right occipito-iliac.

1st Variety. Direct and transverse: right occipito-iliac.

2d Variety. Oblique: right occipito-anterior, or right occipito-acetabular.

3d Variety. Oblique: right occipito-posterior, or left fronto-acetabular.

3d Position. Occipito-pubal.

4th Position. Occipito-sacral.

Second Genus. Presentations of the face:

1st Position. Right mento-iliac.

1st Variety. Chin to the right and front.

2d Variety. Chin directly to the front.

3d Variety. Chin to the right and rear.

2d Position. Left mento-iliac.

1st Variety. Chin to the left and front.

2d Variety. Chin directly to the left.

3d Variety. Chin to the left and rear.

Third Genus. Presentations of the sides of the head:

First Sub-genus. Presentations of the right side:

1st Position. Lobulo-pubal. (*Ear to pubis.*)

2d Position. Right lobulo-iliac.

3d Position. Left lobulo-iliac.

Second Sub-genus. Presentations of the left side:

1st Position. Lobulo-pubal.

2d Position. Right lobulo-iliac.

3d Position. Left lobulo-iliac.

Order II. Presentations of the pelvic extremity.

First Genus. Presentations of the pelvis or breech:

1st Position. Left sacro-iliac.

2d Position. Right sacro-iliac.

3d Position. Sacro-pubal.

4th Position. Sacro-sacral.

Second Genus. Presentations of the feet:

1st Position. Left calcaneo-iliac.

2d Position. Right calcaneo-iliac.

3d Position. Calcaneo-pubal.

4th Position. Calcaneo-sacral.

Third Genus. Presentation of the knees.

1st Position. Left tibio-iliac.

2d Position. Right tibio-iliac.

3d Position. Tibio-pubal.

4th Position. Tibio-sacral.

Order III. Labours accidentally natural. Presentations of the trunk under exclusive circumstances.

SECOND CLASS. Artificial labours.

Order I. Labours rendered non-natural by accidents, the mother and fœtus being well formed.

First Genus. Accidents on the mother's side:

Obliquity of the uterus.
Exhaustion: cessation of uterine contractions.
Hæmorrhage.
Convulsions.
Syncope.
Aneurisms.
Irreducible or strangulated hernia.

Second Genus. Accidents on the side of the fœtus.

Prolapsus of the umbilical cord.
Arrest of development.
Shortness or twisting of the umbilical cord.
Presence of several fœtuses.

Order II. Labours essentially artificial, the mother and fœtus being well formed

Solitary Genus. Presentations of the trunk.

First Sub-genus. Presentations of the right side:

1st Species. Left cephalo-iliac, or first of the right shoulder.
2d Species. Right cephalo-iliac, or second of the right shoulder.

Second Sub-genus. Presentation of the left side:

1st Species. Left cephalo-iliac, or first of the left shoulder.
2d Species. Right cephalo-iliac, or second of the left shoulder.

Order III. Labours made artificial by malformations.

First Genus. Malformations of the fœtus:

Excess of size of the head.
Excess of size of the thorax.
Excess of size of the abdomen.
Anormal tumours developed at different points of the surface of the body.
Monsters by agglutination.

Second Genus. Malformation of the mother.

1st. Malformations of the soft parts.
- Contraction,
  - Œdema.
  - Thrombus.
  - Varices.
  - Encysted tumours.
  - Scirrhous os uteri.
  - Frænula in the vagina or os uteri.
  - Vesical calculi.
  - Morbid productions in the fallopian tubes or ovaries.
- Occlusion
  - of the vulva.
  - of the vagina.
  - of the os uteri.

2d. Malformation of the pelvis,
- At the superior strait.
- At the inferior strait.
- In the excavation.
- In all these parts at once.
- Morbid, osseous, fibrous, or cartilaginous productions.

Appendix. Several modes of termination of pregnancy, caused by anomalies.

1st. In the seat of pregnancy.—Extra-uterine pregnancy.
2d. In the progress of pregnancy.—Abortion.
3d. In the product of pregnancy.—Multiple pregnancy.
4th. In lesions of the gestative organ.—Rupture of the uterus.

IV. *Proportion between the various kinds of Labours.*

It appears from the registers of the lying-in hospital of Paris, as ascertained by Mesdames Boivin, Lachapelle and Legrand, that of 85,788 births, from 1797 to 1840, 84,612 were accomplished by the efforts of nature alone, 725 required the assistance of the hand, and 541 that of instruments. When treating of each species, we shall be careful to indicate its relative frequency.

SECTION I.

OF NATURAL LABOUR.

We have already said that natural labour is the expulsion of the fœtus at term, and its appendages, from the mother's organs, accomplished by the unaided efforts of nature. In order to describe this function, we must first examine the causes which produce it, then the phenomena which precede, accompany and follow it.

CHAPTER I.

OF THE CAUSES OF LABOUR.

The question of the causes of the labour is one of those which physiologists have for a long time discussed, and upon which there yet exists a great variety of opinion.

The ancients, and many moderns, seeing, after the rupture of the bag of waters, the head of the fœtus resting on the os uteri, engage in it at each pain, and at last pass through the tunnel of the pelvis and organs of generation, naturally supposed that the fœtus was the agent of its own expulsion. Starting from this principle, they sought in it the causes which induced it to act and sever the bonds which united it to the mother. The ancients were persuaded that the want of sufficient nourishment occasioned an uncomfortable feeling, which excited it to action to seek elsewhere its food. Others have ascribed its motions and efforts to an imperious necessity of removing from too elevated a temperature, and an instinctive presentiment of the want of respiration, and cooling itself. Some have referred them to the inconvenience felt in too narrow a space. Others, again, have made them depend on the disagreeable impression caused by the meconium on the intestines, the urine on the bladder, the acrimony of the liquor amnii on the skin, etc. Without stopping to discuss each of these opinions in detail, we will merely observe that, as the ancients started with a false principle, the consequences they deduced were also erroneous. In fact, it is now clearly proved that the fœtus is passive, or nearly so, in the accomplishment of the function under consideration, for a woman is delivered as easily of a dead as of a living child. The exciting power and causes of this phenomenon must therefore be sought elsewhere. All physiologists now acknowledge that the principal, necessary, and indispensable power which produces labour, resides in the uterus itself, and that the causes capable of exciting the action of this viscus, are the true efficient causes of labour; but all do not equally agree as to the nature of the causes which produce this action. According to some, labour takes place when there remains no longer in the uterus any fibre capable of being developed; when the different series of those which constitute the organ have been extended successively from the fundus toward the orifice. Petite, the author of this theory, considered the neck of the uterus as a reservoir, or, to use his own expression, as a magazine in which nature has kept in reserve the quantity of muscular fibres she requires during the whole course of gestation, to assist by their development in the expansion of the viscus, which increases, pari passu, with the fœtus. Others have said, with Levret and Baudelocque, that the fibres of the body of the uterus, fixed like so many loops, around the different points of the circles formed by those of the neck, by shortening, draw the latter so as to force them to extend successively; that labour takes place when the preponderance which belonged at first to the fibres of the neck passes over to those of the body, and that it is thus the consequence of the cessation of a sort of struggle between these two antagonizing powers, from one of which the superiority of action is gradually transmitted to the other, after a certain lapse of time, during which they are, as it were, in equilibrio.

We believe that these two theories, to which all the others may be referred, as to fundamental types, have only retarded the solution of the problem. It is certain that when the fibres of the neck of the uterus yield so soon, as may be often ascertained by the touch in soft and lymphatic women, the term of pregnancy is anticipated, and there is premature delivery. But this explanation cannot be maintained in the greater number of cases; for, in abortions at two, three, or four months, uterine contractions take place, although the neck has not yet yielded. We are therefore obliged to confess that we are as ignorant of the determining cause of the contractions of the uterus, as of that of the systolic movement of the heart. The only point clearly established, is that the expulsion of the product of conception must be referred to these contractions, that they are the efficient and principal, if not the only cause of it. They can, even alone, cause the expulsion of the fœtus. We daily see, in fact, pusillanimous women, who, fearing the pain, abandon the uterus to its own efforts. Others have been seen to bring forth after a complete procidentia of the uterus, during an attack of hysteria, of epilepsy, or in a comatose state, in that of apparent, and even after actual death. Now, in the two first cases, no muscle of the body could co-operate in the functions, and, in the others, the action of the brain being suspended or annihilated, it is clear that the delivery must have taken place from the sole efforts of the uterus. There is no other acting cause, at least in the great majority of women, until the dilatation of the neck is accomplished, and even until the fœtus has reached the pelvic excavation. At a late period, indeed, when the orifice is sufficiently enlarged, and the fœtus is to pass through the narrow and solid canal which is to give it exit, the uterus generally calls to its aid all the other muscular forces of the body, which contribute, some directly, as the diaphragm and abdominal muscles by contracting the abdomen; others indirectly, as the muscles of the thorax and those of the limbs, by consolidating the points of support which the large muscular expansions of the abdomen require in order to give efficacy to their exertions. But, whatever influence these causes may enjoy, they merely play a secondary part, and act as auxiliaries to the uterus.

When the fibres of the uterus contract, they are shortened in every direction, so as to diminish the thickness of the parietes of the viscus, to compress its vessels and nerves, or at least compress all the parts which enter its composition. Hence may be deduced the practical consequences very important in the explanation of the pains which occur during labour, or of the suspension of the hæmorrhage,

which sometimes supervenes. On the other hand, by approaching each other, and becoming shorter, the fibres of the uterus diminish the capacity of the viscus, and exert, consequently, a compression on its contents. The latter, therefore, pressed on all sides, tends to escape by the least resisting point; this point is generally the uterine orifice. Thus, in the natural order, the uterine fibres, by the sole fact of their contraction in every direction, must necessarily effect the expulsion of the ovum, the size of which is always proportioned to the degree of distension they had acquired.

CHAPTER II.

OF THE PHENOMENA OF NATURAL LABOUR.

When we examine attentively the occurrences which take place during the progress of labour, we see that this function, which requires the concurrence of a great number of forces, exhibits divers phenomena, which may be referred to two very distinct orders. Some, indeed, are essentially vital, and others purely mechanical. The first may be considered as general, as they are found in all labours, without regard to the mode of termination. The second, on the contrary, vary according to the peculiar species of the labour to which they belong. Although the phenomena of these two orders are united and linked together by close bonds, and though they succeed each other or appear simultaneously, we must isolate them in order to facilitate their study. In the first place, it is necessary to embrace them all in one rapid view, in order to give a clear idea of the exercise of the functions to which they belong.

ARTICLE I.—PHENOMENA OF LABOUR CONSIDERED IN A GENERAL MANNER.

In order to render the exposition of the general phenomena of labour more clear, we shall divide them into three series. The first will comprise those which may be called precursory; the second, those which accompany the dilatation of the os uteri; and the third, those which manifest themselves during the expulsion of the infant, after which we shall determine the average duration of labour.

I. *Precursory Phenomena.*

In the last months of pregnancy the pressure exerted by the uterus on the neck of the bladder and the rectum excites frequent desire to evacuate these viscera; and sometimes we see dysuria, even strangury and tenesmus. The circulation becomes embarrassed in the lower parts of the body; the hæmorrhoidal vessels become swollen; and œdema and varices of the lower extremities sometimes supervene. The articulations of the pelvis become softer and more movable; the act of walking is uncertain, tottering, painful, or even impossible.

Some days before labour ought to take place, the uterus, which had been elevated as high as the epigastric region, is sensibly depressed, and seems to enlarge slightly; the belly falls in, and is sensibly smaller. This effect is owing to the fact that the head of the fœtus, enveloped by the neck, generally penetrates the superior strait, sometimes even into the pelvic cavity, so that the fundus of the organ must descend as much as its inferior portion. It follows, hence, that the diaphragm and viscera of the thorax and abdomen, being less compressed, respiration, circulation, and digestion become more free and easy. The woman has less nausea, vomiting, and depravity of appetite; she is more gay and lively. The external genitals become engorged and moist, and a more or less copious glairy liquid is discharged from the vulva.

II. *Phenomena of Dilatation.*

When delivery, properly so called, commences, that is, that succession of violent and painful phenomena which constitutes *labour*, it is announced by short and light pains, remote from each other, which produce no change in the pulse nor in the rest of the economy. They are popularly called fly-bites, (mouches,) in allusion to the slight pains produced by the stinging of the harvest-fly, improperly mistaken for the common fly, which has no organ for that purpose. At the moment that these pains are felt the belly contracts; and the hand applied to it distinctly feels the uterus harden and plunge into the pelvic excavation: a few flakes of glairy matter escape from the genitals. To these first pains succeed others more acute, longer, and closer together: these are called *preparatory*, and are those which the woman bears with most impatience. These pains produce a remarkable change in the economy. Each one is generally heralded in nervous women by a sort of slight trembling or horripilation: during their continuance the pulse rises, becomes hard and frequent; the face is flushed; the heat increases; the lips and tongue become dry; thirst is felt; the general agitation is very great; the belly contracts still more sensibly, and the glairy discharge is sometimes tinged with blood. On touching the orifice of the uterus at the moment of a pain, we observe that it becomes hard, tense, dilated, and circular; its edges are thinner, harder, and, as it were, cutting; the membranes of the ovum engage in it and form a sort of smooth and tense bladder or bag; the fœtus, supported by the waters which are kept back by the contractions of the body of the uterus, ascends toward the fundus of this organ, which, on the contrary, descends slightly. After the pain, all is changed; the agitation of the woman diminishes; the pulse returns to its normal standard; the skin recovers its usual colour and temperature; the mouth is moist; the edges of the orifice of the uterus become thicker and softer; the bag of waters is smaller; the membranes become flaccid and folded; the uterus reascends, but without attaining the point from which it had been dislodged; the fœtus falls from its own weight and rests on the os uteri, so that we may distinguish, through the relaxed membranes which cover it, the part of the body which presents. With each pain the same series of phenomena returns, and leaves the os uteri more open than it was at the preceding. The os uteri dilates more and more until it is completely expanded, and until the cavities of the vagina and uterus, as it were lost in each other, form almost a uniform and uninterrupted canal.

III. *Phenomena of Expulsion.*

The dilatation of the os uteri being completed, nature unites all her efforts to expel the body of the fœtus. The pains, which are then called *expulsive*, become stronger, more continued, nearer to each other, and are followed by a more perfect calm. The woman assists the action of the uterus by voluntary contractions of all the muscles of the trunk. The heat is much greater; there is excessive agitation, and sometimes the intellectual faculties are disturbed. During the continuance of the pains, the bag of waters engages more and more in the operation: it is excessively tense, and is at last ruptured, sometimes with noise, and the contained fluid gushes forth with violence. The fœtus, forcibly impelled toward the inferior part, is closely applied to the orifice, and engages in it when the calibre of the presenting part can penetrate it. The sudden escape of the fluid suspends the uterine action for a few moments; but the contractions soon return more energetically and powerfully, and the head of the fœtus, if that part presents, passes beyond the circle of the uterine orifice and descends into the vagina. The pains then become stronger and stronger; the woman clings to surrounding objects; props her feet against the bed; throws her head backward; takes a deep inspiration, and contracts violently all the muscles of her body. The head of the fœtus travels along the vagina, of which the length diminishes in proportion to the increase of its breadth. The perineum, strongly pressed upon from above downward, extends and grows thin; the vulva, projecting forward, elongates the curve over which the fœtus is obliged to pass in order to issue from the long canal then formed by the uterus, vagina, and perineum united. The mons veneris and all the folds of the vulva disappear; the labia pudendi unfold and draw in the skin of the inner parts of the thighs. Lastly, one pain, stronger than all the rest, to which the appropriate name of *exhausting*, (conquassante,) has been given, expels the head from the external genitals. The rest of the body soon follows, accompanied by a large quantity of blood and water. After some moments of perfect rest, new pains supervene, which generally are not so acute, and of which the effect is to separate and expel the placenta and membranes, on the removal of which the woman is said to be *delivered*.

Let us conclude this rapid glance at the phenomena of labour, by the remark, that the division into three stages, is purely arbitrary: some authors admit four, and others five. In the natural order, it frequently happens that the various stages are not distinct, and that they are, as it were, dovetailed into each other: but they may be generally pretty regularly observed in primiparous women.

IV. *Duration of Labour.*

The duration of labour varies greatly, even in cases in which nature meets with no opposition, and owing to a host of circumstances which it would be impossible to reduce to any general rules. Haller fixed it absolutely at one hundred minutes; this time is much too short. Apart from all individual peculiarities, it may be reckoned, on the average, at five or six hours; but, if we are treating of primiparous women alone, it may be extended to eight or ten hours; although it is frequently longer. The four following extracts show how difficult it is to give any precise time.

According to M. Merriman, the average has been, of two hundred and twenty-six women, twelve hours in one hundred and eleven; twelve to twenty-four hours in seventy; twenty-four to thirty hours in twelve; thirty to forty hours in sixteen; forty to fifty hours in seven; fifty to sixty hours in five; sixty to seventy hours in three; and seventy to eighty hours in two.

Of five hundred other women, six hours in two hundred and six, of whom five were primiparous; twelve hours in one hundred and ninety-two, of whom twenty-seven were primiparous; eighteen hours in seventy-four, of whom thirty-one were primiparous; twenty-four hours in twenty-eight, of whom ten were primiparous. Average period, somewhat less than fifteen hours.

Of four hundred and forty-two women observed by M. Mansell, two hundred were delivered in less than two hours; one hundred and forty-six in from six to twelve hours; thirty-five from twelve to eighteen hours; eighty-four from eighteen to twenty-four hours; sixteen from twenty-four to forty-eight hours; two at sixty hours, and one in seventy-two hours. Average period, somewhat more than ten and a half hours.

In two thousand three hundred and thirty-five labours in 1811, Madame Lachapelle found the duration in one hundred to be one hour; two hours in two hundred and fifty-seven; three hours in two hundred and fifty-seven; four hours in three hundred and twenty-nine; five hours in two hundred and twelve; six hours in three hundred and seventeen; seven hours in one hundred and forty-two; eight hours in two hundred and thirty; ten hours in one hundred and seventy-four; twelve hours in one hundred and seventy-three; fifteen hours in sixty-seven; eighteen hours in thirty-one; twenty-four hours in twenty-six; thirty hours in nine; thirty-six hours in six; forty-eight hours in four, and sixty hours in one. Average period between five and six hours. It would, therefore, seem that the duration of labour in France is generally shorter than in England.

The advanced age of primiparous women does not seem to have the injurious influence which is popularly attributed to it.

ARTICLE II.—OF SOME OF THE VITAL PHENOMENA OF LABOUR IN PARTICULAR.

In the glimpse we have just taken of the phenomena of labour, we have not been able to examine each one in particular. Some of them, however, deserve careful study; as, for example, the pains or uterine contractions, the dilatation of the os uteri, the formation of the bag of waters; the discharge of the glairy mucus, cramps, and the retrocession or recoiling of the child's head.

1. *Pains.*

Under the generic name of *pains*, are popularly included the more or less violent efforts made by the woman in the expulsion of the fœtus. Such an acceptation is, however, too vague to be admitted without explanation. In fact, this term expresses only one of the three phenomena of which each effort is composed, and which are:—1st, the contraction of the uterus; 2d, the painful sensation, or pain properly so called, which accompanies this contraction; 3d, the action of the voluntary muscles, which nature brings to the assistance of the uterus.

Accoucheurs, nevertheless, in order to employ as far as possible popular terms, generally use the word *pain* as synonymous with uterine contraction, although they are perfectly aware that similar confusion cannot be admitted in the exact and critical language of science, pain not being inherent to the uterine contraction, of which it is only one of the effects, or consequences, in which it follows merely as a shadow does the body.

This being well understood, we shall distinguish three sorts of pains,—*true pains*, pains in the *loins* or *small of the back*, and *false pains*. The former are those resulting from the contractions of the uterus: they are felt in the parietes of that organ, and the lower part of the abdomen. The *pains in the loins* differ from the preceding in their location, and some of the phenomena which accompany them. Lastly, *false pains* do not belong to labour; they arise from other organs than the genital system.

True pains have peculiar and distinct characters, which do not allow them to be mistaken for any others. Their starting point is generally at the umbilicus, they extend toward the flanks, and terminate at the bottom of the hypogastrium: projection of the belly, and tension and hardness of the uterus, sensible to the hand, always accompany them. They are peculiar in not being continuous but intermittent; the interval separating them from each other is longer as they are weaker; and shorter as they are more energetic; they increase in intensity from the commencement of labour until its termination. Physiologists differ in opinion as to the cause which produces them.

Buffon attributed them to the distension of the uterine fibres. A very slight reflection will suffice to reject this opinion. If it were well founded, the pains should be less acute in abortion and premature deliveries, and we know that at these periods they are equal in strength to those at term. They should also be much more rapid, and acute in multiple pregnancies, and yet they are generally observed to be slower and more feeble, whether these pregnancies reach their term, or terminate prematurely.

Petit says, that the pain is not owing to the contraction itself, that it is only the consequence of it, and that it proceeds, at the time of labour, from the tearing of the parts which the fœtus dilates whilst forcibly passing between them.

We are induced to believe that the cause of pain resides in the compression of the nerves. If, as we have said, when uterine contractions take place, the fibres are shortened, swollen, and compress the vessels contained in the substance of the organ, so as to impede the circulation, they must also compress the nerves. Now, it is known that the ordinary state of contraction of the voluntary muscles is not painful: but if partial compression be applied, such as the application of a tight ligature around a limb, as for example the arm, contraction of the muscles of this limb cannot take place without greater or less pain, proportioned always to the degree of constriction of the limb, and consequently of its nerves.

In support of the opinion first advanced, we will bring forward that of a lady of high authority on this subject. Madam Boivin says, that the contraction of the body of the uterus, is not more painful than that of the abdomen, bladder or rectum,* that the pain proceeds from the tension of the internal orifice, of which the fibres are naturally more compact and close than those of the body and neck. She adds, "We may therefore affirm, if our feelings have not deceived us, that, when contraction commences, and during its whole duration, the woman feels only a greater or less sensation of pressure, which seems to arise from the whole extent of the median line of the posterior wall of the uterus, and extends over its sides as far as in front of the anterior median line. This equal, uniform pressure over the whole extent of the fundus and body of the organ, is accompanied by a numbness which extends to the internal orifice. To this numbness succeeds a painful dragging sensation, which commences at the posterior part of the neck, near the base of the sacrum (the point to which the internal orifice corresponds at term), continues descending obliquely on each side, behind the pubes, a direction which the internal orifice assumes with regard to the pelvis; and this painful dragging terminates, but still more acutely, at the external orifice, deep in the vagina."

Another consideration which leads us to believe that this is the true cause of pain, is that when the uterus returns slowly upon itself, the contractions are not painful. If the bag of waters is ruptured before the complete dilatation of the os uteri, the feeble pains which occurred at first, and occasioned the rupture of the membranes, recur no more until after the escape of the fluid. As long as this flows, the parietes of the organ close without pain, and it is only when they are in actual contact with the body of the child, as they were previously with the ovum or bag of waters, that their contractions become painful. Lastly, when the whole of the contents of the uterus have been expelled, and the viscus contracts on itself, the woman no longer suffers, because then the parietes no longer press upon a hard body in their cavity.

The intermission of the true pains is a remarkable circumstance. Buffon thought it was owing to a partial separation of the placenta. This cause cannot be admitted; for, if it were true, whenever the labour progresses slowly, the placenta ought to be entirely separated, and its expulsion follow closely that of the child. Now this does not happen. Frequently, after a long and tedious labour, the placenta is not separated, or only over a small extent, and half an hour may elapse before its expulsion by the uterus. Again, admitting Buffon's hypothesis, those women in whom there is complete or unnatural adhesion of the placenta, in whom, consequently, this body does not separate, notwithstanding the contractions, ought to experience no intermission in the pains, which should continue from the commencement of labour until the expulsion of the whole of the product of conception, which we do not find to be the case.

May not the intermission be explained, as Boerhaave has explained the motions of the heart, the compression of the nerves? As the nerves penetrate the heart between the great vessels, Boerhaave† thought that, after having brought the cerebral influence, which causes the contraction of the fibres, the compression exerted upon them by the contraction of these very fibres, and the increase in size of the vessels from the gush of blood, suspended momentarily the passage of the nervous fluid; that the compression ceasing when the fibres were relaxed and the vessels emptied, the cerebral influence, passing anew through the nerves excited a new contraction, and that this uninterrupted succession explained the alternate movements of the diastole and systole of the heart. Without discussing here the value of this theory as regards the heart, we will remark that it could only be applied to the uterus when the intermission and duration of the contraction of this latter organ were equal, for the cerebral influence would not require a longer time to reach the uterus than the auricles

* Levret, Art des Accouchemens, p. 94, 1766. Also, Suite des Observations sur les Accouchemens Laborieux, p. 12, 1780.

† Institutiones Medicæ, § 409, p. 214, in 12mo. Paris, 1747.

and ventricles. Now, the interval which separates the uterine contractions exceeds their duration; it is sometimes fifteen or thirty minutes or more; it diminishes, indeed, toward the end of labour, but the period of rest is always greater than that of action. Boerhaave's hypothesis, therefore, apparently satisfactory in the explanation of the motions of the heart, is not equally applicable to uterine contractions. Thus, without endeavouring to determine precisely what is the cause of these contractions, we shall merely say, that the uterine fibre, like all others, can act only during a certain space of time, and that after having acted, it requires an interval of rest to recruit its energy. This necessity is the more imperious in the uterus, as its contractions are more vigorous. In fact, when the woman has suffered for a long time, when the obstacles opposing the progress of the fœtus have not been overcome, notwithstanding the energy of the contractions, the latter diminish, become more rare, and sometimes two or three hours elapse before the recurrence of additional ones.

Pains in the loins.—With a little attention, these can never be mistaken for true pains. As indicated by their name they are located in the inferior part of the lumbar region; they may exist without or simultaneously with uterine contractions. In the first case, they are owing merely to fatigue of the sacro-lumbales and longissimi-dorsi muscles, which women are obliged to exert during labour, in order to stiffen the vertebral column and pelvis, and render their efforts more efficacious. But is this fatigue the sole cause of the pain in the loins during labour? Some persons have thought so, because by applying a napkin or broad bandage to the lumbar region, and elevating the woman's buttocks, we give her relief, the pressure exerted on the sacro-lumbar mass acting like an aponeurosis, or tight gaiter around the leg, to prevent fatigue in walking. Others have attributed them to the tension of the posterior ligaments of the uterus. We do not understand why these simple folds of peritoneum should occasion pains in the loins. Moreover, if they arose here, they ought to appear during the whole period of pregnancy, and in some women they are observed only during labour. We believe that pains in the loins result particularly from the compression of the lips of the os uteri, when dilatation takes place unequally. These pains, we have frequently observed in women affected with marked anterior obliquity of the uterus. Now, in this case, the fundus uteri being strongly inclined forward, the posterior part of the neck is compressed between the fœtus and the promontory of the sacrum; when contractions occur, this part of the neck being unable to yield as easily as the other points of the circumference, is compressed between the two resisting bodies. Therefore, the pains in the loins may be compared to those which take place during uterine contractions, in consequence of the compression of the nerves.

False pains.—We give this name to sharp and continuous pains, which, sometimes traversing the abdomen from one side to the other, sometimes appear fixed at one point, for example, at the umbilicus or hypogastrium, and produce no change in the shape of the uterine globe, nor in that of its orifice. They may depend on the exaltation of the sensibility of the uterus, on a morbid state of the intestinal canal, liver or bladder, prolonged constipation, indigestion, diarrhœa, or accumulation of urine. We must find out their cause, and relieve it by appropriate means; but their location and characters will suffice to distinguish them from those owing to uterine contractions, with which they cannot be mistaken, however little attention we may give them.

II.—*Dilatation of the Os Uteri.*

By dilatation we understand the degree of opening of the os uteri during labour. Many causes contribute to produce it. The first and principal is the uterine contractions, and the proof of this is, that without contraction there is no dilatation. This cause is not, however, the only one, others are tributary to it: we mean the action upon the orifice of the sort of wedge formed by that portion of the ovum detached from the uterus, and constituting the bag of waters, and when this is wanting, the wedge formed by the presenting part of the fœtus, when the size and shape of the part are fitted to engage in the orifice of the neck. But we must observe that these causes act only in a secondary, accessory, and purely mechanical manner; that they are subordinate to the first, which is actually the energetic active cause; and we advance in proof of this the dilatation which occurs in cases of vicious presentations of the fœtus with premature rupture of the bag of waters.

It will be readily conceived, without any argument on our part, that the combination of the different causes of which we have spoken, must render, all other things being equal, the dilatation more easy, more regular, and less painful, than when one or both the latter are wanting. Recollecting the account given of the structure of the uterus, we can easily understand the mechanism of its dilatation. When the action of the uterus commences, the prelude, as it were of labour, in short, during the first and feeble contractions, known by the name of monches, the neck, far from dilating, hardens, and its orifice closes. This effect takes place because, the contraction being general and uniform, the circular fibres of the neck contract, and efficaciously resist the united action of the fibres of the body and fundus. But when the latter, more numerous and powerful, have, by repeated, successive and sustained contractions, overcome the resistance opposed by the last circular fibres of the neck which close the orifice, they stretch them, elongate them in every direction, and even rupture some: then the orifice enlarged, is dilated, and ascends, drawn towards the fundus, in a degree equal to the retraction experienced by the longitudinal fibres. At the same time, the ovum separates in the vicinity of the neck: compressed by the oblique fibres which contract the uterine cavity, it is obliged to engage in the point which presents the least resistance. The tide of fluid flows toward the orifice; arrested by the membranes, it distends them; it pushes them through the neck like a wedge, which enters it slowly, compressing equally and uniformly, all the points of the circumference of the orifice; lastly, aided by the contractions, it overcomes the resistance still presented by the central circular fibres, and effects a gradual and complete dilatation.

The progress of the dilatation is governed by the force and frequency of the uterine contractions, the correct position of the uterus, the state of softness and integrity of the neck, and the concurrence or absence of the accessory causes. Generally slow and slightly perceptible at the commencement of labour, it obeys a progression which is generally in direct proportion to its increase; that is, in a primiparous woman, more time is required to obtain a diameter of three centimetres, (1·18 Eng. inch.), than subsequently one from three to nine, (3·54 Eng. inch.) As it is important, in forming a prognosis as to the duration of labour in the woman we are examining, we are in the habit of comparing the extent of the dilatation to familiar and well known objects, such as the various coins used in our country. When the dilatation exceeds these in size we choose other objects of comparison, of which the size is nearly the

same every where, the palm of the hand for example. Lastly, when the dimensions of the os uteri permit the head to penetrate it fully, that is, when it is as largely open as possible, we say that the dilatation is completed. In some public establishments, as the Maternité, for instance, we are in the habit of indicating the measure of the dilatation by the extent of the diameter of the circular opening of the orifice of the neck: thus the dilatation is said to be of three, six or nine centimetres. (A centimetre is equal to about ·3937 of an English inch.)

III. *Bag of Waters.*

The *bag of waters* is the projection made through the dilated orifice by membranes of the ovum, detached from the uterus and urged by the contractions of the organ. This bag, more or less salient, according to the degree of opening of the neck, deserves examination as regards the causes which produce it, the shape it assumes, and the phenomena accompanying its rupture, whether this rupture occurs before or during labour.

The causes of its formation are the same as those of labour, or rather of the dilatation of the neck of the uterus. The membranes of the ovum cannot pass spontaneously through the neck; and can do so only when impelled by a power exterior to the ovum, and this power exists in the uterine contractions. Some authors, however, think that the contractions are not sufficient, and they think that the extensibility enjoyed by the membranes of the ovum, plays some part in the formation of the bag. Whilst admitting the influence of this cause on the production of the phenomena, we must remark that it is very trifling: for if the membranes of the ovum possess a certain degree of extensibility, it is very limited, since the bag may be easily ruptured by unequal compression. It is certain that the formation of this bag is proportioned to the shortening of the uterine fibre, to the separation and passage of the ovum through the neck. The bag is more voluminous as the neck is more open, and as a more considerable portion of the ovum is separated: the projection which it forms represents the degree of shortening of the fibres of the uterus, and consequently also the diminution of the capacity of the viscus.

The bag of waters assumes different forms. Generally *hemispherical*, it appears to form part, sometimes of a smaller and sometimes of a larger sphere: it is arched or flattened, according as its curve has a greater or less extent. Sometimes it is *oval*, transversely, or from before backward. In certain cases it is elongated and narrow, in the shape of an *intestine* or a *sausage*. In other very rare instances it takes that of a *pear*.

The cause of these varieties does not clearly appear. The majority of writers consider the *hemispherical waters* as indicating a presentation of the vertex at the os uteri, the *flattened* and *oval waters* as a sign of the presentation of the shoulder or flank, the *sausage-like* shape, as announcing the presence of the limbs and especially of the feet. Without absolutely rejecting these opinions, we believe them to be generally without foundation. We have observed all shades of shape in presentations of the vertex, and the hemispherical in those of the trunk and limbs; therefore we think that the causes of those varieties cannot be sought in the presentation. They appear to be owing principally to the relations of the situation of the uterus with the entrance of the pelvis, to the resistance of the membranes, their more or less extensive separation, to the manner in which the wave of fluid acts on them, to the mode of dilatation of the neck, to the strength or weakness of the uterine contractions. Thus, the bag of waters is hemispherical whenever the neck, during its dilatation, corresponds to the centre of the pelvic excavation. It is oval if the uterus is very oblique. In marked cases of anterior obliquity, it is transversely oval, because the posterior part of the neck, being against the promontory of the sacrum, does not yield to the extension as easily as the anterior. When, on the contrary, the obliquity of the uterus is to the right or left, the great diameter of the bag corresponds to the sacro-pubal diameter (antero-posterior) diameter of the superior strait. When the bag is elongated in the shape of a *sausage*, or a *pear*, this configuration may be owing to the density of the orifice of the neck, the laxity of the membranes, and especially to the feebleness of the uterine contractions.

The *salient* and *flat* waters depend on the manner in which the fluid propelled by the uterine contractions, reaches the segment of membranes which occupies the orifice of the neck. If the presenting part of the fœtus is small or removed from the orifice, the fluid, falling suddenly on the membranes, impels them backwards, drives them through the neck, and gives to the bag a regular hemispherical shape, which projects in proportion to the dilatation of the orifice of the neck. But if the presenting part is large, if it is applied to the neck, and touches directly the membranes, as frequently occurs in presentations of the vertex, the fluid, meeting the head at the centre of the orifice, breaks against it, the column is divided, and the water passes between the parietes of the neck and the head. In these cases, the bag remains flattened, because the fluid, having lost its impulsive force when it reaches the separated portion of the membranes, acts too feebly to cause any projection of them through the orifice.

When the labour advances regularly, and the dilatation is complete, and the bag well formed, it generally happens that the column of fluid impelled by the uterine contraction, rests on the centre of this bag, overcomes the resistance of the membranes, and ruptures them: the waters are then partly discharged. The portion of the fluid between the membranes and the head of the fœtus escapes, the head prevents the flow of the remainder, and the labour is rapidly terminated.

But the rupture does not occur always in this manner: it sometimes takes place at the circumference, and sometimes high up in the interior of the neck. Hence follow phenomena which require to be pointed out. When the rupture occurs laterally, the waters gradually escape: the head is in immediate contact with the membranes and the fœtus may be born with a *caul*, as when the membranes are unbroken. If the rupture takes place at a point corresponding to the internal surface of the neck, no discharge supervenes during the uterine contractions, because the parietes of the neck, being applied to the fissure of the ovum, prevent the escape of the fluid: but as soon as the contraction diminishes, a certain quantity of water flows between the neck and the corresponding portion of the ruptured membranes, and the labour is slackened. At other times, a second bag is formed which we are obliged to rupture, in order to restore to the latter the necessary degree of energy.

When the membranes are too thin, they yield to the first efforts of contraction, and the rupture of the bag of waters takes place prematurely, that is, from the very onset of labour, before dilatation is effected. When this happens, the majority of women suppose that their trouble will soon be over; but twenty-four, thirty, or forty-eight hours sometimes elapse before this occurrence. We have even seen

the discharge precede it twenty-one days, and continue during all this time. In such cases, labour comes on only when nearly all the fluid is discharged, and when the uterus, sufficiently contracted to embrace the body of the fœtus, experiences a resistance which excites it to action. But this is always an unfortunate circumstance, both for mother and child. Nature being deprived of an accessory means of dilatation, the latter frequently takes place more quickly, but less regularly and with more pain, and may occasion lacerations which give rise to greater or less irritation of the neck, to inflammation, of which the consequences may be more or less extensive ulcerations and indurations of the neck of the uterus. As to the fœtus being no longer protected by the liquid from the contractions of the uterus, it receives their immediate impulsion, and the pressure exerted by them in every direction may be sufficiently powerful to retard or even suspend the movements of its heart. Therefore, in primiparous women of strong constitution, and in whom the organs are rigid, the fœtus sometimes perishes, although the labour may terminate naturally. Its death may then be the result of the general compression of its body, or of the umbilical cord, or merely of the modifications in the utero-placental circulation, in consequence of the long-continued contraction of the uterus after the escape of the liquor amnii. Under other circumstances the bag of waters, if too strong, is not ruptured. The woman is exhausted in useless efforts to effect this rupture, or else, by her exertions, the ovum is expelled wholly, as frequently happens in abortions which occur at the fourth or fifth month of gestation. Then the whole of the product of conception is expelled at once, and the child is born with a *caul*. This peculiarity, considered by the ancients as a fortunate omen, is far from being favourable, for if some benevolent hand does not soon remove the obstacles which prevent the introduction of air into the lungs, the fœtus is asphyxiated. On the other hand, the uterus, too rapidly emptied, is attacked with inertia: its fibres not having had time to return gradually from the maximum of extension to the maximum of contraction, it remains, as it were, stupefied with wonder at its new condition: the vessels, not being compressed, pour out blood copiously, and the woman is in danger of dying from hæmorrhage. The placenta, likewise, not being completely separated, may produce inversion of the uterus. It is therefore important, under these circumstances, as we shall hereafter explain, to rupture the membranes.

IV.—*Of the discharge of glairy Mucus.*

This is the mucus which flows from the sexual organs during labour, and its appearance is one of the first phenomena of this function. Sometimes it begins only with the uterine contractions, but generally precedes them.

Many authors have supposed this discharge to depend on the transudation of the liquor amnii through the membranes of the ovum. It is difficult to conceive how it could have been referred to this hypothesis; for if this were the case, the discharge should appear only when the labour has attained its maximum intensity; it ought to be entirely serous, and manifest itself under the form of a dew, whilst it consists in a thick and viscid fluid. This discharge is owing to the increase of the follicular secretion of the upper part of the vagina and neck of the uterus, influenced by the excess of vital action communicated to these organs by the onset of labour, and the compression of the mucous follicles by the portion of the ovum which passes through the neck.

At first, this mucus is colourless, thick, viscid, ropy, like the albumen of an egg, and adheres to the fingers. At a late period it loses its transparency, and assumes a reddish, yellowish, or blackish hue, owing to the quantity and quality of the blood which colours it. These gradations resemble closely those seen in the hue of the sputa expectorated in certain cases of peripneumonia. The red colour of the mucus is produced by various causes. The first depends on the rupture of the small vessels which establish a communication between the membrana caduca and the parietes of the uterus near the neck; these vessels are small, and contain but little blood, so that by pouring out the fluid they contain, they can merely change the transparency of the mucus. At a later period, vessels also of a small calibre, but more numerous, are ruptured in the substance of the neck of the uterus, which does not yield readily to the effort of distension. We then observe sanguinolent striæ in the mucus. Sometimes an actual sanguineous exhalation takes place at the neck of the uterus and vagina, in consequence of the increased excitement determined by labour: we have seen women in whom the blood escaped from the os uteri in the form of dew. Lastly, it happens in certain cases that the colouring of the mucus is owing to the partial separation of the placenta; not only the mucus then is tinged with red, but we find a discharge of blood, and the formation of coagula, constituting the commencement of hæmorrhage.

When the mucus is tinged with blood, the vulgar expression is that the woman has a *show*, and it is supposed that the labour will be soon terminated: this sign is of no value. Many woman have a show from the beginning of labour, others several days, two or three weeks before delivery, depending on the insertion of the placenta near to or on the os uteri itself; others are delivered without any show. We believe we may say that this sign is frequently wanting, for it is scarcely ever observed except in primiparous women, or in cases of rapid labour, or when the fœtus is very large; under opposite circumstances it rarely occurs.

V.—*Cramps.*

When the head of the fœtus engages in the superior strait, or passes through the pelvic excavation and the external genital organs, women frequently experience in the lower extremities intolerable pains, called *cramps*. These cramps appear particularly when the head is voluminous, the pelvis somewhat narrow, and the concavity of the sacrum not very well marked. They have not always the same location. Some are felt at the upper internal part of the thighs, and depend on the compression of the obturator nerves. They are generally not very severe, and cease as soon as the head has escaped from the superior strait. Others, more frequent and acute, are seated in the posterior part of the lower extremities, sometimes throughout their whole length, and arise from the compression of the sacral plexuses by the head plunged in the pelvis. Sometimes only one limb is affected, because only one plexus is compressed. The cramps disappear with the cessation of the compression or the uterine contractions which produce them; but they sometimes reappear on the slightest exertion of the woman.

VI.—*Retrocession, or retreat of the Child's Head.*

When the head has reached the inferior strait, we frequently observe in primiparous women, that it presents several times, even for hours before escaping from this strait. As soon as the pains cease, the head retires and reascends the vagina. This phenomenon has been erroneously attributed to the twisting of the umbilical cord, for it occurs without regard to the disposition of the cord: it is owing solely to the resistance of the soft parts which line the pelvis and the great sacro-sciatic ligaments, to the want of harmony existing between the capacity of the vagina and vulva, and the size of the child's head, and especially to the elasticity of the bony pieces composing the last. These pieces, compressed during the pain, approach, and even overlap each other; but, as soon as the compression ceases, the parts recover their original conformation; the soft parts lining the pelvis react at the same time, and necessarily cause it to reascend. We may add that the perineum and external genital organs, being thrust downward and forward, exert an action in a direction opposed to progression, and consequently contribute to this retrocession.

Mechanical phenomena of Natural Labour.

By the mechanical phenomena of labour, we understand the passive movements executed by the whole of the body, or only some of the parts of the fœtus, under the influence of the uterine contractions, in order to pass through the tunnel of the pelvis. It will be easily seen that these movements vary according to the position of the fœtus in the mother's womb, and the route it must follow to reach the external world. We can explain them, only by describing successively the different kinds of labour, and will commence with those of the first class, that is, natural labours; the others will be examined in their turn.

FIRST CLASS.

NATURAL LABOURS.

Hippocrates and all the ancients considered as natural those labours alone, in which the head of the fœtus presented; and as non-natural those in which it presented any other part of the body. The moderns have ranked among natural labours all those in which the fœtus presents the pelvic extremity. If we refer only to the accomplishment of delivery, and the preservation of the greatest number of children, we must return to the opinion of the ancients: but if we consider only the possibility of delivery, without regard to the mode of its termination, the difficulties which accompany it, the dangers to which the fœtus is exposed during labour, the peculiar situation in which it reaches the world: in short, if we examine labour in one point of view alone, that of its mechanism, as we are about to do in the present instance, we ought to give a still greater extension to the term natural labour, and include in this class all those which can terminate by the efforts of nature alone, without regard to the position of the fœtus. We shall, consequently, divide this class into three orders; as the fœtus presents to the os uteri either the cephalic or pelvic extremity, or the trunk.

Labours of this class presuppose a natural conformation, both of the mother and fœtus, and the combination of other circumstances which we have previously said were necessary for their accomplishment. The first condition, however, is not so indispensable that it may not be wanting to a certain degree: for example, the pelvis may be contracted, and delivery still take place, if the fœtus be small, or its ossification not very far advanced.

Order I.

Presentations of the Cephalic Extremity.

We have already said, but will here repeat, that by the word *presentation* we mean the presence at the orifice of the uterus, not of any part of the body of the fœtus which may be reached with the finger, but of a part large enough to fill more or less completely the superior strait, and which, in the natural or artificial expulsion of the fœtus, presents a peculiar mechanism, or requires a special manipulation; by the term *position*, we understand the *ensemble* of the relations between this part and the various points of the circumference of the superior strait. From the usual attitude of the fœtus in the mother's womb, the head, of all its parts, most frequently is expelled first: this was the case in 82,164 births out of 84,395 in the Lying-in Hospital of Paris.

Although presentations of the cephalic extremity are extremely common, and may be generally recognized by a hard, round tumour, large enough to occupy the superior strait, still as this extremity is not always situated in the same manner, and may present to the entrance of the pelvis, the vertex, the face, one of the lateral regions of the head, or any other part of its surface, the peculiar characteristics of these presentations must vary according to the region of the head which corresponds to the os uteri. When treating, therefore, of each of these regions, we shall point out the signs by which they may be recognized, and thus will be seen the ensemble of those distinguishing the cephalic extremity.

First Genus.—*Presentations of the Vertex.*

Presentations of the vertex are the most common of all those of the cephalic extremity. In 82,164 labours in which the cephalic extremity presented at the os uteri, they have been observed 81,806 times. They are known by a rounded, hard, elastic, resisting tumour of a certain size, having grooves which indicate the sutures of the cranium, and sometimes membranous spaces of greater or less extent, which are the fontanelles, but which it is not always easy to distinguish at the commencement of labour.

We have said that the occiput might correspond to all the points of the circumference of the pelvis, but that, for practical use and clearness of description, we were obliged to determine a certain number of positions, to which all the others might be readily referred. We admit eight of these positions, viz: four *direct* or *fundamental*, and four *indirect* or *oblique*, which are merely varieties of the first.

The four direct positions are, *left occipito-iliac, right occipito-iliac, occipito-pubal,* and *occipito-sacral,* thus called because the occiput corresponds in the two first to the extremities in the transverse diameter, and in the two others to those of the antero-posterior diameter. (See Plate 33 and 34.) These four positions, somewhat rare, are found, 1st, the two first, when the head is very large, or when the antero-posterior diameter of the superior strait is slightly contracted; 2d, the other two, when the head is small and the pelvis very large, when its transverse diameter alone is contracted, or when the woman, being of an athletic constitution, has the psoas and iliac muscles highly developed.

The four indirect or oblique positions, are, the *left occipito-acetabular, right occipito-acetabular, posterior right occipito-iliac,* or *left fronto-acetabular, posterior left occipito-iliac,* or *right fronto-acetabular.* The occiput corresponds to one of the points of the quadrants comprised between the transverse and antero-posterior diameters. (See Plate 35 and 36.)

The oblique are merely varieties of the four direct positions, but more particularly of the two first. Their cause is the disposition of the female organs: for the shape of the superior strait, its inclination, the presence and mode of action of the psoas muscles, the anterior inclination of the uterus in pregnancy, and the frequency of lateral obliquities, the right, especially, unite in forcing the head of the fœtus to take an oblique direction: sometimes other circumstances, which we shall indicate hereafter, concur in rendering it more frequently oblique in one direction than in another. Hence, we must have present unusual conditions, as an unnatural largeness of the female pelvis, or smallness of the fœtal head, to produce the direct positions. From this circumstance arises the difference in frequency of these various positions. In 19,586 presentations of the vertex, Madame Boivin found only ten times the direct positions, viz: 6 occipito-pubal, 2 occipito-sacral, and 2 transverse occipito-iliac, whilst the number of oblique positions was 19,578, viz: 19,375 anterior, and 203 posterior; 15,787 of the occiput behind the left acetabulum, and 3,791 behind the right; 15,693 of the occiput in front and to the left, and 3,682 of the occiput in front and to the right; 109 of the occiput to the rear and right, and 94 of the occiput to the rear and left.

The direct are distinguished from the oblique positions, by the direction of the sagittal suture, which in the former corresponds to the transverse or to the antero-posterior diameter of the pelvis, and in the others, to one of the two oblique diameters. The situation of the fontanelles to the front, rear, right or left, then points out precisely the position.

First Direct Position. *Transverse left occipito-iliac and its varieties; anterior left occipito-iliac or left occipito-acetabular, and posterior left occipito-iliac or right fronto-acetabular.*

We include designedly under one head, the mechanism of these three positions of the vertex, because it is the same for all, with this sole difference, that the movement of rotation of the head is the more easy and less extended, as the occiput is nearer to the anterior part of the ilium; and slower, more difficult, and extended as the occiput approaches nearer to the posterior part of the iliac bone.

As the left occipito-acetabular position is the most frequent of all, that in which labour is most easily performed, and the movement of the head least extended, we shall take it as our model, and describe *in extenso* its mechanism, indicating in a summary manner the differences presented by this mechanism in the direct or transverse left occipito-iliac and the posterior occipito-iliac positions.

In order to clearly understand the mechanism of labour, we must previously have a precise idea of the general relations of the fœtus with the uterus, and of its partial relations with the mother's pelvis.

1st. In the *anterior left occipito-iliac,* or *left occipito-acetabular* position, (first of Baudelocque,) the most common of all, the occiput corresponds nearly to the left acetabulum; the forehead looks toward the right sacro-iliac symphysis; the sagittal suture traverses the pelvis obliquely from below upward and from before backward; the posterior fontanelle is to the left and front, the anterior to the right and rear; the occipito-frontal diameter is nearly parallel to the left oblique diameter of the superior strait, and the bi-parietal to the right oblique diameter; the dorsal plane of the fœtus is directed toward the left antero-lateral region of the uterus, the sternal plane toward the right postero-lateral region; the right side toward the right antero-lateral, and the left side toward the left postero-lateral region; lastly, the feet and breech correspond with the fundus of the organ, where they are slightly inclined to the right and rear.

The effects of the first contractions of the uterus are to compress all the parts of the fœtus, to roll it, as it were, into a ball, and increase its anterior flexion. The impulse resulting from these contractions is transmitted in the direction of the axis of the uterus, that is, according to a line which, starting from the fundus of this viscus, would fall upon the centre of the neck, and be nearly parallel to the axis of the body of the fœtus. This impulse cannot be communicated to the head of the fœtus except through the solid parts which compose its body; now these solid resisting parts, capable of transmitting the impulse, are superimposed on each other, and form a sort of uninterrupted stalk or lever, which extends from the extremity of the coccyx to the fœtal head. This lever is represented by the vertebral column. If the articulation of the spine with the head were at the centre of the base of the cranium, it would tend to depress the head, so that the vertex, or the most projecting part of the sagittal suture, would occupy the centre of the pelvic excavation. But as this articulation is nearer to the occiput than to the anterior extremity, it follows that the impulse extending along the spinal column must give a see-saw motion to the head and increase its flexion on the thorax. The following phenomena then supervene: the occiput is depressed; the chin rises and approaches the sternum; the anterior fontanelle, which at first was accessible to the finger, ascends slightly by removing from the centre of the orifice of the uterus; the occipito-bregmatic diameter coincides with the left oblique diameter of the pelvis. In this situation the uterine contractions continuing to act cause the occiput to descend on the left antero-lateral inclined plane, whilst the forehead follows the direction of the right sacro-iliac symphysis: this motion continues until the head has reached the pelvic excavation. When the head has passed under the right sacro-iliac symphysis, the head has undergone as great an anterior flexion as possible, maintaining at the same time the general relations with which it entered the superior strait.*

But as soon as the uterine contractions cease, the neck of the uterus and parietes of the vagina, being each drawn in an oblique direction, have a tendency to return to their normal position and react on the head, which is engaged between them. The internal obturator muscle and the left obturator membrane, as well as the right pyriform muscle, react equally, and destroy the slight curve from

* See Plate xxxix.

within outward which the uterine contraction had forced them to describe. If all these parts were left to themselves, the only result of their combined action would be to carry the head upward; but the disposition of the inclined planes of the pelvis is such, that the occiput has less tendency to ascend than to pass in front under the arch of the pubes, where a considerable vacuum is presented, whilst the forehead and face are lodged in the concavity of the sacrum. From that time the general relations of the head are changed; the bi-parietal diameter is parallel to the transverse diameter of the excavation, and the occipito-mental corresponds nearly to the axis of the inferior strait. The rotation of the head being accomplished by a simple torsion of the neck, the trunk of the fœtus has experienced no change in its relative position.*

The flexion of the head being carried as far as possible, the ulterior efforts of the uterus, not having changed their direction, are spent on the extremity of the chin, which departs gradually from the anterior part of the thorax, and is depressed as the occiput passes through the vulva and as the neck and shoulders descend. During this motion the occiput is disengaged and rises below and in front of the symphysis pubis, whilst the forehead and face pass over the inclined plane formed by the united curves of the sacrum, coccyx, and perineum. We, therefore, see appearing successively at the vulva, the occiput, the posterior fontanelle, the sagittal suture, the anterior fontanelle, the forehead, root of the nose, mouth, and lastly, the chin. The shoulders engage in the direction of the right oblique diameter of the superior strait, which has given passage to the bi-parietal diameter of the head.†

At the moment that the chin escapes from the vulva, the anterior edge of the perineum, yielding to its natural elasticity, comes in front of the neck, and the head, forcibly thrown back on the mons veneris, falls again from its own weight in front of the anus. But in a few moments the cervical column, feeling no longer any uneasiness, recovers its natural direction; the torsion of the neck ceases, and the head returns to a direction analogous to that in which it was before engaging in the superior strait; the occiput is turned toward the left groin of the mother, and the forehead and face toward the posterior internal part of her right thigh.‡

Thus, the head undergoes four successive motions: the first, of *flexion* and of *descent* or *depression* all at once, which continues until it reaches the excavation; the second, of *rotation* from left to right, which takes place in the interior of the pelvic canal; the third, of *extension*, occurring beneath the symphysis pubis; the fourth, of *restitution*, which causes it to recover its original direction, and which takes place externally to the pelvis as soon as it has escaped from the vulva and is free from all impediment.

As to the shoulders, after having engaged in the pelvic excavation, they undergo, like the head, a motion of rotation, by virtue of which the right shoulder comes behind and below the symphysis pubis, and the left in the concavity of the sacrum: the former appears first at the vulva, then the latter.

The remainder of the trunk, which was bent toward the right lateral region in order to accommodate itself to the curve of the pelvic canal, and which now represents merely a cone of which the base is expelled, meeting no longer any obstacle, is delivered without difficulty.

2d. In the *direct* or *transverse left occipito-iliac position*, the occiput corresponds to the left iliac fossa, and the forehead to the right iliac fossa; the sagittal suture is transverse; the posterior fontanelle is to the left, the anterior to the right; the back of the fœtus looks toward the left lateral wall of the uterus, the sternal plane toward the right lateral wall of the same organ; the right side toward the abdominal parietes, and the left toward the vertebral column.

As regards the mechanism of its labour, this position does not differ from the preceding occipito-acetabular, except in the motion which brings the occiput forward, having a little more extent.

3d. In the *posterior left occipito-iliac position*, or *right fronto-acetabular*, (fifth of Baudelocque,) the occiput corresponds to the left sacro-iliac symphysis, the forehead to the right acetabulum, the sagittal suture divides the pelvis obliquely from above downward, and from in front backward, and from right to left; the anterior fontanelle is in front and to the right, the posterior to the left and rear; the occipito-frontal diameter is parallel to the right oblique diameter of the superior strait, and the bi-parietal to the left oblique diameter; the sternal plane of the fœtus corresponds with the right antero-lateral region of the uterus, the dorsal plane with the left postero-lateral region of the same organ, the right side with the left antero-lateral region, the left side with the right postero-lateral region; the breech is at the fundus and to the left of the uterus, the feet also at the fundus of the same organ, but in front and to the right. This position is more rare than the others, probably on account of the ordinary situation of the rectum. It presents also fewer advantages than that of the opposite side, because the softness of the intestine along which the head must glide whilst descending, renders its advance more difficult. The labour, therefore, is incomparably more tedious.

Second Direct Position. *Transverse right occipito-iliac and its varieties, right occipito-acetabular and posterior right occipito-iliac, or left fronto-acetabular.*

We shall include in one description the mechanism of labour of these three positions, for the same reasons as in the preceding, since it is the same, with the exception of more or less extent and ease of the motion of rotation of the head, which varies as the latter approaches more or less the anterior or posterior part of the ilium: but as the posterior right occipito-iliac is the most frequent of the three, we shall invite attention to the mechanism of the disengagement of the head in this position.

1st. In the *anterior right occipito-iliac position*, or *right occipito-acetabular*, (second of Baudelocque,) the general situation of the fœtus is the same as in the anterior left occipito-iliac. But its relations are changed; the occiput corresponds to the right acetabulum, and the forehead to the left sacro-iliac symphysis; the sagittal suture divides the pelvis obliquely from above downward, and from in front backward, and from right to left; the posterior fontanelle is in front and to the right, the anterior to the rear and left; the occipito-frontal diameter is parallel to the right oblique diameter of the superior strait, and the bi-parietal diameter to the left oblique; the dorsal plane of the fœtus corresponds to the right antero-lateral part of the uterus, and the external plane to the left postero-lateral part; the right side is to the rear and right, the left side to the front and left.

* See Plate xl. † See Plate xli. ‡ See Plate xlii.

During labour, the reciprocal relations of the head, shoulders and pelvis are the same; by the efforts of the uterus they describe the same inflexions as in the left occipito-acetabular position, but in a contrary direction; thus the rotation of the occiput takes place from right to left, and that of the forehead from left to right. As soon as the head is disengaged, the face turns toward the internal posterior part of the mother's left thigh, and the occiput toward the right groin. The right shoulder lodges in the concavity of the sacrum, and the left behind the pubes.

2d. In the *right* or *transverse occipito-iliac position*, the occiput corresponds to the right iliac fossa, and the forehead to the left iliac fossa; the sagittal suture is transverse, the posterior fontanelle to the right, the anterior to the left; the back of the fœtus looks toward the right lateral wall of the uterus, the sternal plane to the left lateral wall of this organ, the right side toward the vertebral column, and the left side the abdominal parietes.

The mechanism of labour in this position does not differ from the preceding occipito-acetabular, except that the motion which brings the occiput forward, has a somewhat greater extent.

3d. In the *posterior right occipito-iliac position*, or *left fronto-acetabular*, (fourth of Baudelocque,) the occiput corresponds to the right sacro-iliac symphysis, and the forehead to the left acetabulum; the occipito-frontal diameter is parallel to the left oblique diameter, the bi-parietal to the right oblique diameter, the sagittal suture takes the direction of the left oblique diameter, that is, it divides the pelvis obliquely from left to right, from in front backward, and from above downward, the anterior fontanelle is to the left and in front, the posterior to the right and rear; the sternal plane of the fœtus corresponds to the left antero-lateral region of the mother, the dorsal plane to the right postero-lateral region, the right side to the left postero-lateral region, the left side to the right antero-lateral region, and the feet are inclined slightly forward and to the left of the fundus uteri.

The cause of the much greater frequency of this position cannot be exactly determined. It is thought, however, to be owing to the pressure of the rectum and the sigmoid flexure of the colon in the left side of the pelvis, especially when constipation, so common in pregnant women, has accumulated hardened stercoral matter in these intestines.

The following phenomena occur during delivery, without regard to its cause. At the commencement of labour the axis of the uterus passes from in front backward, and from left to right; the impulse produced by the uterine contractions is transmitted to the head through the vertebral column; the occiput is depressed, glides and descends in front of the right sacro-iliac symphysis; the chin rises and approaches the sternum; the forehead ascends slightly, then it glides and descends behind the anterior left inclined plane of the pelvis. If we make an examination at the commencement of labour, we find the anterior fontanelle in the centre of the pelvis; at the period of which we are speaking, this fontanelle ascends and disappears on account of the flexion of the head; and it is only with great care, and by carrying the finger upward and to the left that we can reach it, whilst the posterior fontanelle, previously inaccessible to the touch, is easily felt to the rear and right as the head descends and engages in the pelvic excavation. The occiput rolls from behind forward, describes from right to left an arc of a much larger circle than in the anterior right occipito-iliac position, and passes under the symphysis pubis, so that it is disengaged precisely in the same manner as if the head had originally presented in this last position. But owing to the small extent of the rotation of the head on the neck, the occiput could not thus come under the symphysis pubis without endangering the life of the fœtus, if the trunk did not share in this motion of rotation, and change its position. It hence follows that a longer time is necessary to terminate the labour. If the woman is primiparous, and the child large, nature may be exhausted in useless efforts, and the intervention of art becomes necessary. When artificial interference is not demanded, the rest of the labour is the same as in the anterior right occipito-iliac position, except that the head performs a more extended motion of rotation, in which the upper part of the trunk participates.

After the expulsion of the head, the face is always turned toward the internal part of the left thigh of the mother, and the occiput consequently toward the internal part of the right thigh; the right shoulder is in the cavity of the sacrum, and the left under the pubic arch; the latter is first disengaged.

According to Baudelocque and his followers, as soon as the right parietal bone rests on the base of the sacrum, the head being obliged to turn on its pivot, the occiput passes into the curve of the sacrum to which it is very near, and the forehead, following the inclined plane presented by the left side of the pelvis, passes under the pubes; nevertheless, sometimes, but rarely, they add, that there is a sort of spontaneous reduction to the right anterior occipito-iliac position, that is, the occiput turns to the front instead of toward the sacrum.

We have for a long time been of the opinion of M. Baudelocque: but enlightened by experience we now agree with M. Naegele; we think that Baudelocque has mistaken the exception for the rule, and that the course he considers as a rare exception, is on the contrary that followed by nature in a majority of cases.

Third Direct Position. *Occipito-pubal, (fourth of Baudelocque.)*

The ancients, and Levret among the moderns, considered this position as the most natural; Baudelocque, on the contrary, says, that it is very rare. He only observed it twice in 10,329 labours; Madame Boivin 6 times in 20,517, and Madame Lachapelle not once in more than 30,000. Nevertheless, Drs. Dewees and Radford have reported authentic cases of it; M. Naegele even goes so far as to say that it occurs originally in all the anterior occipito-iliac positions, and that the latter are merely a secondary transformation of it, which is recognized only because we make our examination at too advanced a period. The moderns have urged as an objection that the rounded form of the forehead would not permit it to remain in front of the promontory of the sacrum during the uterine contractions, which always tend to impel it to the right or left. But this objection is more specious than solid; for the promontory is often much smaller in the pelvis covered by its soft parts, than in the skeleton, on account of the psoas muscles which fill up the greater part of the sacro-iliac notches. Thus, even in theory, this position is not impossible, especially in vigorous and muscular women, and we may add that we have several times verified the correctness of M. Naegele's remark. In this position, and at the commencement of labour, the occiput is behind the symphysis pubis and the forehead on the projection of the sacrum; the sagittal suture is parallel to the antero-posterior diameter, the

anterior fontanelle is behind, and the posterior in front; the back of the fœtus corresponds to the abdomen of the mother, the sternal plane to the posterior paries of the uterus, the right side to the right, and the left side to the left.

The mechanism of this labour differs from that we have just described merely in the fact, that the head has only two motions to execute, one of flexion and one of extension, without any well-defined motion of restitution; for, when it is once disengaged, the occiput inclines to the right or left, according as the shoulders engage in the direction of the right or left oblique diameters.

Fourth Direct Position. *Occipito-sacral, (sixth of Baudelocque.)*

In this position, still more rare than the occipito-pubal, of which it is the opposite, the occiput rests on the promontory of the sacrum, and the forehead is behind the pubes; the disposition of the sagittal suture is the same, but the anterior fontanelle is in front and the posterior behind; the back of the fœtus corresponds to the loins of the mother, its sternal plane looks forward, its right side to the left, and its left side to the right.

We may apply to this position the greater part of the remarks made on the preceding.

Thus it has been said that the occiput, much larger than the forehead, could not remain in contact with the promontory of the sacrum, that on the slightest movement of the woman it would be forced to glide to the right or left, and that, consequently, this would soon be converted into one of the two posterior occipito-iliac positions. We admit that in a majority of cases, this remark is correct, but it must not be supposed to be absolute; 1st, because the promontory of the sacrum does not project equally in all women; 2d, because in those of a robust constitution, the volume of the psoas muscles obliterates this angle, and sometimes produces at this point of the superior strait, a kind of depression calculated to receive and lodge the occiput. Moreover, the head of the fœtus being flexed, the occipito-frontal diameter is not presented to the sacro-pubal diameter of the superior strait, but the occipito-bregmatic corresponds to the latter; so that the adjacent parts of the nucha, and not the occipital protuberance, will be in contact with the promontory of the sacrum. It is certain that this position has been admitted and pointed out by judicious observers, and we ourselves have twice observed it, once in a strong, primiparous woman, in whom the labour was very severe and laborious, during which the enormous head experienced such a depression of the frontal bone, that the fœtus was born moribund, and all our efforts to restore it to life were vain: another time, in a woman who had already had several children, it presented no remarkable feature but its slowness. When the head engages in this position, the occiput passes in front of the promontory of the sacrum; having reached the pelvic excavation, the head is forcibly flexed, the chin approaches the sternum, the forehead ascends behind the symphysis pubis, whilst the occiput glides under the curve of the sacrum, coccyx and perineum, in order to disengage itself, in front of the posterior commissure of the vulva. The time occupied by the occiput in passing over the excavation is always extremely long, less, as it is said, on account of the forced flexion of the head, than on account of the considerable extent of the posterior plane of the pelvis which it is obliged to follow, but especially on account of the inflexibility of the head, which, being composed of bony pieces strongly joined to each other, do not allow it sufficient inflexion, in either direction, to adapt itself to the curve of the pelvis, like those parts which compose the trunk. As soon as the occiput is disengaged, the anterior edge of the perineum glides over the nucha, the head undergoes a motion of extension which depresses the forehead and face, and causes them to pass out beneath the symphysis pubis. In this position, as in the preceding, only two motions of the head are necessary to traverse the pelvis, namely, one of flexion, and one of extension.

Anomalies in the disengagement of the head in the various portions of the Fœtus.

Hitherto we have explained only the regular course followed by nature in the disengagement of the head in the various positions of the vertex. But it must be stated, that this progress is not always as uniform and regular as we have just described it, and that influenced by numerous causes, and circumstances which cannot be always exactly understood, the mechanism of this disengagement changes and presents varieties, which it is useful to study.

We have established as a principle, that, whenever the head had escaped from the vulva, and that, free from all impediment, the torsion of the neck ceased, it underwent a motion of restitution, which placed it in the same relative situation with the body of the mother as it had previous to its engagement in the superior strait. It must be remembered, that this motion of restitution is always subordinate to the position assumed by the shoulders in passing through the pelvis, and to the direction of the trunk. Thus, when the shoulders and trunk do not partake of the motion of rotation of the head, the motion of restitution is performed as we have said. If, on the contrary, this motion has been shared by the shoulders, and followed by the trunk, which sometimes occurs when the fœtus is small, the pelvis large, or the uterine contractions strong and energetic, it may happen that the motion of rotation continues outside of the pelvis; that the occiput, after passing beneath the symphysis pubis, is directed backward and the face forward, and that the shoulders and trunk execute a spiral or winding motion, which changes entirely the mode of disengagement of the trunk.

At other times, either from a want of curvature of the sacrum, or amplitude of the pelvis, or from any other cause, the motion of rotation of the head is not performed, or performed imperfectly, and the latter preserves at the inferior strait the diagonal or transverse position with which it entered the superior strait: it may then struggle for hours against the obstacles opposing its expulsion, and if it is large, the ossification not far advanced, or the contractions very powerful, it sometimes happens that the head is more or less deformed, and is finally expelled from the pelvis in this anormal position. But in these cases, when circumstances favourable to its disengagement are not present, the child frequently falls a victim to the mother's exertions, and the interposition of art may become indispensable.

In some cases of right or left posterior occipito-iliac positions, when the occiput, instead of disengaging in front, lodges in the cavity of the sacrum and in those of the occipito-sacral, the head, instead of following the route we indicated for the fourth direct or occipito-sacral position, performs in the interior of the pelvis a motion of extension which throws the occiput backward, sometimes incompletely, sometimes completely, and which occurs particularly when the sacrum is too concave. In the former case, that is, when the extension is incomplete, the root of the nose, resting against the pubic arch, becomes the centre of the movement which the spine, impelled by the

efforts of the uterus, communicates to the head: as the forehead, engaged in the arch of the pubes, cannot ascend behind the symphysis, the occipito-frontal diameter must of necessity present to the coccy-pubal diameter, in order that the vertex and occiput may disengage in front of the perineum, after which the edge of the perineum glides forcibly behind the occiput: the motion of extension is performed round the nucha as a centre; the face descends; and we see appearing successively beneath the pubes the nose, mouth, and chin, which is expelled last.* Now, it suffices to understand the respective relations of the pelvis and head, to perceive that this mode of disengagement cannot take place except when the head is small or the pelvis very large; for, in the extension of the head backward, the occipito-frontal diameter is obliged to pass over the coccy-pubal diameter of the inferior strait, and the smallest want of harmony between these two diameters creates an enormous resistance, which the head cannot always overcome.

In the second case the extension is complete; the occiput, arrested by one of the points of the posterior part of the pelvis, is inverted on the back of the fœtus, and, instead of advancing toward the inferior strait, it ascends in the curve of the sacrum, and is turned on the back, whence it follows that the head, entirely extended or thrown backward, traverses the external genital parts as in a face presentation; the front of the neck is applied behind the symphysis pubis; the chin engages in the vulva; the other parts of the face appear; then the vertex and occiput are disengaged in front of the perineum. This mode of disengagement of the head is rare: Madame Boivin has seen it but once in more than 20,000 labours; Béclard has likewise observed it once, and we have met with it three times in the course of our practice.

Second Genus.—*Presentations of the Face.*

Presentations of the face, without being exactly rare, are nevertheless not very common. They have been observed 352 times in 82,164 births by the cephalic extremity.

We admit, in presentations of the face, only two fundamental positions, which we shall designate by the terms *right mento-iliac*, and *left mento-iliac*, direct or transverse, for, although the chin may be directed forward or backward toward one of the points comprised between the transverse and antero-posterior diameters, when labour commences, it is soon converted into one of the transverse positions which we here point out. In the first, the chin of the fœtus corresponds to the right, and in the second to the left iliac bone of the mother. These two positions are not equally frequent. In 246 cases the chin has been found to correspond to the right in 141, and to the left in 105. Each of these positions may present three principal varieties, as the fronto-mental diameter may correspond, on one side or the other, either with the transverse diameter, or with one of the oblique diameters, or with one of the points comprised anteriorly or posteriorly between the transverse and antero-posterior diameters.

If we credit the greater part of writers, presentations of the face should be considered only as deviations of those of the vertex. We believe that it is really so in a majority of cases, and that this deviation is owing especially to a more or less marked obliquity of the uterus, which, at the first contractions, causes the vertex to bear against one of the points of the superior strait, and forces the occiput to be inverted on the back, and the face to present and descend the first. Presentations of the face, however, have been observed in women who have died near the end of their pregnancy, without any signs of labour. Madame Boivin relates one case of this kind, and Madame Lachapelle two. The presentation could not depend on the obliquity of the uterus, and was consequently original.

The peculiar signs of face presentations are numerous; nevertheless, in order to avoid mistakes, an examination should be made at the very commencement of labour, or immediately after the rupture of the bag of waters. Carrying the finger over the surface of the partly-soft and partly-solid tumour which we feel, we discover the root of the nose, the nose, the upper edge of the orbits, the eyes, the cheeks, the mouth and chin. By introducing the finger into the mouth, it is easy to recognize the tongue, and particularly the alveolar processes, which in no case can permit this part to be mistaken for the anus, as has happened to inattentive examiners. When the face is swollen, the diagnosis is more difficult: the projecting cheeks leave between them a groove in which the puckered lips represent no longer a transverse fissure, but a rounded orifice.

For a long time face presentations have been ranked among artificial labours. We believe we are the first who publicly declared that they ought to be included among those which can terminate by the efforts of nature alone; at least, we have advanced this opinion in our lectures long before the publication of the works of M. Velpeau and Madame Lachapelle. We do not pretend, however, that no one had ever spoken of it previously to ourselves, for we know that Mauriceau, Portal, Delamotte, Deventer, etc., had seen similar labours terminate naturally. But all authors, even to the time of Baudelocque, agreed in regarding this species of labour as very difficult and dangerous for the mother and fœtus, and all, or nearly all, have given the advice to endeavour to modify the presentation, and, when this could not be done, to terminate the labour artificially. In our first public lectures, and constantly since then, have we condemned this view of the subject. It must not, however, be supposed that nature is competent to terminate it alone and without the intervention of art. All other things being equal, the labour is more difficult and tedious than in presentations of the vertex, the head being unable to traverse the excavation of the pelvis, inasmuch as it is forcibly thrown backward; the external and internal jugular veins are so much compressed as to impede the return of the blood from the head to the heart; the face is swollen; the eyelids, cheeks, and lips tumefied and almost on a level with the nose; these parts, being injected with blood, assume a livid, blackish hue, are often actually ecchymosed, so that at the moment of birth the child resembles more closely a negro than a white. It has scarcely a human countenance. This state, which excites great fear in the parents when they have not been forewarned, is not dangerous. We have always seen it disappear in a few days. Sometimes, nevertheless, when the labour is very tedious, the congestion, or rather the stasis of the blood, is not confined to the face, but extends to the brain, induces an apoplectic state, and in some rare cases the death of the fœtus.

1st. *Right mento-iliac position.* (Third of Baudelocque.)—The situation of the fœtus, in this position, is such that the forehead corresponds to the left iliac fossa, and the chin to the right iliac fossa; the bi-temporal diameter is parallel to the sacro-pubal diameter, and the fronto-mental to the transverse diameter of the pelvis. The back looks toward the left lateral part of the uterus, and the sternal

* See Plates xliii. and xliv.

surface toward the right lateral part of the same organ; the right side is turned to the front, and the left to the rear; the breech is to the left, and corresponds to the fundus uteri; the feet are above and to the right. This position is a deviation of the left occipito-iliac position of the vertex, or of one of its varieties.

From the commencement of the contractions, the head, already moderately extended on the back, completes its extension, in consequence of the resistance which it meets; the fronto-mental diameter corresponds with the transverse diameter, without, however, changing the relations of the bi-parietal diameter. When it has descended as low as possible in the pelvic excavation, the reaction of the soft parts, assisted by the disposition of the inclined planes of the pelvis, communicates to it a motion of rotation which carries the chin from right to left behind the symphysis pubis, and the forehead from left to right backward in the cavity of the sacrum.* Then the front part of the neck is applied against the posterior surface of the pubes; the chin is at the centre of the vulva; the action of the expulsive force bears on the occiput, and the head executes a motion of flexion, which disengages gradually the face, by presenting successively at the vulva, first the chin, then the mouth, nose, eyes, forehead and the rest of the head, the anterior fontanelle, the sagittal suture, the posterior fontanelle and occiput, which glide in front of the perineum.† The head, once disengaged, recovers the position it had in the pelvis; the occiput is directed toward the left side of the mother. The shoulders engage in the direction of one of the oblique diameters.

2d, Left mento-iliac position, (fourth of Baudelocque).—In this position, which is a deviation from those of the right occipito-iliac of the vertex, the general relations of the uterus and fœtus are the same as in the preceding position, the partial relations only are inverted; thus the chin is to the left of the uterus, as well as the sternal plane of the fœtus; the forehead and vertex are to the right, as well as the dorsal plane. The face is in the centre of the superior strait, the fronto-mental diameter is parallel to the transverse of the pelvis.

The mechanism of the labour is precisely similar to the preceding; except that rotation takes place from left to right.

The above remarks apply particularly to the transverse varieties. The mechanism of the posterior and anterior varieties, differs only in the extent of rotation necessary to bring the chin under the symphysis pubis, to which point it always inclines, whatever may have been that point in the superior strait with which it originally corresponded. Mad. Lachapelle, however, relates some cases, in which she has seen the face escape nearly transversely from the vulva.

Baudelocque admitted two other positions, characterized by the presence of the chin above the pubes or in front of the sacrum. These positions are excessively rare. We have never met with them. The cases of mento-sacral position, described by Delamotte and Smellie, relate to very small fœtuses, expelled by women who had already had large children. Supposing that analogous cases might occur, they could not, except under a combination of circumstances of the same nature, terminate unless the position be converted into one of the two fundamental positions we have just explained, or even into one of the positions of the vertex.

Third Genus.—*Presentations of the sides of the Head.*

These presentations are known by the presence of the ear at the superior strait.

This genus includes two sub-genera, founded on the side of the head which presents, and each sub-genus three positions, determined by the relations of the ear with the pelvis of the mother. In the first sub-genus, which comprises presentations of the right side of the head, the lobe of the ear may be turned on the pubes, or one of the iliac bones; we have then three positions, *lobulo-pubal, right* and *left lobulo-iliac.* The same thing occurs in the second sub-genus, comprising presentations of the left side of the head, including also three positions, distinguished by the same names.

Presentations of the lateral parts of the head are very rare, since in 20,517 births they have been seen only six times. In our practice we have observed four cases, but three of these were in the same woman; she was small, deformed, hunch-backed, had an enormous belly which rested on her thighs, and extended nearly to her knees, when she was sitting. It will be understood, that in such a conformation, the uterus being greatly inclined forward, the contractions must bear to the vertex and impact it against the promontory of the sacrum, without regard to the position of the head. If, likewise, the belly be not elevated so as to raise the uterus, the neck of the fœtus must undergo a motion of lateral inflexion, which would bring one of the sides of the head to the orifice. In fact, the majority of authors consider a large quantity of water, or a marked obliquity of the uterus as the usual cause of these rare presentations, in which we should see merely deviations of those of the vertex. We reject the first position of Baudelocque, in which the lobe of the ear is in front of the promontory of the sacrum; for, in order that such a position could be possible, there must exist a posterior obliquity of the uterus, which can only occur, when the lumbar column, instead of being convex, presents a concavity anteriorly.

There is also a remarkable difference in the frequency of the side of the head which presents. In the six cases related by Madame Boivin, the right side presented once, and the left five times.

First Sub-Genus.—Presentations of the right side of the Head.

1st. In the *lobulo-pubal position* of the right side of the head, the great diameter of the concha of the ear is parallel to the sacro-pubal diameter. The vertex is at the promontory of the sacrum, the convexity of the helix and occiput is directed toward the left side of the pelvis, the tragus and face toward the right side, the lobe and base of the cranium are behind the pubes. The back of the fœtus corresponds with the left lateral region of the uterus, the anterior plane with the right lateral region, the right side with the anterior region of the same organ, and the left side with the posterior region. The feet are toward the fundus of the organ, inclined to the right.

We consider this position as a deviation of the left occipito-iliac positions, and more particularly of the right fronto-acetabular. It cannot occur without an anterior obliquity of the uterus.

If the woman is not very robust, and she remains in the erect position, the labour cannot terminate, because, in this attitude, the obliquity of the uterus continues: but if she is made to lie on her back, so that the pelvis may be properly elevated, and if, on the other

* See Plate xlv. † See Plate xlvi.

hand, we push the uterus from below upward, we remedy this obliquity. The vertex glides in front of the promontory of the sacrum, the head rises gradually and recovers its original situation, that is, one of the left occipito-iliac positions; having once become straight, its progression and the rest of the labour terminate as in one of these positions. By merely observing these precautions, the delivery can be effected naturally, as we have observed.

2d. In the *right lobulo-iliac position of the right side*, the vertex corresponds to the left iliac fossa, the face looks toward the sacrum, the occiput and posterior edge of the ear correspond to the pubes, the chin, lobe of the ear, side of the neck and right shoulder are to the right, the feet are turned toward the posterior left part of the fundus uteri.

This position, which may be considered as a deviation of one of the left occipito-iliac positions, anterior or transverse, results from an extreme right lateral obliquity of the uterus.

In order to relieve it, the woman must be laid on her left side, the obliquity of the uterus disappears, the head engages in the pelvic excavation in an erect position, and the labour terminates as in a simple left occipito-iliac position of the vertex.

3d. *Left lobulo-iliac position of the right side.*—This position of the right side of the head, which is a deviation of the posterior left occiput-iliac position, is produced by a left lateral obliquity of the uterus, and is excessively rare.

In this position, the attitude of the fœtus is such, that the head, forcibly inclined to the left shoulder, presents the great diameter of the concha of the ear parallel to the transverse diameter of the superior strait, the vertex is directed toward the right iliac fossa, the lobe of the ear, the neck, and right shoulder are toward the left iliac fossa; the face to the pubes, and the convexity of the helix, and the occiput to the sacrum.

It is remedied by placing the woman on her right side, the head engages in an erect position in the pelvic excavation, and the labour terminates as in the posterior left occipito-iliac position.

Second Sub-Genus.—Presentations of the left side of the Head.

1st. In the *lobulo-pubal position of the left side*, the general relations of the head are the same as in the lobulo-pubal position of the right side, the partial relations alone are inverted; thus the vertex corresponds with the promontory of the sacrum, and the lobe of the ear with the pubes; but the face and tragus are directed toward the left iliac, and the occiput and helix toward the right iliac fossa of the pelvis. In order to remedy this position, which is a deviation of one of the right occipito-iliac positions, it is sufficient to place the woman on her back, to elevate the fundus uteri, to carry it upward and backward; then the vertex glides over the cavity of the sacrum; the head rises, the occiput is directed toward the right ilium, and the labour terminates as in a right occipito-iliac position of the vertex.

2d. *Right lobulo-iliac position.* In this position of the left side of the head, which should be considered as a deviation of the posterior right and left occipito-iliac positions, the vertex corresponds with the left iliac, the lobe with the right iliac fossa, the tragus and face with the pubes, the helix and occiput with the sacrum.

3d. In the *left lobulo-iliac position*, the great diameter of the ear is parallel to the transverse diameter of the pelvis, the vertex rests on the right iliac fossa, the head is turned toward the sacrum, the occiput and posterior edge of the ear answer to the pubes, the side of the neck and left shoulder are to the right, the feet upward, backward and to the right. This position should be referred to a deviation from the right anterior and transverse occipito-iliac positions.

The last two positions, of which the principal cause is a strongly marked left lateral obliquity of the uterus, are on that very account excessively rare. In order to remedy them, the woman must be laid on her right side, and the same rules observed as in obliquities of the uterus: the vertex is found to glide in the excavation, the head to become straight; these positions assume one of those of the vertex, of which they are merely a deviation, and the labour terminates as in the positions of the vertex to which they belong.

Order II.

Presentations of the Pelvic Extremity.

This order comprises three genera, presentations of the breech, feet and knees. Except presentations of the vertex, those of the pelvic extremity are most frequent. In 84,395 births, 2,842 of this kind have been observed, viz: 1,811 of the breech, 1,010 of the feet, and 21 of the knees.

For a long time, presentations of the pelvic extremity were ranked among those which require the interposition of art. In presentations of the feet, Hippocrates recommended that these parts should be pushed back and the head brought down, and some moderns, even, have been of this opinion. Experience, however, has proved the fallacy of this precept; for, in 2,000 births by the pelvic extremity, at the Maternité, 82 only required assistance, viz: 57 in 1,214 breech presentations, 25 in 772 of the feet; all the knee presentations, 14 in number, were delivered without aid.

If we considered merely the mechanism of presentations of the pelvic extremity, and especially of the feet, they should be regarded as more advantageous than those of the head, for it seems very plain, that a conical mass like the pelvic extremity, engaging first by its smallest part, presents the most favourable conditions for the dilatation of the os uteri. But this is not the point of view in which the question is to be examined. If, in theory, the vital and mechanical actions composing delivery can be separated from each other, it is not so in practice. Therefore their necessary combination annuls all rigorous application of the laws which govern the mechanism of inanimate bodies, and it has been proved elsewhere that the dilatation of the os uteri is effected by the action and shortening of the uterine fibres; and that the child plays but an accessory and secondary part. We have demonstrated that nature is able to terminate unaided the labour in the cases in question, but the birth is generally more tedious, more painful for the mother, and more dangerous for the child. Thus the proportion of still-born children is much greater under these circumstances than under any other. In 790 spontaneous labours by the

pelvic extremity, there were 101 deaths, whilst in 20,567 of the vertex, there were not more than 635* and 88 of the face, 3 only perished. If we add to this that besides these 101 still-born children, the 790 foregoing cases have furnished 98 children of feeble constitution, and 16 premature or deformed, we shall be forced to confess that deliveries by the pelvic extremity, although capable of being accomplished by the efforts of nature alone, are more disadvantageous than those of the vertex. It must also be admitted that the unknown cause which produces the attitude of the fœtus on which they depend, frequently exerts a very unhappy influence on the product of conception. The slowness of the labour may be explained by the small size and slight resistance of the parts which present at the orifice; the softness of the breech allows it to yield readily to compression, and it does not engage as freely as the head. When the child is large, there is formed in the woman a kind of cushion, occasioned by the pushing back of the soft parts which oppose the advance of the fœtus. Although the configuration of these parts is apparently more advantageous in dilatation, they are much less efficacious than the head, because the efforts expended on them are not so clearly defined. Let us add, that as the head enjoys a certain degree of mobility on the vertebral column, and may be flexed forward or backward, there is an uncertainty in the action of the uterus, of which the efforts are, as it were, decomposed, and the result is a remarkable decrease in the strength of the pains.

The more frequent death of the child is due less to the slowness of the labour than to the inverse order in which it is accomplished. Thus, whenever the head is expelled first, the rest of the body is protected against the direct action of the uterus by the interposition of a certain quantity of fluid. The cord is rarely compressed in these cases, and if it occur accidentally, when the head escapes through the vulva, the life of the child is not necessarily endangered, for the interruption of the placental circulation may not produce immediate asphyxia, since the mouth being expelled, respiration may take place, imperfectly, it is true, but sufficiently to support life. On the contrary, in presentations of the pelvic extremity, the orifice of the neck, being only incompletely closed by the part which is engaged in it, especially if it be the feet, the whole of the waters are discharged, the uterus contracting on itself, embraces the body of the child, and, if compression of the cord ensue, even for a short time, asphyxia is the necessary consequence; nothing can here compensate for the interruption of the circulation, for as the head still remains in the uterus, respiration cannot be effected. Moreover, the compression exerted from below upward on the body of the fœtus may cause the blood to flow toward the upper parts, and produce an apoplectic condition; it may give rise to serious lesions of the organs contained in the splanchnic cavities, particularly of the heart, whose movements it interrupts, and of the liver, so voluminous at this age, of which the soft and delicate tissue always suffers from sudden or slow, but long-continued mechanical impressions.

First Genus.—*Presentations of the Breech.*

The breech is known by a round and soft tumour, presenting inequalities more or less projecting and hard, owing, in some cases, to the presence of one of the great trochanters, generally to that of the ischia and coccyx. The only part for which the breech can be mistaken when it is at an elevation that the finger can scarcely reach, and when the membranes are not ruptured, is the vertex or one of the shoulders. In these cases, we must wait, in order to decide, until the bag of waters be ruptured, for then the signs of which we have just spoken become more evident. Others have likewise been indicated, for example, a fissure separating the two thighs, in the centre of which the orifice of the rectum is found, discharging a certain quantity of meconium. These signs are useful certainly; but they are not met with at all stages of labour. The fissure is well marked only when the breech is above the superior strait; when it begins to engage in the pelvic excavation, the tension it undergoes from the thrusting upward of the soft parts covering the buttocks, effaces completely the groove in the median line. The escape of meconium takes place only when the belly begins to be compressed by the engagement of the breech in the excavation. This sign, which is present under other circumstances, but with peculiar characters which we shall hereafter indicate, is sometimes wanting in this, either on account of imperforation of the anus, or because, from the small size of the fœtus, the belly can be greatly compressed. We therefore must attach more importance to the presence of the sacrum, coccyx, tuberosities of the ischia, hips, and genital organs. There is another case in which the breech may be mistaken for the vertex; it is when the child, presenting this latter part, experiences, after the rupture of the membranes, great difficulty in escaping from the os uteri, and the integuments of the cranium become greatly swollen. The sensation of softness, which we stated was indicative of a breech presentation, is then felt; we can recognize neither sutures nor fontanelles; but with attention, by passing the finger over the parts in contact with the circumference of the os uteri, the hardness of the bony pieces will leave no doubt as to the presence of the cranium.

Various hypotheses have been imagined to explain presentations of the pelvic extremity. As long as it was supposed that the fœtus remained seated on the promontory of the sacrum until the end of the seventh month of pregnancy, and then turned with its head downward, the admission of any cause capable of preventing this somerset-like motion was sufficient. There was some plausibility in this explanation, for it has been remarked that breech presentations are more frequent in premature deliveries than when the fœtus has reached maturity; but, in this case, it is more natural to suppose that the smallness of the fœtus and the abundance of the waters which surrounds it, permit it to perform various motions in the mother's womb, and labour may more frequently supervene when the breech is directed downward.

But one supposition can be made as to the causes of breech presentations at full term—that the fœtus, when yet small, remains in this position for some time, and is there developed until the vertical or occipito-coccygeal diameter of the ovoid which it represents has become longer than the transverse and antero-posterior diameters of the uterus; and, being no longer able to move except on its own axis, it is obliged to remain in the position it had accidentally taken until the moment of its expulsion.

The breech may present in four distinct positions, which we designate by the terms *left sacro-iliac*, *right sacro-iliac*, *sacro-pubal*, and *sacro-sacral*. These positions are not equally frequent. In 1214 breech presentations observed at the hospital of the Maternité, the first has been seen 917 times, the second 456, the third 13, and the fourth 26.

* Admitting even, with M. Paul Dubois, that, among these still-born children, some perished from causes which evidently did not belong to the presentation, and that the proportion of death be only one in eleven, the mortality would still greatly exceed that of vertex presentations, in which this same proportion is only one in fifty.

1st. *Left sacro-iliac position of the breech.*—In this position the sacrum of the fœtus is opposite to the left ilium of the mother; the hips are parallel to the antero-posterior diameter, or in the direction of one of the oblique diameters of the superior strait. The back of the fœtus looks to the left, and the anterior plane, on which the legs and thighs are extended, is turned to the right; the left side is in front, and the right side to the rear; the head is slightly inclined to the right at the fundus uteri. (See Plate 47.)

The impulsion communicated by the uterine contractions is transmitted from the vertex to the coccygeal extremity of the fœtus; the latter passes through the superior strait into the excavation of the pelvis; the left hip turned toward the acetabulum or the obturator foramen of the right side, that is to say, diagonally. But we should observe that, in a majority of cases, the hips enter the excavation parallel to the antero-posterior diameter of the superior strait; it is only when the fœtus is very large that they engage in the direction of one of the oblique diameters. Having reached the bottom of the excavation, the hips undergo a motion of rotation which brings the left behind the symphysis pubis, and the right in the cavity of the sacrum. All writers have repeated, after Baudelocque, that the left hip then ascended behind the symphysis pubis, whilst the right followed the cavity of the sacrum, in order to be disengaged first. We can assert positively that such is not the order of events. In every case of breech presentations we have always seen the hips descend on the same horizontal line, and the hip which corresponds to the pubes appears first at the vulva, and be disengaged long before the other had traversed the posterior paries of the pelvis: it is indeed only when the former is disengaged that the motion of lateral inflexion of the trunk, which is to effect the disengagement of the latter, commences. We believe this remark will be found useful and important in the extraction of the secundines. (See Plate 51.)

In order that the hips may be disengaged, the trunk of the fœtus must undergo a lateral inflexion, of which the concavity corresponding to the pubes of the mother inclines to the left side, and the convexity to the right. This is precisely what happens. In this manner the breech escapes from the inferior strait; the left hip appears first externally, under the arch of the pubes, and the right subsequently, after having traversed the inclined plane formed by the curves of the sacrum, coccyx, and perineum. (See Plate 52.)

The motion of lateral inflexion continues during the whole period of disengagement of the trunk. The shoulders, having reached the superior strait, engage in the direction of the right oblique diameter; the right shoulder in front of the left sacro-iliac symphysis, and the left behind the right acetabulum. The former, after having traversed the whole of the posterior paries of the pelvis, is disengaged in front of the perineum, whilst the latter remains still above and behind the right acetabulum or behind the pubes. When the fœtus is large, the arms glide generally over the lateral parts of the trunk, and rise to be applied against the sides of the head: when, on the contrary, the child is small, the arms remain agglutinated to the trunk, or, if one arm rises, it is generally that which corresponds to the symphysis pubis. But when, in consequence of subsequent contractions, one of the arms is disengaged, the other, being no longer retained, executes a motion opposite to that which it had followed in order to rise, it is depressed, returns to its natural position, and is disengaged with the trunk. The head enters the pelvic excavation in the following manner:—the face passes in front of the right sacro-iliac symphysis; the occiput glides behind the left antero-lateral inclined planes of the pelvis, and when the disengagement of the left shoulder is effected, it undergoes, in consequence of the influence which we explained in describing the first position of the vertex, a motion of rotation which brings the occiput behind the pubes and the face into the cavity of the sacrum. (See Plate 53.) The head descends as follows:—the chin, mouth, nose, forehead, the anterior fontanelle, sagittal suture, and posterior fontanelle, are successively disengaged in front of the posterior commissure of the vulva, whilst the occiput is expelled last, rolling against and below the symphysis pubis, by the continuation of a motion which inclines the trunk of the fœtus toward the abdomen of the mother. (See Plate 54.)

The ignorant always express their surprise that a child can be *born doubled up*, to use their own language, that is, having the thighs elevated and applied to the trunk. This apparent miracle disappears when we remember that the bis-iliac diameter of the breech, and even the bi-trochanterian diameter of the fœtus, which is the largest of the pelvic extremity, is smaller than the bis-acromial and bi-parietal diameters of the head; so that it is not strange that the breech can thus engage. As to the exaggerated flexion of the thighs on the trunk, it is no longer extraordinary when we reflect on the extreme laxity of the articulations and the great mobility of the thighs on the pelvis during infancy. For the fœtus to be expelled *doubled*, the flexion would have to take place about the centre of the vertebral column, which is impossible or could not occur without endangering its life.

2d. *Right sacro-iliac position of the breech.*—This position differs from the preceding only in the inversion of the partial relations of the fœtus and pelvis. Thus the sacrum of the first corresponds to the right ilium of the latter, the legs and thighs, extended and elevated in front of the abdomen, are directed toward the left ilium, the right hip toward the pubes, the left toward the sacrum of the mother. Its mechanism is the same: the hips engage in the direction of the antero-posterior, or of one of the oblique diameters, but the motions they undergo in the cavity of the pelvis are inverted. The right hip appears first at the vulva, after which the right side of the trunk is inflected under the pubes in order to assist the escape of the left hip; the shoulders then appear at the superior strait, in the direction of the diameter, followed by the hips, and the labour terminates as in the preceding position, except that the face passes in front of the left sacro-iliac symphysis instead of the right, and the occiput glides over the right antero-lateral inclined plane of the pelvis. It is important to remember, that in all presentations of the pelvic extremity, the head can engage properly only so long as it remains flexed on the upper part of the thorax, that is, when the chin is as close to it as possible. If by imprudent tractions, it is made to depart from the breast too early, difficulties might be created which would endanger the life of the fœtus.

3d and 4th. *Sacro-pubal, and Sacro-sacral positions.*—Some of our cotemporaries, M. Paul Dubois, among others, have suppressed these two positions, undoubtedly because natural labour cannot be effected except they are converted into one of the two preceding ones. Nevertheless, as they sometimes occur from the commencement of labour, we think they should be retained, and moreover, this is important in a practical view, for they present very great difficulties, and frequently, when the child is very large, do not descend into the cavity of the pelvis, and artificial assistance becomes necessary. The third is less difficult than the fourth, and the latter is the only position of breech in which we are obliged to bring down the feet.

In the third position of the breech, the right hip of the fœtus corresponds to the left side of the mother, the left hip to the right side, the lumbar region to the pubes, and the sternal surface to the posterior paries of the uterus. If the fœtus is small, the loins glide behind

the arch of the pubes; the hip which feels the immediate action of the uterine contractions, is inclined backward until it reaches the curve of the sacrum; the other hip turns behind the pubes and the breech escapes from the inferior strait, as in one or other of the two first positions.

In the fourth position, (see Plates 49 and 50,) the right hip and right side of the fœtus, correspond to the right side of the mother: the left hip and left side to her left side, the back of the legs and thighs, and the whole anterior part of the fœtus are toward the anterior paries of the uterus, the sacrum and back are toward the posterior part; the head, flexed forward, is in contact with the fundus of the organ.

Natural labour is longer and more difficult in this position than in the third; and can only be effected when this position is changed into one of the two first. In general, we can hope for an unaided termination of it only when the fœtus is small, and even then, in order to facilitate its engagement, we must be patient, change the position of the mother, support her courage, assist the contractile efforts of the uterus, and we shall find this position converted into the first or second, and the labour terminate like one of the latter.

Second Genus.—*Presentation of the Feet.*

Previously to the rupture of the bag of waters, the feet may be mistaken for the hands; but at a later period this error becomes impossible. The shape of the feet in no wise resembles that of the hands; the toes are short, not very movable, of nearly equal length: the heel forms a rounded projection; the articulation of the foot with the leg, instead of being, like the hand, in the direction of the axis of the limb, is at right angles, and presents a malleolus on each side; lastly, the breech is nearly always close to the feet and immediately above them, so that by carrying the finger somewhat higher it may be felt, and it cannot be mistaken for a shoulder or the thorax, which would be found beyond the hand.

We admit in presentations of the feet, as in those of the breech, four positions, which we term *left calcaneo-iliac, right calcaneo-iliac*, without regard to the direction of the feet, whether the heels are turned directly to the left or right, a little more forward or backward, provided that they correspond to some point of the right or left iliac bones: *calcaneo-pubal* and *calcaneo-sacral*, as the heels answer to the pubes or sacrum. These positions are not equally frequent. In 769 presentations of the feet, the first was seen 482 times; the second 261, and each of the two others thirteen times.

These presentations being merely variations of those of the breech, are produced by the same causes. They are generally accompanied by a very marked obliquity of the uterus; it may then be conceived, that the breech does not correspond exactly to the centre of the superior strait; the feet engage as the dilatation of the os uteri advances.

In order that the labour may be as natural as possible in these presentations, both feet must present at once; nevertheless, it is sometimes terminated unaided, although only one foot presents; but, in that case it is more tedious, because the other foot is not always extended on the anterior region of the fœtus, and a certain length of time is necessary to accomplish its descent.

The following is the progress of labour in the four positions of the feet.

In the *left calcaneo-iliac position*, the feet resting on the breech and impelled by it, engage in the os uteri, then in the vagina, still preserving their oblique position. The right hip passes in front of the left sacro-iliac symphysis, turns slightly to lodge in the cavity of the sacrum, along which it glides, and escapes first at the inferior angle of the perineum; the left descends behind the right acetabulum, then inclines forward, ascends behind the pubes, turns under the lower edge of this bone, and escapes in its turn. As soon as the breech is expelled from the vulva, the trunk, engaged in the pelvic excavation, experiences a lateral inflexion, by virtue of which the right side describes a curve in order to follow the direction of the corresponding hip: the arms are raised on each side of the head; the upper part of the trunk enters likewise the superior strait: the right shoulder engages in the same manner as the hip of the corresponding side, and turns like it to pass in the cavity of the sacrum; the right arm descends on the right side of the head; and the forearm is in front of the face, which is to the right and rear of the pelvis; the right shoulder appears first at the vulva, after which the left descends from behind the pubes. The face, situated at first in front of the right sacro-iliac symphysis, passes into the curve of the sacrum, along which it glides in order to escape from the pelvis, so that the mouth, nose, eyes and forehead are successively disengaged, then the vertex and occiput which escape last.

In the *right calcaneo-iliac position*, the feet and legs engage obliquely in the os uteri. The right hip descends in front of the right sacro-iliac symphysis, reaches the curve of the sacrum, and is expelled first; the left, which was behind the left acetabulum, glides behind the pubes, and engages under the arch; the breech escapes from the vulva, by rising toward the left groin of the mother, the left side of the trunk traverses the curve of the sacrum, the left shoulder passes in front of the right sacro-iliac symphysis, turns in order to reach the cavity of the sacrum, and disengages in front of the perineum; the right shoulder, which was at first behind the left acetabulum, lodges behind the pubes; the face descends in front of the right sacro-iliac symphysis, then turns to pass in front of the sacrum; the chin, mouth, nose, forehead, vertex and occiput, are successively disengaged in front of the perineum.

The *calcaneo-pubal position* is always converted into one of the two preceding, during the course of labour; but sometimes, if the fœtus is very small, it continues until the termination; then the hips, shoulders and head not turning on their axis, as in those two positions, and the back of the fœtus being always directed forward, there is no motion of rotation internally, nor motion of restitution externally; but the head and shoulders, after engaging transversely in the superior strait, take an antero-posterior direction, in order to pass through the vulva, and in this case the rest of the expulsion is effected as in the two first positions of the feet.

In the *calcaneo-sacral position*, the hips sometimes pass through the superior strait in the direction of the transverse, but most frequently in that of one of the oblique diameters; we then have a position, as it were *hybrid*, or right or left calcaneo-posterior, which however, is soon converted into one of the two first; the shoulders observe the same course, except that they rarely fail to execute a pivot-like motion on themselves, even when they first assume a transverse position. The trunk is bent into an arc, with the convexity backward, as in the first position; the shoulder, which had inclined backward, appears first at the vulva, then the one which had lodged under the pubes, and on their expulsion they cross each other by a sort of motion of restitution. The head then escapes in its turn; the

chin, mouth, nose, trunk, vertex, and occiput are successively disengaged in front of the perineum; still if the heels and back of the fœtus remained directed backward, as M. Bonhous, a physician at Roissy, says he has seen, we should find the face descend behind the pubes, disengage in front of the pubic arch, and the occiput escape last by rolling in front of the posterior commissure of the vulva and perineum.

Third Genus.—*Presentations of the Knees.*

Previously to the rupture of the bag of waters, the knees may be mistaken for the elbows, but this cannot happen after the membranes are broken. The knees represent a plane surface, and not a pointed eminence, in the middle of which the patella may be felt, its cartilage having already acquired considerable density. On the opposite side may be felt the fold of the ham, which differs sensibly from that of the arm. Again, should any doubt remain, a little patience would soon dispel it, for the pains, causing the parts to descend more and more, would remove all uncertainty, the more so, as in the supposition of an elbow presentation, the usual progress does not take place, on account of the transverse position of the child.

There are four positions of the knees founded on the relations of the tibia with one or other of the iliac bones, pubes or sacrum, and designated by the terms *left tibio-iliac, right tibio-iliac, tibio-pubal, and tibio sacral.* These four positions are not equally common; in fifteen cases, the first has been observed nine times, the second and third each three times, without a single example of the fourth. Plate 48, of the Atlas, gives an idea of the attitude of the fœtus in the second position of the knees. The mechanism of labour in each of the positions of the knees is the same as that we have just described, in each of the positions of the feet, which correspond tothem.

CHAPTER III.

LABOURS ACCIDENTALLY NATURAL.

Spontaneous Evolution.

We have said that presentations of the trunk or torso bélonged essentially to artificial labours, but that nevertheless, under certain circumstances, the fœtus might be born by the efforts of nature alone. This truth, which in our opinion it would have been better for humanity to have kept concealed than to have made public, since some writers, following the example of Denman, have wished to erect it into a rule of practice, deserves to be carefully examined and fixed at its true value. In order to do this, it is necessary to understand the steps of the labour in this case.

The trunk of the fœtus may present at the os uteri by one of the anterior, posterior, right or left lateral surfaces. All these presentations are rare, but not in the same degree; those of the anterior plane are less common, those of the posterior plane slightly more frequent, and the most common of all, are those of the lateral planes.

I. The disposition of the fœtus in the mother's womb explains the rarity of presentations of the anterior plane of the trunk. In order that this surface should appear at the orifice of the uterus, it would be necessary for the fœtus, instead of being rolled into an ovoidal ball, to be extended. It is true that if we consult the old authors, we shall find that they not only admitted the possibility of these presentations, but have even described and figured them. Thus Mauriceau has given plates exhibiting the fœtus presenting the abdomen to the os uteri.* Nothing similar has ever been seen in the Hospital of the Maternité. If this presentation has occurred, it could take place only by the upper part of the thorax appearing at the orifice, as in the 43d and 44th cases of Amand;† one of these cases is that of a woman pregnant with three children, of which the second presented both hands at the os uteri; and the other, that of a fœtus which presented at once both hands, both feet, and the umbilical cord.

II. It may be conceived that presentations of the posterior plane of the body are more possible than those of the anterior, but they have never been observed except in women whose uterus contained a small fœtus, and frequently an abortion which had been deprived of life for a greater or less length of time, or if it were animate, was so small, when compared to the extent of the pelvis, as to pass through it easily without regard to the presentation. They have never been met with in cases of well formed fœtuses. It has been proposed to refer them to presentations of the lateral planes. This plan appears to us the more reasonable, inasmuch as in the latter, the trunk of the fœtus is always found more or less inclined.

III. We reduce all presentations of the lateral parts of the trunk to those of the shoulders. We do not, therefore, admit, with Baudelocque, those of the lateral parts of the neck, flank, and hip, because, in the indications to be fulfilled, they are included in those of the shoulder, properly so called. If, for example, one of the sides of the neck should present at the os uteri, this part not being adapted to the outline of the pelvis, after a few contractions of the uterus, the shoulder almost always engages in the orifice of the viscus, or in extremely rare cases, the head itself will present, and we shall have in the first case a more or less simple presentation of the shoulder, and in the latter, a more or less regular position of the vertex. As the other parts of the lateral plane, the flank and hip, project less than the shoulder, they have less tendency than it to engage in the os uteri.

The shoulders presented 389 times in 84,395 births; they are, therefore, slightly less frequent than those of the face.

The shoulder cannot be distinguished with certainty until after the rupture of the bag of waters. Its characteristics are a round, smooth, firm tumour, smaller than the head, less resisting than the vertex, not so large, but of nearly the same firmness as the breech, the only part for which they can be mistaken. If the finger be carried sufficiently high, we shall feel the acromion, the clavicle, and the depression between the shoulder and neck. Should any doubts still remain, we pass the finger forward and backward, in order to reach the axilla; the difference of size between the arm and thigh renders it difficult to commit an error. Lastly, if the child is not too fat, we should feel the ribs, the intercostal spaces, and, in some cases, the angle or spine of the scapula.

* Traité des Maladies des Femmes Grosses, t. i. p. 321. 1721.

† Amand, Observations sur la Pratique Accouchemens, p. 168 and 173. 1714.

The causes of presentations of the shoulder are the same as those assigned to deviations of the head. They most frequently depend on an obliquity of the uterus, or a great quantity of water; they sometimes result from the smallness and mobility of the fœtus, thus explaining their apparently greater frequency in abortions than in deliveries at term. In some cases they can be attributed only to accidental causes, as some violent agitation, a succession of shocks, a ride in a carriage or on horseback, a fall, sudden fright, which have given rise to quick and hasty movements of the fœtus during the last stages of pregnancy.

Baudelocque assigned four positions to each shoulder, in which the acromion was, 1st, above the pubes, 2dly, against the promontory of the sacrum, 3dly and 4thly, toward one of the iliac bones. We reject the two first. The second is the only one which should be preserved, which may possibly occur when the anterior obliquity of the uterus is very strongly marked, and the fœtus small; but, even then, the projection of the lumbar column would cause the head to incline to the right or left, thus approximating this position more or less to the third or fourth, the only one we have ever observed. We admit, consequently, only two positions for each shoulder, the first of which we designate by the term *left acromio-iliac*, in which the acromion is directed toward the left side of the pelvis, the head toward the left iliac fossa of the mother, and the axilla and base of the chest correspond to the right iliac fossa of the latter; the second, or *right acromio-iliac*, in which the acromion and ilium are in an opposite direction to the preceding. There are numerous varieties of each of these positions: the shoulder may be directly transversely, or the acromion approach more or less the ileo-pectineal protuberance, or the sacro-iliac symphysis; the trunk may be nearly horizontal, or its pelvic extremities may be more or less elevated: it may be perpendicular, or its anterior and posterior inclined planes more or less inclined forward or backward: lastly, the arm may remain applied to the chest, or depart from it, be bent double or completely extended. All these varieties, with the exception of the last, of which we shall hereafter treat separately, have no bearing on the termination of labour.

The right shoulder presents rather more frequently than the left; in three hundred and nine cases, the former occurred two hundred and fifteen times, and the latter one hundred and seventy-four only, owing to the combination of two causes; the ordinary position of the fœtus in the mother's womb, and the greater frequency of the right lateral obliquity. The frequency is not exactly the same for each of the two positions of each shoulder: Madame Boivin found, in forty-six cases, the right nineteen times in our first position, or the third of Baudelocque, and twenty-seven in our second, or the fourth of the same author; in thirty-three cases, the left thirteen times in our first, or third of Baudelocque, and twenty in our second, or fourth of Baudelocque. Thus, the fourth position is met with rather more frequently than the third.

When we have ascertained the position of the shoulder, it is important to know if it belong to the right or left side. In the left acromio-iliac position, when the left shoulder presents, the back is directed to the rear, and to the front when the right presents; the contrary takes place in the right acromio-iliac position. We take as a guide, in order to ascertain the side to which the shoulder belongs, the direction of the axilla and the position of the scapula; the axilla turned toward the right side of the mother indicates the right shoulder, if the scapula is directed forward, and the left, if this bone is directed backward; the same part turned toward the left side of the mother, announces the right shoulder, when the scapula is to the rear, and the left when this bone is to the front.

The accomplishment of delivery by the efforts of nature alone, in cases of shoulder presentations, constitutes a phenomenon known by the name of *spontaneous turning or evolution*. Several examples of this nature had been observed without attracting much attention, until Denman published his work in 1784.* Since that time, a considerable number of cases have occurred, of which several are reported annually in the French and foreign periodicals. The course pursued by nature offers several varieties.

There are cases in which the fœtus, very movable on account of its small size and the abundance of the liquor amnii, is completely displaced, and actually changes its position, either by the head ascending, and carrying with it the shoulder which stops at the strait, whilst the pelvic extremity descends toward the orifice of the uterus, or by the shoulder ascending, and carrying with it the head, which it permits to be disengaged. These two cases, the latter especially, are excessively rare, and have been but seldom observed.

In other cases, on the contrary, the shoulder does not move; it remains stationary, without sensibly advancing or retiring, and nevertheless, the fœtus is expelled from the uterus. Then, the superior part of the thorax does not leave the excavation, and the head or the pelvic extremity descends, in order to traverse gradually the tunnel of the pelvis.

The former of these two cases, designated by the term *cephalic evolution*, has been but seldom observed. In fact it can only occur when the fœtus is small or the pelvis very large. After the shoulder or upper part of the sternum filling the excavation, had reached the vulva, violent tractions exerted on the fœtus, or powerful efforts of the woman, have been seen to cause the head to advance, which gradually escaped from the pelvis, by descending from the neck toward the vertex, whilst the thorax does not leave the excavation.

The latter case, much more common, constitutes what is called the *pelvic evolution*, in which the shoulders, fixed in the excavation, or even at the vulva, does not prevent the fœtus from being expelled by its pelvic extremity. In order to understand how natural labour is then accomplished, we will suppose a left acromio-iliac position of the right shoulder. After the discharge of the waters, the uterine contractions force the body of the fœtus, which is placed nearly transversely, to be flexed on the side opposite to that which presents, that is, to describe an arc of which the convexity is represented on the right side of the fœtus; the head is inclined toward the left side of the neck, and the breech toward the left hip, so that the right shoulder tends to engage more and more in the excavation. But this descending motion of the shoulder being arrested by the size of the head, since it is necessarily limited by the length of the neck, the trunk performs a motion of displacement which causes it to abandon its transverse direction, to assume one nearly parallel to the antero-posterior diameter of the mother. It follows hence, that the breech is above, or rather in front of the sacro-iliac symphysis, and the head above the horizontal ramus of the pubes, not far from its spine. This displacement once performed, the descending motion is completed, the side of the body lodges behind the symphysis pubis, extending along its whole length. In fact, the forearm and arm are seen to appear at the vulva, and the shoulder under the symphysis pubis. At the same time, the efforts of the uterus impel into the excavation the trunk doubled on its right side, and cause it to descend until the head arrests its further progress. Then, the acromion still remaining under the symphysis, the

* Vide the detestable translation of Kluyskens, t. 2, p. 300.

pelvic extremity which alone remains movable, continues its downward progress, and glides along the anterior surface of the sacrum to the vulva, where are successively seen to appear the side of the thorax, the flank, the hip, the thighs, and subsequently the whole extent of the lower extremities, which become extended and unfolded externally. The head and right arm alone remain in the pelvis; they are afterwards expelled as in an ordinary case of presentation of the pelvic extremity.

The same phenomenon, that is, the doubling of the trunk, the actual passage of the fœtus in that position, sometimes takes place in presentations of the dorsal* and sternal plane;† some examples are reported, but it must be confessed they are few in number.

This kind of labour terminates only after very prolonged sufferings, which reduce the woman to a dangerous condition, and sometimes even are the cause of her death. The child generally perishes in this evolution, and frequently is not expelled until putrefaction has commenced. Thus, far from coinciding in the opinion that we should wait for spontaneous evolution, we cannot too earnestly oppose it, because, we repeat, this evolution is fatal to the child and dangerous to the mother, on account of the tediousness of the labour and the great compression of the maternal organs: we assert that it should be permitted only when it cannot be prevented. In fact, spontaneous evolution can be considered only as a fortunate accident on which we can by no means reckon in ordinary cases. It is the ultima ratio of omnipotent nature, her last struggle against the destructive agents which threaten the mother, but it is a struggle beyond the reach of art, and which at the commencement of labour can neither be foreseen nor excited.

CHAPTER IV.

CONDUCT DURING LABOUR.

When we are called to a woman who is said to be in labour, we should ascertain—1st, if she is pregnant; 2d, if she has reached her full term; 3d, if she is in labour.

Although it may at first sight appear strange to wish to ascertain the existence of pregnancy in a woman supposed to be on the eve of parturition, yet it sometimes happens that the assistance of our art is invoked for those who are not pregnant. We could relate examples drawn from our own practice. Evrat informed us that he was one day sent for to apply the forceps to a woman who not only was not pregnant, but who, on account of an excessive elongation of the neck of the uterus, was and always would remain barren. Similar facts may be found in all writers on midwifery.

After having ascertained the pregnancy, we should endeavour to find if it has passed through all its stages; for, if the full term of gestation has not arrived, we should endeavour to relieve the suffering which must end in the exhaustion of the woman or in premature delivery. We have previously explained the manner of judging if the pregnancy has reached its full term, and of distinguishing the pains depending on uterine contractions from those produced by other causes.

An examination per vaginam can alone determine whether labour has commenced. It enables us, 1st, to ascertain precisely if the woman is or is not about to be delivered; 2d, to determine what part of the fœtus presents, a point frequently difficult, sometimes even impossible in the beginning, but which, with practice, becomes easy, when the relations between the mother and the fœtus are normal; 3d, to form an opinion as to the probable duration of the labour. We are guided in this prognosis by the natural or vitiated conformation of the pelvis, the state of softness or rigidity either of the os uterus, or the parts lining the pelvis excavation, or of the external genital organs; by the more or less regular or defective position of the fœtus; lastly, by the degree of moral and physical energy possessed by the woman.

As long as the accoucheur has made no examination per vaginam, he knows nothing, or at least is supposed to know nothing; until then, therefore, no questions are addressed to him, or if there are any, he would do wisely not to answer; but, as soon as the examination is made, the woman or her friends are anxious to know if the fœtus be correctly placed or not, if the labour will be fortunate and soon over. The prognosis he is about to make will be useful to himself, to the woman and those around her—to himself because, if, in his opinion, some hours must previously elapse, he may take his leave for a time, whilst an anxiety easily understood would cause him to consider it his duty to remain in the contrary case; to the woman and her friends, because he tranquillizes their minds by informing them that he has every reason to expect a successful and speedy delivery. It is most advisable, however, not to assign a precise period for the termination of the labour, lest the event should not fulfil the prediction; for it frequently happens that a labour commences regularly and suddenly, without any possibility of foreseeing it, the pains become less powerful and much slower, thus varying the duration of the labour. Whenever we suppose, either from the rigidity of the parts, or when the woman is primiparous, or from other signs, that the labour will be tedious, we should not hesitate to say so; it is even better to fix the event at a more remote period than we may suppose must elapse; for, if it occurs sooner, we will not be accused of having made a mistake, whilst if it exceeds the period assigned, the woman loses confidence, is worried, and her excited imagination might give rise to serious accidents.

If the woman is about to be delivered, we must arrange every thing that may be useful during this process. When the social position of the woman will allow it, the following measures are to be taken. The first object of our attention should be the arrangement of the room. If we have it in our power to choose, we should select a well-lighted, quiet apartment, free from all unpleasant smells, and large enough, but not too much so, to admit of free ventilation, and of the maintenance of an equable and moderate temperature. Too great a heat exposes the woman to pulmonary or cerebral congestions, to which she is already predisposed by the effects of labour: weakened by the debilitating action of a high temperature, she frequently wants strength to assist herself; we are then obliged to open the windows, in order to refresh her, and she may be thus exposed to currents of air, which may produce more or less serious inflammatory symptoms. The inconveniences of a cold room are too evident to require any remark from us.

Only the number of persons absolutely necessary should remain with a person in labour. Too many witnesses are always injurious,

* Clinique des Hôpitaux, Tom. 1, N° 60, p. 53.

† Statistica Ostetrica di Santa Maria. Nuova, p. 13.

because they are in the way, they vitiate the air and increase the heat, and because they are generally women, frequently wanting in courage or discretion; some faint, and require that assistance which should be exclusively reserved for the patient; others amuse themselves by the recital of unfortunate deliveries, which they always misrepresent and exaggerate, so that the female becomes uneasy, loses her patience, or receives impressions which may exert an injurious influence. All useless persons, therefore, should be desired to leave the room, and only one or two intelligent assistants should remain, such as a mother, sister, relation or intimate friend, and a nurse to support her knees.

Certain precautions are likewise to be observed in regard to the woman herself. In the first place, an enema should be administered, in order to free the large intestine from any fæces which might escape during labour and soil the child or the bed and impede the advance of the fœtus: this enema should be purely emollient. The woman should also be desired to make water, and, if she is unable to do so, we should not hesitate to introduce the catheter into the bladder, for the repletion of this viscus causes acute pain which may paralyze the uterine contractions, and may produce a rupture of the organ which is soon fatal, of which examples have occurred.

In natural deliveries, and especially in the early stages of labour, the attitude of the woman is immaterial. When no accident occurs, and the pelvis is well formed, she may be allowed to change her position frequently, for she is comfortable in none. Thus, we permit her to stand, to walk about, or to stretch herself on a sofa, unless some particular cause should contra-indicate, such as a marked obliquity or prolapsus of the uterus, a mal-presentation of the fœtus, an incipient hæmorrhage, etc. But, as soon as the dilatation is effected, she must assume a proper attitude. In our choice of position we are guided less by the precepts of reason than by customs consecrated by use, and varying according to the nation, the locality, and various social conditions. Formerly the woman was required to walk about, with the view of hastening the pains: in some provinces of France she was delivered in the erect position, with her elbows resting on the headboard of a bed, and the accoucheur before or behind her to support the perineum and receive the child: in other places she knelt, or was seated on the knees of an assistant. In Germany and the north of Europe, a sort of arm chair, of which the invention is very ancient, is still used: the movable back of this chair may be inclined to any degree by means of a spring; the seat is pierced with a hole, beneath which is placed a vessel to receive the liquor amnii, the blood, and all the excrementitious matter which may escape during labour.

These various positions are liable to many objections. When the labour is tedious, the woman is exhausted by walking about; the erect position is equally fatiguing, and exposes her to the risk of having the child plunged into the cavity of the pelvis before the completion of the dilatation, and of dragging the uterus with it. Admitting that it penetrates only after the dilatation, it may happen that the head, falling suddenly on the perineum and vulva, these organs have not sufficient time to be distended, they are ruptured, and the laceration extends to the sphincter ani and even to the rectum; or again, if the fœtus passes too rapidly through the external organs of generation, it may fall to the ground and be more or less seriously contused; the cord may be broken, and a fœtal hæmorrhage ensue; or the uterus, being too suddenly emptied, and not contracting on itself, the still adherent placenta is dragged down by the child, inversion ensues, and the mother's life may be endangered. Nevertheless, none of these positions should be absolutely proscribed; for, notwithstanding the perhaps somewhat exaggerated, but possible inconveniences which belong to them, it may happen that we must have recourse to them to assist the delivery; but in that case we must take every precaution necessary to prevent the accidents we have indicated.

In England and in the United States, where English manners and customs are observed, women are delivered in bed, resting on their left side, with their legs and thighs flexed, and their knees separated by a cushion; there they generally refuse to allow any examination, and the accoucheur is sent for to be, as it were, merely a spectator of a process left to nature. This position is not improper, and is not liable to the same objections as the vertical attitudes; it is even useful in cases of right lateral obliquity of the uterus, in which it assists in rendering the delivery more easy than if the woman were constantly on her back. But like all the rest, when not absolutely necessary, it should not be exclusively employed. It has, moreover, some inconveniences; the woman being on her side with her back to the accoucheur, especially when, according to English and American custom, the light is carefully excluded, the physician can observe less readily the impressions she receives and which are pictured on her countenance; we cannot judge whether she is threatened with hæmorrhage, cerebral congestion, or any other accident.

The position adopted in France, or at least in Paris, appears to us superior to all others; it consists in placing the woman on a temporary, narrow bed, to which the names of *bed of misery*, *bed of pain*, *little bed*, (lit de misère, lit de douleur, petit lit,) have been applied. This bed is not always made in the same manner. Formerly it was a cross bedstead, with the headboard against the wall, covered with a matress, on which was placed a second, folded double at its superior third, so as to leave the first uncovered toward the foot of the bed, where a wooden bar was fastened transversely, against which the woman could support her feet during labour. This bed, in shape of an inclined plane, is liable to the objection of allowing the woman to slide towards the foot, of making tense the skin of the posterior part of the trunk, of drawing the vulva backward, causing it to oppose more resistance, and of exposing the perineum to laceration; its demi-vertical attitude has therefore some of the inconveniences of the completely vertical; and again, the wooden bar across the end of the bed compresses the plantar nerves, and produces pain and cramps.

The best manner of preparing the bed is to take a solid cross-bedstead with iron pegs, for wooden pegs may break with the weight and exertions of the woman, which would be disagreeable, or better still, a small bed without curtains, two or three feet wide. When the bed is properly arranged, two matresses are laid upon it; between them, at the spot corresponding to the woman's breech, a pillow, or bag filled with oats, is placed; the pelvis being thus elevated, the axis of the superior strait and of the uterus are parallel to each other, so that the child engages more readily in the pelvic excavation. The matresses are covered with oil cloth, and a sufficient number of cloths, to prevent the discharges from soiling them. The bed is then made as if the woman were to sleep in it, except that on the under sheet a towel is to be laid, which can be removed at pleasure, so as to preserve the greatest possible degree of cleanliness. A pillow under the woman's head serves to raise her and flex her head on the chest.

This bed possesses many advantages. When the labour is tedious, the woman may, during the interval of the pains, take a refreshing nap, which enables her to support her sufferings better; she can change her position with more ease, and turn on her back or sides, as

circumstances may require; lastly, the narrowness of the bed permits the assistants to give all the necessary support, by holding her hands and knees, so that she is as comfortable as she can be in such circumstances.

I. *Conduct in simple Cases.*

In a regular labour, one of the most remarkable phenomena is the rupture of the bag of waters. When this takes place only at the moment of completion of the dilatation, things follow the course we have pointed out; a torrent of fluid is forcibly discharged, the pains become more energetic, and the labour advances. But we have also seen that it sometimes occurs prematurely, and that in some cases it is retarded.

The premature rupture of the membranes of the ovum, is generally an unfortunate occurrence. It deprives the uterus of an accessory means of dilatation, renders it consequently less equal and regular; the fœtus is subjected for a long time to a compression which may injure it or prove fatal; and, not unfrequently, in a primiparous woman, a fœtus, full of life in the beginning of labour, perishes before its expulsion, from the sole fact of the premature rupture of the bag of waters.

In other cases, the membranes being too thick, require us to rupture them. At what period does this rupture become proper? The rule is not to perform it until the dilatation is complete, or nearly so, that is, until the os uteri is sufficiently enlarged to allow the passage of the fœtus. There are, however, some exceptions to this rule. Baudelocque admitted the necessity of prematurely rupturing the membranes in certain cases of hæmorrhage, convulsions, and those in which the fœtus being extremely movable, presented successively the various parts of its body at the orifice of the uterus; he recommends then the use of great caution, and the rupture of the membranes only when a large part, such as the vertex or breech, for example, presented, asserting that in this case the fœtus remained fixed in the position which it occupied when the discharge took place. Notwithstanding the authority of so great a teacher, we believe it is sometimes prudent to depart from this principle. We see no advantage to be derived from rupturing the membranes on account of the mobility of the fœtus, as it is an extremely rare phenomenon, and the rupture may be disadvantageous, for it is not always easy, previously to this occurrence, to determine the presentation. In fact, before this period, the breech may be mistaken for the head or shoulders, and, if this error has been committed, we only add to the difficulties and dangers which accompany the termination of labour. We think, therefore, that it is much better to wait until the dilatation is completed, for then, if the fœtus presents unnaturally, it is much more easy to turn. We admit, consequently, only two cases in which the rupture of the membranes is imperiously demanded, namely, certain cases of hæmorrhage and convulsions, which we shall hereafter point out. We are aware that it may be done, and is even advised by some, in some cases of rigidity of the orifice, of enormous distension of the uterus, and extreme density of the membranes, which cause the dilatation to take place very slowly, and the uterine contractions to cease or occur at prolonged intervals; but these cases, which are far from being as frequent as many think and assert, require great attention and much practical experience; thus, without absolutely rejecting this advice, we would say to young practitioners that, even in these cases, there is always less danger in rupturing the bag of waters too late than too early.

The mode of effecting this rupture is so simple as scarcely to require description. Nevertheless, it has not appeared such to all writers, since some have invented instruments for the purpose, particularly a kind of thimble, armed with a spur, worn on the finger of the accoucheur, and used to rupture the membranes. Others employ a knitting needle, scissors, an allumette, or the instrument nearest at hand: some old nurses use a crystal of hydrochlorate of soda. The greater part of these means are useless. It is generally sufficient to wait for a pain, and when it is in full force, to apply the index finger with some strength against the extended membranes, in order to effect their rupture: if they are flaccid and pendulous, they may be grasped with the index and thumb, twisted and torn; if this be unsuccessful the first time, it may be repeated in successive pains: lastly, if the membranes are dense and firm enough to resist these various attempts, they may be weakened by being scratched with the finger nail. We have always found these means successful; but supposing that a case might occur in which they would be insufficient, we should prefer using a quill in the shape of a toothpick, rather than any pointed or cutting instrument. One thing should be carefully remembered, especially in the commencement of the practice of midwifery; it is, that sometimes little or no fluid is found in the membranes, which are, as it were, glued to the presenting part of the fœtus: if then we use a pointed or cutting instrument, instead of the finger nail, we might wound the fœtus, as has been done more than once.

In ordinary cases, when the labour is regular and uninterrupted by any unforeseen accidents, our only care is to watch attentively its progress. Some ignorant persons, however, think they can assist the delivery by the introduction of one or two fingers into the external genitals, even into the os uteri, as they say, to enlarge the orifice and prepare the parts. This manipulation is generally more injurious than useful; it removes the mucous discharge intended to assist the gliding of the fœtus, and may even irritate the organs so as almost to inflame them, thus retarding instead of accelerating the labour. Sometimes, however, it is useful in women somewhat advanced in age and in their first labour, when the organs oppose great resistance, or the uterine contractions are not powerful. In such cases, it may be useful to introduce one or two fingers into the vagina, in order to exert on the rectum, during a pain, a compression, which increasing the sensation of tenesmus experienced by the woman in the last stage of labour, induces her to bring all her voluntary muscles into action, and sympathetically stimulates the uterus. But these are exclusive cases, and in general, it is better not to interfere with nature. Under some peculiar circumstances, such as the dryness, rigidity, tumefaction, or excessive sensibility of the organs, it may be proper to use some greasy and emollient substance, such as fresh butter, axunge, mucilages, local baths, etc.

Many women think that they lessen their pains by uttering piercing cries; this immoderate noise astounds and bewilders the assistants; and by the rapid passage of the wind through the air passages, produces a desiccation which may result in violent irritation. Hence, women who cry much during labour, can scarcely speak on the following day, and are sometimes attacked with inflammation of the throat. These cries are liable to another and more serious objection, that of destroying the muscular forces which assist the uterine contractions. We do not pretend that it is possible for a woman to repress all expression of suffering; but for their own sake, they should be moderate, and it is the duty of the accoucheur to explain to them the necessity of it. It frequently happens that the very natural

desire of being quickly delivered induces the woman to make violent efforts, or, as it is commonly expressed, to *bear down* her pains. These voluntary efforts should be employed, or advised only when the dilatation is completed, or at least well advanced; otherwise their only effect would be to exhaust the woman's strength, and produce prolapsus uteri, or some more serious accident. The woman should take advantage of her pains when the head of the fœtus, after having escaped through the os uteri, enters the cavity of the pelvis, and she is generally conscious of the proper moment by a sensation of weight on the fundament, and an imperious necessity of bearing down, as in defecation, a necessity which arises from the pressure exerted by a part of the product of conception on the rectum. But when the head has passed the perineal strait, and is no longer retained, except by the resistance of the soft parts composing the perineum and vulva, the woman should moderate her efforts, especially in a first labour, in order to give nature time to distend successively organs, which, otherwise, might lacerate rather than yield. This precaution alone is not always sufficient to prevent this accident: the perineum must be supported in the following manner. During the pain, the woman's breech is to be elevated, in order to allow the posterior part of the skin of the back to assist in the amplification of the vulva; then, guided by the side of the bed at which we may be, we are to apply the right or left hand flat to the perineum, so that the ulnar margin may be directed to the coccyx, and the radial to the vulva; we thus support, during one or two contractions, the musculo-membranous plane forming the floor of the pelvis. When it is distended, if, as in a majority of cases, the fœtus presents the occiput, we press with the ulnar, depressing the radial margin which forces the head, as it is disengaged, to pass from behind forward, and laceration is prevented as much as possible. Some persons have thought it proper to apply the ends of the fingers to the coccyx, and the wrist to the anterior part of the vulva. This plan does not appear to us very rational, for it tends to keep back the fœtal head, and prevents its escape. Others prefer placing the hands under the tuberosities of the ischia, and drawing the integuments of the posterior part of the trunk forward, so as to bring them near the vulva.

Sometimes, notwithstanding all the precautions we can use, the perineum is lacerated to a greater or less extent. When there is only a slight rupture of the fourchette, it is not serious; but it becomes more alarming when the laceration extends to the sphincter ani, and especially when the muscle and the rectum are involved. If these last parts are unhurt, the wound soon heals, but as the margins always cicatrize separately, the vulva remains greatly enlarged.

II. *Conduct when Anomalies occur during Labour.*

Hitherto we have treated only of regular cases; we will now examine some of the anomalies which may occur during labour.

Sometimes, after having gone on regularly, the uterine contractions are suddenly suspended; at other times, the pains succeed each other with such rapidity and energy that it becomes necessary to moderate their effects.

A. *Slackening or suspension of the Uterine Contractions.*

The proper course to pursue in case of slackening or suspension of the pains, is to wait patiently, if the woman is otherwise well, and there is no reason to fear any accident. It is only necessary to endeavour to find out the causes of the cessation, for they are not always the same, and opposite circumstances frequently produce similar effects. Thus, the pains are sometimes suspended, because the woman is feeble, either constitutionally, or from some preceding illness, or because the contractions, being too rapid, have exhausted her strength, or lastly, because there is either general or local plethora. Our conduct, therefore, cannot be the same in all cases.

If the woman is naturally delicate, she should be allowed to repose on the bed and endeavour to sleep. If she has been debilitated by want of proper nourishment, we should take advantage of this moment of rest to administer food, soups, animal jellies, broths, or, in short, any thing which contains considerable nourishment in a small space, and does not require much exertion of the digestive powers. The use of solid food should generally be avoided, because, the functions of the stomach being disturbed during labour, the woman would be troubled with vomiting as soon as the pains returned. If soup or rich broths are disagreeable, as they frequently are, we give slightly tonic drinks, or a few spoonfuls of good wine. The common people had formerly the bad habit, when the labour was tedious, to gorge the woman with hot wine, made more stimulating by the addition of cinnamon, cloves, etc. In robust individuals this custom might cause an excitement ending in inflammation. They sometimes even had recourse to brandy, so that the woman soon fell into a state of intoxication, which, by exciting her circulation, predisposed her to cerebral congestions and all their dreadful consequences. In modern times it is generally conceded that the use of hot wine and alcoholic liquors in similar cases is dangerous, and they are exhibited with much greater caution.

Gentle frictions over the hypogastrium sometimes excite contractions of the uterus: these means, being very innocent, may be used without the least impropriety.

Some persons have thought it better to act directly on the uterus, and have advised the titillation of this organ by one or two fingers introduced into its orifice, at the same time applying frictions to the abdomen. This plan might be practicable in a lymphatic, feeble woman, who has had children, but would be inapplicable to a healthy, primiparous female, as it may excite inflammation of the organ. Others have preferred, in order to excite the action of the uterus, to act upon it by sympathy, that is, by stimulating the adjacent organs, and have advised the administration of irritating, emetic, or purgative substances.

We have said that an enema of warm water was useful in the commencement of labour, to evacuate the hardened fæces which are sometimes found in the lower part of the intestinal canal, and to thus render the passage more easy. We believe that the efficacy of purgative, irritating, or saline enema, composed of vinegar and water, senna, castor oil, hydrochlorate, or sulphate of soda, or of potash, etc., has been grossly exaggerated. In ordinary cases they are useless, and we have always found them insufficient when we have used them in women who had exhausted themselves in useless efforts. Moreover, they may produce colic, and thus add to the discomfort already existing.

Purgatives, properly so called, may restore the uterine contractions; but they are not free from objections. At one time every practitioner had his panacea. Mauriceau administered a decoction of senna, to which was added the juice of a sour orange or lemon;

others prefer more or less similar preparations. If we remember that purgatives do not act immediately, that some time is necessary to procure, prepare, and administer them, we shall find that nature frequently requires less to arouse from the stupefaction which has overcome her, and these remedies are of but little use. Moreover, we are not certain that they will always produce the desired effect. Lastly, they may excite colic and irritation of the intestines, to which the woman is already only too much exposed.

Some physicians, having observed that the labour generally advances more rapidly when vomiting supervenes, have inferred that this was the cause of the action of the uterus. Lebas, who promulgated this opinion, recommended the exhibition of tartar emetic or ipecacuanha to excite the suspended or languishing pains. If we study carefully the phenomena of labour, we shall soon perceive that Lebas has mistaken the effect for the cause. The vomiting which occurs in the last stage of pregnancy is merely the consequence of the uterine contractions; for it is observed only when the latter are long and powerful. The woman then exerts the voluntary muscles; the abdomen is contracted in every direction; the intestines, different viscera, as likewise the stomach, are more or less compressed, and vomiting supervenes from the same cause as when, in the experiments of Magendie, a bladder was substituted for the stomach in an animal. But, without entering into explanations, we do not see the advantage of provoking vomiting; we even doubt the propriety of it, for, if it were excited previously to the contraction of the uterus, it might happen that this organ, compressed between the abdomen and vertebral column, and not presenting sufficient resistance on its sides during the convulsive action of the abdominal muscles, might be ruptured, and the whole or a portion of the product of conception be extravasated in the cavity of the belly.

The same remarks are applicable to sternutatories, the use of which, so much lauded in ancient and even in modern times, is now completely abandoned.

Among the therapeutic agents which exert the most particular action on the uterus, the secale cornutum or ergot holds the first rank. Although the obstetrical qualities of this substance had been pointed out by Camerarius about the end of the seventeenth century, and a hundred years subsequently more accurately by Degranges, of Lyons, it occupied no place in therapeutics until the knowledge of the effects attributed to it in England and America attracted attention to it. Since then it has been advocated and condemned: some have denied that it exerted any action on the uterus; and others, on the contrary, have attributed to it a powerful and almost infallible influence. The former probably made use of defective ergot; for this substance, whose poisonous effects have been long known to affect persons who eat bread into which it enters in large proportions, exerts evidently an undeniable and very powerful action on the uterus when given in proper doses and in a perfect state of preservation, that is, after having kept it carefully from the air and light, and pulverized it only just before its exhibition. We are of opinion that it is far from being inactive, but that its action is neither so constant nor efficacious as many suppose: we think, moreover, that under certain circumstances it may be injurious, and cannot suit all cases: hence we rarely use it. We have remarked that the uterine contractions produced by it have a peculiar, and, as it were, pathological character: that, instead of being intermittent like the normal contractions, they are continuous, with periods of exacerbation: if, therefore, the contractions are permanent, they must interrupt, and even suspend the utero-placental circulation, and may cause the death of the fœtus. In this case the death of the fœtus should not be attributed to any poisonous qualities of the ergot, but to a purely mechanical effect, caused by the continuous contraction of the uterus. Whatever may be the cause of death, this fact alone should induce us to use the medicine with extreme caution. Ergot may be useful in women who have had children, when the os uteri is dilated or easily dilatable, when but few contractions are necessary to terminate the labour, and these contractions cease. But if it is administered to a young, vigorous, primiparous woman, exhausted by a tedious labour, it may produce uterine contractions which destroy the child, as we have several times observed. In one case we saw it excite acute, permanent, and, as it were, convulsive contractions, without the slightest advance of the head; it was subsequently necessary to deliver with the forceps a dead child, which at the moment of the exhibition of the medicine was full of health. We are far from proscribing the remedy, but recommend its judicious use in suitable cases. We have seen, with regret, many accoucheurs employ it in cases in which it was useless, and in others in which it was directly contra-indicated, as in shoulder presentations, an example of which recently fell under our notice. We shall hereafter apply the same remarks to the indiscriminate use of the forceps. The ergot should be administered in powder, in the doses of from ten grains to a drachm. The effects are generally manifest in ten or fifteen minutes; but we must remark that, when the woman has been exhausted by hæmorrhage, we have sometimes given as much as two drachms in the course of an hour without any avail.

B. *Excess of energy or irregularity of the Uterine Contractions.*

It may happen that labour, instead of slackening, advances too rapidly, that the contractions are so powerful as to endanger the woman from the excess of their energy. We should then endeavour to moderate the action of the uterus. This advice is undoubtedly good, but not always easily followed; we may, however, sometimes succeed; for this purpose, venesection, baths and narcotics have been successively recommended.

Venesection appears to us more calculated to increase than to moderate the energy of the uterine contractions. The cases in which it can be advantageously used are not very common. It is applicable, for instance, to vigorous and plethoric women, even when there is œdema or anasarca of the lower extremities, because it diminishes the quantity of blood, and restores the elasticity of their muscles. Likewise, when the uterus is the seat of a sanguineous congestion, which impedes the free exercise of its contractions, a timely bleeding diminishes the congestion, and restores the energy of the viscus. It is also proper when the os uteri is thick, hard, and not disposed to yield. But notwithstanding the efficacy of this remedy, it must be carefully used, and only when imperiously demanded. It is inapplicable to delicate lymphatic women, labouring under passive infiltration, and to those who are exhausted by distress, grief, disease, or when the labour becomes tedious for want of power. General blood-letting is that most commonly employed; we rarely have recourse to local abstraction of blood. Many learned discussions have arisen as to the propriety of bleeding in the arm, external jugular vein, or in the foot. We shall treat of this question under the head of convulsions.

Baths are relaxing remedies which should not be neglected, and from which great advantage is sometimes derived. But like all other

therapeutic agents, they have some inconveniences. But lately, they were an object of fashion rather than utility; it was thought that a woman could not be delivered without having taken a bath; as formerly, it was supposed that the child could not be born, if the mother had not been bled. These prejudices have disappeared; we have ceased to be exclusive, and now know the necessity of discerning between those cases which require these means, and those which contra-indicate them. Baths are either general or local, and in some cases, the mere lotion, or even fumigation of the external genitals is sufficient.

General baths are particularly useful in nervous, irritable women, in the beginning of labour, that is, when the dilatation has not advanced far, when the os uteri is thin, tense, and as resisting as a sheet of parchment. In such cases, we may obtain excellent effects, from immersing a woman for one, two, or three hours in a bath. If the patient is strong, a previous bleeding is often necessary, in order not to drive the blood toward the chest or head. The temperature of the water should never exceed 30 or 32 degrees of the centigrade thermometer. No absolute point, however, in this respect, can be determined; the sensibility of the individual, which varies so much, must be our guide, and our sole rule must be the feelings of the patient.

Local, or hip baths, are of but little use during labour; the woman is placed in an inconvenient position; she is exposed, especially in cold weather, to becoming chilled, notwithstanding all the care that may be taken, and the difficulty in making an examination per vaginam, prevents us from observing properly the advance of the labour. Some old women and ignorant nurses frequently expose the genital organs to the vapour of boiling water, often without knowing if the woman is in labour or not. This practice is essentially bad; in the first place, if the water is too warm, instead of relaxing the parts, it irritates them, and produces an effect contrary to the one desired. In the second place, the heat of the fluid often cracks the vessel containing it, which breaks under the weight of the woman. We have seen two cases, where this accident and the heat of the water injured the patients so severely as to keep them in bed for a long time. These fumigations, to be useful, should be of a moderate temperature, about 30 or 32 degrees centigrade; and, as they act only on the external organs of generation, they are really useful, only when the fœtal head is in the cavity of the pelvis, the os uteri being completely dilated; for they then allay the irritation caused by the length of the labour, or too frequent touching. But as soon as the head has passed through the inferior strait, they should be abandoned, and the woman placed in a horizontal position, without which the parts would not have sufficient time to be distended, and, urged with too great violence, they might be lacerated.

Baths have another advantage, secondary, indeed, but still not unimportant; that of gaining time, quieting the imagination of the woman, and the impatience of her friends; they relieve the accoucheur from troublesome advice, allow him to act when he thinks it right to do so, and to wait with patience for the event. By prescribing a bath, we give nature time to complete her arrangements, and very frequently to terminate that labour before the bath is ready. This subterfuge is not at all reprehensible, for it is dictated by a laudable motive.

Narcotics have been much praised by many, and have been used both internally and externally. We think that these remedies and their preparations should never be employed internally during labour; they may be used externally in case of rigidity of the os uteri, when baths have failed, or the woman is nervous, irritable, or subject to spasms. Chaussier prescribed, under these circumstances, an ointment composed of thirty-two grains of cerate, and four grains of extract of belladonna. Half a grain or a grain of this extract, or of the watery extract of opium, may be spread by means of the finger over the os uteri. We sometimes form a sort of capsule of fresh butter, into which some laudanum is dropped; the orifice is then closed, the capsule allowed to harden in cold water, and when sufficiently firm, it is introduced into the vagina, in order to anoint the os uteri.

Narcotics externally have also been advised, to relieve cramps; they are utterly useless in these pains, which proceed from the compression of the nervous trunks by the fœtal head; dry frictions over the muscles spasmodically contracted are sufficient, and as soon as the contractions of the uterus cease, the cramps disappear with the cause which produced them.

Administered internally, the preparations of opium are not only useless, but may be injurious. This medicine, as is well known, does not immediately produce a sedative effect; it, at first, accelerates the circulation, and even, in certain doses, excites a sort of intoxication. Its use, therefore, is improper in women predisposed to cerebral and pulmonary congestions. Moreover, its sedative effects may produce a kind of stupor, which prevents the contractions of the uterus, and thus impedes the progress of the labour.

SECTION II.

OF ARTIFICIAL LABOURS.

We designate by the term *artificial labours*, all those requiring the interposition of art, either from some accident which complicates the labour and endangers the life of the mother or the fœtus, or the presence of some impediment to the advance of the latter.

The causes of artificial labours are numerous and various. Some arise suddenly, and occur when we had every reason to expect an easy, successful, and in short a natural termination of the process. Others, on the contrary, inherent to the position of the fœtus, its constitution, or the organism of the mother, exist long before the act of child-birth; some may be previously recognized and ascertained, thus giving them a fixed and permanent character, which distinguishes them from the former; whence it follows, as regards the causes, that artificial labours are not all so to the same degree, that is, that some are artificial only accidentally, whilst others, on the contrary, are so essentially. The former occur with a normal conformation of both mother and fœtus, the latter are sometimes met with under the same conditions as in unnatural presentations of the fœtus; but they generally accompany a malformation of one or the other, of which they are the necessary consequence.

The signs by which we may diagnosticate artificial labours, and the indications they present, being as variable as the species to which they belong, will be explained as each one comes under our consideration.

FIRST DIVISION.

LABOURS ACCIDENTALLY ARTIFICIAL, THE MOTHER AND FŒTUS BEING WELL FORMED.

The quite numerous causes which, notwithstanding the natural conformation of the mother and her child, may accidentally require the interposition of art in the termination of labour, relate, the former to the mother, and the latter to the fœtus. The former may appear and be recognized at all periods of labour; the latter generally supervene, and can be ascertained only in an advanced stage of the same function. We shall begin with the causes relating to the mother, and explain the indications to be fulfilled in each, with the treatment required; and then examine in the same manner, the causes which relate to the fœtus.

CHAPTER I.

CAUSES IN THE MOTHER, WHICH MAY RENDER THE LABOUR ACCIDENTALLY ARTIFICIAL.

Among the fortuitous causes which, in the mother, sometimes render our assistance necessary, we rank obliquities of the uterus, exhaustion, the cessation of uterine contractions, hæmorrhages of all kinds, wherever they may be located, but especially uterine hæmorrhage, convulsions, syncope, various organic changes, such as concealed or apparent aneurisms of the aorta or great vessels, irreducible, strangulated herniæ, or those merely threatened with strangulation: in a word, every accident which may endanger the woman's life.

ARTICLE I.—OBLIQUITY OF THE UTERUS.

The uterus, feebly supported by extensible ligaments, and surrounded by organs whose volume varies at every moment, floats, as it were, in the middle of the cavity of the pelvis. It follows, from this anatomical structure, that the organ very rarely preserves a perfectly vertical position, and that it is singularly disposed to incline in different directions. We have already studied, under the head of displacements, the various changes it undergoes inferiorly, anteriorly, posteriorly, and internally; we are now to examine the lateral inclinations, or *obliquities of the uterus*.

In a state of vacuity, these displacements are very rare, or if they exist, they occasion so little inconvenience, and their characters are so obscure, as frequently to pass unnoticed. This, however, is not the case, when the uterus, distended by the product of conception, has passed through the superior strait, from the cavity of the pelvis to that of the abdomen; its rounded form, the projection of the lumbar column, and the disposition of the adjacent organs, no longer allow it to maintain a vertical position; it is forced to turn in one or the other direction, and assume a position more or less inclined as regards the entrance of the pelvis.

Since the time of Mauriceau and Amand, who first pointed out the obliquity of the uterus, and especially of Deventer, who attracted attention to it, the majority of writers have admitted several species; they reckon four principal ones, anterior, posterior, right and left lateral. The same remark is applicable to obliquities of the uterus, as to the diameters assigned to the straits of the pelvis; we may suppose as many as there are points in the circumference of the pelvic circle, as has been nearly done by Levret, who admitted positions intermediate to the four of which we have just spoken. But this distinction has been justly neglected; and even in the four principal, we think the posterior may be omitted, for it can exist only when the lumbar portion of the vertebral column is concave forward instead of being convex, and we know that the general effect of deviations of the bones, is not to change, but merely to exaggerate their natural curvatures. We are acquainted with but two examples of anterior concavity of the lumbar column, the case related by Mr. Bell, and another of which the specimen is deposited in the museum of the Faculty. These malformations are the result of the wasting of the bodies of the lumbar vertebræ from caries or tubercles.

The causes of right or left lateral, and anterior obliquities, are either general or special.

The general causes are, the rounded form of the uterus, the extreme mobility of the organs on which this viscus reposes, and the changes of volume which may occur in the adjacent parts. Levret ranked, among the most important of these causes, the insertion of the placenta, which, in his opinion, always attracted the uterus toward the point of its insertion. It may be supposed that, if the placental mass were suddenly added to any point of the circumference of the uterus, it might, in the vertical position of the woman draw the viscus toward that side. But here, as in many other cases, theory and facts do not agree. In fact, we daily see anterior or lateral obliquities of the uterus, with the placenta inserted in a diametrically opposite direction, whereas if the opinion of Levret were well founded, the obliquity should take place in the same direction. Others have attributed them to an original malformation, which is only avoiding the difficulty, as then this malformation must be admitted in all women.

Among the special causes of obliquities of the uterus, we must include, for the anterior, the natural inclination of the pelvis forward, which, in the vertical position, causes the pubes to be lower than the promontory of the sacrum. To this forward inclination, add that only a small part of the anterior wall of the pelvis is osseous, whence it follows, that as soon as the fundus uteri begins to rise, and meets in the abdomen only parts which are soft, more or less extensible, and consequently incapable of presenting much resistance, it naturally inclines forward; and therefore, the more children a woman has had, the more relaxed are the abdominal parietes, and the more marked the anterior obliquity of the uterus.

Some writers have attributed the lateral obliquities to want of length of the ligaments of the uterus. Chaussier, among others, thought that he had found the broad ligament of the right side to be shorter than the left; and the round ligament of the same side to be thicker and shorter than the opposite one, and hence deduced the greater frequency of the right lateral obliquity. We believe that, in this case, the effect was taken for the cause. Ascending in front of the vertebral column, the uterus has the form of a round body; of which the posterior portion is in contact with the lumbar vertebræ; but this contact being only over a small extent, cannot last long; on the least movement of the woman, the uterus glides over the column and lodges in one of the two lateral grooves. This explains sufficiently these obliquities. The greater frequency of the right direction, is explained by general causes. We have said that, among the latter must be reckoned the changes of volume to which the organs adjacent to the uterus are liable. Therefore, the course of hardened fæces in the large intestines, and their collection in different parts of the colon, and especially in the sigmoid flexure and rectum, account for right lateral obliquities, and no doubt on this subject can exist, when we remember that constipation is habitual during pregnancy. We think this explanation more rational than that founded on the position of the mother in bed, an hypothesis which cannot explain the greater frequency of the right deviation. However, it must be added that some special causes may produce obliquity of the uterus in one direction rather than in another, for example, tumours in one side of the abdomen, or in the interior of the pelvis. We saw one case in which a left obliquity depended on an encysted tumour in the right ovarium, and which was partly in the cavity of the abdomen, and partly in that of the pelvis.

In order to ascertain the existence of obliquities of the uterus, it will be sufficient to place the woman on her back or in the erect position. It will then be felt and seen that the fundus of the viscus is inclined to the right, left, or to the front. In some women, the anterior obliquity is so marked, that the belly falls like a bag on the thighs, and even rests on her knees when she sits down. By an examination per vaginam, we can distinguish the os uteri, instead of being in the centre of the cavity of the pelvis, directed, in cases of anterior obliquity, upward, backward, and sometimes in contact with the promontory of the sacrum, giving rise to the idea that it was imperforate. In right or left lateral obliquities, the fundus uteri is inclined in the opposite direction. Sometimes it undergoes a kind of torsion; but this is rare, and can occur only when the fœtus is not engaged in the superior strait.

Obliquities of the uterus may be the origin of more or less serious accidents, both to mother and child. In the woman they may impede the progress of labour, or excite dangerous symptoms. When the obliquity is strongly marked, the os uteri does not correspond to the centre of the pelvic excavation, the woman is exhausted by useless efforts, the fœtal head plunges into the cavity of the pelvis, covered by a portion of the neck of the uterus, which it distends, perchance lacerates, and may produce inflammation, gangrene and death. These disastrous consequences have been chiefly observed in anterior obliquities. Baudelocque was one day called in to see a woman who had been four days in labour, and who was affected with anterior obliquity of the uterus. An ignorant midwife had allowed her to walk about, and stand erect during the whole period of labour. As the obliquity was very great, the head rested against the promontory of the sacrum, and dilatation could not take place; at last, the head descended, covered by the neck of the uterus. Venesection, a horizontal position, and the precaution of elevating the breech, could not prevent gangrene and death, which occurred before the termination of labour, and which, certainly, would not have happened, if the obliquity had been remedied in the beginning. About twenty years ago, we were desired to see a woman who had already had several children, and in whom there was a very marked anterior obliquity. The fœtal head was in the cavity of the pelvis, covered by the neck of the uterus, whose parietes were so smooth, thin and tense, that it seemed as if the head were bare; such, indeed was the opinion of the attending physician, who was preparing to apply the forceps, when the family requested our advice. We immediately ascertained, by the sensibility of the part and the pain caused by touching, that the fœtal head was not exposed, and that it was covered by the yet undilated neck of the uterus: we placed the woman on her back, with her breech elevated, introduced the extremity of the index finger, curved in the shape of a hook, into the os uteri, which was behind and nearly on a level with the promontory of the sacrum, so as to draw the anterior lip gently downward and forward, during the uterine contractions, at the same time, with the other hand on the abdomen, we pushed the fundus uteri, upward and backward; this simple plan, continued with great caution and gentleness, effected a rapid dilatation, and in less than two hours, the successful and natural termination of a labour, which until our arrival had been considered as excessively difficult, and requiring the use of the forceps. We might relate several similar cases which we have since seen. The vaginal Cæsarian operation, mentioned by Lauverjat, was, undoubtedly, performed under similar circumstances. An incision was made into the neck of the uterus, under the supposition that it was imperforate; but after the operation, the os uteri was found in the middle of the cavity of the pelvis, proving that there had been no obliteration.

When an obliquity of the uterus exists, and the fœtus descends into the cavity of the pelvis, we must immediately remedy this

accident. If the obliquity is anterior, the woman is to be laid on her back, with a cushion under the breech, in order to establish the parallelism between the axis of the uterus and that of the superior strait; the fundus of the organ is pushed upward, a finger introduced into the vagina, in order, in the interval of the pains, to seek the os uteri, which is found on a level with the promontory of the sacrum, and then the directions given in the preceding case are to be observed, taking care to exert very moderate traction, for fear of lacerating the os uteri. When there is right or left lateral obliquity, the patient is laid on the opposite side, one hand placed on the flank towards which the fundus uteri inclines, the os uteri is acted on with two fingers of the other hand, and thus restored to its natural situation.

Obliquities of the uterus influence the position of the fœtus, and although the viscus may be restored to its natural position, the deviation of the body of the fœtus sometimes continues; they are the most frequent causes of the inclined positions in presentations of the cephalic or pelvic extremities.

ARTICLE II.—EXHAUSTION OF THE WOMAN, CESSATION OR SUSPENSION OF THE UTERINE CONTRACTIONS.

General debility of the mother is not of itself a sufficient cause to render the delivery impossible; it merely causes it to be more tedious without being more difficult. Every day we see women of a delicate constitution, give birth, unassisted, to children, and others whose strength is so exhausted by a disease which must soon prove fatal, that they can scarcely walk. We have said also, that in some cases the apparent or actual death does not prevent the uterus from expelling, unaided, the product of conception. There is, however, danger in exposing a very feeble woman, to the exhaustion of her strength in the accomplishment of the act by which she is to become a mother. Moreover, this exhaustion does not always act upon the muscles; the uterus itself may be affected by it, so as to have its contractile power nearly annihilated. This distressing condition may depend, either on excessive length of labour from any cause whatsoever, from great loss of blood, or from prolonged syncope. If art does not interpose after we have endeavoured to restore the expiring pains, the labour becomes so tedious and difficult, as to endanger the life of mother and child.

ARTICLE III.—OF HÆMORRHAGE.

Every discharge of blood which occurs during labour, may, if copious, endanger the existence of mother or child, sometimes of both. This alone would induce us not to remain idle spectators of the scene; the indication for action is more or less urgent, according to the organ from which the blood issues. Thus, when a woman in labour is attacked by epistaxis, hæmoptysis, hæmatemesis, melæna, or hæmaturia, the case, although unpleasant, does not always require immediate delivery. It may be generally relieved by general means, as absolute rest in the horizontal position, exposure to cold air, the use of slightly acidulated drinks, the application of compresses wet with cold vinegar and water, or venesection at the commencement of the disease, if the woman is plethoric. The necessity of terminating hastily the labour, in these various hæmorrhages, can occur only in a few, and almost exclusive cases. It is very evident that, during the violent efforts of the woman to effect her delivery, the affluxus toward the organ which is the seat of hæmorrhage increases, and the latter augments in proportion to the activity of this affluxus. Therefore, by terminating the labour, we lessen by so much the chances of hæmorrhage.

Uterine hæmorrhage may appear during pregnancy, during labour, or after this period, either before or after the delivery of the secundines. We shall treat only of the former: those of the third genus have peculiar characters, and even peculiar causes, which we shall explain when on the subject of the delivery of the placenta. They have also the exclusive property of endangering only the life of the mother, whilst the former may be fatal to both mother and child.

At whatever period of pregnancy hæmorrhage may supervene, it is always to be regarded with great anxiety. In this respect we differ in opinion from some accoucheurs, Gardien and others, who consider as a menstrual discharge the sanguine exhalation which sometimes takes place periodically from the vulva in the early stages of pregnancy, and even later, and who, on that account, think that it requires no attention. We, on the contrary, look upon it, not as an evacuation supplementary to this discharge, but as an accident of pregnancy requiring relief; for we are never certain that it will be arrested until the plethora is removed, and early enough not to become alarming.

Uterine hæmorrhage has been divided into two classes, according to the manner in which the discharge of blood takes place. Whenever this liquid flows externally, it is called *external* hæmorrhage; when, on the contrary, it collects in the interior of the uterus, without appearing externally, it is termed *internal, latent,* or *concealed* hæmorrhage.

The causes of hæmorrhage are very numerous. We shall divide them into predisposing, efficient or occasional, determining or proximate, and special.

The predisposing causes include the texture of the uterus, and the state in which the vessels of the organ are brought by the very fact of pregnancy. In fact, during gestation, the calibre of the vessels increases, and their flexuosity diminishes, so that the circulation becomes more free and active, and hence the disposition to general or local plethora much greater. General plethora may be known by the hardness and fulness of the pulse, the red colour of the face, a dulness in the head felt by the woman, the epistaxis which supervenes, sometimes a sort of numbness in the limbs, by embarrassed respiration, etc. When local plethora is seated in the uterus, the woman complains of tension in the hypogastrium and loins, a sensation of dragging and uncomfortable weight in the pelvis; in a word, we observe all the precursory symptoms of the catamenia, or what Stahl called the *molimen hæmorrhagicum.* We may also include among the predisposing causes, the acute irritation resulting from inflammations of this organ, or the growth, either in its interior or its vicinity, of foreign bodies, as polypi, fibrous tumours, false conceptions, or other similar products, which by their presence cause a greater afflux of blood to the viscus than usual.

Among the efficient or occasional causes may be comprised all those which can produce the development of the proximate cause, as blows, falls, jolting in a carriage, the act of jumping; all causes of general excitement, such as balls, theatres, assemblies and places where the temperature is too elevated; the passions, lively emotions, joy, and anger, which accelerate the circulation; fear, which concentrates

the blood in the internal organs; and as during gestation the uterus enjoys greater activity than any other organ, the afflux of blood is naturally directed toward it.

The proximate or determining cause is the partial separation of the placenta. Whenever the placenta is detached for some extent from the internal surface of the uterus, a portion of the blood which goes from the mother to the fœtus, and of that which returns from the fœtus to the mother, being no longer received by the cavernous tissue of the placenta nor the uterine sinuses, must be extravasated between the two organs, and there accumulate. At first the hæmorrhage may not be very evident, because the phenomena occur internally; but, as the blood becomes more abundant, it separates a larger portion of the placenta, then also a part of the membranes, in order to escape through the os uteri and reach the external genitals. There is, therefore, in the first place internal, and subsequently external hæmorrhage.

The special causes of uterine hæmorrhage are three in number.

1st. Sometimes the blood is effused in the cavity itself of the membranes, in consequence of the laceration of the vessels of the umbilical cord. To this sort of hæmorrhage particularly, the term latent has been applied, because the blood cannot escape externally except after the rupture of the ovum: it might also be called *inter-membranous*. It is very rare, and we mention it merely in deference to the great men who have spoken of it; for in all the records of our art there exist but three cases, related by Delamotte, Levret, and Baudelocque. We even believe it to be impossible, and think that the hæmorrhage attributed to this cause was simply in consequence of the rupture of the umbilical cord during labour: this at least would be the natural inference from the perusal and study of the cases which have been reported.

2d. Another species, also very rare, is owing to the rupture of the large umbilical vessels which are distributed over the fœtal surface of the placenta. We are acquainted with a single example only of this hæmorrhage, which may be called *intra-membranous*. We observed it in a woman, who had great difficulty in the expulsion of the secundines: on examining the placenta, we found one or two ounces of blood effused between the chorion and amnion.

These two varieties of hæmorrhage should be erected into a separate class, and designated more correctly by the term hæmorrhage of the ovum, than by that of uterine hæmorrhage properly so called.

3d. Lastly, the third special cause is the insertion of the placenta over the os uteri. It will be the only one which we shall examine, after having described the hæmorrhages owing to the separation of the placenta, for the discharge produced by the two other special causes can furnish no pecular indication to be fulfilled.

The diagnosis of uterine hæmorrhage, produced by a partial separation of the placenta, presents no difficulty when it appears externally, for it is easily recognized by the flow of blood. Internal hæmorrhage is not so evident, and can be known only by general symptoms. We are led to suspect its existence whenever the woman's abdomen becomes suddenly unusually large. This enlargement cannot, however, be considered as a decisive sign, since it may depend on another cause, as, for example, meteorism or intestinal tympanitis. But when to this are added a sensation of languor, weakness, vertigo, dimness of sight, tinnitus aurium, fainting, pallor of the face, and a feeble and weak pulse, we may be certain that hæmorrhage is going on. If the mother is not immediately relieved, syncope, cold sweats, convulsions, and even death, supervene. On touching the os uteri it will generally be found relaxed, and sometimes by pressure on this part the blood may be expelled, thus rendering the hæmorrhage external instead of being internal. Lastly, under certain peculiar circumstances, other local symptoms come to the assistance of the diagnosis. Thus, when the separation has taken place on the anterior paries of the uterus, the hand applied to the hypogastrium feels sometimes a protuberance at this point.

The prognosis of hæmorrhages varies as they occur in the mother or fœtus. As regards the latter, uterine hæmorrhages are more dangerous when they occur at an early stage of pregnancy, because they then cause abortion and the loss of the embryo, whilst in a more advanced stage, if hæmorrhage occurs at a period nearly approaching that of the viability of the fœtus, the latter is better enabled to resist it, and go on to maturity. The inverse of this obtains in the mother; in the former case, the uterine vessels not being very large, can pour out but little blood, not sufficient to endanger the woman's life; whereas, when hæmorrhage occurs from the fifth to the ninth month of pregnancy, these same vessels, being greatly enlarged, can, in a given time, discharge blood enough to prove quickly fatal to the mother. Certain distinctions likewise exist in the prognosis of hæmorrhages which occur during labour. In general, all other things being equal, the external are less dangerous than the internal, because, as they appear externally, we are sooner aware of them, and may attack them ab initio, whilst the internal, being manifested by general phenomena alone, they are frequently remarked only when considerable debility has supervened. All these sanguineous discharges are less dangerous when the period of labour is advanced, for we can always arrest them by terminating the process. When, on the contrary, they occur in the commencement of this function, we must wait, until nature has completed her own arrangements, in order to pursue that course which may save both mother and child.

The treatment is general or special, according to the case to which it is applied. If hæmorrhage occur during pregnancy, and is not alarming, we begin by resorting to hygienic measures. We prescribe rest, the horizontal position, the room is kept cool and well ventilated; all causes of irritation of the uterus are to be removed by evacuating the bladder, cleansing the large intestine by simple enemata, applying compresses, wet with iced water, to the hypogastrium, groins and upper part of the thighs, by prescribing diet, and only allowing refreshing and incrassating drinks, as cold acidulated rice-water, etc. If this treatment does not succeed, we must resort to venesection, if the woman is young, plethoric, robust, and if she has not already lost much blood: in the contrary case, it is inadmissible. General and revulsive bleeding must be used. Local loss of blood does not act with sufficient rapidity on the circulatory apparatus; it merely affects the general capillary system, unless it be carried to syncope. Moreover, it would do more harm than good, by producing, by the scarifications of cups, or the bites of leeches, an irritation and affluxus toward the parts to which they were applied.

These general means will ordinarily arrest the hæmorrhages which occur during the first months of gestation. Sometimes, indeed, by their assistance, we may extend to full term a pregnancy which, otherwise, would have aborted. Unfortunately, we are not always so successful, and, most frequently, when the occurrence takes place during the first three months, abortion cannot be prevented.

The hæmorrhages occurring at the close of gestation, and especially during labour, require peculiar cares. Unprofessional persons,

and even some physicians, think that their appearance establishes the necessity of terminating the labour. But, before adopting this plan, we must ascertain if we can act advantageously for the mother and fœtus, and an indispensable condition of success is the dilatability or requisite dilatation of the os uteri. If the hæmorrhage occurs before the obliteration of the orifice of the uterus, we must do nothing, for fear of endangering the existence of two beings over whom we are expected to keep a watchful eye. Nevertheless, if things are left to themselves when the blood flows copiously, and the uterine contractions are scarcely sensible, the woman would be greatly debilitated, or might even perish before the dilatation takes place. In this case, the tampon, in our opinion, is the only efficacious resource, that is, the introduction into the orifice of the uterus of a body capable of preventing the escape of the blood, and of retaining it in the cavity of the viscus. The immediate effect of the tampon is to convert an external into an internal hæmorrhage. The retained blood coagulates, and the clot, as it is formed, extends gradually as far as the orifices of the vessels which pour out the blood, and arrests its flow, if not entirely, at least to a great degree. The tampon, exerts also another secondary influence in labour; it interposes between the ovum and the os uteri a clot which moistens the latter, softens and disposes it to yield more promptly. Moreover, this foreign body distends the fibres of the uterus, arouses them from their torpor, and restores their action. Thus, the triple result of the application of the tampon is to moderate the hæmorrhage, to soften the os uteri, and excite the uterine contractions; its mode of action, therefore, indicates the cases to which it is applicable. We should have recourse to it when the ovum is uninjured, and when we have lost all hope of seeing the hæmorrhage arrested except by the expulsion of the product of conception. If, on the contrary, the bag of waters is ruptured, and the liquor amnii discharged, the tampon must not be used, for it can be efficacious only when the coagulum is equal to the volume of water which has been evacuated; and, therefore, the woman being already weakened, she might perish before the stoppage of the flow of blood.

Various modes of applying the tampon have been proposed. Some recommend the introduction of dossils of charpie into the orifice of the uterus. This plan is bad, because the softness of the charpie permits it to become saturated too readily, and the woman would lose too much blood before sufficient compression was effected. It is better, if the orifice is not sufficiently dilated, to apply a muslin bandage of a pyramidal shape, previously soaked in vinegar, or some diluted mineral acid, or a solution of alum, or any other styptic fluid. Sometimes, however, the tampon does not produce entirely the desired end, and although it moderates the flow of blood, the woman might perish if we still waited for its complete effect. The tampon is inapplicable to all cases; those of general or local irritability forbid its use; and lastly, it cannot be employed when the dilatation has advanced considerably, still not sufficiently to allow the labour to terminate.

Others have advised the introduction into the vagina of a square of linen, of which the four corners are retained on the outside, and which is afterwards stuffed with charpie. This operation is difficult of performance: we have several times tried it without success. It causes severe pain, and as we are obliged to draw on the corners of the linen filled with charpie, in order to apply it against the parietes of the vulva, and prevent the escape of the blood externally, a vacuum takes place between the os uteri and the tampon, which permits a considerable quantity of blood to accumulate in the upper relaxed and extensible part of the vagina.

The plan we have followed with most advantage and success, consists in introducing into the vagina a lemon, of which one end has been sliced off. This fruit being applied against the os uteri, the acidity of its juice produces coagulation of the blood. When the orifice is not dilated, or when it is only just begun, if its diameter be greater than that of the lemon, we stuff the vagina as full as possible with strips of linen soaked in vinegar and water, and retain them by means of a napkin.

Puzos has recommended a method which consists in introducing first one, and then several fingers into the os uteri, in order to gently titillate it; then in slowly dilating the orifice, and lastly, in rupturing the membranes, in order to cause contractions which, by closing and compressing the blood-vessels, would arrest the hæmorrhage. This plan can be useful only when the uterine contractions have already existed for some time; for if the discharge of the liquor amnii took place before the proper establishment of the pains, the blood would collect internally, instead of escaping outwardly, and the woman would perish before relief could be afforded. The method of Puzos is really efficacious only when we can excite the contractions, and when the dilatation of the os uteri is nearly equal in extent to a five franc piece. Then, indeed, if the liquor amnii has been discharged, the organ contracts energetically, the hæmorrhage is diminished, and sometimes completely arrested.

Many practitioners have advised the exhibition of ergot. We think it is useful if the discharge is not arrested and the woman is visibly weakened. By thus exciting the uterine contractions, the flow of blood may be diminished, and the labour perhaps terminated. But this remedy frequently fails; all other things being equal, its action is less marked in proportion to the debility of the woman, and we have been obliged in some cases, to give it in doses of from one to two drachms, before obtaining any effect; and this dose even has sometimes failed in restoring uterine contractions.

Occasionally, the hæmorrhage is so copious and sudden that we have not time to use any of the means just enumerated, and the woman is so weak, that she cannot support the pangs of labour, and is liable to perish with her child. In this unfortunate, but happily rare and exclusive state of things, we must have recourse to the plan proposed by Celsus, that is to the forcible dilatation of the os uteri. We are aware that this method is not free from difficulties, or even from danger, and that in endeavouring to terminate a labour *per fas et nefas*, we are not always certain of preserving the mother, and almost always endanger the life of the child; but, in this dreadful alternative it is better to use both measures than to remain an idle spectator of an event that appears inevitable. We therefore endeavour to dilate the os uteri, so as to introduce the hand and perform the operation of version. When the feet are once seized and brought to the orifice of the neck, the progressive motion given to the body of the fœtus gradually dilates the os uteri. These forcible labours are always extremely difficult; they frequently produce contusion and laceration of the os uteri, and the head is extracted with great trouble: for when the shoulders are expelled, the os uteri generally contracts around the neck of the fœtus. Then, notwithstanding all our care, the latter perishes, either from the exhaustion produced by hæmorrhage, or the suspension of the circulation from the inevitable compression of the cord, and sometimes from the elongation of the spinal marrow, in consequence of the tractions made on the body of the child.

Let us now examine those uterine hæmorrhages which depend on an insertion of the placenta upon the neck of the womb. We

have previously stated that the point of insertion of the placenta is not fixed; this body is sometimes inserted upon the fundus, the sides, and sometimes, though much more rarely, upon the neck of the womb. In the latter case, hæmorrhage is a necessary consequence of pregnancy; for gestation cannot be completed without more or less separation of the placenta, and loss of blood.

Certain signs have been pointed out as indicating the insertion of the placenta upon the neck of the womb. Many writers have asserted, that a vaginal examination will show the os uteri to be softer, larger and more swollen than usual. These signs are of no value, for the swelling, thickening, softness, and flaccidity of the orifice may depend on many causes not connected with the arrangement here described, and in this, even, are not always constant. One single phenomenon may lead us to suspect the insertion of the placenta over the os uteri, that is, the period at which the hæmorrhage occurs. It generally takes place at an early stage; but it never appears before the neck of the organ has begun to increase in dimensions. There are, indeed, some exceptions. Some accoucheurs, Désormeaux among others, state that they have observed it at the fifth month: others, on the contrary, only in the course of the ninth. It usually appears about the sixth or seventh. This phenomenon is easily explained by the change of texture of the uterus during pregnancy. When the body of the organ begins to dilate, the portions of the placenta which adhere to its neck are detached, the utero-placental vessels are broken, and the blood escapes externally. It follows hence, that the hæmorrhage is in proportion to the dilatation of the os uteri, and *vice versâ*.

The first bleeding is generally slight. During ten, twelve, fifteen or twenty-four hours, there is only a sort of leaking which may be compared to the catamenia. If the woman remains quiet, the discharge ceases and may not return for five or six days; but then reappears with greater energy. We can, therefore, hope to arrest it only by absolute rest; for it is evident, that, as pregnancy advances, the os uteri dilates, the uterine contractions are more powerful, and the hæmorrhage has a greater tendency to return.

If we perform touching, especially in the beginning of labour, when dilatation has commenced, we will feel at the orifice of the neck, a soft mass, ordinarily formed by a coagulum of blood of greater or less firmness. By carefully passing this coagulum, we reach the surface of the ovum, and find a firmer but unequal body, not presenting the smoothness of the membranes, nor marking the part of the child which presents. This body is the placenta. We cannot be too cautious in the examination, in order not to rupture the adhesion between the coagulum and the adjacent parts, and destroy the barrier which prevents a fresh discharge of blood.

The hæmorrhage is in proportion to the strength of the contractions, for the more energetic the pains are, the wider the orifice is expanded, and consequently the more vessels are ruptured. When the contractions cease, the orifice is, indeed, relaxed, but, by its relaxation, it closes on itself, its edges approach the centre, and the lacerated placental vessels are partly covered by it; the blood, not being able to escape, coagulates, and in the interval of the pains, all other circumstances being equal, the discharge is less copious, whilst in the hæmorrhage just described, owing to the separation of the placenta, the opposite is observed, the hæmorrhage diminishing during the contractions. How does this take place? When the placenta is inserted near the os uteri, the protruding bag of waters is more closely applied to the orifice, as the contractions become less frequent, so as to cut off all external communication: the membranes act here like a cork, which closes the os uteri, and does not allow the escape of a single drop of blood. But the pain scarcely ceases when the membranes become less tense, the orifice closes on itself, the space between it and the bag of waters is enlarged, and the barrier being broken by the superincumbent weight of blood, this fluid escapes outwardly. The gravity of the prognosis increases as the centre of the placenta approaches that of the os uteri. The mother's life may be the forfeit. The result depends on her strength, her constitution, the quantity of blood she has lost, and whether timely relief has been afforded. The fœtus generally falls a victim to the debility produced by the hæmorrhage, for it must occur at the expense of the placenta.

The conduct of the accoucheur must vary with the stage of the accident. It has been pretended that nature should never be permitted to terminate the labour without assistance. This proposition appears to us to be too general, and we shall presently quote facts to support our opinion.

If the woman has not reached her full term, our first step is to endeavour to check the hæmorrhage. We prescribe a horizontal position, the free circulation of fresh air around the woman, as slight clothing as possible, and the use of acidulated incrassating drinks; her bowels must be kept soluble; she must be condemned to absolute rest, and very light food. The object is to carry her as near as possible to her full term. When these means are not successful, we may resort to cold affusions, to the application of water mixed with vinegar, ammonia, and æther to the thighs and abdomen. Ergot is here inadmissible, because it would excite premature labour, without diminishing the hæmorrhage.

When the pregnancy is at term, the most efficacious plan consists in using the tampon from the very beginning. But if the hæmorrhage continues, and is in danger of becoming fatal, we must have recourse to forcible delivery. The cases which can be trusted to nature are very rare. Among the latter, however, might be included those in which the placenta corresponds only to a portion of the circumference of the orifice, instead of being inserted centre for centre. Being sent for one day to see a woman who, for six weeks or two months, had suffered from hæmorrhage from insertion of the placenta upon the neck of the womb, we found the orifice dilated to nearly the extent of an inch in diameter. Observing that the pains were sufficiently strong, and that the woman was not gradually growing weaker, we entreated her to take advantage of her pains: as the hæmorrhage did not increase, and as the placenta diminished in thickness, we concluded that labour was progressing: in fact, in an hour's time the placenta separated, and at the same instant the membranes protruded. As the insertion was on the left side, the membranes descended on the right, the fœtus presented by the breech, and we had the satisfaction to see it born alive. The same thing occurred to us in another case, but in which the placenta did not occupy so much of the neck. Some have asserted that delivery could be effected when the centre of the placenta corresponded to that of the os uteri, and that at the moment of the escape of the head through the vulva it was covered by the placenta. Theory gives rise to the supposition that this might occur: we have never seen a case of it. Moreover, the whole of the placenta must necessarily be detached at once, and an enormous quantity of blood-vessels would be ruptured. The cases of which we have just spoken are exclusive, and consequently cannot serve as rules. In a large majority of cases the labour must be terminated. How is this object to be effected? Some

recommend the use of the forceps in presentations of the head; but then the placenta would be detached: hence, this instrument is inapplicable. We think that the operation of turning or version is preferable.

In order to accomplish version, some writers have advised us to introduce the fingers into the os uteri, lacerate the placenta with the nail, enlarge the opening, seek the feet and bring them down. There are many objections to this operation. In the first place, it is difficult to perform: again, in order to lacerate the placenta we must push forcibly against it, and run the risk, by rupturing the slight adhesions it maintains with the uterus, of increasing the hæmorrhage: lastly, some of the principal vessels of the cord may be ruptured, and, as the child is already greatly weakened by loss of blood, this rupture would render its death certain. We are opposed to this plan for another reason: that is, supposing that we have overcome all the difficulties just indicated, and the feet are brought down, the fœtus must pass through the opening made in the placenta; and if the lower extremities, the pelvis and trunk, pass easily when the shoulders engage, the great size of the placenta being added to their own, and this body, forming a kind of cravat around the neck, gives rise to an additional obstacle.

Others recommend us to seek the part of the circumference of the orifice which is nearest to the membranes, to rupture the latter, and bring down the feet. This proceeding may prove fatal to the woman. Besides, how can we ascertain whether the placenta is inserted more on the right than on the left? There is no time to be lost, and, when it is once determined to terminate the labour, the following course is to be pursued.

After having placed the woman in a convenient position, we introduce one or two fingers of the right or left hand, according to circumstances: they are to be passed between the os uteri and placenta, and the latter detached as far as the membranes; when this point is reached, the fingers are to be curved, and the membranes ruptured laterally. In this manner all the liquor amnii is preserved, and the labour is sometimes terminated without the frequently ineffectual attempts to bring down the feet. In several cases, a slight impulsion to the body of the fœtus has been sufficient to cause, as it were, the feet to drop in our hands. Version is then easily performed, because, the bag being entire, the waters are not discharged.

In order to terminate the labour, some advise gentle traction, which is a good precept; others, on the contrary, and especially Leroux, of Dijon, recommend traction to be exerted until the breech reaches the vulva, fearing that, if we expend too much force on the feet, the uterus might be suddenly emptied, and atony of the organ supervene in consequence of the too sudden depletion. This advice is correct in ordinary versions; but when there is a hæmorrhage which may endanger the mother and child, this temporizing might increase the chances of a fatal issue. Deleurye was of opinion that we should deliver the child as far as the axillæ, and then wait for the uterine contractions to expel the remainder. This practice is yet more erroneous than that of Leroux; for, the cord being expelled, it would be compressed.

In short, the fears of many writers on the subject of forcible delivery in cases of insertion of the placenta over the os uteri, appear to us to be exaggerated. In these cases we have always endeavoured to terminate the labour, and have always found the stimulation exerted by the arm and hand more than sufficient to arouse the uterus from its torpor; and we have never seen consecutive hæmorrhage after turning. We were desired to visit a woman who had suffered for a long time from a sanguineous discharge in consequence of placenta prævia. The tampon had been tried, but was improperly applied, and the woman was in a state of extreme debility from the continuance of the hæmorrhage. We found her pale, exhausted, and apparently dying. We ordered her to be placed transversely on the bed, and proceeded to perform the version. This operation was not difficult, the bag of waters being unbroken. The feet were brought out; but when we drew on the body the woman had a sort of convulsion which threw her backward, and we thought she had breathed her last. We, therefore, hastened to terminate the labour. The mother died, but the child was saved; whilst, if we had been less energetic, it likewise would have perished.

ARTICLE IV.—OF CONVULSIONS.

In common parlance, the term *convulsions* is applied to every sudden, irregular, involuntary contraction of the different muscles of the body, without regard to their exciting causes, or the age and sex of the individual. In this wide acceptation, the word convulsions expresses merely a more or less serious symptom, important, indeed, but belonging to many various affections, to the designation of none of which it can be applied. We shall here employ it to express a particular state, peculiar to pregnant women, which may appear during the whole period in which she is influenced by the modifications inherent to conception and its consequences.

When a woman is attacked with convulsions, she experiences sudden, irregular contractions of all the muscles of the body, more particularly of those under the power of the will, although the hollow muscles contained in the visceral cavities do not always escape. We sometimes see partial convulsions, which affect only an organ, a part of the body, one or several limbs. In other cases the convulsions are general, and affect nearly the whole of the organs. We say, nearly the whole, for if all the organs were attacked simultaneously the woman might perish immediately.

Different names have been given to the convulsions of parturient women. Some have called them simply convulsions; others have given them the appellation of *eclampsia gravidarum*, apoplexy of parturient women, milk, epileptic convulsions. In short, as many various denominations have been imagined as there are predominant symptoms. Thus, we have had apoplectic, hysteric, cataleptic, choleric convulsions, etc. It is important to remember that convulsions which supervene during labour have a special character, which serves to distinguish them from those which occur when pregnancy does not exist. The symptoms which are manifest during this state are certainly analogous to those of epilepsy, apoplexy, and hysteria; but they have not the less a peculiar stamp, which distinguishes them from any other.

The causes of convulsions are numerous. Those termed predisposing, relate to the constitution of the woman, and especially to the peculiar modification induced by pregnancy in all her organization, especially in her nervous system. In general, strong, plethoric women, with dry, muscular fibres, and with a moderate share of embonpoint, are more liable to them than feeble and lymphatic women, especially

if they are with their first child, and do not conceive until an advanced age, as thirty-five or forty years. We do not pretend, however, that under other conditions women are always exempt, but they are less subject to them. To these causes must be added, the sudden impression of cold air, a foul atmosphere, or too elevated a temperature, every thing capable of over-exciting the brain, as balls, theatres, etc. Some depend on the peculiar circumstances in which the woman may be placed, or on those which accompany labour. I have observed that the women most liable to these accidents were those who had suffered from deep grief during pregnancy, or those who had been obliged to resort to a thousand stratagems to conceal the consequences of an illicit love. The fibres of the uterus have been thought to play an important part, and it has been said that the predisposition to convulsions increased in proportion to their distension. The fact is true; we have verified it in the hospital of La Maternité. Convulsions occur more frequently in women who are pregnant with several children than in those who have but one; yet it is worthy of remark, that an accumulation of water in the uterus, and uterine dropsy, do not so often excite convulsions as a compound pregnancy. Convulsions have also been attributed to gastric and intestinal irritation; and, indeed, causes sufficient to produce them have been found in all the organs. We are of opinion that the essential cause is owing to the peculiar state of the brain during pregnancy, a state of uneasiness and congestion during the greater part of the time. We have seen women in whom convulsions were always preceded by infiltration of the limbs. One came under our care in whom the convulsive phenomena were daily more marked. Reverses of fortune had occasioned her profound distress. About the sixth or seventh month of pregnancy, œdema began to attack the inferior extremities, distension of the genital organs and lower part of the abdomen supervened; lastly, the upper extremities became swollen, so that at the eighth month the infiltration existed throughout the whole trunk. The patient complained of headache, which increased daily. One day, about four o'clock P. M., she was suddenly seized with blindness and nervous twitchings. We did not see her until about eleven o'clock at night. The physician in attendance, being unable to bleed her, on account of the œdema, had administered antispasmodics without success. At midnight, convulsions came on; we saw the necessity of bleeding, even at the expense of a large incision in the arm. We therefore applied a ligature very tightly, made a large opening in the vein, and took away about two pounds of blood. The convulsions ceased, but consciousness did not return for one or two hours, and her sight was not restored. Leeches behind the ears relieved her considerably; but the blindness continued for twelve hours. The woman recovered, and was soon after delivered, but the child perished.

Convulsions are sometimes preceded by precursory signs, and they sometimes occur suddenly. Generally, when they are preceded by precursory signs, the woman complains of numbness in the limbs and of pain in the head, and occasionally experiences a peculiar sensation, like that preceding an epileptic fit. Most frequently, however, convulsions happen suddenly, so much so, sometimes, that the woman is arrested in the midst of a sentence, which she finishes after the attack, without the least recollection of the occurrence. We were one day attending a strong and plethoric woman from Switzerland; the labour was advancing regularly; at the moment that the fœtal head was about executing its motion of rotation, we desired her to take advantage of her pains; but finding that the head did not descend, on account of an obliquity of the uterus, we wished her to turn on her left side; during this movement, she was seized with a frightful convulsion. We immediately bled her largely, and terminated the labour by the application of the forceps. The child was born alive, and the woman recovered. Thus, without any assignable cause, this woman was attacked by a convulsion resembling apoplexy. Sometimes we are forewarned by partial convulsions. We should never lose sight of the countenance of a woman in labour; the inspection of her face will indicate the approach of convulsions, in the same manner as it denotes the existence of uterine hæmorrhage. Thus, in some cases, the general attack is preceded by convulsive movements which affect one side of the face; most frequently the levator anguli-oris muscle is first convulsed; sometimes a twinkling of the eyelids supervenes, or an irregular motion of the eyeball, which rolls in its orbit; or perhaps one of the limbs is attacked. Most frequently, however, the whole body is suddenly attacked at once, and we have subsultus, and twisting of the limbs, as in an attack of epilepsy or hysteria. During these convulsions, the respiration is laboured, short, and stertorous; the muscles of the chest being unable to dilate this cavity, hæmatosis is imperfectly performed; there is almost always constriction of the throat, and foamy salivation, as in epilepsy. If the tongue is accidentally caught between the teeth, it may be wounded, and the sputum is tinged with blood. In a majority of cases, the pulse is hard and quick, sometimes small. The face is not swollen as in apoplexy, properly so called; in the commencement of the attack, it is rather pale than injected; but, after some time, it becomes marbled, and partly covered with bluish patches. When the woman labours under expulsive pains, which give rise to general excitement, the face is highly coloured, but the marblings do not occur for some time.

The duration of convulsions is infinitely various. Sometimes they cease instantaneously, and sometimes last two, four, five, ten, or fifteen minutes, rarely longer, for they must not, as is frequently done, be mistaken for the comatose state which follows. We have seen women labouring under convulsions for three or four days; they were not, indeed, continuous, but ceased for an hour or two, and then returned.

Their mode of termination is not less variable than their duration. A woman will frequently have a convulsive fit, either during pregnancy or labour, or immediately supervening, which disappears spontaneously. Sometimes, also, convulsions, after having rapidly succeeded each other, cease entirely: this is of rare occurrence. In some women, whether they have been the subjects of medical treatment or not, more or less profound lesions of the senses take place. Momentary blindness, or partial paralysis has been known to follow convulsions. We attended a woman who, from the time of her delivery, remained unconscious, hemiplegic and dumb; notwithstanding all our care, she dragged along a miserable existence, and died at the end of eight months. Death does not always happen at so remote a period, but sometimes occurs suddenly.

A post-mortem examination generally exhibits no appreciable lesion, no trace of injection or alteration of the tissues. Where, however, the woman perishes in the first attack, the vessels of the brain are sometimes found distended with blood: the substance of this organ sabulous, injected, and its cavities more or less filled with serum.

The prognosis affects both fœtus and mother. There is no more frequent cause of death to the fœtus than convulsions during pregnancy. Its life may also be forfeited when these convulsions appear toward the close of gestation or during labour. But, all other things being equal, they are less dangerous in an advanced stage of labour, when we can render useful assistance. Great variety of

opinion exists as to the danger incurred by the mother during the paroxysms which supervene after the commencement of labour; and statistical accounts have been supposed to throw some light on the subject. Some assert that two-thirds of the women perish, some one-half, others only a fourth. In our opinion, the prognosis admits of fundamental distinctions; for the danger of convulsions varies according as they are or are not accompanied by loss of consciousness. We have generally seen women recover, in whom coma did not supervene, however numerous may have been their paroxysms; but, in the contrary case, we should deem ourselves fortunate not to lose more than one-half or two-thirds of our patients. Circumstances, however, may occur which frustrate all calculations of chances. In some years, M. Girardin and I have lost nearly all our patients at the Maternité, whilst, in others, the mortality has not exceeded ten or twenty per centum. No general rule can therefore be established as regards the prognosis. Nevertheless, it is more alarming when a long time elapses before a return of consciousness, for that is the evidence of considerable disturbance in the cerebral spinal system: hence Mauriceau considered as inevitably fatal the occurrence of convulsions with loss of consciousness during the progress of labour.

The treatment must vary according to the peculiar condition of the woman. When convulsions occur during the course of pregnancy, when labour is not near, we must be satisfied with the use of general means. When, on the contrary, they occur toward the close of pregnancy, and especially during labour, this process must be terminated as soon as possible. It is not, however, always in our power to act as soon as convulsions are manifested; we must first place the woman in a condition that will give her and her child a chance of success, thus obliging us to combat convulsions by all kinds of means.

The principal are antiphlogistics, sedatives, narcotics, revulsives, and derivatives.

In our opinion, antiphlogistics occupy the first rank in importance, for convulsions particularly attack strong and plethoric women. Of these, the most valuable is venesection. Learned discussions have arisen as to the vein which should be opened in these cases. For a long time, the jugular was preferred. Bleeding from this vein ought to be more effective than from any other, as it is nearer the seat of congestion, and diminishes more directly the quantity of blood in the affected organ. It is far, however, from possessing all the advantages which, at first sight, it would appear to present; for in its performances we are obliged to use, both before and after, a compression which cannot fail to be injurious, by impeding the return of blood to the upper parts of the heart, without reckoning the danger of the introduction of air into the vessel. Another reason would cause us to reject it entirely, namely, a regard for the moral condition of the patient; for, supposing that she recovers after the opening of the jugular vein, it cannot be concealed from her that an operation has been performed during the convulsion; she will think she has been dangerously ill, and the mere recollection of past danger may renew the disease.

Blood-letting in the foot has been recommended from the earliest times. Hippocrates and Galen advised it; Mauriceau preferred it to that in the arm, and when it did not succeed, he thought it was because it had not been sufficiently copious. Evrat was very partial to it, and obtained from it unhoped-for results. It is not, however, always easily performed. If the convulsion is very strong, and the woman stiff, it may be impossible to immerse her foot in warm water in order to produce tumefaction of the saphæna vein. Again, in dropsical or corpulent persons, this vein is covered by a thick coat of tissues which prevents our reaching it. Add to this, that in bleeding in the foot, we are never sure of the quantity of blood drawn. Sometimes the blood flows badly, either from not having freely opened the vessel, or because the convulsive condition extends to it; a question we have as yet been unable to determine.

Blood-letting in the arm has been extolled by Baudelocque, both as a prophylactic and a curative measure. But is it proper to bleed moderately, save it be frequently repeated? Opinions vary on this point. Evrat recommended a large quantity of blood to be drawn, and Alphonse Leroy considered venesection as the anchor of safety of the woman. In fact, women are never in more favourable conditions to bear it. Moderation, however, is always proper, and too copious a loss of blood might prevent the establishment of a healthy reaction. The best plan is to bleed largely the first time, and if not completely successful, the operation can be repeated, at proper intervals, abstracting a smaller quantity, and taking always the pulse for our guide.

Local blood-letting is useful only when convulsions succeed hæmorrhage, or when, in a lymphatic woman, the comatose condition continues in the interval of the paroxysms, although venesection has been freely resorted to. We may then derive advantage from leeches to the mastoid processes, and perhaps also around the malleoli.

Baths have likewise been greatly lauded. They are at once antispasmodic and antiphlogistic, and are useful in these cases. We think that tepid baths, rather cool than warm, are to be preferred; for a warm bath might increase the congestion of the head and the convulsions. This remedy should never be used unless preceded by blood-letting. When the woman is in the bath, we may derive great advantage from cold affusions on the head and face. We prefer these affusions to the application of ice, which may excite to violent reaction, if not continued for a sufficient length of time, or, in the contrary case, may produce a state of collapse from which it is difficult to arouse her. The proper medium between these two extremes is not readily ascertained; it can be learned by practice alone. The combination of bathing and blood-letting is useful in convulsions which occur during pregnancy, and especially in the onset of labour. The indication, however, is then less urgent.

Antispasmodics, sedatives and narcotics have been much lauded in convulsions. When used as prophylactics, they may be of service; but, when convulsions are once established, they are useless. If the physicians who have recommended them had been present at their exhibition, they would have been convinced that, in an immense majority of cases, the patient cannot swallow a single drop. Convulsions affect not only the voluntary muscles, but also those which close the pharynx; deglutition cannot be performed, and if the glottis were not closed, some of the fluid, falling into the larynx, might produce strangulation, which would add to the intensity of the convulsions.

If we prescribe narcotics and sedatives internally, we also advise their external use, in order to prevent convulsions. In these cases, it is proper to apply to the os uteri the preparations of opium, hyoscyamus and belladonna, of which we have spoken elsewhere.

Revulsives, both external and internal, have enjoyed great celebrity. Among the former are ranked sinapised foot-baths. But the convulsion frequently renders their employment impossible, and the limbs are so rigid that they would break rather than bend. If we can use them, they are undoubtedly advantageous.

Some writers, among others Mad. Lachapelle, have asserted that blisters are injurious rather than useful. We have frequently seen

them applied in the Maternité, to the thighs or the neck, when blood-letting did not succeed, and have never observed them to exert any influence over convulsions.

A seton in the nucha is too violent a remedy, and can only serve to increase the sensibility which, in convulsions, far exceeds the natural standard. Moreover, women are not fond of scars on their skin.

We prefer the use of derivatives which act on the intestinal canal, whenever they are not contra-indicated by the state of this organ. We may administer enemata prepared with senna or some of the purgative salts, such as the sulphate of potash or soda, etc.

The English place great confidence in laxatives, especially in calomel. We have recently used it, in conjunction with Messrs. Paul Dubois and Girardin; but it would be impossible for us to say positively that the cessation of the convulsions was owing to the evacuations, because these remedies were not employed alone, and because we have cured many patients without calomel. Whenever blood-letting, repeated according to the strength of the patient, purgatives, warm-baths, cold affusions to the head and mild drinks, do not succeed, and we have tried more active means, the woman has nevertheless perished. We shall say nothing of musk, castor and other medicines used in these cases by the English, because we have no fixed opinion concerning them; but we think that in desperate cases, it is better to employ a doubtful remedy than to remain an idle spectator of the distressing scene.

The termination of labour is more or less imperiously required by convulsions. In order to effect this the os uteri must be dilated or easily dilatable, and permit the introduction of the hand to perform version or apply the forceps, which is not always the case. We should therefore endeavour to place the woman in the most advantageous condition for herself and her child. When we wish to act on the os uteri, if the rigidity of this organ is an obstacle, we may derive great assistance from the local application of narcotics. It has been advised to rupture the membranes, in order to empty the uterus, and diminish its compression on the aorta. This plan appears good in theory. It should not, however, be indiscriminately followed; for if the membranes are ruptured before the os uteri is dilated or easily dilatable, the uterus contracts on itself, violent pains supervene, and we are deprived of a resource which may be indispensable to the termination of labour. This rupture must, therefore, be effected only when the dilatation is sufficiently advanced to permit the head to engage, that is, when it is larger than a five franc piece.

Among the causes which sometimes require the interposition of the accoucheur, the spasmodic contraction of the os uteri around the neck of the fœtus, has been included. We have never observed this peculiarity: without denying that it may occur, we believe that it must be very rare, especially when the head has escaped through the orifice of the uterus. Baudelocque relates one case. Here the contractions were so violent, that after having crushed the head with the forceps, great difficulty was experienced in overcoming the resistance of the os uteri, and it was necessary to turn the fœtus and bring down the feet. These spasmodic contractions belong rather to the internal than to the external orifice of the neck, and occur particularly when we have been obliged to resort to forcible delivery, as in uterine hæmorrhage or similar cases.

ARTICLE V.—OF SYNCOPE.

A woman may fall into syncope during labour, and at intervals more or less remote. Syncope almost always depends on a state of general debility or exhaustion; but is likewise sometimes produced by accidental causes which cannot be known during life. Baudelocque relates the case of a woman who, after great convulsive movements of her child at the commencement of labour, fell into frequent fainting fits, followed by vomiting and diarrhœa, and died in fifteen hours, without being delivered. On an examination after death, the omentum was found adhering to the right inferior and lateral part of the uterus, so that at each contraction of this viscus, the stomach and arch of the colon were dragged downward. The indication, in all cases, is to terminate the labour.

ARTICLE VI.—DIFFERENT ORGANIC LESIONS.

If the woman is affected with aneurism of the great vessels, asthma, hydrothorax, ascites, a large tumour in the abdomen, if she is threatened with rupture or suffocation, it may be easily conceived that she should not be permitted to use the violent exertions required by child-birth. For a still stronger reason, must the labour be terminated, if the woman has an irreducible hernia, which may become much larger, or even strangulated.

CHAPTER II.

OF CAUSES, IN THE FŒTUS, WHICH MAY RENDER THE LABOUR ARTIFICIAL.

The causes, in the fœtus, which may render the interposition of art necessary, are the premature escape or prolapsus of the umbilical cord; the shortness of this cord, either when naturally too short, or when made so by being twisted several times around the body or limbs of the fœtus; lastly, the presence of several fœtuses, one of which may be so placed as to impede the advance of the other. We may also add that in certain cases, peculiar circumstances may oblige us to modify the presentations or positions of the fœtus.

ARTICLE I.—PROLAPSUS OF THE UMBILICAL CORD.

The umbilical cord may escape from the uterus before any other part of the fœtus, or after a portion of the latter has engaged in the orifice of the organ. This accident is not very common: for Madame Lachapelle observed it only forty-one times in 15,652 births at La Maternité: in thirty-four cases, the cord was by itself, and in seven cases was accompanied by a limb. No proportion in this respect, can, however, be established, on account of the very great variety which exists.

The unusual length of the cord will undoubtedly contribute to its prolapsus. But this accident may also depend on the copiousness of the liquor amnii, whose gush, in the sudden rupture of the membranes, carries with it a loop of the cord at the moment that it escapes externally. We are, however, of opinion, that it more frequently depends on mal-presentations of the fœtus, as some obliquity of its head,

or of its whole body. It may also be caused by want of energy of the uterine contractions, when they are too feeble to press the head strongly against the opening of the superior strait.

The ancients had already observed the premature escape of the cord. Mauriceau, Amand, Delamotte, etc., considered it as a serious occurrence. It does not render the labour itself more difficult, but it endangers the life of the fœtus, the compression of the cord interrupts the circulation, and the communication with the mother being cut off, the fœtus perishes, either from apoplexy, syncope or asphyxia, for each of these three hypotheses reckons some partisans. The course to be pursued varies according to the period of the labour at which the accident occurs, the part of the fœtus which presents, and the state of the cord itself.

If the whole of the fœtus is still retained in the uterus, the cord must be pushed back above the presenting part. When this part is the head, we pass two fingers between it and the os uteri; then supporting the loop, with the end of the finger, it is gradually made to ascend; the head then escaping, the cord remains in the uterus, and the labour may terminate successfully. To accomplish this, uterine contractions are necessary, for without them, the procidentia generally returns; consequently, the hand is to be kept in the vagina until some pains have advanced the head so far as to render the escape of the cord impossible. This plan is better than placing, according to Mauriceau, a piece of soft linen between the side of the head and the uterus, to stop the place through which the cord descended, close the orifice and prevent a recurrence of the accident. The same precautions must be observed in breech presentations, above which the cord is to be restored and there maintained until the return of the contractions. We believe that there is no necessity of introducing the whole hand into the uterus in order to hook the loop of the cord on one of the limbs of the fœtus as recommended by M. Croff, for version would be infinitely preferable. The various instruments that have been proposed, and which are only imitations of Burton's crutch, of which we shall speak hereafter, also appear useless.

If the fœtus has already engaged in the os uteri, and especially in the cavity of the pelvis, reduction can no longer be thought of. The only thing to be done is to prevent compression of the cord. Various methods have been proposed to fulfil this indication. Osiander and Siebold recommended the application, to the os uteri, of a sponge in one side of which a groove had been made to receive the cord. These practitioners forgot, that the sponge being compressible could neither prevent the contraction of the orifice nor the pressure of the head, and that it merely increased the chances of compression. According to Denman, Mackenzie conceived the idea of drawing out as much of the cord as could be conveniently done, and enclosing the whole mass in a purse of soft leather, closed by a string, to push the whole above the head, and maintain it there until the latter was expelled: but this singular plan, the object of which is incomprehensible when the cord can be thrust and maintained above the head by the hand, did not succeed, even in other cases in which he tried it. The only safe method is to carry the cord toward that part of the circumference of the pelvis where it will be least exposed to compression. This point is generally one of the sacro-iliac symphyses, when not occupied by the forehead or occiput. For example, in a left occipito-acetabular position, it will be proper to carry the cord toward the left sacro-iliac symphysis. Our subsequent conduct must be guided by the condition of the woman. If it be her first child, we cannot trust to nature alone, for the compression of the cord being too great, the fœtus would perish. The forceps must be applied immediately and the labour terminated. We were, one day, called to a woman in labour in whom a loop of the cord presented at the moment of the rupture of the bag of waters, the dilatation being complete. We found that delivery was at hand, but fearing for the child's life, we sent for a pair of forceps; before their arrival, and in less than ten minutes, after two or three pains, the child was expelled, but almost instantly expired, although the cord still pulsated feebly. At another time, we were more fortunate with a woman in her ninth delivery; the child was apparently still-born, but we succeeded in reviving it. The forceps must, therefore, be applied in these cases. If the breech presents, and is not sufficiently advanced, we must bring down the feet. If the fœtus is situated transversely, our only resource is to perform version.

When the cord, having escaped through the external genitals, does not pulsate, and is cold and flaccid, the death of the fœtus being, if not certain, at least extremely probable, the only indications to be fulfilled would be those resulting from the position of the latter.

ARTICLE II.—SHORTNESS AND TWISTING OF THE UMBILICAL CORD.

The absolute or natural shortness of the umbilical cord, of which there exist several well-authenticated examples, when it is very great, must necessarily be an obstacle to parturition. It may expose the mother to accidents, and endanger the life of the fœtus. But, as it cannot possibly be ascertained beforehand, there can be no indications to fulfil.

The same may be said of the relative or accidental shortness of the cord, produced by its twisting around the body of the fœtus. However profound may be the skill of the accoucheur, it is impossible for him, before the head or some other part has escaped through the external organs, to know if this peculiarity exists or not. After the partial expulsion of the fœtus, there are particular indications to be fulfilled.

When the fœtus is expelled with the cord wrapped around its neck, some writers advise us to leave the rest to the efforts of nature; and others, to widen the loop by gentle traction and to slip it over the head. The former of these precepts cannot be followed. For a long time we were of opinion that the twisting of the cord could not endanger the existence of the fœtus, because we had never seen any injurious consequences, though indeed we always endeavoured to remedy it. The following case, however, proved the necessity of action. A woman was in labour with her third child, and the pains succeeded each other rapidly. During our absence a neighbouring physician, not a practitioner of midwifery, was called in, who allowed nature to pursue her own course, although he saw the cord twisted around the child's neck. The labour was over in a few moments; the child was dead, and our utmost efforts were unable to restore it, although we arrived just when it was escaping through the vulva.

If the cord passes but once around the child, we must endeavour to enlarge the loop and slip it from the posterior part of the body to the anterior. If we fail in this, we should not persist in pulling on the cord, for it may be broken, or the placenta or umbilicus lacerated. The best plan is to divide it, bruise its fœtal extremity to prevent hæmorrhage, and terminate the labour as rapidly as possible by intro-

ducing into the vulva, along the back of the fœtus, toward the hollow of the arm corresponding to the concavity of the mother's sacrum, two fingers, which we use in the same manner as a crotchet.

ARTICLE III.—PRESENCE OF SEVERAL FŒTUSES.

The simultaneous presence of several fœtuses in the uterus does not always necessarily require the aid of the accoucheur. Nature sometimes is all-sufficient; but, in the greater number of cases, the interposition of art is indispensable. We shall here merely mention this fact, upon which we will enlarge more fully when treating of anomalies in the product of conception.

ARTICLE IV.—OF THE CASES IN WHICH IT IS NECESSARY TO MODIFY THE PRESENTATIONS OR POSITIONS OF THE FŒTUS.

Sometimes, in labours which appear about to terminate in the most natural manner, the head of the fœtus being perfectly situated and plunged into the cavity of the pelvis, the movements are not properly performed. If, in this case, the woman were left to her own exertions, she would be delivered only with great difficulty, and after the exposure of the internal parts of the pelvis to contusion or laceration.

We have seen that, in the anterior left or right anterior occipito-iliac position, it sometimes happens that the head, having reached the cavity of the pelvis, preserves its diagonal position instead of executing the motion of rotation by virtue of which the occiput is brought toward the symphysis pubis, and that, under certain conditions, it was even seen to be expelled from the external organs in this position. From this circumstance M. Gerdy was induced to make the assertion that the motion of rotation was not indispensable to the termination of labour by the efforts of nature alone. The fact is true: but M. Gerdy has mistaken the exception for the rule. This motion is necessary to the successful termination of labour. Indeed, when the pelvis is large and the parts composing the child's head present but little resistance, it may happen that, in consequence of powerful contractions, the head may pass more or less obliquely through the cavity of the pelvis, by preserving a diagonal position; but this does not always occur, and our aid becomes requisite.

Let us suppose a case in which the head is slowly disengaged in a left occipito-acetabular position, and in which it preserves its diagonal situation as far as the inferior strait; it will be necessary, during the interval of the pains, to introduce two or three fingers of the right hand between it and the corresponding parts of the pelvis, that is, in front of the left sacro-iliac symphysis, and take advantage of the remission of the pains to turn it so that the occiput shall come behind the symphysis pubis; the fingers are maintained in their situation until the recurrence of the pains, and the head sometimes then executes its motion of straightening. We say sometimes, because many things apparently easy of performance in theory are not so in practice. It sometimes happens, especially with a first child, that, after the introduction of the fingers, the head has a tendency to descend, and we are obliged to exert so much force, that the pain experienced by the accoucheur and patient is so severe as to oblige him to let go, so that the head regains the point it occupied previously to the attempt. But we must boldly return to the charge: with time and patience we can succeed in bringing the occiput beneath the symphysis pubis. It is to be remembered that, in the right occipito-acetabular position, we must use the left hand, and cause the head to execute a motion in an inverse direction to the preceding.

It has been advised, when the head presents in one of the two fronto-acetabular positions, and must consequently describe more than a quarter of a circle in order to come under the symphysis, to introduce the hand into the uterus, at the moment of the rupture of the bag of waters, and to endeavour to modify the position of the head by grasping it either with the right hand, if it be in the left fronto-acetabular, or with the left, in the right fronto-acetabular position, and giving it a motion of rotation which brings the occiput from behind forward. This operation looks well on the manikin, but it is not feasible in the female. In fact, in order that neither mother nor child should run any risk, the motion of rotation given to the head must be communicated not only to the cervical column, but likewise to the back of the fœtus, which must turn on its axis: and during this manœuvre the vertebræ may be easily luxated. We believe, therefore, that in these cases, it is better to trust to nature. If, for example, the head engaged in a left fronto-acetabular position, it would be suffered to descend into the cavity of the pelvis; then, if it were thought possible to bring the occiput to the front, we should act in concert with the efforts of the uterus, by placing two or three fingers of the left hand in the concavity of the sacrum, or on a level with the left sacro-iliac symphysis; afterward, as the head engaged, it must be made to execute a motion of rotation from right to left, in order to bring the occiput toward the symphysis, but gradually and slowly, that the trunk may turn likewise. We observe the same course in the right fronto-acetabular position, with the exception of introducing the fingers of the right hand in the concavity of the sacrum, so as to bring the occiput from left to right. But, we repeat, this attempt must be made only when the head has entered the cavity of the pelvis, and even then will fail if there is not a tendency to execute the motion.

Whenever, in presentations of the face or lateral parts of the head, one of the two positions just mentioned is present, the best plan, as we have said, is to permit the head to engage in the same direction. In one case, however, artificial aid may be useful, that is, when the rupture of the bag of waters has taken place after complete dilatation. The hand may be then introduced into the uterus, in order to push back the chin or head. But if the membranes have been prematurely ruptured, this operation must not be performed, as it might cause a laceration of the parietes of the uterus, as we ourselves once saw.

When it is proper to attempt the motion of restitution of the face in the right mento-iliac position, the right hand is to be introduced with the back of it toward the concavity of the sacrum, the fingers are directed between the left side of the fœtus and the corresponding part of the pelvis, the thumb is applied to the right side of the head, which is inclined so as to elevate the chin. This may be done in two ways; if the right hand is introduced, we endeavour to depress the occiput, and then to make it perform a motion of flexion on the chest; the position is thus converted into one of the two right or left occipito-iliac, and the delivery is effected. But the head of the fœtus must be free above the superior strait, for if it is engaged in this strait, it would be impossible to perform the restitution, unless it were very small, in which case it would be useless. If, on the contrary, we wish to act on the chin, we introduce two fingers only of the left hand,

which are applied first to this part, and then to the sides of the nose: a manœuvre very difficult of execution, whatever may be said to the contrary, the parts being so smooth that the motion of flexion cannot always be accomplished; we finish by acting on the forehead, to elevate the face. If this attempt is not successful, we must not persist in it, lest we should do more harm than good.

In the left mento-iliac position, if we wish to act on the occiput, the left hand is to be applied to the right lateral, and the thumb to the left lateral part of the head, which is pushed upward, and made as erect as possible. If, on the contrary, flexion of the chin is intended, it must be performed with the two fingers of the right hand.

In presentations of the lateral parts of the head, it will generally be sufficient to remedy the obliquity of the uterus; if this cannot be effected by giving the woman a proper position, we may introduce the right or left hand, separate the fingers, and take advantage of the interval between the pains to elevate the head and bring it forward; as soon as it has departed from the promontory of the sacrum, the motion of restitution must be performed.

Oblique or inclined presentations of the breech present no particular indications to be fulfilled. If we decide on introducing the hand into the uterus, the feet can be found so readily, that the best plan is to observe the precepts we shall hereafter advance, in the description of version. Oblique or indirect presentations of the knees or feet are the only ones in which any thing need be attempted. Thus one foot is sometimes situated in the pelvic excavation, whilst the other is expelled; the case must then be left to nature, and the first foot is at last also protruded. If a knee presents in this position, we must use our finger in the same manner as a blunt hook.

SECOND DIVISION.

LABOURS ESSENTIALLY ARTIFICIAL, THE MOTHER AND FŒTUS BEING BOTH WELL FORMED.

The labours which we include in this order are those of which we have already spoken under the head of labours accidentally natural, and explained their mechanism when a rather unusual combination of circumstances permits their spontaneous termination. Most frequently, however, the interposition of art is necessary, and version must be performed in these cases, which comprise presentations of the trunk.

We shall, in the first place, describe the indications which may arise from the various presentations of the trunk, and then the operations necessary in these cases, namely, version or turning, and the application of various instruments, particularly of the forceps.

CHAPTER I.

OF THE MANAGEMENT OF PRESENTATIONS OF THE TRUNK.

I. If the anterior plane of the fœtal trunk presents, and the head corresponds to the left iliac fossa, the trunk or torso must be elevated, the hand passed over its left side, the feet seized and brought down, and the labour terminated as in the second position of the feet. If the head corresponds to the right iliac fossa, the right hand must be used, and, when the feet are brought down, the delivery accomplished as in the right occipito-iliac position.

It is customary to refer to this head the very frequent cases in which one or both hands appear at the vulva, without presentation of the lateral plane or of the shoulder. We should be careful not to draw on the hand, for it would only retard the labour, and almost always be injurious. Neither must it be returned. The indication is to ascertain which side of the head presents, and place the fingers so as to prevent the hands from descending further. In order to do this, we must give the latter a direction which allows them to be folded in front of the anterior region of the body of the fœtus; for if they are made to glide in the direction of extension, or of the posterior region of the trunk, we would meet with obstacles, and might even fracture the upper extremity. The head is known by the fontanelle, which is the point corresponding to the hand. Let us suppose that the posterior fontanelle is in front, the accoucheur places his hand between it and the hand of the fœtus, and, during the contraction, supports the latter; the contractions causing the hand to advance, the little hand glides spontaneously over the anterior region, and is placed on the side of the trunk. In the right or left fronto-acetabular position, the fingers are placed behind, and the head brought forward.

It may happen that the whole arm appears at the orifice of the vulva, without there being a presentation of the shoulders: it must then be returned. A woman affected with obliquity of the uterus was in labour with her eighth child: the fœtus presented, the vertex resting on the left iliac fossa, the arm on the left side, and the hand to the vulva. We hesitated as to the propriety of performing version; but, having perceived that the head was in the vicinity of the os uteri, we were anxious to restore the fœtus to a natural position, and we returned the arm, placed the woman on the side opposite to the obliquity of the uterus, and in two hours the head descended in the centre of the strait, and nature unaided terminated the labour. It may perhaps be objected, that it would have been more simple and expeditious to have performed version: that is true; but we do not value time and patience if we are successful; and if we scarcely lose one child in two by this method, we believe it to be a sufficient reason for its adoption.

II. Presentations of the posterior plane of the fœtus being, properly speaking, only variations of those of the lateral planes, they are included in the latter, and present no special indications.

III. In those where the lateral parts of the trunk, whether the side of the neck, flank, or hip, present at the orifice, we must perform turning, and the manœuvre is the same as for the corresponding shoulder.

1st. In the first position of the right shoulder, (see Plate 67,) the head of the fœtus is in contact with the left iliac fossa, the breech corresponds to the right iliac fossa, but is more or less elevated or inclined toward the right side of the woman, and the back is more or less directed forward. In order to reach the feet, the hand must be introduced, supine, between the trunk of the fœtus and the promontory of the sacrum of the mother. We must not, after the manner of the ancients, seize the shoulder and give it a motion of rotation in order

to bring it from left to right and forward. This manœuvre cannot be performed in a woman, especially when the waters have been discharged for some time. Consequently, the trunk is elevated in order to remove it from the os uteri; the back is carried upward and forward, toward the symphysis pubis; the hand is passed beneath the right shoulder, and the right side of the fœtus is followed, in order to seize the feet, which are behind and to the right at the fundus of the organ: they are seized, and, during the absence of the contractions, are made to execute a motion of rotation; it being understood that if any difficulty is experienced in performing this motion, we must endeavour to act externally with the left hand, by thrusting the head as much as possible from below upward and from left to right. The rotation being once effected, and the feet brought into the first position, the labour is terminated as in this position.

2d. In the first position of the left shoulder the general relations of the mother and fœtus are the same: the only difference is in the particular relations. Here, in fact, the head is equally directed toward the left iliac fossa and the pelvis to the right; but the feet, instead of looking toward the posterior part of the uterus, are nearer the anterior. The anterior plane of the fœtus is toward the belly of the mother, and the posterior toward her back. In order to terminate the labour we must introduce the left hand, and version is much more easily performed than in the preceding case, because there is no necessity of giving the trunk a motion of rotation. We follow the left lateral parts to reach the feet, which are grasped and brought to the os uteri, at the same time bearing on the head with the other hand, in order to assist the operation. (See Plate 68.)

3d. In the second position of the right shoulder the general relations of the fœtus with the mother are different. The head rests on the right iliac fossa; the breech is above and to the left; the feet are more or less inclined forward; the shoulders always cut the pelvis transversely; the acromion looks toward the right iliac fossa; the axilla is turned toward the left iliac fossa; the clavicle corresponds to the anterior part of the mother, and the scapula is directed backward. The right hand must be here introduced, supine; the trunk raised; the shoulder removed from the os uteri, and kept above the superior strait by the assistance of the wrist and forearm, and, as it is thrust upward, all the parts of the right side of the trunk must be followed to reach the feet; these must be grasped, brought to the orifice at the same time that the left hand exerts pressure from above downward on the right iliac fossa, and this position converted into the first of the feet.

4th. Lastly, in the second position of the left shoulder the general relations of the child do not differ from those which have just been enumerated; but the dorsal region is directed forward, and the sternal region backward. Turning then presents difficulties which may be compared to those of the first position of the right shoulder. The left hand must be introduced, supine; the left shoulder elevated; the trunk pushed slightly forward, so as to carry the back as far as possible behind the pelvic symphysis; the left side must be followed until the feet are reached, and, when these engage, the version is to be assisted by the other hand on the right iliac fossa of the mother, at the same time that we exert gentle and regular traction in order to bring the feet into the second position. (See Plates 71 and 72.)

It frequently happens in presentations of the shoulders that the arm engages in the orifice, either demi-flexed or wholly extended, so that we can feel, or even see, in the former case, the elbow in the vulva, and in the latter, the hand. This disengagement of the arm occurs almost constantly in positions of the shoulder when left to themselves. The direction of the elbow or hand will indicate to which shoulder it belongs. The elbow is always inclined in an opposite direction to the head of the fœtus, and the forearm occupies likewise the anterior plane of the latter. If the hand is not disturbed, but left to itself, it is not less sure a guide, its back looking toward the internal surface of the mother's left thigh, and its thumb toward the pubes in the first position of the left shoulder; its back toward the right thigh, and its thumb toward the coccyx in the second: whence we may easily infer its situation in the two positions of the right shoulder. In all cases it will be sufficient to bring physically or mentally the palmar face of the hand behind the symphysis pubis, and the direction of the thumb will indicate precisely the arm which presents. If, in this position of the hand, the arm corresponds to the right thigh of the woman, it is the right; if with the left thigh, it is the left arm.

When our art was yet in its infancy, the first idea that suggested itself was to draw on the limb. In this way the shoulder is engaged in the orifice, the head undergoes a strong lateral inflexion, the chest is curved, and the trunk has a tendency to descend. In fact, delivery may take place under these circumstances by an actual spontaneous evolution, in cases of twins or abortions which are not very large, or of half-putrefied fœtuses whose articulations are greatly relaxed. But, when the fœtus is well formed, the only effect of these tractions can be the evulsion of the arm, if they are strong enough, and, in the contrary case, the loss of much valuable time, the uterus contracting on itself, so as to render version impossible and to compromise the life of the fœtus. The following is a case in point. We were one day sent for by a person who, seeing a hand presenting, grasped it and drew it out as far as the forearm: the head, having also engaged in the cavity of the pelvis, could not advance, and the integuments of the cranium became so swollen as to form a groove in which the arm was lodged, being itself tumefied, livid, and exhibiting some phlyctanæ. The woman was in a very dangerous condition; for, from frequent touching, the abdomen had become excessively sensible. We were anxious to apply the forceps, being the proper course in such cases, but the state of the parts forbade it. We prescribed, therefore, blood-letting, and a bath during two or three hours, at the end of which time we intended to return. But the midwife, fearing lest the patient should die during our absence, took her to the hospital, holding her on her knees. During her passage thither she was delivered of a dead child, which would certainly have been born alive if the mistake had not been committed of pulling down the arm. In a similar case we must, therefore, proceed to turn immediately, having previously fastened a fillet on the arm so as to bring it on the side of the trunk when the feet are engaged, and the version effected. (See Plates 69 and 70.)

The ancients, thinking that the expulsion of the arm was an insurmountable obstacle to the termination of labour, and that it should be removed at all hazards, tore it off by pulling on it until the ligaments yielded, or separated it, either by torsion, as recommended by Mauriceau, or by dividing it with cutting pinchers, or other sharp instrument, thus exposing the woman to the danger of being severely wounded. Others advised, as the arm tumefies greatly after being engaged for a long time, the performance of longitudinal incision to effect its disgorgement. These horrible measures have justly received sentence of condemnation. Accoucheurs revolt at the idea of mutilating a living child in the mother's womb, and are aware, that even were the arm attacked with gangrene, amputation could be properly performed after delivery. Nevertheless, some have dared, even in modern times, to reproduce the barbarous scenes which we

read with horror in the works of Mauriceau, Delamotte and others, and but a few years since, in a case of this nature, the tribunal of justice pronounced a severe, but righteous application of the law.

It has also been proposed to return the arm, and Burton, following the idea of Albucasis, invented for this purpose a kind of crutch, with which he intended to act on the axilla between the pains. We believe that this instrument was never used, even by its originator. If the arm has sometimes been successfully returned, it could only take place immediately after the rupture of the bag of waters, and before the uterus, having contracted on itself, embraces closely the whole body of the fœtus. The operation is then useless, because the free state of the fœtus allows us to bring down the feet. It even may give rise to great difficulties, as proved by the following case which we witnessed:—A midwife and several accoucheurs had alternately exerted their skill on a woman in labour, in whom the fœtus presented an arm; this part had been returned, and they had endeavoured to bring down the feet; one had been grasped, and for a long time they had vainly sought the other. We tried likewise: but finding that this foot was applied to the anterior plane of the fœtus and the uterus greatly contracted, we drew moderately on the other; in this manner the breech was made to engage, and we sought the second foot, and then desired one of our colleagues, who had sent for us, to finish the case. He extracted the fœtus readily as far as the axillæ, but could not disengage the arm. Having again undertaken the manœuvre, we ascertained that the arm had been returned, not to the anterior but to the posterior plane of the fœtus, and that, whilst ascending in the pelvis, the upper part of the humerus had been fractured, and that a fragment of the bone, having pierced the muscles and skin, prevented the escape of the limb. We succeeded in overcoming this obstacle; the child was born dead, but the woman recovered.

CHAPTER II.

OF TURNING.

The term *version* or *turning* is generally applied to an operation in which the accoucheur introduces his hand into the uterus, in order to seek the feet of the fœtus and bring them down.

The ancients, who thought that labour could not terminate unless the head of the fœtus presented, had established the principle of sparing no effort to bring this part to the orifice of the uterus in deviated presentations. When they could not succeed, they considered the fœtus as lost, and proceeded to extract it piecemeal. In the age of Augustus, Celsus proposed *version by the head*, such as is now practised: but he advised it only when there was a certainty of the death of the fœtus, so dangerous did he consider it. In fact, this operation, in ancient times, appears to have been rarely performed on the living child: and although Ambrose Paré speaks of it as a method frequently adopted in his day, it acquired no rank in science until the time and by the writings of Guillemeau. From that time, the practice of the ancients had been totally abandoned, when Flamand, in France, and Osiander, in Germany, imitated since by some German, English, and French accoucheurs, endeavoured to bring it into vogue, and gave the advice of seeking the head, without regard to its position in the uterus, saying, that by this plan the woman and child are in less danger, and that, if after having brought the head to the os uteri, nature is incompetent to terminate the labour, the forceps must be applied. This was prescribing a method which might render two operations, instead of one, necessary.

Version by the head, for it is thus called, cannot be performed except in some rare and purely exclusive cases. We do not deny that it is sometimes possible to bring the head to the os uteri; we would even, as we have said above, recommend that it be attempted when the head is near the os uteri, as in deviated positions of the vertex, presentations of the face and ear, if we are called early enough to be able to introduce the hand at the moment of, or immediately after the rupture of the bag of waters; but it would be evidently absurd in presentations of the shoulders, flanks, or lower extremities; and merely creating great difficulty, and diminishing the chances of success of version by the feet. We even go further, and assert that version by the head is physically impossible, when, the liquor amnii having been discharged for some time, the uterus is contracted on itself: the life of the mother or fœtus would inevitably be destroyed. A skilful accoucheur, whose talents we highly respect, endeavoured in a face presentation, to bring the vertex to the os uteri: the membranes had only been ruptured two hours. Notwithstanding his dexterity, he failed; acute contractions supervened, after which the woman lost a considerable quantity of blood. Some hours subsequently, he succeeded in applying the forceps, and extracting a dead child. On examination, we found its vertebræ luxated, and a solution of continuity of the spinal marrow; after the lapse of thirty hours, the mother likewise expired. In the posterior part of her uterus, there was a rupture through which the fist could be easily passed.

Version, properly so called, or the operation by which the feet are brought to the superior strait, from which they were more or less distant, requires the concurrence of certain conditions and the observance of certain rules, some of which are general or applicable to all, and others special or pertinent merely to peculiar ones.

I. *Conditions necessary for Turning.*

The most important point is to determine the proper instant for action; this occurs only when symptoms arise sufficiently serious to endanger the mother and child, or when the latter presents defectively at the os uteri. Malpositions of the fœtus are not always easily ascertained; there is only one period at which no mistake can be committed: that is when, by the touch, we find the orifice sufficiently dilated or the membranes ruptured. But it may happen that, notwithstanding the dilatation, the parts of the fœtus are too distant to be reached by the finger, and oblige us to wait in order to ascertain those which present. Generally speaking, the position of the fœtus can be most readily recognized at the moment of the rupture of the membranes. This moment, whether brought on artificially or naturally, is also the most opportune to effect the delivery. The nearer the period at which we act is to that of the rupture of the bag of waters, the greater will be our chance of success in terminating the labour. This rule, however, admits of numerous exceptions, and it must not be supposed, whenever unpleasant symptoms arise, or we detect a malposition of the fœtus, that art must necessarily interpose and rupture the membranes in order to terminate the labour. If the bag of waters is prematurely ruptured, before dilatation is accomplished, even in

a defective presentation, we must wait until this dilatation is sufficient to allow the passage not only of the hand, but also of the fœtus. The rule can only be strictly observed when the dilatation is complete or nearly so. If we are called only after the rupture of the membranes, and the vain attempts of several persons during eight, ten, twelve, or twenty-four hours to terminate the labour, and when the uterus, contracted on itself, embraces closely the body of the fœtus, a circumstance always unfortunate for the latter and its mother, it would be more than dangerous to act immediately, for the irritable state of the organ alone might give rise to dangerous symptoms. If, therefore, we find the os uteri swollen and painful in consequence of repeated introductions of the hand, we must begin by relieving this part first. If the woman is strong and well formed, we may abstract six or eight ounces of blood. If the loss of blood does not remove the irritation, a bath of three or six hours is prescribed, and then a labour may be terminated which previously was impossible. Sedatives and narcotics, both externally and internally, are sometimes useful.

Therefore, the conditions necessary for turning may be reduced to two:

1. That the os uteri be sufficiently dilated or dilatable, to allow the introduction of the hand, and the free passage of the child.

2. That the presenting part of the fœtus be not engaged too far forward in the excavation, and especially that it should not have escaped through the orifice, because, in that case, it would be impossible to push it back, in order to introduce the hand and bring down the feet.

II. *General rules to be observed in Turning.*

When this operation is decided upon, certain preliminary precautions are necessary, both as regards the woman, her child, and family, and the reputation of the accoucheur himself; for, however skilful he may be, he is by no means always sure of success. Thus, whenever a woman or her infant is in danger, we should take the members of her family aside, and acquaint them with the state of the case, so that we may not be accused of malpractice in the event of an unfortunate termination. Great prudence must be observed in this communication, so as not to excite an alarm which parents and relations can scarcely conceal, and which might react injuriously on the patient. The latter must be kept in absolute ignorance of her situation; for it might happen that she would refuse to consent on being informed of the danger incurred by her child; on the contrary, we should endeavour to inspire her with confidence by a calm and composed demeanour, for she generally tries to read her fate in the countenance of her physician. She is to be placed in a proper position; this position, of no great importance in natural labours, becomes a matter of serious moment here, where, as in all great surgical operations, it must vary with the exigency of the case. The woman is to be placed transversely on a firm bed, without casters, and rather too high than too low, because when the hand is introduced into the uterus, as we are obliged to carry it upward and backward, the arm runs less risk of being compressed or impeded by the symphysis pubis. We must also be careful that the breech is not too deeply buried in the matresses, and to prevent this we generally interpose a board between them. The legs are then flexed on the thighs, and the thighs on the pelvis: the head must also be flexed and supported by an assistant behind, who places her hands beneath the axillæ to prevent the patient from moving; two other assistants are at her sides, and maintain the legs in a demiflexed position. We then proceed to terminate the labour. Formerly accoucheurs laid aside their coat, rolled up their sleeves, and put on an apron. These preliminaries have been abandoned, as tending only to alarm the woman. If, as a measure of cleanliness, we wish to remove our coat, it should be done quietly; but it is better to wear one of which the sleeves, open below, can be turned back without difficulty. The hand is then covered with some unctuous or mucilaginous substance. The fæces and urine should be evacuated as much as possible, by means of enemata and the catheter. We say as much as possible, for the introduction of the catheter is not always easy, especially when the head of the fœtus is in the pelvic excavation; it is sometimes so difficult, even in simple cases of version, to introduce a female sound, that we are obliged to use a curved one.

It is not a matter of indifference which hand is introduced into the uterus, for success frequently depends on the proper selection. We should always use that hand whose palmar surface corresponds to the anterior surface of the child. When we have reached the feet, they must always be brought in the direction of the anterior flexion; for we thus increase the motion of rolling into a ball, (*pelotonnement,*) and version is readily executed. If the feet were brought in the other direction, we should be obliged to change the relations of the diameters of mother and fœtus, and run the risk of rupturing the body of the latter or the uterus. But, before introducing the hand, we must diminish its size as much as possible; this precaution is particularly useful in primiparous women, whose organs have never been distended. The hand is made to assume a cone-like form, by uniting the ends of the fingers so that the thumb and little finger may be opposite to each other. It should be introduced during the pain, because the agony of this deadens, in a great degree, that inseparable from the operation. However skilful we may be, when the hand is once in the vagina, there is an important precaution to observe before introducing it into the uterus, which is to secure firmly the fundus of the latter by the other hand applied to the hypogastrium; from not having observed this, some accoucheurs, in their attempts to overcome the resistance of the posterior cul-de-sac of the vagina, have thrust their hand into the abdominal cavity; the uterus not being fixed, had slipped over the hand, which had lacerated the parietes of the vagina. This precaution has also another advantage: by causing the two hands to act in concert, it is easier to make the parts we wish to grasp approach that which is in the uterus, and prevent the inversion of this organ.

We have said that the child must always be brought in the direction of anterior flexion. This manœuvre is best performed during the absence of the pains; for, if we endeavoured to act whilst they were in force, the uterus, closely embracing the body of the fœtus, would render it difficult and even impossible. When the turning is executed, and the feet have reached the orifice of the uterus, we wait for the pains, to act in concert with them, for if we drew too suddenly on the feet, various accidents might occur; the uterus, being too suddenly emptied, might be attacked with inertia, or if hæmorrhage already existed, it would certainly be increased; the child itself would likewise be in danger, for the body would escape readily through the os uteri, but when this orifice contracted, it would embrace the head, and prevent its expulsion. The tractions on the fœtus should be made not suddenly and by jerks, but slowly, gradually, and in harmony with the contractions of the uterus.

However skilful we may be in performing version by the feet, it always endangers the life of the fœtus. Its death may be produced

by various causes, such as compression of the umbilical cord, or the afflux of blood toward the upper, resulting from compression of the lower parts: it generally arises from imprudent tractions excited on the spinal column, which immoderately extend the spinal marrow.

III. *Rules for the Performance of Turning in each particular case.*

A. *Presentations of the Cephalic Extremity.*

The symptoms which require our interference in a case where the fœtus is properly situated and presents the cephalic extremity, the dilatation of the orifice being complete, may appear before the rupture of the membranes, immediately after, or when more or less time has elapsed since the discharge of the amniotic fluid. In these different cases, the head may be, either above the superior strait, or more or less completely engaged in this strait; or lastly, have reached the pelvic excavation. Moreover, it may descend into this excavation in two ways, either after, or without having escaped through the os uteri, that is, in the latter case, covered by it, which happens when the pelvis of the woman is large, or the fœtus sufficiently small to allow the organ to engage with it. These various circumstances are important in practice, for each one must modify the course to be pursued.

When the head is still movable, is above the superior strait, and the bag of waters is not ruptured, or very recently so, it is easier to terminate the labour, by performing version by the feet than by applying the forceps above the superior strait, the mobility of the head in this situation presenting difficulties which can be overcome only by consummate skill in the use of the instrument. When, on the contrary, the waters have been discharged for a long time, and the uterus has contracted on the body of the fœtus, version is sometimes so difficult that we prefer the use of the forceps. If the head has entered the pelvic excavation, but has not escaped through the os uteri, we may use either indifferently: at the same time, we believe the application of the forceps preferable, because it is easier to seize than to push back the head, which, however, is not absolutely impracticable. Lastly, when the head having entered the excavation, has escaped through the os uteri, it would be impossible to push it back: for the uterus has contracted considerably, and its capacity has diminished in a proportion equal to the size of the part of the fœtus which has been expelled. Ignorance of this important circumstance has caused several practitioners, in endeavouring to bring down the feet, to have ruptured the uterus so much as to permit the head to pass into the superior strait. We have then no resource left but the forceps if the child is living, or the crotchets if dead. It is always better, when possible, to extract the child whole than mutilated; for the signs of death in the mother's womb are not absolutely certain, and it frequently happens, that, when the fœtus is supposed to be dead, by using great caution, it is born alive.

The necessity of performing version being well established, there are certain general rules to be observed, which are not so important when we rupture the membranes ourselves, or arrive immediately after the spontaneous discharge of the liquor amnii, when the uterus has not yet contracted, but which must be scrupulously followed, when the uterus having already contracted, it becomes indispensable to calculate all its movements, in order not to create too many obstacles. The following are some of the indications to be fulfilled, always supposing a difficult case.

1*st. Presentations of the Vertex.*—When the vertex of the fœtus presents, we must first make choice of the hand to be introduced into the uterus. This being introduced, the palm is applied to the head of the child, which is pushed above the superior strait, and kept there by the wrist or inferior extremity of the forearm, in order to prevent it, as the arm enters the uterus, from returning into the pelvic excavation, and coming between the bones of the pelvis and the hand, which would give rise to acute pain in the forearm, and prevent us from proceeding. The hand must always follow that side of the child which is nearest to the posterior wall of the uterus: if it followed the other, it would find the extremities of the limbs collected in a bundle, and it would be difficult to distinguish the limbs from each other: the hands and feet of the fœtus being placed across the back, the hand or the fingers, we might seek further for them, without the least suspicion that they were so near: we might also possibly compress to a dangerous degree the chest, belly or umbilical cord: lastly, if the upper extremities were removed from the axis of the body of the fœtus, they would be unfolded, and if we were to seize the knees or feet whilst executing the motion of rotation, the arms would separate from the anterior part of the trunk by being raised backward, and be exposed to luxation during their expulsion.

After having pushed the head above the superior strait, we generally place a finger on its side corresponding to the posterior part of the mother; we then reach the shoulders; and, in order to avoid their projection, follow the dorsal region of the fœtus, the finger being constantly near the anterior part; we thus successively find the flanks, lateral parietes of the thorax, and hips; the finger is passed into the fold of the groins, and the knees are reached. When the waters have been discharged for a long while, and there is difficulty in finding the feet, tractions on the knees will sometimes bring them down; but it is better to follow the projection of the legs, in order to reach them. To do this, the fingers are extended, the feet maintained in a state of flexion on the legs, and we endeavour to grasp the heels, in order to make the fœtus present as small a size as possible. If both feet can be seized, they are drawn to the os uteri; but if one only can be grasped, it should be, as far as possible, separated from that which corresponds to the posterior part of the mother. If, however, the feet of the fœtus instead of being parallel to each other, are crossed saltier-wise, as sometimes happens, the foot corresponding to the anterior part of the mother, must be first disengaged. This would be particularly the course to pursue, if the waters having been discharged for some time, we should find the operation of version to be easily executed, by means of slight tractions exerted during the intervals of the contractions. If we experience much difficulty, it is better to apply a fillet to the foot which has been disengaged, and cause the other parts to follow the route it traversed; or, in order to spare the mother pain, the hand should follow the inner surface of the disengaged limb, until it reaches the other. The two feet being disengaged, we must proceed as usual.

If the head is in the left occipito-iliac position, we introduce the left hand on the right side of the pelvis, in a state between pronation and supination, by giving it the direction of the right sacro-iliac symphysis, until the palm is applied to the vertex of the fœtal cranium, (see Plate 55,) the fingers to the posterior, and the thumb to the anterior side. Then this hand, acting in concert with the right, which compresses the fundus uterus externally, elevates the head so as to remove it from the superior strait, and at the same time carry it into

the right iliac fossa. This being done, the hand is insinuated between the left side of the head and the posterior part of the uterus, and passed behind the projection of the shoulder along the left side of the fœtus: the breech is reached and turned: we descend along the posterior plane of the lower extremities as far as the feet: these are seized with the index and middle fingers, and a slight motion from right to left will suffice to disengage them. Once disengaged, the fœtus is brought into the second position of the feet, and the labour terminated.

When the head is in the *right occipito-iliac position*, the right hand must be introduced, and in front of the left sacro-iliac symphysis. If the occiput looks directly toward the right iliac fossa, the hand is introduced in a state of supination along the concavity of the sacrum; if it corresponds to the right acetabulum, the hand is introduced in a state between pronation and supination; lastly, if it is turned toward the sacro-iliac symphysis, the hand itself must be in a state of pronation. The head is grasped with the four fingers of this hand; the thumb placed on the opposite side; the palm applied to the vertex, and it is carried as much as possible toward the right iliac fossa by the assistance of the left hand, which, resting on the woman's belly, depresses the fundus of the uterus. This motion being executed, we follow with the four fingers the right side of the head, the projection of the shoulder, the right flank, and we reach the feet, which are brought down to the os uteri. During the absence of the pains the motion of rotation is performed and version accomplished.

2d. *Presentations of the lateral parts of the Head.*—The deviated positions of the vertex, that is, the presentations of its lateral parts, when any obstacle opposes the advance of the fœtus, present merely the indications of which we have spoken in a preceding article. If any dangerous symptoms arise, such as hæmorrhage, convulsions, etc., we must pursue the same course as in the corresponding positions of the vertex. Consequently, if the head is movable above the superior strait, we perform version; if it has entered the pelvic excavation, we prefer the application of the forceps.

In order to turn, in the *right mento-iliac*, as in the left occipito-iliac position, we must introduce the left hand into the uterus, elevate the head, carry it as much as possible into the left iliac fossa, follow the left side of the fœtus, bring down the feet, and terminate the labour as in the second position of the feet. If the head presents in the *left mento-iliac*, we introduce the right hand, push the head toward the right iliac fossa, follow the right side of the fœtus, reach the feet, perform the version, and terminate as in the first position of the feet.

B. *Presentations of the Pelvic Extremity.*

1st. *Presentations of the Feet.*—If, in the majority of presentations of the feet, the labour may be entrusted to the powers of nature alone, there are nevertheless cases in which the interposition of art becomes necessary. For a still stronger reason it is indispensable in case of any accident, such as syncope, convulsions, etc. The following is the course to be pursued under such circumstances. We begin by examining the os uteri, to ascertain if both feet present at once. If but one appears, it is fixed by means of a fillet, the hand is introduced along its inner side, the other is grasped and brought down. (See Plate 59.)

The ancients asserted that tractions on the foot which presented were sufficient to bring down the rest of the body. We are of the same opinion in ordinary cases; but, when there is a disproportion between the cavity of the pelvis and the size of the fœtus, a malposition of the foot, or when the wrong foot has been brought down, rendering the escape of the other difficult, we think it necessary to endeavour to find the latter. Moreover, in all cases it is better to draw on both feet than on one alone.

We place the fingers of the hand introduced into the uterus so that the thumb may rest above the external malleolus of the opposite foot, the middle finger on the external malleolus of the other, and the index between the legs above the internal malleoli; and we take advantage of the interval between two uterine contractions to draw gently on the feet thus united.

When the feet are brought out of the vulva, as they are rendered viscid and slippery by the amniotic fluid, the blood, and sebaceous matter which covers them, and would, therefore, easily escape from the hand, they must be enveloped in a piece of dry linen or a dry napkin. Then we take one in each hand, and exert gentle tractions on the parts during the uterine contractions. We must, however, be careful to maintain the feet in the position that has been given to them, that is, with the feet directed toward one of the acetabula of the mother, and the toes toward the symphysis pubis. The articulations must also be cared for, and we must endeavour not to permit the tractions to bear constantly on the same parts, lest they should be luxated. Consequently, as we advance, the hand is carried upward, the thumb placed on the posterior part of the leg, then in the hollow of the ham, and we draw until the hip presents at the superior strait. The trunk is then made to engage in the direction of the oblique diameter, and the breech is brought to the bottom of the cavity of the pelvis. When they appear at the vulva, we pass the hands along the thighs and communicate to the limbs an oscillatory movement from above downward and from side to side, the effect of which is to bring one of the hips in front of the sacro-iliac symphysis, and thus assist their engagement and passage through the pelvis. When these parts are once out of the vulva, the trunk remains to be considered. We place the palmar surface of the hand in front of the thigh, so that the radial edge of the index finger shall correspond to the horizontal ramus of the pubes of the fœtus, and we cross the two thumbs on the sacrum. This precaution is necessary; for, if the hand was applied flat upon the belly, we should compress the abdominal viscera, especially the liver, which is very large and friable, and more or less serious hæmorrhage might supervene. Moreover, even if this compression did not lacerate the liver, it might arrest the circulation of the blood, either in the umbilical vein or in the cord.

Having thus grasped the hips, we draw gently on the fœtal trunk, directing successively and alternately, by a motion of elevation and depression, one of them toward the left groin of the mother, and the other toward the posterior part of her right thigh, until the umbilicus reaches the external genitals. We then support and elevate the trunk with the right hand resting on the side of the fœtus, whilst the index and medius of the other hand seize the cord near its umbilical insertion, draw it out, and form a loop large enough to prevent its undue extension or laceration during the disengagement of the rest of the trunk.

The cord is sometimes between the legs of the fœtus; were we to then draw on it, it would infallibly be ruptured. In this case the trunk is to be supported by the left hand, and not the right: one or two fingers of the right are placed along the sacral region of the fœtus,

the cord is seized, and a loop formed of it: then in order to disengage it from the foot which corresponds to the posterior part of the mother's body, the leg is flexed on the thigh, and the foot on the leg, and the limb is passed through the loop. This being disengaged, it is pushed backward to a level with the sacro-iliac symphysis, in front of the sacro-sciatic ligament; being there in contact only with soft parts, it cannot undergo the same compression as against the pubes: the disengagement of the foot corresponding to the posterior part of the mother, is recommended in order to obtain this advantage.

Having observed all these precautions, we continue to act in concert with the uterine contractions, by giving the body of the fœtus an oscillatory motion, and the shoulders are brought to the superior strait. They engage in the oblique diameter, through which the hips have passed. We proceed in the same manner until they have descended to the bottom of the pelvic excavation. There the trunk undergoes a motion of rotation, which carries the right shoulder into the cavity of the sacrum, whilst the other is brought behind the symphysis pubis.

What now remains to be done? Must we continue to draw on the child, or disengage the arm? Practitioners are divided on this head. Those opposed to disengagement, assert that when the arms are left raised on the sides of the fœtal head, they serve as a guide to this part, and protect it from the sudden contractions of the os uteri, which occur only too frequently in deliveries by the feet. We are not of this opinion. The arms extended along the neck of the child protect it indeed from the action of the uterus, but they oppose the disengagement of the head, especially when there is want of harmony between the dimensions of the pelvis and the size of the head. We, therefore, think it better to disengage the arms.

We must always begin with that arm which corresponds to the sacrum of the mother. We place the hand flat on the right side of the fœtus, whose trunk is to be elevated, by inclining it toward the right iliac fossa and disposing the legs to the right and left of the forearm, lest it should escape: we then glide one or two fingers of the other hand, on the right side of the vertebral column, as far as the upper part of the shoulder, the two first phalanges are to be curved so as to act like a hook, and draw this shoulder directly downward, by placing the end of the finger in the axilla, its palmar surface directed toward the inner part of the arm, along which they are made to slide as far as the bend of the elbow. The arm being thus brought down on the right side of the trunk, we perform the same operation on the other, but with the right hand, by inclining, in this case, the body toward the left iliac fossa, and gliding the two fingers of the left hand behind the horizontal ramus of the pubes.

When the arms are expelled, we must proceed to the extraction of the head. This is the most critical stage of labour, for the child may perish, either from regurgitation of blood to the upper parts, or from the compression of the cord. These two causes, however, produce death far less frequently than the extension of the spinal marrow, in consequence of imprudent tractions, which may likewise luxate the vertebræ, and even separate the trunk from the head. In order to avoid these accidents, we must, with the hand and forearm passed between the legs of the fœtus, support its trunk, which is to be elevated toward the belly of the mother: we then introduce two or three fingers, and sometimes the whole hand, into the uterus, to the level of the superior strait, in order to ascertain whether the fœtus preserves its proper relations, that is whether the face corresponds to the right sacro-iliac symphysis, and the occiput to the left acetabulum. If the head is well placed we introduce a finger into the mouth, not to use it as a hook, for we might fracture the jaw, but to keep the chin close to the upper part of the chest, and prevent the motion of flexion which the head might execute. Some accoucheurs have advised the fingers to be placed on the sides of the nose, or even on the orbits, in order, as they say, to prevent luxation of the jaw: but the direction of the rami of this bone in the new-born child, renders this luxation impossible. Moreover, the lateral parts of the nose present an inclined plane, polished and made more smooth by the mucous discharge, so that the finger rests on it with difficulty; moreover, it is not easy to reach this point, much less the eyes, and we must sometimes consider ourselves happy in reaching the chin, which is to be hooked with the finger, in order to keep it in contact with the chest. If the neck of the fœtus is closely embraced by the os uteri, we must, according to the advice of Viardet, introduce the hand flat between the head and the sacro-iliac symphysis, grasp the face with the whole hand, and draw it towards us, by giving it a motion from left to right, in order to bring it in the cavity of the sacrum. By interposing the hand between the face and the os uteri, we overcome the resistance of the latter, render it permeable, and form a sort of inclined plane over which the neck is forced to glide.

As soon as we are quite certain that the direction of the head has not changed, we must apply two fingers of the left hand, the index and ring finger, like hooks, to the shoulders of the fœtus, whilst the middle finger, extended behind the symphysis pubis, prevents the occiput from inclining backward. The woman is desired to bear down her pains, and, whilst we draw on the shoulders and chin, we invert the trunk of the fœtus on the abdomen of the mother, so as to cause the occipital region to roll behind the symphysis. Then the face, forehead, and all the parts constituting the vertex traverse successively the sacro-perineal curve, and escape from the vulva. If the forehead is arrested, which generally happens in primiparous women, the life of the fœtus would be endangered by inconsiderate tractions on its body. As there is nothing to fear, since we can penetrate into the mouth, we wait for a few minutes, in order that the resistance of the soft parts may gradually yield. The escape of the head might be hastened by placing the right hand transversely across the perineum, and exerting strong pressure with its ulnar margin, in the direction of the antero-posterior diameter between the sacrum and vulva.

When, in the third position of the feet, in which the heels correspond to the symphysis pubis and the toes to the promontory of the sacrum, the labour is left to nature alone, this position is generally converted into the first or second. If we are called in the commencement of labour, we must follow the course indicated for the two latter. After having seized the feet, we bring them out of the vulva, and give them a motion of rotation which tends to carry one of them toward the posterior part of the mother, and the other toward the symphysis pubis. If, for example, we wished to bring the feet in the first position, we would carry the right thigh in front of the left sacro-iliac symphysis, behind the right acetabulum, and then terminate the labour as in the first position.

We might be called, however, only when the trunk of the fœtus was more or less engaged in the pelvic excavation, and when the breech was already expelled from the external genitals. In this case, it would still be possible to convert the third position into the first or second. One circumstance alone should induce us not to perform the change; namely, the existence in the woman of a contraction in the

antero-posterior diameter of the superior strait, a contraction which may be easily recognized, either by the arching of the posterior part of the loins or the flattening of the symphysis pubis. It would then be proper to allow the child to engage in a direct position, because the transverse diameter being larger than the others, the labour could be more easily terminated; only, after having disengaged the arm, it would be necessary to make the head follow the same motion. If we drew directly on the feet, the face being in front of the promontory of the sacrum, and the occiput more or less behind the symphysis, the forehead would soon meet the promontory of the sacrum, the head would become straight, the occiput would be behind the symphysis, and the head, presenting its occipito-frontal diameter to the antero-posterior diameter of the pelvis, which is contracted, would be impacted in this situation, and if we were to draw directly upon it, the head might be separated from the trunk. It is therefore necessary to introduce a hand into the cavity of the pelvis, grasp the face of the fœtus, and give it a motion of deviation, in order to bring it toward the right lateral part of the pelvis, and allow it to descend into the cavity. But we should scrupulously avoid imitating the example of the ancients and of some moderns, who, in order to bring the head which was retained at the superior strait towards one of the sides of the pelvis, are satisfied with turning the trunk and back of the fœtus toward one of the angles of the pubes. It frequently happens, in this improper manœuvre, that the head does not follow the motion of the trunk, and the neck is twisted. This accident is avoided by acting directly on the head; and if all our exertions fail, we must apply the forceps. The face being once brought to the side of the pelvis, is made to descend into the pelvic excavation, and, without moving the hands, it is brought into the cavity of the sacrum, and the labour terminated as we previously described.

In the fourth position of the feet, which is the most rare and difficult, and in which the heels of the fœtus look toward the sacrum of the mother, our conduct must vary according to the stage of labour.

In the beginning, when the membranes are just ruptured, and the feet are scarcely engaged, we endeavour to convert this position into the first or second, according to the apparent tendency of nature. The hand is introduced in a state of supination into the uterus and the feet seized; then, exerting slight tractions, so as to give to the trunk a motion of rotation which brings it forward in the direction of adduction, the foot is carried backward by causing it to describe a slight curve from left to right, whilst an analogous but opposite motion is communicated to the other foot. When the hips have once reached this diagonal position, the conversion of the fourth position into the first is completed, and the labour is terminated as in the latter case.

If we are called when the breech has already engaged in the pelvic excavation, or even in the inferior strait, some writers advise the introduction of either of the hands in a state of supination, into the uterus, accordingly as we propose to reduce the position into the first or second, cause it to follow the convexity of the sacrum of the fœtus, which is lodged in the concavity of that of the mother, then to direct the limbs backward, by forcibly depressing the perineum; to carry two or three fingers below the symphysis pubis, and in front of the belly of the fœtus; then, during the interval of the pains, to push the latter upward, in order to disengage it somewhat from the pelvic excavation; to recommence the manœuvre five or six times, until we have given a motion of rotation to the body; and, when the position is once converted in this manner into the first or second, to terminate the labour. This precept can be followed on the manikin; but to the living being, it is entirely inapplicable. We might conceive that the above manœuvre could be executed immediately after the rupture of the membranes, and if the uterus did not embrace the child too closely; but it would then be superfluous, for the conversion would take place if we acted on the feet alone. This manœuvre, moreover, would give the mother great pain, excite uterine contractions, and produce compression of the cord. We think it preferable to grasp the thighs of the fœtus as high up as possible, and communicate to it a motion of rotation, as if we were acting on the feet alone.

Lastly, what is to be done, if nature has expelled the trunk, or if unskilful persons, instead of converting the position into the first or second, have drawn on the feet, so as to disengage the arm, and leave the head in the interior of the uterus? The greater part of the ancients supposed that the difficulty experienced in that case, by the head in executing its motion of rotation, was the effect of the chin being hooked under the symphysis pubis. But a mere inspection of the arrangement of the organs and the conformation of the head, will prove this occurrence to be impossible. In fact, the abdominal parietes of the mother are so thick as not to allow the chin to become hooked, and moreover, the bladder is interposed between the pubes and the parts of the fœtus. Nevertheless, it is certain that if we draw directly on the head of the latter, when it is engaged in the pelvic excavation, as we have first stated, the neck may be broken. We must therefore act directly on the head, so as to bring it into a transverse position. One of the hands is introduced in a state of supination between the fœtus and the concavity of the mother's sacrum, the three last fingers are placed on the side of the trunk, and the thumb on the opposite part; a motion of rotation is then given to the head, which brings it toward the sacro-iliac symphysis, or rather in the transverse position. We must act in concert with the uterine contractions, in order to make the face descend into the pelvic excavation; extending the finger along it, we give it a motion of rotation, and when it has once reached the cavity of the sacrum, we pursue the course prescribed for the second position of the feet. If we experience too much difficulty in performing this manœuvre, we must have recourse to the forceps, which, however, are by no means always indispensable.

2d. *Presentations of the Knees.*—We have previously seen that presentations of the knees are as natural as the others, although very rare. It might happen that the labour could not terminate, because one of these parts became propped against the circumference of the pelvis. When we are required to relieve this accident, our conduct must vary according to circumstances. If the advance of the fœtus is prevented by one of the knees being fixed against the circumference of the pelvis, it will be sufficient to apply a finger to this part, seize it, and bring it near to the other, and the labour will terminate spontaneously. If the labour progresses too slowly, the finger is passed under the fold of the ham, to act as a hook, and the feet being disengaged, the labour is terminated as in the corresponding position of the feet; likewise if, the knees being movable and placed below the superior strait, any accident should endanger the mother's life, we must bring down the feet; but this manœuvre is useless, if the feet are already engaged in the pelvic excavation, and can only increase the woman's distress; we must then draw directly on the knees, with the fingers curved in the shape of a hook. It would be improper in this case to pass a fillet or blunt hook between the knees. If the breech is closely applied to the feet, and prevents the descent of the knees, we must bring down the feet. Let us suppose a first or tibio-acetabular position; we introduce the right hand into the uterus, push the knee toward the left iliac fossa, carry the fingers over the external surface of the leg, and terminate as in the first position of the feet. In the second position we follow the same

course, using the left hand. In a third or fourth position, we may use either hand; only, if the feet are behind the symphysis pubis, as in the third position, we must introduce the hand in a state of pronation behind the symphysis, hook the feet after having pushed aside the knees, and terminate as in the first or second position of the knees. In the fourth position, the hand must be introduced in a state of supination.

3d. *Presentations of the Breech.*—As in the majority of these presentations, the labour terminates by the efforts of nature alone, the interposition of art is generally necessary only when accidents occur. Nevertheless, the presentation of the breech being less natural than that of the head, delivery may be rendered impossible, either on account of the size of the breech, or because it is less solid than the cranium, and for that reason engages less readily. Lastly, certain positions of the breech almost always require the assistance of art; such as the fourth, in which the sacrum of the fœtus is in contact with that of the mother.

Our conduct must also vary according to the stage of labour. Let us suppose that the breech has escaped through the os uteri, and has engaged in the pelvic excavation: the indications to be fulfilled are certainly no longer the same as at the commencement. The breech having descended into the pelvis, must not be pushed back, in order to bring down the feet, for the operation would be excessively difficult, and even if we were to succeed, the fœtus, and especially the mother, would be in great danger, on account of the lacerations which would certainly take place in the uterus. We must act directly on the breech. If it has descended far enough, we introduce one or two fingers into the fold of the groin, which is the part nearest to the posterior region of the mother, and during the uterine contractions, we exert traction, in order to oblige the breech to escape outwardly. If it were possible, we should leave the fingers thus applied, until not only the breech, but the feet likewise were disengaged: the latter being once free, the case would be converted into the corresponding one of the feet. Sometimes the fold of the groin cannot be reached with the end of the finger. Some writers recommend a fillet to be passed around the knees. This advice is absurd, for the fillet could be applied only by the aid of a blunt hook, which of itself would be sufficient.

At the commencement of labour, before the rupture of the bag of waters, if the breech presents in the first position, that is, with the sacrum of the fœtus in relation with any point whatever of the left half of the circumference of the pelvis, the left hand must be introduced in a state between pronation and supination, in the direction of the axis of the superior strait, passing in front of the right sacro-iliac symphysis: there the palm of the hand is applied to the breech of the fœtus, which is pushed upward toward the left iliac fossa, and the feet, which are generally not very deeply seated, are brought down to the vulva, and the delivery accomplished as in the first position of the feet. If one foot only is brought down, and the child is not very large, by exerting moderate traction on this foot, the other may be expelled. Should we, however, experience the slightest difficulty, it is best to bring down the second.

When the breech presents in the second position, the mode of proceeding is the same, with this difference, that instead of the right hand, we introduce the left into the uterus, on the left side of the pelvis, passing in front of the left sacro-iliac symphysis: we draw on the posterior and left part of the child, push up the breech with the palm of the hand on the right iliac fossa, and follow the lower extremities until we reach the feet: we grasp these and bring them to the vulva, and when they are once expelled from the external organs of generation, we proceed as in the second position of the feet. It must be borne in mind that if we bring down only one foot, we must proceed to find the other, as mentioned in the preceding paragraph.

In the third position of the feet, either hand may be used, but if we employ the left, the feet must always be brought into the first position, and into the second, if we use the right. Supposing, for example, that we employ the right hand, it is introduced in a state of supination in front of the promontory of the sacrum, the breech is pushed upward, and at the same time we endeavour to give a motion of rotation to the trunk, in order to cause it to incline toward the anterior part of the uterus: the feet are disengaged, brought out externally, and the labour terminated as in the first position of the feet.

In the fourth position, which is more rare, we may also use indifferently, either hand. If it be the left, we direct it along the lateral parts of the mother, grasp the breech of the fœtus, push it upward, communicate to the body a motion of rotation which brings the sacrum to a level with the sacro-iliac symphysis of the mother, in order to make it follow the right external lateral part of the uterus, the feet are brought down to the orifice, and the delivery accomplished as in the first position of the feet. We must not, however, forget, that this fourth position is one of the most difficult and dangerous. We had under our care a woman in whom the fœtus presented in this way: very dangerous symptoms arose, sloughs of more than six inches in extent were separated, and for a long time, we feared the establishment of a vesico-vaginal fistula; not only the perineum, but likewise the rectum was lacerated.

CHAPTER III.

OF THE INSTRUMENTS USED IN ARTIFICIAL DELIVERY.

The hand alone will not always suffice to terminate the labour in those cases in which it cannot, unaided, effect the expulsion of the fœtus. We are then obliged to have recourse to instruments, which vary according to circumstances.

No surgical operation, perhaps, has given rise to the invention of more instruments, many of them whimsical and deadly, than that under consideration. As science, however, has approached perfection, these instruments, invented in times of ignorance, have been abandoned, and those only preserved whose utility was evident.

The instruments now in use may be referred to three principal classes, according to their mode of action. 1st, Those which are applied to the fœtus, without injury to any of its parts, viz. the fillet, blunt hook, lever and forceps. 2d, Those which are also applied to the fœtus, but which can act only by injuring or dividing more or less its parts, as sharp hooks, and perforators. 3d, Lastly, those which act on the parts of the mother, and to which we sometimes have recourse in the various operations performed on the latter to render delivery possible.

We shall now treat only of those belonging to the first class. Those of the second and third will be subsequently noticed in the description of the operation requiring their use.

ARTICLE I.—OF THE FILLET.

This is the most simple of all the instruments employed in midwifery. It may even be said to be the least necessary; for, in the majority of cases, we are persuaded that it might be dispensed with without the slightest inconvenience. Cases, nevertheless, occur, in which, without being indispensable, they may be useful and facilitate the delivery.

Fillets are made of ribbons of worsted, silk, cotton, or thread, and are about a yard in length and an inch or two in width. We prefer them of worsted, because they are more elastic, and, when saturated with moisture, stick closer to the parts of the fœtus to which they are applied.

In using the fillet the two ends are held in one hand; the other hand is placed in the loop formed by the middle of the ribbon; then, closing the index and middle finger and the thumb of this hand, the loop is turned so as to form a slip knot; the hand, armed with this knot, is then introduced into the genital organs; the limb of the fœtus which we wish to draw down is grasped, and the knot passed over it by flexing the fingers on each other; when it is applied, we draw on the two ends held in the other hand in order to tighten the knot.

An instrument, called a porte-fillet, has been devised, to introduce the fillet to a great depth in the mother's organs, but it can be readily supplied by a simple rod or stick. Moreover, when the introduction of the lever is difficult, we think that there is no use in attempting it, for the ribbon then serves no longer as a simple retentive means, but is intended to exert traction on the limb to which it is applied: therefore, these tractions may luxate the articulations, lacerate the ligaments, and even fracture the bones of the fœtus.

The fillet is used in presentations of the feet, when one foot only has been brought down, and we are endeavouring to bring down the other; but practice will enable us to dispense with it. It is particularly serviceable when the arm is expelled, in order to fix the limb and prevent it from being propped against the circumference of the pelvis, at the moment of the escape of the trunk of the fœtus. This is actually the only case in which the fillet ought to be employed. Many accoucheurs recommend it in presentations of the knees; but the finger, curved like a hook, is then all-sufficient. The same may be said of breech presentations. As it is impossible to introduce a fillet into the fold of the groin, the finger suffices, and is even preferable; moreover, the blunt hook or handle of the forceps would be better than the fillet, if we cannot accomplish our object with the finger alone. Lastly, some empirics have advised the use of the fillet to extract the shoulders of the fœtus when the head has been expelled. We should never have believed that such a method had been proposed, had we not heard Dubois the elder state that he had been called to a woman, in whom the head, having escaped from the vulva for some time, his ignorant predecessor had conceived the absurb idea of surrounding the neck of the fœtus with a fillet, in order to draw upon it.

In short, we think that the employment of the fillet can be advantageous only in two cases, namely, when, in presentations of the feet, we wish to bring down the second foot, and in presentations of the arm: and even here it is not indispensable.

ARTICLE II.—OF THE BLUNT HOOK.

The blunt hook is merely a metallic rod, curved at one extremity, which is rounded. This instrument has been used under the same circumstances as the fillet, particularly in presentations of the pelvic extremity, and of the knees and breech. Some practitioners have thought that, when the knees have descended too far, and it was impossible to bring down the feet, that the hook should be applied to the fold of the ham. But as the finger is then sufficient, we think it useless to have recourse to this instrument. We restrict its application to the two following cases alone: that of presentations of the breech, in which this part, being disengaged, is not sufficiently so to allow our bringing down the feet by means of the finger curved like a hook, or when the fœtus is so large that, although the fold of the groin can be reached by the finger, it would be impossible to exert sufficient traction on it. Lastly, the hook may be useful if, the head of the fœtus being expelled from the external parts of generation, the size of the thorax prevents the escape of this part of the body: if the finger cannot reach the fold of the axilla, it would be proper to pass a blunt hook into the axilla corresponding to the shoulder which is nearest to the mother's sacrum, in order to cause this shoulder to engage. The blunt might also, perhaps, be preferable to the sharp hook when it is necessary to mutilate the fœtus; but this is an exclusive case.

The best manner of applying this instrument is to introduce it in the manner we shall recommend for one branch of the forceps, and cause it to pass, with its point toward the palmar surface of the hand by which it is guided, until it has reached the part of the fœtus we wish to seize; we then give it, in the direction of its axis, a motion of rotation which brings its free extremity into the fold of the groin or ham that we wish to draw down. In acting on the groin, we must be careful not to injure the genital organs.

ARTICLE III.—OF THE LEVER.

The subject of the discovery of the lever excited much attention, and gave rise to many learned discussions toward the close of the last century. Some thought that the idea was taken from the scoop mentioned by Celsus as being used in his time for the extraction of calculi from the bladder. Others ascribe to it a more recent origin, and attribute it to Mauriceau, who in fact employed, undoubtedly after the example of Ambrose Paré, a sort of blunt hook, somewhat resembling the scoop of the lithotomist, to extract the head after the decollation of the fœtus. The credit of its invention is by some ascribed to the brothers Chamberlain, who are generally considered as the inventors of the forceps.

Be this as it may, the lever first became celebrated in Holland, and if its early history is wrapped in so much obscurity, it must be referred to the mercantile genius, all powerful with the men of that nation, even with those who devoted themselves to the most liberal professions. It appears that the whole or a part of the secret of the Chamberlains was acquired by Roohuysen, Velsen, and Bockelmann, and that the secret then passed into the hands of Bruyn, at whose death it was bought by Vischer and Van de Poll, who made it public. The instrument, however, which had made so much noise whilst shrouded in mystery, appeared very defective when brought to light.

It was a steel blade, ten inches long, and ten wide, the middle part of which, for an extent of three inches, was straight, and was slightly curved at each end, so that it closely resembled the yoke which, in some countries, is used for oxen. In order to render it less slippery, its concavities were protected by a coat of diapalma,* over which was sewn a covering of thin and very soft dogskin.

As soon as the lever became public, every one endeavoured to improve it. Plaatmann, Boom, Titsingh, Moraud, Bruns, Fleurant, Peau, Rechberger, Goubelly, Baudelocque, Van Wy, Herbinieux, Dease, Sims, Lowder, Aitken, Hark, Zeller, Trye, Dennison, Loeffler, Siebold, Maygrier, Pole, etc., have more or less modified it, sometimes by changing the shape and substance of the end which serves as a handle, either by giving it a greater curve, elongating it, making a fenestrum in it, or enabling it to vary its curve by means of a screw. In modern times it is merely one of the branches of the ordinary forceps, much extended, without any depression, slightly curved, having a large fenestrum, and an ebony handle, in the middle of which a hinge is sometimes placed, so that it may be bent, and thereby made more portable. The lever now in use does not resemble in the slightest degree that of Roonhuysen.

The inventors, or at least the first advocates of the lever, asserted that it was intended to be applied to the occiput of the fœtus in cases of locked head. Their motto was *Potentia agit in os occipitis.* They introduced it toward the sacrum of the mother, sufficiently far to allow its curve to embrace the forehead of the fœtus, then applied it to the occiput behind the pubes, passing it by that side of the pelvis which presented the least difficulty. Now, this manœuvre would be possible only in the bi-parietal locking, the sole case which would permit an instrument to pass between the occiput and the circumference of the pelvis. It is, therefore, notwithstanding the assertions of authors, that the lever was originally employed only when the head, having descended into the cavity of the pelvis, could not overcome the resistance of the external parts, and it was then used either to make it perform a motion of rotation, or to bring the occiput under the symphysis, or it was applied when, the woman's strength being exhausted, the uterine contractions had ceased. At all events, what was then called locked head, could not be the accident now known by that name; it was a simple detention of the head in its progress; otherwise, considering the rarity of true locked head, Bruyn could not have unlocked eight hundred heads in the space of forty-two years, as he asserts he did.

The advocates of the lever soon discovered that in order to render this instrument applicable to all, its mode of application would have to be modified. Camper advised it to be passed along the forehead, temple or occiput, as far as the inferior angle of the jaw, that the external extremity of the spatula should then be elevated, that we should bear on its middle, and at the same time draw the head toward us. But this proceeding would not be in accordance with nature; for if the head had not yet descended into the pelvic excavation, and especially if it were arrested at the superior strait, it might be turned aside from the route it ought to follow. This manœuvre would be possible, only when the head, having escaped from the superior strait, is arrested by the resistance of the perineum: it might then assist its motion of extension. Others, as Titsingh and Herbinieux, advised the application of the lever to the mastoid process. By following this advice, the most we could do would be to cause the head to deviate and be inclined to the opposite side, which would, by no means, be of any advantage.

In short, but little importance is now attached to the lever, and it might be stricken from the catalogue without the slightest inconvenience. It may, perhaps, be of some use, when the head, having entered the excavation, deviates and cannot execute its motion of rotation; applied to one side of it, it may sometimes serve better than the fingers in bringing the occiput under the symphysis pubis. Likewise, in presentations of the face, if, in the commencement of labour, we desired to straighten the head, tractions on the occiput by means of the lever, at the same time that the chin was pushed up by the hand, might be successful in some cases. In all these cases, however, one of the branches of the forceps is sufficient, without any necessity of having recourse to a special or particular instrument.

ARTICLE IV.—OF THE FORCEPS.

The origin of the forceps appears to have been somewhat posterior to that of the lever, and was probably suggested by this latter instrument. Its invention is generally ascribed to the family of the Chamberlains, from whom it passed into the hands of Palfyn or Ledoux. This historical point will never be settled, on account of the obscurity with which private interest has designedly shrouded it. The only certain point is, that the instrument, known as the *hands* of Palfyn, notwithstanding the slight resemblance it bears to that now in use, was, as it were, the first of a family, perfected since by a series of successive modifications, of which the principal were introduced by Smellie and Levret. In fact, few instruments have undergone more changes than the forceps, for which the name of *cephalo ductor* has been proposed, for about one hundred species of it may be counted, among which we shall quote, in order of precedence, those of Dusee, Giffard, Chapman, Mesnard, Boehmer, Schlichsing, Rathlaw, Levret, Peter de Wind, Burton, Smellie, Bing, Pugh, Johnson, Fried, Petite, Leake, Van de Laar, Peau and Baudelocque, Orme, Lowder, Heurs, Aitken, Young, Evans, Mayer, Starke, Contouly, Forster, Boer, Osborn, Denman, Mulder, Santarelli, Saxtorf, Weisse, Wrisberg, Osiander, Eckard, Siebold, Brunninghausen, Thenance, Froriep, Uhlhoff, Ritgen, Davis, Guillou, Horn, Olmes, Haighton, Dubois, Flamant, Radfort, Mende, Meyrieu, Audibert, Colombat, Prout, etc. As the limits of the present work do not allow us to examine all those modifications, we refer those who are curious in this matter to the work of Mulder,† in which they will find a detailed account of each.

I. *Description of the Forceps.*

The forceps now in use, considered in a general manner, are large two-branched pincers, in which we distinguish the jaws, the hinge or junction, and the handles. The jaws are a kind of spoon, pierced by a long and wide fenestrum, doubly curved, that is, in the direction

* Diapalma. Emplastrum Phœnicium, composed of equal parts of litharge, olive oil, water, axunge, a certain quantity of sulphate of zinc, dissolved in water and white wax. Transl.

† *Historia Literaria Forcipum et Vectium Obstetricorum.* Leyden, 1794. Reip. *Recherches Histor. sur le Forceps.* Strasbourg, 1806. Rist, *Essai Hist. et Erit. sur le Forceps.* Strasbourg, 1818.

of their longitudinal and of their transverse axis. The junction is effected by means of two depressions extending half way through each branch, at the base of the longitudinal curvature of the jaws; a movable pivot is in one of these depressions, and an opening destined to receive this pivot in the other, by which means the blades are firmly united. We give the name of *male branch* or *blade* to that in which the pivot is fixed, and *female branch* or *blade* to that which receives it. The handles describe a curve near the junction of the blades, so as to allow them to be grasped more firmly when the instrument is closed, and their extremities are curved outwardly, in the direction of the greatest separation of the jaws.

As regards our own particular forceps, we do not pretend to present it as new; we have merely endeavoured to unite in it all the real advantages of those which have preceded it. It is a modification of that of Levret, elongated by Peau. It is sixteen inches and six lines in length. The blades are oval inferiorly; they are seven and a half lines in width, and three in thickness. When closed, their thickness at the pivot is seven lines. The distance from the pivot to the ends of the blades is nine inches and three lines. The separation, at the centre of the blades, is nineteen lines above and twenty-one below. Near the point of junction the blades are more contracted than in other forceps, an arrangement which prevents laceration of the vulva, and does not allow this part to be distended except by the fœtal head, when this is about escaping externally. The blades are four inches and nine lines in length and five in width; only one line in thickness at their inner margin; the fenestra are two lines in thickness at their external margin, thus permitting the parietal protuberances to lodge in them without any sensible increase of the bi-parietal diameter of the head. The handles are curved in a crotchet-like shape. That of the male blade terminates in an olive-shaped end, forming a blunt hook, and which, being unscrewed, exposes a sharp hook which it encloses. That of the female blade represents an angular crotchet, forming a sheath on the back, concealing a perforator. (See Plate 80, figs. 1 and 2.) A key (fig. 3) serves to fasten the pivot and unscrew the crotchets.

II. *Parts of the Fœtus to which the Forceps should be applied.*

The forceps should never be applied to any part but the head. Smellie, influenced by a case related by Pudecomb, and some subsequent authors likewise, have advised their application to the pelvis; but far from presenting any advantages, this plan would, on the contrary, be productive only of injury; for the presence of the blades would rarely fail to crush or at least to disarticulate the bones of the pelvis, the greater portion of which is cartilaginous in the new-born child. Even supposing that their action did not dislocate the pelvis, it would endanger the existence of the fœtus, by producing contusions, either of the spine or umbilical cord, or of the inferior portions of the thorax, the hypochondria, or organs contained in the thoracic and abdominal cavities. The forceps might, perhaps, be applied to the pelvis, if we were absolutely certain of the death of the fœtus, in order to avoid another operation; but even in this case, the blunt hook is preferable.

Some persons have been of opinion that the utility of the forceps consisted chiefly in their diminishing the size of the fœtal head by the pressure they exerted, and, thus causing this part to harmonize with the extent of the mother's pelvis, they enabled it to escape, notwithstanding the anormal diminution of the diameters of the pelvis. Desirous to know what degree of confidence could be reposed on this opinion, Baudelocque took the heads of nine children still-born at full term, restored their natural softness by soaking them in warm water, and then submitted them to the action of three different pairs of forceps, having carefully closed the blades until they touched each other, either by means of the hands alone, or by a ligature around them. Although the compression was sufficient to spoil the instruments, fracture the bones of the cranium, and squeeze out the brain through the opening, the reduction he obtained never exceeded three or four lines, when the forceps were applied to the sides of the head.

It was also supposed that, when the head was compressed in its bi-parietal diameter, it gained in other directions what it lost in this. The experiments of Baudelocque have destroyed this supposition, by proving that the diameters which cross that in the direction of which the head is compressed, far from increasing in the same proportions as the latter diminishes, do not generally increase by a quarter of a line, and sometimes even become smaller. This result, moreover, might have easily been foreseen; for if, whenever the head is compressed laterally, it gained in one direction what it lost in another, it would follow that the application of the forceps could never be useful in locked head, whereas these are precisely the cases in which it is necessary. Let us suppose, for example, that the head is impacted in its antero-posterior diameter, by compressing it laterally, we should only multiply the points of contact between it and the pelvis, and apply it still more closely to the parts of the circle of the pelvis, between which it is already locked: now, this does not happen.

Others, among the most devoted advocates of the forceps, have asserted that, the experiments of Baudelocque having been performed on children not in the mother's organs, could lead to no correct idea of the degree of reduction which the head might undergo from the united influence of the instrument and pelvis. According to them, the osseous circle described by the deformed pelvis, through which we endeavour to force the head included between the blades of the forceps, must act on the latter like the ring passed along the handles of certain sorts of pincers, in order to close the jaws more tightly on the object they contain, since the instrument in this situation forms a kind of ellipsis of which the convexity is above the osseous circle. If this were the case it would be very dangerous for the mother and child: for a compression sufficiently powerful to effect the reduction of the head, besides compromising the life of the child, would expose the woman to lacerations, contusions, and gangrene.

Thus, although various authors have pretended that the reduction of the head could be carried to six lines, and though Osiander asserts that he had obtained nearly an inch, without discussing the veracity of these assertions, it may be affirmed that, in an immense majority of cases, this result can never be obtained, and that, even were it possible, it should never be done, because the death of the fœtus would inevitably follow. The opponents of the forceps have said, for this reason, that the instrument was useless, since, it being imprudent to carry the reduction beyond two or three lines, and the blades being at least three or four lines in thickness, if this be added to the size of the head, the latter acquires a volume equal to, if not greater than its original dimensions. This objection is trifling, or made by those

who have not reflected that, when the head of the child is grasped, and a reduction of three lines effected, the size of the instrument does not add in a sensible degree to that of the head, because the parietal protuberances are lodged in the fenestra of the blades.

III. *Cases which require the use of the Forceps.*

We have just seen that the forceps must never be employed with the intention of obtaining any considerable diminution of the fœtal head, and that consequently they must not be used when the mother's pelvis is malformed and too narrow to allow the head to pass: the reduction which can be obtained by its assistance, never exceeding one or two lines without endangering the life of the child and sometimes also that of the mother. But in many other circumstances the application of this instrument is useful or necessary. We have recourse to it: 1st. In order to complete a motion of the head which is imperfectly performed. 2d. To make amends for the exhausted strength of the mother, after having endeavoured in vain to restore, by all proper means, the contractions of the uterus. 3d. To relieve some dangerous symptom which has supervened during labour, such as copious hæmorrhage, more or less frequently repeated syncopes and convulsions, in the mother: and prolapsus of the umbilical cord in the fœtus. 4th. To prevent the dangerous consequences which might ensue from a labour left to nature alone, in cases of irreducible, or strangulated hernia, or one threatened with strangulation, hæmoptysis, aneurism, great dyspnœa, etc. 5th, Lastly, to assist in the expulsion of the head in cases of a slight want of proportion between it and the straits of the pelvis, and in locked head.

IV. *General Rules to be followed in the application of the Forceps.*

The general rules to be followed in the application of the forceps, relate to the woman, and to the mode of introducing the instrument.

The application of the forceps always alarms the woman, whose excited imagination causes her to fancy herself in imminent danger; and we must, following the advice of Baudelocque, begin by familiarizing her with the instrument, showing it to her, explaining its mechanism and intention, and thus convincing her that no injury can arise to her or her child.

She is then to be placed in a proper position. Some writers pretend that she may lay at length on the bed, when the head of the fœtus has descended into the cavity of the pelvis. This position is absurd, because the breech being buried too deeply in the matress, we have not room enough to execute the necessary motions. The best position is that which we described in artificial labours, when turning became necessary.

The forceps must never be applied before the os uteri is sufficiently dilated. By a neglect of this precaution, we might lacerate the edges of the orifice, and, when we had grasped the head, it might happen that this orifice, not sufficiently expanded, might cover it like a cap, and thus give rise to prolapsus of the organ. We might, also, commit the mistake of introducing the instrument between the os uteri, and the cul-de-sac of the vagina.

In winter time especially, the forceps must be warmed, not by placing them close to the fire, which might heat them too much, but by immersing them in water of twenty-five or twenty-eight degrees of Reaumur. Without this precaution we might increase the irritation, already so acute, of the parts. The blades must then be coated with some greasy or mucilaginous substances, in order to render their introduction more easy. Each blade must be introduced separately. The majority of authors advise them to be held in the hand like a writing pen. This method is erroneous for many reasons. Although the instrument should not be held with great force, it should be sufficient to prevent it from slipping, and, in the position recommended, the operator cannot exert the requisite degree of strength; if the instrument, coated with cerate and lubricated by the mucus flowing from the genitals, meets with the slightest obstacle, it will escape from his hand. Each blade should, therefore, be held in the same position as we hold a bistoury in making an incision. (See Plate 74.)

In order to introduce each blade, it is to be guided with the fingers of the hand which does not hold the instrument, until it penetrates between the os uteri and the head of the fœtus. If the head has not completely descended into the excavation, and there is a cushion formed by the os uteri, it is proper to introduce at least one finger between the head and the latter, to avoid pinching it. If the head has descended, and the finger cannot be carried as far as the os uteri, when the end of the forceps has left the hand which served to guide it, we must be careful to pass it flat over the head, always bringing the instrument from without inward.

Neither force nor roughness must be employed in the introduction of the blades; it must be done slowly, without exertion, and as it were, spontaneously, by gentle and gradual pressure. If the end is arrested by the head of the fœtus, or any point of the parietes of the pelvis, or if folds of the integuments of the cranium, or of the soft parts of the mother prevent its progress, we must overcome these obstacles by changing the inclination of the blade, and giving it a slight motion of vacillation.

Generally, the male blade should be introduced first, then the female; after which they are locked by placing the pivot of the one in the mortise of the other. When the first blade has been introduced to the requisite depth, the assistant who has charge of the handle must be careful not to change its direction; otherwise, the head being pushed to the opposite side, and resting against the circumference of the pelvis, there would not be sufficient space for the other blade.

The blades should always be applied to the sides of the head, so that the occipito-mental diameter may correspond to the axis of the forceps, and the bi-parietal to the fenestra. This rule admits of no exception but when the head is locked in the bi-parietal position; for then we are obliged to apply one to the face and the other to the occiput. The blades being joined together, we exert a certain degree of pressure on the handles, in order to be sure that no part of the mother is pinched between the forceps and the head; and gentle traction, to be convinced that the latter has been properly grasped.

Before proceeding to the extraction of the fœtus, the handles must be closed, tightened sufficiently to prevent the head from escaping, and kept in that position by a fillet, that the pressure may not vary. We should not draw on the head suddenly, nor by jerks. The traction should be continuous, and accompanied by gentle oscillations to the right and left, in order not to contuse the adjacent parts, and give them time to yield without rupturing; neither ought we to draw in a straight line, but follow successively the axes of the superior strait, the cavity of the pelvis, and the inferior strait. We must keep in mind before us the various motions the head must execute

in passing through the tunnel of the pelvis; for it is only by imitating nature that we can be really of service; by departing from this course, and substituting strength for skill, we should create difficulties sometimes insurmountable, and in all cases expose the mother and child to more or less serious accidents, if even their existence was not endangered.

V. *Rules to be observed in each particular case.*

I. *The Head has descended into the Cavity of the Pelvis, after having executed all its Motions.*

This is the most simple, and fortunately the most frequent of all. The course to be followed varies slightly, according to the different positions the head may assume.

A. We shall first suppose that its occipito-frontal diameter coincides with the antero-posterior diameter of the pelvis.

1st. When the occiput of the fœtus corresponds to the lower part of the symphysis pubis, and the face to the concavity of the sacrum, we grasp the male blade of the forceps at its middle with the left hand; place three fingers of the other hand between the left side of the fissure of the vulva and the head of the child, and present the extremity of the blade to the vulva, in the direction of its axis. The left hand must correspond nearly to the right iliac fossa of the mother, so that the blade may lie obliquely in front of the groin, and the hook which terminates incline to the right, externally to the pelvis. (See Plate 73). The instrument is made to slide over the palmar surface of the fingers of the right hand, by depressing gradually the handle between the woman's thighs, and bringing it near to the median line of the body. The blade must penetrate about four or five inches, that is, until its extremity has reached the angle of the lower jaw of the fœtus, and at least the level of the malar region. It is then given in charge of an assistant, and the female blade introduced. This is grasped with the right hand, and between the right side of the head and the corresponding part of the vulva, three fingers of the left hand are passed, which serve to guide it as in the preceding blade, and carry it above the latter. (See Plate 74). The two blades are then closed, fastened by turning the pivot, the proper degree of pressure is maintained by a fillet passed around the handles, which are covered with a towel to prevent them from slipping, and we proceed to the extraction of the fœtus. In order to do this, we place the left hand above at the point of junction of the blades, with the pivot between the middle and ring fingers; we grasp the ends of the handles below the crotchets with the right hand, (see Plate 75,) and begin to exert on the head motions of traction and oscillation, to bring the occiput beneath the symphysis pubis and externally to the vulva. As soon as the occiput has passed the arch of the pubes, the hands still continuing to act in the same manner, elevate slowly the handles of the forceps, so as to bring them toward the mother's abdomen, (see Plate 76): this gives the head a motion of extension which causes the occiput to ascend in front of the symphysis, whilst the forehead and face pass and are disengaged in front of the posterior commissure of the vulva. When the head is expelled we remove the fillet from the handles, turn the pivot, withdraw the female blade by causing it to follow, in an opposite direction, the same course over which it had first passed, and the male blade is withdrawn in the same manner. If the head is not completely disengaged, it will be sufficient to pass above the angle of the jaw, a finger forming an inclined plane, which may induce the parts of the vulva to glide below the chin. As soon as the head is extracted, the delivery is generally easily accomplished. Sometimes, when the pelvis is contracted and the fœtus large, this latter stage of the labour is difficult. It is then advisable to depress the head that the shoulder may engage; when this has reached the perineum we pass a finger curved like a hook under the axilla, seize the shoulder, bring it into the concavity of the sacrum and extract it.

2d. If the head has reached the same point, but in an opposite direction, with the forehead toward the symphysis and the occiput in the cavity of the sacrum, the mode of introduction of the blades of the forceps is not changed by this circumstance; but the management of them differs on account of the manner in which the head is disengaged. The occiput will, indeed, appear first; but it will escape in front of the posterior commissure of the vulva. Consequently, the first tractions must be made from behind forward, toward the mother's belly, so as to forcibly flex the head, that the occiput may gradually be brought in front of the perineum. As soon as it has reached this point, we cease all traction, or, if it is necessary, we draw gently, depressing the handle of the instrument in front of the anus, so that all the parts of the face may be disengaged in their turn below the pubes; the forceps are then unlocked, and the two blades withdrawn in the manner previously directed.

B. When, although the head has descended into the cavity of the pelvis, it still retains the diagonal position it had at the superior strait, it becomes necessary to modify somewhat the manner of introducing the blades.

1st. In the left occipito-acetabular position we introduce two fingers of the right hand into the space comprised between the summit of the coccyx and the left sciatic tuberosity: we direct the male blade backward and to the left, so that the handle may incline to the right groin of the mother, and introduce it by depressing the handle and bringing it from the middle of the abdomen toward the inner part of the thigh, so that the blade may enter in the direction of the left sacro-iliac symphysis; we then introduce the female blade, likewise obliquely, but at the inferior right lateral part of the pelvis; it is united to the preceding in such a manner that the pivot may look toward the woman's left groin. (See Plate 77.) The Germans, who pay no regard to the position of the head, and are guided by the pelvis alone, introduce the first blade to the right, and the second to the left. When no malformations exist, this plan may answer in causing the head to execute the motion of rotation, and bringing the occiput behind the symphysis; but if the sacrum is not sufficiently concave, if the pelvis is too narrow in proportion to the size of the fœtal head, the only result of the German method of applying the forceps is to accelerate the motion of rotation and place the head diagonally, so that the latter, presenting its greatest diameter to the inferior strait, cannot be easily extracted. The left hand must then be applied on a level with the pivot of the instrument, the right to the ends of the blades, the latter must be brought obliquely downward and from left to right, in order to place the occiput behind and below the symphysis pubis, and the tractions continued whilst the instrument is moved from side to side, and at the same time elevated so as to be thrown back on the mother's abdomen.

2d. In the left fronto-acetabular position the same course is to be followed, except that the longitudinal curvature, instead of looking toward the occiput, should be directed toward the face. After having caused the head to roll behind the symphysis, the instrument is

elevated so as to effect the disengagement of the occiput in front of the perineum; it is then depressed, in order to allow the face to escape beneath the pubes.

3d. If the head is in the right occipito-acetabular position, the male blade is introduced on the left lateral part of the pelvis, in the space comprised between the symphysis and the left obturator fossa; then the female blade in the interval between the sacrum and the right sciatic tuberosity; after which they are joined so that the pivot may be directed toward the right acetabulum of the woman. The right hand is then placed on the point of junction; the left hand is applied under the end of the forceps, with the pivot between the ring and middle fingers; the blades are carried upward, and from right to left, until the pivot is opposite the symphysis, in order to cause the head to revolve in the pelvis and bring the occiput under the arch of the pubes, and terminate as in the first position.

4th. In the right fronto-acetabular position the manipulation is the same, except that, in the last stage, the forceps must be elevated so as to disengage the forehead.

II. *The Head being still above the Superior Strait.*

Smellie was the first to recommend the application of the forceps to the head when it was still above the superior strait. This operation is difficult and dangerous, especially in unpractised hands. It is difficult, because we cannot always ascertain accurately the position of the head on account of its height, and because, on account of its mobility, it slips away from the instrument, which does not always grasp it fairly. It is dangerous because, if the forceps slip during the tractions on the head, which it does not properly enclose, it may wound or kill the fœtus: therefore, it appears to us, that the cases to which it is applicable are very limited in number. We reduce them to two:—1st, when there is a moderate contraction of the pelvis; but the child being alive, the forceps should never be applied if the antero-posterior diameter is not at least three inches and a quarter in length: 2d, when the pelvis is well formed, but version is impossible, because, the liquor amnii having been discharged for some time, the uterus embraces closely all the parts of the fœtus.

1st. If the great diameter of the head corresponds to the antero-posterior diameter of the pelvis, it matters but little whether the occiput or the forehead looks toward the promontory of the sacrum. As, in this case, the finger can never be carried as far as the head to guide the instrument, the whole hand, with the exception of the thumb, must be introduced into the organs of generation, so as to be able to place at least one finger between the neck of the uterus and the left side of the head. The male blade is then introduced as if the head were in the cavity of the pelvis, except that it penetrates to a greater depth. The handle must be lowered as much as possible, in order to depress the posterior commissure of the vulva, especially if the woman is primiparous; for, without this precaution, the head, being grasped only by the ends of the blades, would slip on the slightest traction; but we should also be careful not to carry this depression too far, for fear of wounding the anterior paries of the uterus. The blade, being properly placed, is entrusted to an assistant; the other is seized by the right hand, and the whole of the left hand, with the exception of the thumb, is introduced into the parts, and the fingers passed between the os uteri and the head. If we cannot reach this orifice, the blade must be passed on the other as far as the head, in order that it may not deviate into the cul-de-sac of the vagina. The blades being joined, and the proper degree of compression determined, the right hand seizes the forceps at the end of the handles and above the crotchets; the left is below, in front of the point of junction with the index finger, in the separation between the blades. (See Plate 78.) The occiput or forehead is turned from above the symphysis, so as to bring it toward one of the acetabula; the head is drawn from above downward parallel to the mother's left thigh, in order to make it descend into the excavation: a motion of rotation is communicated to it, by means of which the blades are carried from below upward and from left to right, in order to bring the occiput or the face beneath the arch of the pubes, and the delivery is terminated as previously described.

In some cases the head, although properly grasped, will not descend. To ascertain whether it obeys the force applied to it, we must, after having taken the instrument in the left hand, extend the index finger of this hand into the space between the blades, so as to touch the vertex; a motion of rotation is communicated to the latter, at the same time that we exert traction; and as the hand follows the movement of the forceps, and the end of the finger is applied to the cranium, we will be informed if the head follows the impulsion.

2d. The head may be situated transversely, either by reason of its great size, when compared to that of the pelvis, or the narrowness of the latter. If it is very movable, the introduction of the hand into the organ is recommended, and the communication of a motion of rotation which brings the occiput and forehead forward, and after that the application of the forceps. But this manœuvre is impossible if the pelvis is contracted, or if the waters have been discharged for some time. The following course is then to be pursued.

The occiput looking toward the left iliac fossa, we pass two or three fingers of the left hand into the vagina, in front of the right sacro-iliac symphysis, the female blade is held in the right hand, and caused to follow the concavity of the sacrum to a certain height; we then place the fingers, which served as its guide on the longitudinal curvature, give it a motion of rotation, and cause it to traverse the interval comprised between the left sacro-iliac symphysis and the symphysis pubis. In this motion the blade which at first was applied to the left side of the head passes in front of the face, and is brought on the right side, behind the symphysis. The handle is then forcibly depressed, so that the crotchet may fall, as it were, perpendicularly to the floor. This blade is given to an assistant, without withdrawing the hand which guided it, we hold the male blade in the right hand, pass it between the hand in the uterus and the female blade, direct it according to the concavity of the sacrum, and depress forcibly the handle, in order to make it penetrate properly. When the two blades are joined, the pivot should look directly toward the inner surface of the thigh. The forceps are held as in the preceding case, by extending the index finger into the separation of the blades, in order to ascertain if the head obeys the tractions; the latter is drawn in the transverse position which it originally occupied, is brought into the pelvic excavation, a slow motion of rotation communicated to it, in order to lodge the occiput behind the symphysis, it is moved from side to side, and the forceps are inverted on the mother's abdomen. If the occiput looks toward the right iliac fossa, we introduce the right hand upon the lateral parts of the head, and the male blade in front of the left sacro-iliac symphysis, pass it from behind forward by means of the finger which served as its guide, and bring it under the symphysis pubis; the female blade is then introduced along the anterior surface of the sacrum. If the hand cannot be left in the organs, we must grasp the latter

with the right hand, introduce it in front of the space between the coccyx and the tuber of the right ischium, cause it to follow the curve of the sacrum to a proper height, and join it to the other. The head being seized, we place the right hand at the point of junction of the blades, holding the instrument below, with the index finger stretched along it. The other hand at the end of the handles draws the forceps downward parallel to the right thigh of the mother, in order to cause the head to engage in the cavity of the pelvis. The latter is then made to revolve on its axis, in order to bring the occiput under the pubes, and the delivery terminated as in the preceding case.

III. *Of the Locked Head.*

The head is said to be *locked* when, having descended to a greater or less depth in the cavity of the pelvis, it becomes so impacted that it cannot advance any further, nor be moved in any direction, by the efforts of nature alone. Some writers, as Lamotte, Deleuyre, and Levret, have asserted that the locked head could not be pushed up by the hand alone beyond the point at which it became impacted. This assertion is evidently false; for the head can be locked only by passing from a larger into a more contracted space, in which it is fastened like a wedge, and it must always be possible to push it up beyond the point at which it is fixed. Others have admitted, with Roederer, two species of locking: one incomplete, in which the head rests on two diametrically opposite points of its surface, either at the pubes or sacrum, or the lateral parts of the pelvis; the other complete, in which it is equally held on all sides so tightly, that the thinnest body cannot be passed between it and the pelvis in any direction whatsoever. A comparison of the shape of the head with that of the osseous circle will convince us that there is not a perfect harmony between the conformation of these parts, and consequently that the *paragomphosis* of Roederer is impossible. The only locking possible is always incomplete, that is, there are always some points of the circumference of the head which are not in contact with that of the strait.

Locked head may occur in two ways either in the direction of the occipito-frontal, or of the bi-parietal diameter of the head; but a concurrence of circumstances rarely met with is necessary for its accomplishment. Thus occipito-frontal locking would require that the motion of extension of the head should take place, not in the pelvis, but in the interior of the uterus, before the head had escaped through the superior strait. Locked head cannot occur if the pelvis be too wide or too narrow, or the head too small or too large. If the ossification of the latter be not far advanced, it yields to compression and progresses; if, on the contrary, it be solid and hard, it is retained, and does not advance. There is also necessary, in the woman, an energy, limited, moreover, to a certain extent, for if the mother be feeble, the head will not engage, and if she be vigorous, it may overcome all obstacles. The conditions necessary on the part of the fœtus and of the mother to the production of locked head, are rarely found united; it follows, therefore, that the accident is much less frequent than was formerly pretended, especially at the period when the lever enjoyed so much credit in Holland. We are led to believe that certain cases of locked head, asserted by the older practitioners to have been relieved by them, were merely those of heads arrested in their progress, or which, after having passed through a narrow strait, met with another equally contracted, two circumstances of great importance in practice, to the latter of which we shall refer hereafter. Nevertheless, however rare true locked head may be, it demands our careful attention, though it should occur only once in ten thousand cases.

The signs by which locked head may be ascertained have been divided into precursory and pathognomonic.

The precursory signs are drawn from the degree of energy of the uterine and muscular contractions. It has been said that locked head was threatened whenever it remained for a long time above the superior strait, and the integuments of the cranium became tumefied: but, how frequently this symptom is observed, without locked head being the consequence. The same has been said of swelling of the os uteri, forming a cushion of variable thickness beneath the head, of the engorgement of the parietes of the vagina and that of the external genital organs of the woman; these, however, are merely accessory, although inseparable signs.

There is but one certain sign of locked head: that is, the complete immobility of the head, no instrument being able to traverse over more than a fourth of the circumference, without being arrested by the points at which it touches the periphery of the pelvis. This case differs widely from that of which we have just spoken, and in which the head is fastened between two contractions of the pelvis, one superior and the other inferior. Let us suppose a pelvis contracted by excessive projection of the promontory of the sacrum, and with its inferior strait also narrower than usual: if the head is moderately reducible, and the uterine contractions energetic, the head will, at first, experience some difficulty in passing through the superior strait: but by reason of the impulsion communicated to it, it will at last yield and engage in the cavity of the pelvis: there, finding itself more at ease, it will recover its original size. Now, the inferior strait being equally contracted, the woman, already exhausted, will not have strength sufficient to expel the child: it will then be impossible to push up the head, or make it advance: but this head will not be locked, for the finger applied to it, will easily cause it to perform rotation on its axis. This distinguishes it from true locked head: in the latter being fixed by two opposite points of its circumference, the fingers cannot cause it to move laterally; but, if it cannot advance unassisted, with a little patience it can be pushed upward, and the locking removed. When locked head has persisted for a long time, it may become dangerous for the fœtus and mother.

Compression of the brain may result from that of the head, as also rupture of the vessels, separation of the dura mater or of the integuments of the cranium, fracture of the bones, effusion, apoplexy, and death.

On the other hand, if the head of the fœtus is tightly squeezed, it likewise compresses the soft parts of the mother, and all the consequences of contusion, such as inflammation, gangrene of the bladder, os uteri, rectum, vesico or recto-vaginal fistulas, or even the rupture of the uterus and the passage of the fœtus into the cavity of the abdomen may ensue.

The ancients were acquainted with but one course of treatment in these cases: they mutilated the fœtus and extracted it piecemeal; the more timid among them waited until its life was extinct. Were we reduced to a choice between these two difficulties, the first is preferable, because at least it spares the mother the danger which might accrue from the head remaining too long in the pelvic excavation. Others have had recourse to the Cæsarian operation or to symphyseotomy.

The consequences of locked head may be so serious, that it is important to prevent, and especially to relieve them, when existing. The application of the forceps is then indicated. The following is the course to be pursued in these cases:

1st. In occipito-frontal locking, the forceps are applied in the same manner as in the corresponding positions of the vertex at the bottom of the cavity of the pelvis. It is merely necessary to introduce the blades to a greater depth, and, moreover, before exerting any traction, to relieve the locking, otherwise we should increase the points of contact between the head and soft parts, and thus expose them to contusion and laceration. For this purpose, the head being properly grasped, is shaken by gentle motions, which carry the handles of the forceps alternately to the right or left thigh of the mother: at the same time, it is pushed upward, and, as far as possible, in the direction of the axis of the pelvis. The index finger extended along the space between the blades, by touching the vertex, serves as a guide and indicates the progress made by the head. Were we merely to push up the latter, without giving it the lateral motions, the blades of the forceps might slip over it, and wound the anterior part of the uterus. 2d. A warm discussion arose between Baudelocque and Deleurye, as to the manner in which the head should be grasped in cases of bi-parietal or transverse locking, if the pelvis were sufficiently large to render possible its complete and entire disengagement, without the necessity of a bloody operation. Deleurye was of opinion, that it should be seized in the direction of the occipito-mental diameter. Baudelocque has objected in the strongest terms to this plan. It is, however, the only one that can be adopted, because in this case the hand cannot be introduced between the head and the pelvis. Hence, the male blade must be placed on the left side of the latter, and the female on its right side, the head must be moved laterally, in order to dislodge it, whilst at the same time we endeavour to push it upward. As soon as it has passed above the superior strait, the situation of the blades must be changed, one replaced in the cavity of the sacrum, and the other behind the symphysis, in order to be able to bring the occiput under the arch of the pubes, and terminate the labour as in the anterior or posterior occipito-iliac position.

IV. *Presentations of the Face.*

1st. In the right mento-iliac position, we place two or three fingers in the space between the coccyx and the left tuberosity of the ischium. We carry the male blade in front of their palmar surface, introduce it in the direction of the left sacro-iliac symphysis, and apply two fingers to its convexity, in order to cause it to pass from behind forward as far as the arch of the pubes, so that the longitudinal curvature may correspond with the chin of the fœtus. This blade being applied, we proceed to the introduction of the other without withdrawing the hand, for it will be sufficient to pass the female in front of the male blade, to the same depth as the latter, following the concavity of the sacrum. The pivot must look toward the inner part of the left thigh of the mother. We grasp the forceps at their junction, with the right hand above and the left at the end of the blades. After having determined the degree of compression, we draw in a direction parallel to the mother's right thigh, in order to bring the head into the cavity of the pelvis and give it a motion of rotation from below upward, and from right to left, which turns the pivot opposite to the symphysis pubis. Then, continuing to draw backward, we bring the chin to the vulva; after which, by merely elevating the blades, all the parts of the face are seen to successively disengage.

2d. In the left mento-iliac position, the main position is the same, except that the female blade must be introduced first. We pass on the right side of the pelvis three fingers of the left hand, which serve to guide this blade, which is introduced in the direction of the right sacro-iliac symphysis to a proper depth; after which we place two fingers on its concavity, in order to cause it to traverse about two-thirds of the circumference of the pelvis, and bring the blade under the symphysis; then, without withdrawing the hand, the other blade is introduced, following the concavity of the sacrum to the same depth as the preceding. The two blades being joined together, the pivot must look toward the left thigh of the mother. Then the left hand seizes the instrument above, the right grasps the end of the blades, and we draw parallel to the left thigh, in order to bring the chin of the fœtus into the cavity of the pelvis; we move the handles from below upward, and from left to right, thus carrying the pivot in front of the symphysis; the chin being then behind the latter, we draw from below upward, to make it pass above the symphysis, and when this is once disengaged, the mere action of elevating the forceps will effect the extraction of the fœtus.

When the head, having descended into the cavity of the pelvis, has performed its motion of rotation, and the chin is already behind the symphysis pubis, the application of the forceps is more simple. The male blade is introduced on the left side of the pelvis, the female on the right, and the head being grasped, we have merely to execute the last stage of extraction.

In these manœuvres, Baudelocque advised the head to be slightly compressed when we had grasped it, so that whilst traversing the pelvis it could become straight, that is, be flexed on the thorax; he even recommends us, if we do not succeed in this manner, to unlock one of the blades so as to use it as a lever wherewith to depress the occiput, and then to reapply the instrument as in a presentation of the vertex. This manœuvre cannot be performed on the living woman, and the head can never be straightened; it is to be drawn down as best we may, merely remembering, that when we bring down the chin we must proceed slowly, in order to allow the trunk to perform a motion of rotation, that the neck may not be twisted.

V. *The Trunk being expelled, the Head is still retained in the parts.*

When, the feet of the child being disengaged, the trunk is expelled, whilst the head remains in the organs of the mother, the practitioner who is well acquainted with the theory of evolution easily avoids all accidents; and if the woman is well formed, he does not require the forceps to terminate the labour. But he may be obliged to have recourse to them when one of those empirics, in whom skill and knowledge are supplied by violence and rashness, has exerted on the trunk in order to bring the head, traction, whose slightest inconvenience is to effect an artificial locking. If, in these cases, the accident cannot be remedied by the fingers alone, we must use the forceps, if not to save the child, which nearly always falls a victim to ignorance, at least to relieve the mother.

1st. The occiput being lodged behind the symphysis pubis, the arms are brought together on the sides of the trunk, the latter wrapped in a dry napkin and entrusted to an assistant, who raises it so as to invert it slightly on the abdomen of the mother; we pass two fingers in front of the sacro-sciatic ligament, and raise the body in order to introduce the male blade of the forceps to a proper depth on the right side of the pelvis; it is then given to an assistant, who depresses the handle in order to afford sufficient space for the introduction of the other

blade; the latter is guided by the fingers which are already in the uterus, between the male blade and the sternal region of the fœtus: the two blades are united after having grasped the head, and we proceed as in a presentation of the vertex. (See Plate 79.)

If the head is locked we must first dislodge it; if it has merely engaged anormally, it will be sufficient to incline it to the right or left, by means of the forceps, as we wish to bring the occiput toward one or other of the oblique diameters of the pelvis.

2d. If the head has descended into the cavity of the pelvis, or below the superior strait, we endeavour to make it engage in such a manner that the forehead may correspond to the symphysis pubis, and the occiput to the concavity of the sacrum. The application of the forceps is then more difficult than in the preceding case, on account of the small space left for their introduction. After having enveloped the trunk of the fœtus in a napkin, as previously recommended, it is inclined forcibly downward and backward, in order to depress the perineum of the mother; the male blade is then passed on the left side of the pelvis, between the sternal region of the fœtus and the corresponding side of the pelvis, and entrusted to an assistant, who, being unable to depress it as much as could be wished, on account of the body which impedes it, lowers it sufficiently to do no harm to the fœtus. The female blade is then introduced on the right side of the pelvis, in front not only of the fœtus, but also of the male blade; the head is grasped and the usual course followed. If there is locking it must be removed, or the position modified by bringing the head in a diagonal direction. We then draw on the instrument in order to bring the head into the cavity of the pelvis under the symphysis, and instead of elevating the forceps to terminate the labour, the occiput must be made to revolve on its axis in front of the perineum; it will therefore be sufficient to depress strongly the blades, in order to disengage the parts of the face beneath the symphysis, and to see all those of the vertex escape from under the arch of the pubes.

3d. The application of the forceps may also become necessary when the trunk of the fœtus being expelled, the head still retains a transverse, that is, a right or left occipito-iliac position. Apart from unskilful manipulation, this is one of the cases which occur most frequently in practice, although the coincidence of rather uncommon conditions, such as the presence of a large head in a pelvis moderately contracted, is necessary for its production.

If the occiput is directed toward the left iliac fossa, the trunk is given to the care of an assistant, who carries it to the left upon the mother's thigh; three fingers of the left hand are placed in front of the right sacro-sciatic ligament, the female blade introduced to a proper depth, passed from behind forward to bring its curvature toward the symphysis, and entrusted to an assistant; then, without withdrawing the hand, the other blade is introduced in front of the sternal region of the fœtus; the head being grasped, the blades are united, with the pivot corresponding to the anterior plane of the fœtus; we then proceed to extract the latter. We must begin, however, by diminishing the volume of the head by exerting moderate pressure upon it, in order to bring it into the pelvic excavation. We give the handles of the instrument a motion of rotation from below upward and from right to left, by causing the body of the fœtus to execute a rotation which brings its back and the pivot of the forceps to the symphysis pubis; after which we terminate, as in the first case, by reversing the trunk and blades on the mother's abdomen. In the opposite position, right occipito-iliac, the manipulation is the same, except that the male branch must be introduced first, in front of the left sacro-sciatic ligament.

THIRD DIVISION.

OF LABOURS ESSENTIALLY ARTIFICIAL IN CONSEQUENCE OF MALFORMATION OF THE MOTHER OR FŒTUS.

This order comprises these labours, to the spontaneous termination of which some malformation of the mother or fœtus presents insurmountable obstacles, so that the interposition of art, and the use of means which vary with the nature of the case, become necessary.

CHAPTER I.

OF THE MALFORMATIONS OF THE FŒTUS WHICH RENDER LABOUR ARTIFICIAL.

We include in this category the excessive size of the head, thorax, or abdomen, the development of anormal tumours on various parts of the surface of the body, and monstrosities by agglutination.

ARTICLE I.—EXCESSIVE SIZE OF THE HEAD.

Of all the diseases which may attack the fœtus during the period of intra-uterine life, the most dangerous is the accumulation of a serous fluid in the interior of the cranium, or hydrocephalus. By an abuse of terms, this name, modified indeed by the epithet external, has been given to an infiltration of pure or bloody serum into the cellular tissue of the integuments of the cranium. It much more frequently proceeds from a state of general infiltration, which produces the death of the fœtus at a period more or less remote from the termination of pregnancy; and, until the present time, although it has been sometimes seen to increase greatly the thickness of the hairy scalp, it has never been observed to render labour more difficult.

Internal hydrocephalus fortunately occurs so seldom that, according to Madame Lachapelle, it has been remarked only 15 times in more than 43,000 labours. As regards the obstacles it may present to the escape of the fœtus, we distinguish three degrees. 1st. The head has slightly increased, and the sutures are capable of being sufficiently approximated to permit it to pass through the tunnel of the genital organs. 2d. It has become so large that it cannot possibly escape, but still contains but a small quantity of fluid. 3d. The serum which it contains is sufficiently abundant to destroy all its proportions with the straits through which it must pass; but the osseous pieces composing it adhere so slightly that they play, as it were, upon each other.

A skilful practitioner can never be mistaken in the diagnosis of hydrocephalus, unless the pelvic extremity of the fœtus should present. We might hesitate, even in a presentation of the head, if, as it often happens, after the rupture of the bag of waters, we were to perceive a second bag, that is, a more or less extended surface, which, hard and resisting during the pains, became soft and fluctuating after their cessation; but, by exploring this surface with the finger, we ascertain the presence of the fontanelles and sutures, that the

former are large, and that in the latter, between the bony pieces, there is a membranous compressible space, which may exceed in extent the width of one's finger.

If the head of the fœtus have not acquired too great a size, were soft and reducible, and during the uterine contractions were found to approach nearer and nearer to the inferior strait, our treatment should be limited to assisting the spontaneous termination of the labour by proper means.

If, on the contrary, the head be too large to pass through the straits of the pelvis, it would be necessary to diminish its size. This may be effected by a simple puncture with a bistoury, trocar, or any sharp instrument that may be at hand. We have seen several similar cases, and have always succeeded in this manner.

A woman had been in labour for seventy-two hours; her accoucheur, at a loss what to do, proposed the application of the forceps: the liquor amnii had been discharged for forty-eight hours, and, as it was said, a second bag had formed, which he had endeavoured, but in vain, to rupture with his nail. We immediately recognized a case of hydrocephalus, and proposed to puncture it: alarmed by this advice, he wished first to try the forceps. We yielded, stating at the same time, that the size of the head would produce too great a separation of the blades to allow us to grasp the head, which proved to be the case. The death of the fœtus being certain, from the cessation of its movements, and the long duration of the labour, we punctured the head: the labour terminated spontaneously after the escape of the fluid.

The feet of another hydrocephalic child had been brought down, and traction exerted on them in vain. We were called to apply the forceps; but, on introducing the hand into the organs, we found that the head did not descend, although the pelvis was well formed. The head of the fœtus had descended into the excavation and turned toward the left iliac fossa; the occiput was still above the superior strait. Convinced that the opposition to the progress of the head did not depend on this strait, since the base of the cranium had passed through it, we attributed it to the excessive size of the upper part. We passed the finger toward the root of the nose, and observing there a separation of the bones, through which a distinct fluctuation could be felt, we concluded that it was a case of hydrocephalus. The application of the forceps, and the extraction of the head were twice attempted, without success. We then introducced a sharp hook into the zygomatic fossa of the right side, and immediately there occurred a discharge of fluid which permitted the head to disengage. Unfortunately the mother perished with violent symptoms, depending, apparently, on a laceration of the os uteri produced by the traction which had been exerted on the child.

ARTICLE II.—EXCESSIVE SIZE OF THE THORAX.

Cases of dropsy of the chest sufficiently developed to have prevented delivery, are to be found in the records of medical science. They are, however, very rare. The difficulty of introducing the hand into the organs, and of ascertaining through the interstices of the ribs, so vague a sensation of fluctuation, and that depending on an accumulation of serosity in the thoracic cavity, would compel us to establish our diagnosis by means of induction, unless the feet of the child presented; for, in that case, by passing the hand along the thighs, we might examine the trunk, and determine the nature and seat of the obstacle. Hydrothorax is marked by unusual amplitude of the chest. After having ascertained its existence, we should plunge a trocar in an intercostal space, then place two fingers on the sides of the wound, in order to keep it open, compress the chest, and assist the escape of the fluid: without this precaution, the soft parts of the mother, applying themselves to the surface of the fœtus, might close the aperture.

ARTICLE III.—EXCESSIVE SIZE OF THE ABDOMEN.

Ascites in the fœtus is more rare than hydrocephalus, but more common than hydrothorax. Many cases reported by various writers, prove that this dropsy may sometimes render delivery very difficult, or even impossible. It is impossible to ascertain its existence, in presentations of the head. In presentations of the pelvic extremity, it is marked by a large, soft, fluctuating tumour, filling the pelvic excavation. Levret advised, in these cases, the laceration of the integuments of the abdomen, at the umbilicus, by means of the finger. Others, as may be seen by examples in Mauriceau, had recourse to mutilation of the child's body. No modern practitioner would think of following a similar course. If the serosity collected in the peritoneum were copious enough to render the escape of the trunk impossible, we should merely puncture it, observing the precautions already indicated.

Osiander, junior, speaks of a delivery which was made very difficult by the volume of the abdomen caused by an enormous hypertrophy of the kidneys.

ARTICLE IV.—TUMOURS ON VARIOUS PARTS OF THE SURFACE OF THE BODY.

Tumours developed on the surface of the body may become serious obstacles to delivery. They have been seen, on the sacrum, breech, lower part of the back, perineum, neck, nucha, mastoid apophysis, and clavicle. Some are said to have been as large as a child's head, and to have weighed two or three pounds. Some are attached by a pedicle, and others rest on a large base: some are lobulated: in short they vary ad infinitum. No general rule can be given for their treatment, which must be guided by circumstances. Pedunculated tumours are sometimes separated by the uterine contractions, or the tractions exerted on the fœtus, and those which are not too firm sometimes diminish, so as to allow nature unaided to accomplish the delivery. If they prevent the escape of the fœtus, and we can reach them, we must either remove them, or empty them by puncturing, when they contain a fluid. Unfortunately, they are generally discovered only when the labour is well advanced, and there is no way of acting on them, so that, if they are very large, the death of the fœtus is the consequence.

ARTICLE V.—MONSTROSITIES BY AGGLUTINATION.

Monsters by agglutination are the only ones which can present any peculiarities of interest in parturition. Sometimes there are two

heads for one trunk, sometimes one head for two trunks, either separate or united by the anterior, posterior, or lateral parts of the body. Very frequently, however, delivery is effected spontaneously in similar cases, at which we should not be surprised when we reflect that the majority of these monstrous beings are expelled prematurely, either dead, or already somewhat advanced in putrefaction. Nevertheless, some celebrated cases, like those of Ritta-Christina, and the Siamese twins, prove that they may be born alive, and subsequently exist for a greater or less length of time.

No rules can be here laid down; if nature cannot relieve the mother, the accoucheur called to her assistance, guided by circumstances, adopts that plan which seems to him best. The greater or less facility of delivery depends on the relation between the size of the fœtus and the dimensions of the pelvis. We once received two fœtuses which were united at the lower part of the trunk, and were born dead at seven months, the breech presenting. When the two trunks were disengaged, one of the heads descended into the pelvic excavation, the other followed immediately. This monster is in the cabinet of the Royal Academy of Medicine. It presented some remarkable peculiarities: the two trunks had but one heart, seated in the left side; the other body had merely a cavity filled with black blood: there existed no bladder, nor organs of generation, and the anus was imperforate.

When these fœtuses are small, they can escape through the genital organs without difficulty; but if they are large, we must mutilate them, for it would be absurd to resort to an operation to save them at the risk of the mother's life.

CHAPTER II.

OF THE OPERATIONS IN WHICH THE PARTS OF THE FŒTUS ARE CONCERNED.

The operations that we may be obliged to perform on the fœtus, by means of instruments which affect the integrity of its parts, are of two kinds. Some, like those of which we have first spoken, in cases of cephalic, thoracic, or abdominal dropsy, are required by a disease which, greatly increasing the volume of the fœtus, renders its reduction necessary to the accomplishment of delivery. These, indeed, compromise the existence of the fœtus; but if, as generally happens, death follows, it should be ascribed less to the operation than to the necessity of relieving the effects of a malady which, even supposing that the child had been born alive, would have destroyed it ere long. The other operations are required, not by a disease of the fœtus, but by the malformation of the mother. They are fatal to the fœtus, which otherwise might have lived, or if the latter is sometimes extracted alive, we are subjected to the pain of seeing it soon expire, in consequence of its wounds. We should, therefore, resort to them only when we are certain of its death, or when we are convinced that the mother is too feeble to bear any operation which would give her child a chance of life.

We shall, consequently, begin by making known the signs which announce the death of the fœtus in utero, after which we shall describe the methods of extracting it when its death is certain, or at least as probable as possible. If the parts be not greatly tumefied, and the dimensions of the head harmonize with those of the pelvis, the delivery may sometimes be accomplished, either by turning by the forceps or blunt hooks; but when the contraction of the uterus will not permit us to bring down the feet, or when putrefaction is advanced, or when the body is not firm enough to be properly grasped with these instruments, and above all, if there be a great disproportion between the size of the head and the dimensions of the pelvis, no alternative is left to us but to resort to the use of the sharp hooks, or to cephalotomy.

ARTICLE I.—OF THE SIGNS WHICH ANNOUNCE THE DEATH OF THE FŒTUS IN UTERO.

We infer that the fœtus is dead when none of the signs of life are present. The signs of life of the fœtus in utero are so well known, that it is useless to enumerate them here: we will merely recapitulate a few of the principal ones. The woman generally enjoys good health, with the exception of some inconveniences and nervous phenomena inseparable from pregnancy. Her abdomen increases regularly, commencing at the centre of the inferior part. About the middle of gestation, she experiences peculiar motions, known to pertain to the fœtus, and which, at a late period, can be felt by the hand applied to the abdomen. Lastly, in certain positions, by means of auscultation, we can perceive the double and rapid pulsations of the child's heart.

Now, the death of the latter may occur during gestation, or only during the progress of labour.

When it takes place during the period of viability of the fœtus, the woman, who until then had enjoyed good health, suddenly ceases to feel the motion of her child, sometimes without any appreciable cause, sometimes after a fall, a blow, a fright, or a convulsion. During the three or four subsequent days, her abdomen retains nearly its usual size; but when she reposes on her side, she feels a kind of ballottement, which arises from the fœtus becoming an inert mass, displaced passively in each new attitude, and falling, in obedience to the laws of gravity, to the most depending point. After a few days, the abdomen decreases in size, and, as it diminishes, the woman loses her appetite, gaiety, and freshness; her tongue is covered with a saburral coat; she has nausea, vomiting, horripilations, and general uneasiness; the alæ of the nose are contracted; a brown or black circle forms around the eyes; the pulmonary exhalation, as well as the perspiration, frequently acquires a fetid odour; the breasts are distended, and then wither; slight fever, exacerbating every evening, supervenes; the hands and feet are hot and dry. As the fœtus receives no more blood from its mother, less also reaches the uterus through whose soft and flaccid parietes, the finger can distinguish a more or less firm body, and sometimes even the parts of the child.

If the death of the fœtus occur during labour, there are several signs, of which the knowledge is highly important.

The first is deduced from the pains, which are said to become slower and less energetic than usual. This phenomenon may, however, arise from many other causes; as, for example, the woman's constitution, the abundance of the liquor amnii, the presentation of the sternal region of a living fœtus.

It has been pretended that the death of the fœtus was certain when the waters had a greenish hue or were loaded with flakes of sebaceous or albuminous matter; but, on the one hand, the waters are rarely thick and muddy when the fœtus is dead, and, on the other, well-authenticated facts prove that they may be fetid, and the fœtus still be alive.

The discharge of meconium has also been regarded as a sign of the death of the fœtus. When this substance escapes in a ribbon-like

form, after the rupture of the membranes, we can only thence infer a breech presentation, and the phenomenon is the consequence of the compression of the uterus immediately on the limbs of the child, and secondarily by them on its abdomen. But if the meconium which escapes tinges the liquor amnii of a green colour, the child not presenting by the breech, can we hence conclude that the latter is dead? The same phenomena then occur as in moribund persons: the sphincters of the fœtus tightly enclosed in the uterus are relaxed, and the contractions of the intestinal canal expel the contained substances, which, mixed with the liquor amnii, tinge it with their colour. This circumstance may excite our fears; but we would err in regarding death as certain, for we have examples of children who have been born alive and healthy, under these conditions, after the lapse of a few hours. In an ordinary case, that is, in a well-formed woman, we should immediately apply the forceps, in the hope of extracting the child alive; but if the pelvis were deformed, the probabilities of death would increase in proportion to the degree of deformity, and the energy and duration of the uterine contractions.

It has been said that the part which first engages is tumefied when the child is alive, but presents no trace of swelling when it is dead. This sign is of some value; it should be recollected, however, that tumefaction might continue if death did not occur until after its appearance, and that, morever, it is observed only in cases of violent uterine contractions, when the discharge of the waters has taken place some time previously. It is particularly to the tumefaction of the portion of the cranial integuments which corresponds to the os uteri, that importance has been attached; and it has been said, with Levret, that this region of the hairy scalp presented in the living child an elasticity which is replaced, after death, by flaccidity. But this flaccidity may be the effect of a cause very foreign to the death of the child; it may be produced by an effusion of blood caused by the frequent pressure exerted in the inconsiderate performance of touching, being substituted for the simple engorgement of the cellular tissue.

It has been proposed to introduce the finger into the child's mouth, to ascertain the motions of the tongue, or on the præcordial region and the cord, to determine the existence of pulsation. The former plan requires the deformity of the pelvis to admit the introduction of the hand, and the mouth to be within reach. Even then the motion of the tongue would prove nothing, for it might be passive as well as active. As regards the pulsations of the cord, when they are not perceived for several minutes, during the influence as well as the absence of the uterine contractions, there is reason to believe that the fœtus is dead; but we cannot always reach the cord. The putrefaction of this organ is not a certain index; for we once saw it present distinct pulsations, although its envelopes were half putrefied.

If the bones of the head were loose, there would be no doubt of the death of the fœtus; but the livid or bluish tinge of a limb expelled from the uterus would not justify this conclusion, nor positively indicate the existence of sphacelus.

In short, of all the signs supposed to determine the death of the child in the mother's womb, not one has any absolute value, with the exception of the total extinction of pulsation in the umbilical cord. The concurrence of several of them establishes a very great probability, but putrefaction alone places the question beyond a doubt. Books are filled with cases of children born, and laid aside, as it were, in a corner, under the supposition that they were dead, and which have afterward given signs of animation and been restored by proper means. If, therefore, the signs of death are so doubtful when we can freely examine the whole body, how cautious should we be in the case of a fœtus contained in the mother's womb, and for the very incomplete exploration of which we merely possess means all more or less difficult of practical application!

ARTICLE II.—OF THE APPLICATION OF THE SHARP CROTCHETS.

Sharp crotchets are pieces of steel, supported by a wooden handle, and curved into an arc of a circle. These pieces are terminated by a rounded or flattened and triangular point, sometimes single, sometimes double, resembling in the latter case a sort of sharp pincers, mostly loose, but which Levret enclosed in a sheath, in order to prevent them from wounding the accoucheur's fingers. The male blade of our forceps might serve as a sharp hook, by unscrewing its olive-shaped end.

We resort to these instruments when circumstances demand the immediate termination of the labour, and the head of the dead child is in the fundus of the pelvis, or when we cannot, without danger to the mother, displace it and bring down the feet; they are also used when it is so much softened by putrefaction as to afford no hold for the forceps, or lastly, when it has been separated from the trunk. The sharp hooks are sometimes applied to the head, and sometimes to the trunk. Their mode of application varies with the presentation of the fœtus.

When the head presents, the rule is to apply them to a part sufficiently firm to resist the efforts of traction we are obliged to make, and then to give the head motions similar to those it performs in natural labour. Some accoucheurs have advised their application to one of the mastoid processess; this would be proper if the head were voluminous and the pelvis small; but if the cavity of the pelvis were relatively very large, we might, by this means, give the head a see-saw motion, and place it in an oblique position, thereby increasing the difficulties of retraction. Others apply the crotchet to the upper margin of the orbit; but this produces extension of the head, which can advance only by presenting its long diameter abreast, and its progress is thus greatly impeded. When the vertex presents, our advice is to apply the instrument to the occiput.

In presentations of the pelvic extremity the use of the sharp crotchet is rarely necessary. The blunt hook applied above the symphysis pubis, almost always answers the purpose; if it be not sufficient, and we are obliged to resort to the sharp crotchet, it must be implanted in the sacrum.

In the subsequent article we shall treat of the cases in which the head, separated from the body, is retained in the maternal organ after the expulsion of the trunk.

We have never seen a case of detruncation, that is, one in which the head is separated from the trunk, the latter remaining in the mother's organs. It has been said to proceed from advanced putrefaction of the fœtus, but it could never arise from this cause alone, unless too great force had been applied to the part. Apart from this ciruumstance, we cannot conceive the possibility of its occurrence, except there were a great disproportion between the body of the fœtus and the straits of the pelvis, resulting from disease, an enormous internal or external tumour, or a monstrosity by agglutination. Be this as it may, if it took place, and the feet or hands could not be

brought down, the sharp hook must be applied to the sacrum or vertebral column, and not to the ribs or sternum, for the latter bones, presenting but little resistance, might be fractured on the first attempts, and produce asperities which would wound the parts of the mother.

There are certain precautions to be observed in the introduction of the instrument, and in the tractions exerted on it. It must always be preceded by the hand or fingers, in order to protect the genital organs of the mother from injury. The fingers are passed as far as the part of the child on which we propose to act, the crotchet is then introduced with its point turned toward the palmar surface of the hand, and when it has reached the point intended it is revolved on its axis so as to disengage its extremity, which is fastened by means of a finger resting on its convexity. When once fixed, the hand that guided it should not leave it during the whole period of its remaining in the mother's womb, for fear that a portion of the bone might yield, and produce wounds always more or less dangerous. This precaution has another advantage, that of preventing us from operating by jerks, in lieu of drawing slowly and steadily.

ARTICLE III.—OF CEPHALOTOMY.

Under certain circumstances, instead of applying the sharp hook, we are compelled to resort to a peculiar operation, known by the name of cephalotomy or craniotomy. This happens when the head cannot traverse the tunnel of the pelvis, either because it is too greatly developed, or, its size not being unusual, because the passage is too contracted to permit its egress. In the article on hydrocephalus the treatment to be pursued in the first case was explained, and we shall, therefore, now describe only the second.

Various instruments have been devised for the purpose of dividing the fœtus and extracting the head, when the pelvis of the mother is too contracted to allow its passage. The most common are the perforator of Mauriceau, and the scissors of Smellie. The former (see Plate 80,) consists in a piece of steel terminated by a lance-shaped extremity; the latter (see Plate 80,) resembles a pair of ordinary scissors, with long cutting blades, and the edge outwardly, which causes them to penetrate the cranium more easily, and allow of an enlargement of the aperture by merely separating the blades. Sharp and pointed blades have also been invented, enclosed in a sheath, whence they were projected at will by means of a spring. The most simple of all these instruments is that of Smellie, but it also is too complicated, for the first instrument that offers will answer, provided it be pointed. We might use, as did Devater, a common knife, with the blade protected throughout nearly its whole length by a thick envelope of fine linen, if the too celebrated trial of Baudelocque did not prove that surgeons must have instruments of a peculiar form and appearance, in order to silence the ignorant and prejudiced. A long bistoury wrapped with linen, with the point protected by a ball of wax, is equally serviceable.

Let us suppose we have selected Smellie's scissors. They are carefully introduced so as to touch the head of the fœtus perpendicularly, by passing them over the palm of the left hand, previously introduced into the vagina; they are then made to penetrate the cranium and the blades separated.

The operation is not to be supposed to be terminated because the cranium is opened. The contents of this cavity are to be removed. It has been recommended to introduce two fingers into the aperture, and use them to extract the brain. It is probable that this advice was never followed by those who gave it: for the contractions of the uterus being excited by the first attempts, if we were to pass the fingers into the separation between the bones, they would soon be compressed to so painful a degree as to render it impossible to act. We prefer employing a scoop similar to that used in lithotomy. The instrument may, previously, be moved about in different directions in the cranium, in order to break up the encephalon and reduce it to a pulpy state.

When the cranium is emptied of its contents we may, according to circumstances, leave the expulsion of the head to the efforts of nature alone, or effect it either by means of the hand, forceps, or crotchet. Sometimes it is useful to crush the bones and extract them piecemeal, at the same time taking care to spare the skin, which protects the parts of the mother against the asperities of those we are obliged to leave.

It sometimes happens, in deliveries by the pelvic extremity, that the head is separated from the trunk and retained in the maternal organs. This accident is generally attributed to malformation of the pelvis: we are, however, convinced that it is almost always produced by inconsiderate tractions. But it must be relieved without regard to the cause of its occurrence. It will often be sufficient to introduce a finger into the mouth of the child, in order to give the head a favourable position, and then extract it by adding our efforts to those of the woman. If this does not succeed, the forceps must be tried, and introduced as in applications of this instrument above the superior strait: two assistants can compress the abdomen of the woman with advantage, in order to keep the head at the os uteri, whilst we endeavour to grasp it. But when the size of the head is much too large when compared to the dimensions of the pelvis, we should thus lose much valuable time, and should resort immediately to cephalotomy. After having passed the hand into the genital organs, we turn the head so that the vertex may present, it is then fixed by means of two fingers curved above the base of the cranium, the end of the thumb being applied to the anterior fontanelle: the instrument is directed as just described: the cranium is opened, emptied, and the remainder extracted either with the fingers, or a crotchet properly placed on the occiput or forehead.

All the instruments invented by the ancients for the performance of this operation, and known by the general name of extractors, (tire-têtes), as the *bascule* of Levret, the double cross of Bacquié, the basiocestrum of Metzler, the sling of Mauriceau, the net of Amand, are completely consigned to oblivion among the useless armamenta of the obstetrical art.

In this case we might, perhaps, use with advantage the cephalotribe of M. Baudelocque, the nephew. This instrument has strong and slightly curved blades, the handles of which are traversed by a screw, which closes them with force sufficient to crush the head of the fœtus. Nevertheless, we are inclined to doubt that its great size will render it inapplicable precisely to those cases for which its inventor recommends it, namely, when the fœtus is dead, and the Cæsarian operation becomes necessary, on account of the narrowness of the passages. It does not appear to us, if the small diameters of the pelvis are reduced to less than two inches, that its use is less dangerous than the Cæsarian operation or the mutilation of the child. The motive which led to its invention is undoubtedly laudable; but, all things considered, it might be liable to more objections than cephalotomy, the dangers of which the author has singularly exaggerated.

CHAPTER III.

OF THE MALFORMATIONS OF THE MOTHER WHICH RENDER LABOUR ARTIFICIAL.

The soft, as well as the osseous parts, or pelvis of the mother, may be interested in those malformations which sometimes require the performance of more or less dangerous operations on the latter.

Those of the soft parts are included in two categories. The first comprises the occlusions, complete or incomplete, congenital or accidental, of the vulva, vagina and os uteri: the consideration of these need not detain us in this place, as they have been previously examined in all their bearings. The second category is composed of those malformations which contract the passages through which the fœtus must necessarily escape; these are likewise very numerous, and will separately constitute the subject of our investigation.

Œdema of the labia pudendi, when not excessive, may be considered as a favourable sign; for it proves that dilatation is accomplished, and that the compression exerted by the head of the fœtus, causes the fluids to flow toward the external parts of generation. The tumefaction, however, sometimes is so great, that the opening of the vagina is nearly obliterated, the delivery is effected with difficulty, excites a great deal of pain, and the pressure of the head may cause more or less profound lacerations, or even the formation of gangrenous sloughs. The only plan to prevent these accidents, is to scarify the internal surface of the labia, in proportion to the extent and degree of the engorgement.

Abscesses of various kinds may impede the progress of labour; but this case is very rare, for the fluid contained generally escapes externally, or in those by metastasis, the pus ascends to its starting point, and does not oppose the advance of the fœtus.

Hernia protruding through the parietes of the vagina, although rare, deserves attention. We were consulted by a woman who thought she laboured under prolapsus uteri: in the erect position, there was a tumour hanging like a pudding between her thighs, produced by a portion of intestine which had protruded through the parietes of the vagina. After the reduction of the hernia we applied a pessary, and no accident supervened. We saw the same phenomenon in another rather elderly woman, who was likewise relieved by a pessary. If this accident occurs in a pregnant female, the tumour must be reduced previously to delivery.

Tumours closely resembling hernia may greatly embarrass our diagnosis. We were called to a woman who had become again pregnant after having given birth to twins, and who desired our attendance only when delivery was on the eve of its termination. We found her in a state of extreme agitation, continually vomiting a porraceous matter, succeeded by fainting fits. On touching, we discovered a soft tumour, not fluctuating, which we were informed had existed throughout her pregnancy. The tumour disappeared in the recumbent, and re-appeared in the erect position: it prevented the advance of the head, which had already descended into the cavity of the pelvis. The syncope and vomiting led us to suppose it to be a hernia. Fearing that the compression exerted by the fœtus might increase the symptoms, we were preparing to apply the forceps, when, to our great surprise, the tumour was ruptured by a strong uterine contraction, and the labour terminated spontaneously: a large aperture had given exit to a whitish substance, partly viscid and partly concrete. It was simply a cyst, which was readily cured by means of injections. We have since seen a similar tumour, as large as a hen's egg, in another woman, who was delivered in the hospital of La Maternité; but in this case it did not impede the labour, nor was it ruptured during the progress of the latter.

Varicose veins in the vagina, so common in pregnant women, especially toward the close of gestation, rarely become sufficiently large to impede delivery; but, by their rupture, they may give rise to the effusion of blood in the adjacent cellular tissue, thereby embarrassing the labour to a considerable degree. Baudelocque speaks of a woman who, after a very laborious delivery, was seized with a copious discharge, of which she perished, and which proceeded from the simultaneous opening of an abscess around the right psoas muscle, and an enormous varix formed by one of the lumbar veins. Another woman, whose external genitals were studded with varicose tumours at the time of delivery, was attacked, after the removal of the placenta, by new pains, which were attributed to the presence of a second fœtus, but which Solayrès ascertained to depend on a sanguineous infiltration of the lower part of the vagina, produced by the bursting of one of the varicose veins. M. Deneux has reported several similar cases, and some have also fallen under our notice. These thrombi generally get well spontaneously. Nevertheless, if they were very large, it might be necessary to puncture them, after having waited some time, in order that coagula of blood might close the aperture, and thus prevent a dangerous hæmorrhage.

The tumours of which we have just spoken are not the only ones which may prevent the progress of the fœtus. Others, of the nature of polypi, sometimes pedunculated, sometimes having a broad base, appear either in the vagina or uterus. No general rule of treatment can be laid down. When they are attached by a pedicle, they may be removed either by a ligature or by excision. We are of opinion, however, that it is unnecessary to resort to an operation always when polypus exists, for it may sometimes be more convenient to wait until after delivery. Dubois the elder adopted this plan in a pregnant woman at full term, who had an enormous polypus attached near the os uteri, and occupying the whole cavity of the vagina; the tumour was expelled by the pains, and, after the birth of the child, returned spontaneously, being drawn in by the action of the uterus, and it was not until several months subsequently that it was removed.

Certain tumours, of greater frequency than is generally supposed, are seated in the adjacent parts or in the appendages of the uterus. Baudelocque relates the history of a woman in whom an ovarian tumour, containing several pieces of bone furnished with teeth, contracted the superior strait, so as to render delivery exceedingly difficult. This tumour had been supposed to be an exostosis, and its true nature was not discovered until after death. We have met with some similar cases, which are reported in the Bulletins of the Faculty. We were called one day to the assistance of a midwife in a case of labour in which hæmorrhage supervened at the very moment of delivery. The patient was suffering with phthisis pulmonalis, and exceedingly debilitated. On an examination of the abdomen, we felt in the cavity of the pelvis an enormous tumour, between the rectum and vagina, occupying the whole side of the pelvis, and as large as a child's head. There was but one point, at the left side, through which the finger could be passed to the os uteri, which was dilated only to the size of a two-franc piece. The woman was losing blood, and would evidently perish if not relieved. The difficulty was to attack

such a tumour. Having ascertained, however, that it was movable, we conceived the idea of pushing it up into the belly, whilst we brought down the feet. We introduced our right hand into the uterus, and brought its orifice to the centre of the excavation, and, having ruptured the membranes, we grasped a foot, but had scarcely extracted it when the tumour, being no longer supported, fell again into the pelvis, and prevented the advance of the fœtus. It was necessary to re-introduce the hand in order to push it above the superior strait, whilst we drew on the foot. The child fortunately was not large, and we had the satisfaction of seeing it born alive: but it died from exhaustion in a few hours. After delivery, the woman's abdomen presented two projecting lines, one marked by the uterus and the other by the tumour, resembling closely a bilobed uterus. Since then we have seen another case, in which an enormous tumour occupied the whole cavity of the pelvis. This tumour appeared to be adherent, and the Cæsarian operation had been decided upon. We compressed it slowly, and with great difficulty caused it to ascend. The os uteri, which was above the symphysis, fell into the centre of the excavation, and the labour terminated successfully. The tumour, of the size of a child's head, has remained stationary for four or five years, and in no wise affects the woman's health.

A large vesical calculus may impede labour by slipping below the child's head, and arresting its progress. Several cases of this kind are on record, notwithstanding the rarity of stone in the bladder in women. The greatest injury which could arise from the presence of a calculus would be undoubtedly the contusion of this viscus, which would be forcibly compressed between the foreign body and the head of the child. It might be possible, were we called early enough, to push the stone above the pubes, until the head passed beneath it; this manœuvre should be attempted, even if the calculus had descended before the head; and only when this fails, should we extract the body, by an incision in the anterior part of the vagina.

We will not, in this place, occupy the time of the reader with malformations of the pelvis, of which we treated at length in the first part of this work. We will merely recall to his mind that if the dimensions of this bony cavity were greater than those we have stated as belonging to the type of normal conformation, there can scarcely arise any impediments to delivery, and that at least, should the woman run any risk, the child would generally be free from danger. This observation does not hold good in the opposite case; the contraction of the pelvis may be fatal to the mother and her offspring.

Whenever the antero-posterior diameter is not less than three and a half inches, delivery may be effected, provided the fœtus be not large, and the ossification of the head not very far advanced. When this diameter is but two inches, the expulsion of the fœtus is impossible, and we have no alternative left but the Cæsarian operation, for the crushing of the head would be quite as dangerous. Between two and three and a half inches, there are intermediate degrees requiring various modes of treatment. Among the latter are comprised turning, the application of blunt hooks and forceps, of which we have already spoken; there still remain four others for examination, viz: the observance of a regimen which may prevent the fœtus from acquiring a great development, the provocation of premature labour, symphyseotomy, and the Cæsarian operation.

ARTICLE I.—OF THE DEBILITATING REGIMEN.

The idea of prescribing a debilitating regimen to pregnant women whose pelves are malformed, has long been considered as ridiculous. It has been observed, in fact, that some women, subject to continual vomitings during the whole course of their pregnancy, and in the last degree of emaciation and debility, bring forth children as strong and robust as those who have always enjoyed good health. We also see others whose children are small, whilst they are stout and perhaps have even grown fat during gestation. It is probable, however, that in this respect we have too much generalized facts, which, in reality, possess merely an exclusive character. But, be this as it may, the opinion that the regimen of the mother would exert, at least during a greater part of the time, any marked influence over their offspring, was considered as an absurdity, and we ourselves formerly opposed it. It is therefore proper to state our reasons for changing our way of thinking.

We were called, one day, to a woman of almost athletic constitution, who had been in labour for upwards of sixty hours. Previously to our arrival, two accoucheurs had in vain attempted to apply the forceps. We found her in convulsions, with all the symptoms of cerebral congestion. An examination per vaginam showed us that the head had engaged transversely in the cavity of the pelvis. We were more successful in the application of the forceps than our predecessors, undoubtedly because they had overcome the resistance which prevented the advance of the head, which, in fact, was considerably flattened. The child was born merely alive, and soon expired, notwithstanding all our care. We perceived that the pelvis was contracted, but the dangerous condition of the woman prevented our making a critical examination. Subsequently the woman became pregnant and lived as she had previously done. Having reached her term, we were again sent for. We ascertained that the antero-posterior diameter of her pelvis was scarcely three and one-fourth inches. The pains were active, and the labour having already lasted upwards of sixty hours, we were on the point of applying the forceps. But, by placing the patient over a bidet, and desiring her to bear down her pains, we succeeded in causing the child to pass. The compression of its head had been so great as to produce a slough on each parietal protuberance. It was with great difficulty restored to life. We informed the woman that, if in future pregnancies her children could not be reduced in size, the operation of symphyseotomy might become indispensable, and advised her, as soon as she became pregnant, to acquaint us with the fact, which she did. We subjected her to an extremely severe regimen, and bled her several times. Her pregnancy being accomplished, an assistant, whom we had left with her, finding the dilatation but slightly advanced, and trusting to preceding experience, thought he might leave her for a few hours. He was greatly surprised, on his return, to find that the labour had terminated naturally. The child was small, compared with the others, but it did not die. During a subsequent pregnancy, the woman followed no regimen; the child, very voluminous, could not engage; the application of the forceps was attempted in vain, and we were forced to resort to embryotomy, which proved fatal to the mother and her child.

Were this a solitary case, it would have but little weight: but since then, we have collected several which corroborate it. We are of opinion, however, that regimen cannot be of much service, if the antero-posterior diameter of the pelvis is less than three and a quarter,

or at least three inches. If it be contracted to a still greater degree, this method can only be looked on as auxiliary, and we cannot reckon on its efficacy.

ARTICLE II.—OF PREMATURE LABOUR.

The provocation of labour before the termination of pregnancy, but at a period when the fœtus is viable, has been proposed to avoid the dangers inseparable from symphyseotomy and the Cæsarian operation, when the malformation of the mother's pelvis renders the birth of the child at term impossible. This advice has been based on the well-known instances of children born at the seventh and eighth months, and who, with care, have thriven as well as those born at nine.

Premature labour has long been condemned by French accoucheurs. Baudelocque especially assisted in its rejection, by exaggerating its dangers. He pretended that there was no resemblance between premature labour effected by nature, and that excited by art, even at the full term of pregnancy. In the former, according to him, the uterus is prepared beforehand for the act it is to accomplish, and the function is performed nearly in the same manner as at full term, whilst nothing similar occurs at the seventh and eighth months, in those in whom a malformation of the pelvis renders delivery at the ninth month impossible. This remark of Baudelocque is correct, but only inasmuch as it is applied to premature labours, which occur spontaneously, without external violence: it does not obtain in those which result from a blow, a fall, or any accident of which the effect has been, either to produce an inflammatory state of the internal organs of generation, or the rupture of the ovum and the discharge of the liquor amnii. We believe that it is because the ancients made no distinction between natural and accidental premature labours, that they considered as viable children born at seven months, and non-viable those born at eight months. It appears to us, all other things being equal, that the chances of viability increase as the fœtus approaches the term of two hundred and seventy days assigned as its ultimatum.

In going back to the origin of this practice, there is an important distinction to be made as regards the end proposed. This end may be, in fact, the safety of the mother or of the fœtus. In the former case, we should act as soon as possible after conception, because the smaller the fœtus is, the less difficulty will it meet in passing through the straits of the pelvis. In the latter case, on the contrary, we should wait until the fœtus has attained all the dimensions that it possibly can acquire, without becoming too large to traverse the passages by which it must reach the external world: but beyond this period the operation would be equally useless to mother and child.

This distinction being established, it is evident that we cannot here consider the practice of the Greeks, and which, according to Aetius was very familiar to a matron known by the name of Aspasia. Neither shall we discuss the method employed by Puzos, in cases of hæmorrhage during labour, since the principal intention is to save the mother's life, that of the chiid being only a secondary object. We must come down to the middle of the last century to find an example of labour excited when the viability of the fœtus was well established, and with the formal intention of securing the latter from the dangers which, at a later period, it could not avoid. According to Kelly, Macauley was the first who attempted this operation, in 1755, and was completely successful. Since then it has found many advocates in England, Germany, Holland, and Italy. Among its partisans in England, may be reckoned, Denman, Hull, Clarke, Headly, Barlow, Marshall, Ramsbotham, Merriman, Burns and Conquest: in Germany, Mai, Reisinger, Wervzel, Ritgen, Scheel and Weidmann.

The only case which, in our opinion, would justify the artificial excitement of labour, would be that of a pregnancy of seven months, with a pelvis having a diameter of at least two and a half inches, or at most three inches; for then, the biparietal diameter of the head not being more than three inches, we should have the same chance as if the delivery took place at full term, through a diameter of three and a half inches. We do not think it advisable, in case of the death of the fœtus. Its provocation in chronic diseases, the danger of which is daily increased by pregnancy, and which, from their very nature, must produce death before the natural termination of gestation, seems to us unworthy of serious discussion, until general opinion is definitely settled on the value of the treatment.

In order to form a correct idea of this method, it must not be forgotten, that it has but one object, that of compelling the uterus to expel, suâ sponte, the product of conception before the head has become so large as to render its escape impossible, and that it consequently tends to bring the child alive into the world, without incurring the chances, unfavourable for it and the mother, presented by the other methods hitherto devised. Let us compare it, in fact, with embryotomy, symphyseotomy, and the Cæsarian operation.

The term embryotomy alone dispels at once all idea of parallelism. This operation kills the child, if not already dead, and is very dangerous to the mother. Symphyseotomy, considered with regard to the preservation of the children, offers but few advantages; for, although its effect is to increase the bony circle of the pelvis, it does not always insure their existence; the majority perish during the operation, or from its consequences. Many of the mothers, likewise, fall victims, fewer, indeed, than by the Cæsarian section, and a great part of those who survive, remain subjected to serious inconvenience. The Cæsarian section is less dangerous for the child; in this point of view alone, it would be preferable to the forceps, crotchets, symphyseotomy, version, or even to natural labour; but as the mother has an equal and even greater right to existence than it, it must be resorted to only as a very last alternative, since it exposes the woman to a host of causes of death, either immediate or consecutive. The results of labour artificially excited, are very different. In the summary made by M. Wilde* of one hundred and seventy cases published in Germany, England, Holland, and Italy, it will be seen that one hundred and sixty-one mothers were saved, and that one hundred and twenty children were born alive, of whom seventy-seven survived; the other fifty were born dead, and the nine women who perished were already dangerously ill prior to the operation. Similar facts speak with a louder voice than all the reasoning which can be conceived.

We do not desire, however, to conceal the difficulties pertaining to the provocation of premature labour. In the first place, it is necessary to determine exactly the malformation which exists. As the case is not always urgent, and we have several months before us, we may, before deciding, obtain the opinion of skilful and experienced men; for until our laws are modified, it behoves us to act with the greatest caution. This is not all: we must endeavour to prevent the abuses which might result from ignorance on the one hand, and

* Das Weibliche Gebær—Unvermœgen, p. 204. Berlin, 1838.

from cupidity on the other. Thus, for example, a child born during the 300 days subsequent to the death of the father is legitimate: might it not happen that foul means were employed to insure the benefit of this law to the offspring of illicit intercourse?

If a high degree of reserve is necessary in such a case, it should be no reason for refusing to examine one of the most important questions in obstetrical medicine. The law does not make customs; she merely sanctions and regulates them; and enlightened and honest discussion must furnish her reasons for altering her enactments. Let it be remembered that our art recommends a resort to forcible delivery when copious hæmorrhage or convulsions attack a woman in labour; now, therefore, we cannot conceive how a duty in one case can become a crime in another, where there is but a slight difference in circumstances, and where the object is the same.

ARTICLE III.—OF SYMPHYSEOTOMY.

Symphyseotomy is an operation which consists in the division of the fibro-cartilage, which unites the two bones of the pubes.

It has been pretended that this operation originated with the ancients, even as far back as the time of Galen, or certainly in that of Severinus Pineau. The latter, indeed, proposed emollient applications to the mons veneris, in order to relax the symphysis pubis in women in whom the superior strait was too small to allow the natural termination of labour; and he seems to have thought that advantage might be derived from the section of the interpubal cartilage. No one, however, proposed the operation until, toward the close of the last century, Sigault read an essay on it before the Academy of Surgery, who rejected it as chimerical: without being discouraged, he, some years subsequently, made it the subject of a thesis, defended before the Faculty of Angiers; four years afterward, assisted by Alphonse Leroy, he performed it, for the first time, on a rachitic woman, who was saved as well as her child. From that moment symphyseotomy became the theme of conversation. Lauded by some with all the exaggeration of the wildest enthusiasm, condemned by others with an earnestness unsoftened by reason and sober judgment, it became the origin of a long and violent dispute, during which neither of the two parties could avoid offending the other, and which, as usual, rendered the question more obscure, instead of throwing light upon it. Now that the passions of men on this subject have long been extinguished, we can judge more calmly of symphyseotomy, and assign it its proper rank among the operations of midwifery.

In order to determine the circumstances in which this operation may be useful, we must know to what degree it can enlarge the various diameters of the pelvis.

In general, when malformations of the pelvis affect the superior strait, they bear particularly on the antero-posterior diameter of this strait, and are produced by the flattening of the pubes or the projection of the sacrum. When the contraction exceeds a certain limit, the operation must not be attempted; for if the diameter were only of fifteen or eighteen lines for instance, it would be absurd to perform it, as in the majority of such cases the child could not be extracted. The antero-posterior diameter of the superior strait must therefore be greater, or at least equal to that of the head of the child, and consequently exceed two inches. Now, when the pubes are separated from each other, this separation of the bones effects an increase of the antero-posterior diameter, equal to about two lines for every inch they depart from each other. Again, if in extracting the child we take care to engage one parietal protuberance in the interval between the two pubes, and to pass the other in front of one of the sacro-iliac symphyses, the relative size of the head is diminished by that of the two protuberances, that is, by some lines. It is, therefore, generally supposed that symphyseotomy is practicable when the extent of the antero-posterior diameter is comprised between the extreme limits of two and a half and two and three-quarter inches. Some advocates of the operation have pretended that it might be tried at two and a quarter inches; this method, we believe, would injure both mother and child: under similar circumstances, in fact, symphyseotomy would be attended with all the dangers of the Cæsarian section for the former, without any of its advantages for the latter.

If we may credit certain friends of this operation, the occasions favourable for its performance are of quite frequent occurrence. According to them, we should resort to it whenever the antero-posterior diameter of the superior strait is contracted. We shall hereafter explain to what cases in this respect, in our opinion, it should be restricted. It has been proposed in the double contractions of the superior and inferior diameters resulting from excess of curvature of the sacrum. We have elsewhere said that, in this case, the head could neither advance nor retire, although it was not locked, but preserved the power of moving on its axis. Here the Cæsarian operation would not advantage the child, and the section of the pubes would be preferable to any other operation, if we had abandoned the hope of extracting the latter by means of the forceps.

Symphyseotomy has been recommended when, the feet of the child being brought down, the head remains in the organs of the mother. We should by no means follow this precept. In this case, the life of the child is already greatly endangered by the compression of the umbilical cord, and the preparation necessary would require too much time to afford us any reasonable hope of preserving it. It would expose the mother to the chances of a dangerous operation, which would present no advantages for her child. In such a case, we should not hesitate to mutilate the fœtus.

Among the cases indicating symphyseotomy has been included that in which the breech had engaged in the excavation, and escaped through the os uteri, without being able to advance further. It is difficult to conceive that a man like Gardien should have given similar advice; for, if the breech has descended into the cavity of the pelvis, the superior strait can require no further extension.

Section of the symphysis pubis has been ranked among those methods to which we might resort in cases of locked-head, in order to increase by some lines the extent of the osseous circle of the pelvis. This is a purely theoretical view, admitting of no practical application. The same may be said of the operation in cases of the retroversion of the uterus.

It has been asserted to be useful in transverse contractions of the pelvis. These deformities are extremely rare, and as, in general, the antero-posterior diameter then gains what the transverse loses, it follows that the space is always sufficient to allow the head to engage.

We shall merely glance at those cases in which the contraction of the pelvis depends on an exostosis arising from the sacrum or ilium. It seems to us that the operation, far from being adapted to these cases, is contra-indicated.

In short, the only cases which appear to authorize the performance of symphyseotomy, are that of a contraction of the antero-posterior

diameter of the pelvis, included between two and a quarter and three inches, and that in which the head, having descended into the pelvic excavation, can neither advance nor retreat, on account of a simultaneous contraction of the superior and inferior straits.

These circumstances existing, other conditions are requisite to induce us to resort to the operation. In the first place, it must be necessary, not only that the woman should have reached her full term, but also that she be actually in labour and the fœtus alive. In the second place, we must wait until the os uteri be dilated sufficiently; because, otherwise, if the woman be not strong enough to be delivered without assistance after the section, this latter would be useless. Lastly, it is better to operate before than after the rupture of the bag of waters, because then we have a choice, either of entrusting the delivery to the efforts of nature alone, or of resorting to version, or the application of the forceps, whilst, after the discharge of the liquor amnii, version is so difficult, that we might, in attempting it, compromise the existence of the child, and consequently lose the advantage expected from the operation. This in itself is very simple. We commence by shaving the pubes, after having arranged the probe-pointed bistouries, scalpels, a sonde, some ligatures, pledgets of lint, compresses and bandages. The woman being placed in the same position as for the application of the forceps, the operator stands before her, between her limbs. The bladder is emptied by means of a catheter, which is left in the urethra, and serves to protect it from the sharp instruments. An incision is then made in the median line, commencing at a few lines above the symphysis, and extending to the left side of the clitoris. This incision, which intersects the skin and all the soft parts constituting the mons veneris, should fall upon the very centre of the articulation. The interpubal cartilage is then divided, after having exactly ascertained its situation, for frequently, in deformed pelves, it does not correspond to the median line of the body, but is found to the right or left. The best plan is to first divide, from in front backward, one-half of the thickness of the fibro-cartilage throughout its whole length, and then, with a probe-pointed bistoury passed behind the symphysis, complete its section from behind forward. The advantage of this method is to protect the bladder from injury, which might happen if the whole thickness of the fibro-cartilage were divided from in front backward. It is also proper, toward the termination of the division, to incline the blade of the bistoury to the left, so as to follow the descending ramus of the pubes, and avoid the root of the corpus cavernosum.

When the section is completed, the iliac bones are drawn by the elasticity of the posterior sacro-sciatic ligaments, and a separation of ten or twelve lines takes place between the pubes. Should we stop here, or increase the separation, either by extending the woman's limbs outwardly, or by applying the palms of the hands on the anterior superior spinous processes of the ilia? We can only say that, in a case in which we saw Dubois perform symphyseotomy, this plan was not resorted to. Gardien ruptured the membranes, effected turning without difficulty, and delivered, by the forceps, a child, which lived for several days.

When the delivery is accomplished, the woman must receive those cares that her situation claims. The pubes are drawn together, the wound dressed with lint spread with cerate, and a body bandage pretty tightly applied to prevent the bones from separating. The patient is put to bed, and kept in absolute repose; but she may be allowed to incline to the right or left side, because this position cannot be unfavourable to the approximation of the parts. In ordinary cases, when a cure takes place, it is effected in five or six weeks. But it must not be concealed that the operation is very serious. Two sorts of accidents may arise from it; one primary or immediate, the other secondary or consecutive. The former class is not very numerous. Hæmorrhage is not to be feared, because the tissues divided are nearly all fibrous, and contain but few vessels, which, moreover, are so small as to cause no uneasiness. It could only occur where the instrument is carried too low down along the ramus of the pubes, and the internal pudic artery is wounded, which may be readily avoided with a little care. More dangerous primary accidents, but which can proceed only from a want of skill in the operator, would be the lesion of the bladder, vagina, or even of the uterus.

The symphysis may be ossified, and a saw necessary to divide it. A Neapolitan accoucheur has lately proposed to substitute for symphyseotomy another operation, which consists in sawing on each side the body and ramus of the pubes, between the two obturator foramina. This operation, according to him, would have the advantage of leaving the sacro-iliac symphyses uninjured, of placing the bladder and urethra beyond the reach of danger, and enlarging considerably the antero-posterior diameter. In our opinion, it requires a careful examination, before it can take rank among useful operations.

Among the numerous consecutive accidents of symphyseotomy, we may reckon urinary fistulas, resulting from wounds of the bladder by the bistoury or scalpel, or contusion of this viscus by the head of the child at the moment of its passage. A fistula of this kind occurred in the case which we witnessed, but did not proceed from a wound by the instrument, as was proved by the fact that the flow of urine was under the control of the will for three or four days, after which it was perceived that the dressings were wet with this fluid. A catheter left in the bladder soon effected a cure, because the anterior wall of the organ had been injured.

Much more dangerous are the other consecutive accidents, such as peritonitis, metritis, sero-sanguinolent infiltration, inflammation of the pelvic cellular tissue, laceration of the sacro-iliac symphyses; all of which may prove fatal to the woman. Baudelocque considered the latter particularly as one of the greatest objections to symphyseotomy. In numerous experiments made at the Hôtel Dieu, in Paris, he had ascertained that a separation of two and a half inches between the bones of the pubes, could be obtained only by carrying the limbs forcibly outward, or by drawing on the hips, at the same time that the lower extremities were separated, and that this separation was always accompanied by laceration of the sacro-iliac ligaments. But the experiments of Baudelocque were made on women of all ages, and who had died under circumstances very different from those who are about to be delivered. Now the result is no longer the same if the operation be performed on women who have expired immediately after parturition. This has been seen in experiments since made by MM. Giraud and Ansiaux. These gentlemen have, in fact, ascertained that the section performed in subjects advanced in years, produces but little separation; that at the same age a greater separation is obtained in a woman who has died during labour, than in one who has not, and that then, the laceration of the sacro-iliac symphyses is much less to be feared. Be this as it may, this accident is always to be dreaded, for its consequences are fatal. Even supposing that the patient does not die, she may remain permanently lame, in consequence of want of consolidation of the symphysis pubis. Some practitioners consider this as a favourable circumstance, supposing that a subsequent pregnancy will not require a repetition of the operation. But the bones do not remain disunited; the cellulo-fibrous substance between them merely does not become sufficiently solid; and the separation between the bones can never be great enough to dispense

with a second operation, even if the first had been absolutely necessary, and yet it may permit the protrusion of the organs contained in the abdomen or pelvis. The woman on whom Dubois operated, retained a separation of more than an inch, which allowed the bladder to appear externally, a circumstance which sometimes impeded the excretion of urine.

If, however, the consequences of symphyseotomy are dangerous to the woman, they are not less so to the child. A table, drawn up by Baudelocque proves that of forty-one women operated on, fourteen died; the rest were cured, experiencing always a greater or less degree of inconvenience. Of the children, thirteen only survived. We see, therefore, that the section of the symphysis is extremely dangerous, and that we should resort to it only when circumstances forbid the performance of the Cæsarian operation.

ARTICLE IV.—OF THE CÆSARIAN OPERATION.

The Cæsarian operation is performed by making in the parietes of the abdomen and uterus an incision, through which the fœtus is extracted.

The origin of this operation is lost in the obscurity of time. It appears that at first it was resorted to only in case of the mother's death. A Roman law, ascribed to Numa Pompilius, commanded that the bodies of women who had died in pregnancy should be opened, in order to preserve citizens for Rome. Pliny informs us that Manlius and Cæsar were born in this manner. This custom continued during the middle ages; and even in the seventeenth century, the Venetian government pronounced severe penalties against professional men who did not operate with the same care as during the life of the woman supposed to be dead; and in the eighteenth, the King of Sicily inflicted capital punishment on the physician who neglected to perform the Cæsarian operation on the bodies of women who had died during the last months of pregnancy. Rousset, whose work first appeared in 1581, was the first to maintain its practicability on the living subject; but the greater part of facts of this kind which date from so remote a period, are inauthentic and not very conclusive. Numerous cases are now well established, uniting all the conditions necessary to induce belief; but it seems that all the indispensable data have not been given in order to properly appreciate the intrinsic value of the operation. Great success is said to have accompanied it, but we doubt whether the failures were as carefully enumerated, and our opinion is that if both were equally well known, we should find a much less encouraging proportion than that resulting from the cases reported in medical writings. In fact, when we reflect that the operation has so frequently failed in France and abroad, in the hands of the most distinguished men, we ask how it could be more successful in those of ignorant persons, some of whom were totally unskilled in the healing art, and, according to history, were the first to perform it. Its danger is such, that Dubois the elder thought it never could be successful, and said that in the cases reported as cured, there was probably a rupture of the uterus, through which the child's head had passed. It would be hyper-sceptical to adopt this opinion, for we are in possession of many cases beyond all doubt, proving the successful performance of the operation, and even of its repetition on the same individual.* But although we cannot deny the possibility of saving some women by this method, it is a sad resource to be resorted to only in the last extremity, and when we are solemnly convinced that it is the only chance of preserving the patient's life; it is, in short, the ultima ratio medicorum.

The Cæsarian operation becomes necessary in the following cases:

1st. When the woman dies in the latter period of pregnancy, or at a stage posterior to the viability of the fœtus. Theologians have thought that it should be resorted to at whatever period the mother might perish, in order, at least, to secure the benefits of baptism to her child; if the family desire it, we ought, unhesitatingly, to yield to their wishes. In our opinion this is not essential, unless the child is viable. Moreover, when the mother dies, the disease which proved mortal to her is generally fatal to her offspring. We should have a right to entertain some hopes, only when the death of the mother has been the effect of accident, and even this, it must have been of recent occurrence, for there is, probably, some error in the accounts of children extracted alive from their mother's womb several hours after death. Facts, unfortunately too numerous, related by Van Swieten, Baudelocque, Peu, and others, prove that gross mistakes have been committed under similar circumstances, that apparent has been taken for actual death, that some women came back to life just as preparations were made to perform the operation, and that some even, who were merely in a state of lethargy, perished from the untimely application of the remedy. Other facts have also proved, that in the last moments of life nature frequently makes great efforts to terminate the labour per vias naturales. We were called one day to a young woman who had died of rubeola between the seventh and eighth month of utero-gestation; having found the os uteri nearly completely dilated, we extracted the child, but it was dead. In all cases, if we were obliged to perform the Cæsarian operation on a woman deprived of life, we must first ascertain, by all possible means, that she is dead, after which we would proceed with the same caution as though she were alive, in order to guard against the event of a mistake, the consequences of which would be horrible.

2d. The other cases requiring the Cæsarian operation, refer to malformations of the pelvis, or the presence of tumours in the soft parts, whenever the passages through which the fœtus must escape are so contracted or obstructed as to render delivery by the forceps impossible, and the mutilation of the supposed dead fœtus more dangerous to the mother than the Cæsarian section. In the particular case of tumours we must, moreover, be certain of the absolute impossibility, either of removing them, diminishing their volume by puncturing, or lastly, of pushing them up above the superior strait.

There are two periods to be selected in the Cæsarian operation, one of necessity, and the other of choice. The first occurs when the nature of the obstacle to delivery being well ascertained, accidents supervene, such as hæmorrhage, convulsions, etc., requiring the immediate delivery of the woman. Under all other circumstances, the operation should never be performed before the full period of pregnancy, the onset of labour, nor even before this latter has reached its highest degree of intensity; for if we acted previously to the establishment of the uterine contractions, we should incur the risk of seeing, after the operation, the uterus remain inactive, and the woman experience all the danger resulting from this inertia; and besides, the lochial discharge might not take place. It is, therefore, essential to wait until the dilatation is as far advanced as possible.

* See American Journal of Medical Sciences, for a case in which this operation was twice performed with success by Prof. Gibson, the mother and children being still alive.

Should the operation be performed before or after the rupture of the bag of waters? The advocates of the latter opinion alleged that by this means we prevent the extravasation of the fluid in the cavity of the abdomen. This consideration is too unimportant to exert any influence, for it is difficult to conceive the occurrence of effusion in the abdomen filled by the distended uterus; moreover, compression by the assistants on the sides of the belly would prevent it; and should it even happen, a fluid of a serous nature would not be likely to do much harm in the peritoneal sac. We prefer operating before the rupture of the membranes, because the distension of the uterus is a condition favourable to the contraction of its parietes after the escape of the waters through the incision.

The instruments necessary for its performance are scalpels and probe-pointed bistouries, tenacula, ligatures, needles, strips of adhesive plaster, pledgets of charpie, compresses, a body bandage, sponges, vinegar, and water both cold and warm.

Having arranged all these articles, the woman is placed in the position for the operation of strangulated hernia, supported by assistants, and the surgeon stands at the edge of the bed.

Four different methods of performing the operation have been proposed:—1st. That of Levret, or rather of Rousset, which consisted in dividing the abdominal parietes parallel to the outer edge of one of the two recti muscles, preferring the left, at an equal distance from these muscles, and another line drawn from the extremity of the third false rib to the superior spine of the iliac bones. 2d. That of Mauriceau, adopted by Platner, Solayrès, Deleurye, and Baudelocque, in which the incision was made in the linea alba. 3d. That called by the name Lauverjat, although known before his time, which consists in making a transverse incision from the outer edge of the rectus muscle to a level with the anterior superior spinous process of the iliac bones. 4th. Lastly, that which consists in making an incision parallel to Poupart's ligament, from the spine of the pubes, beyond the anterior superior spinous process, pushing back the peritoneum from the iliac fossa into the cavity of the pelvis, opening the upper part of the vagina, bringing the os uteri opposite to the wound in the belly, and then abandoning the delivery to the efforts of nature alone, or assisting her either by the hand, or the forceps.

There are several objections to the first method. The three muscular planes, the fibres of which follow different courses, are not all divided in the same direction; those which are cut obliquely or transversely, retract so as to prevent the subsequent coaptation of the edges of the wound, necessary to their exact reunion. The epigastric artery or its branches may be wounded, giving rise to troublesome hæmorrhage. Lastly, the longitudinal axis of the uterus, never being parallel to the oblique incision of the lower belly, this viscus cannot be opened unless the greater portion of the fibres are cut obliquely or transversely, occasioning their greater retraction, weakness of the cicatrix, and exposure to consecutive hernia; for these reasons this plan has been abandoned by surgeons.

That bearing the name of Mauriceau, by dividing the linea alba, avoids the muscular fibres, as well as the arterial vessels of any size: the uterus is incised in the direction of its principal fibres, the wound of this viscus can be readily made parallel to that of the abdomen, so that we may ascertain either by the eye or finger, what is passing in the interior of the organs, which we cannot do in Levret's method. This plan has likewise its inconveniences; the bladder may be wounded, and the wound is long in healing.

In Lauverjat's method, as the incision is parallel to the fibres of the transversalis muscle, we merely, as it were, separate these fibres. We, indeed, divide those of the external and internal oblique; but if we pay attention to the point at which the scalpel is applied, we shall see that there they are nearly parallel to the fibres of the transversalis, so that in reality we separate rather than divide them. Serious hæmorrhage could not occur, unless by accident we were to meet some of the anastomosing branches of the epigastric with the lumbar arteries, and we have a better chance of avoiding those vessels, by making the incision parallel instead of perpendicular to their course. The same remark is applicable to the uterine vessels and nerves. Another advantage of this method is, that when the uterus is free from the product of conception and contracts on itself, its inferior posterior forms a sort of funnel in which the fluids arising from the wound collect, and easily escape through the os uteri. Notwithstanding these advantages, the majority of surgeons reject Lauverjat's method, and persist in performing the incision in the linea alba despite its frequent failures.

The idea of those who wished to isolate the peritoneum and the organs contained in it, in order to prevent their injury, is worthy of all praise: but we do not see how this method is exempt from the objections made to the others. Is not equally acute inflammation liable to follow the tearing up of the peritoneum, as an incision properly made through it? Effusion into the abdomen, indeed, is not to be feared; but can this plan be really followed in practice? M. Baudelocque, the nephew, who attempted it once, failed, and was obliged to resort to the Cæsarian operation, properly so called. And again, who will guarantee that, after its separation, the peritoneum will not be lacerated at the time of the passage of the child's head?

Let us suppose that we have selected the linea alba, as the most eligible part for the incision, the following precautions are to be observed. In the first place, in order to avoid injuring the round ligament and Fallopian tube, the uterus must be brought into the centre of the abdomen, and there maintained by two assistants, whose hands are to be applied to the woman's flanks. Levret advised the pinching up of a large fold of skin before making the incision: but the parietes are so distended as to render this impossible. Perhaps it would be better to bring the skin of the abdomen from below upward, with the ulnar margin of the left hand, whilst the right conducts the bistoury. The incision should be five or six inches in length, and run parallel to the linea alba, from the umbilicus to two inches from the pubes; if extended further it might wound the bladder. The integuments being divided, we next incise layer after layer, the aponeurotic planes of the linea alba, as far as the peritoneum. A small aperture is then made in this membrane into which the left index finger is introduced, and the incision enlarged to the same dimensions as that in the skin by means of a probe-pointed bistoury passed along it. The uterus is then exposed, and only remains to be opened. We think that this part of the operation ought to be performed in two stages. In the first, a longitudinal incision is made through about one half of the substance of the organ; in the second, the rest of the viscus is divided gradually until we reach either the membranes of the ovum or the placenta, the former of which may be known by their transparency, and the latter by its peculiar aspect. These parts are then pushed aside with the little finger, and a probe-pointed bistoury substituted for the scalpel, with which the incision in the uterus is made as large as is required: when we meet the placenta, it must not be divided, as has been advised, but detach it at one side in order to reach the membranes. When once these are exposed, they are to be ruptured and the child extracted.

No rules can be given for the performance of this extraction. The operator must be guided by his own judgment. If the back

presents, two fingers are to be placed under the body, so as to bring out simultaneously the breech and shoulders, and the head last. If this latter presents, the finger may be passed under the neck. The extraction rarely presents any difficulty, unless the incision be too small, in which case, the contraction of the uterus impeding the exit of the head, two fingers must be introduced at the upper part of the wound, the chin or jaw grasped, and a see-saw motion from above downward given to the head, in order to disengage it. The forceps have been recommended, but we think that they never can be necessary.

After the extraction of the child, the placenta remains to be delivered. This must not be left to nature alone. If, therefore, this substance has not been detached by the action of the uterus, the hand must be passed between it and the organ, in order to separate and extract it.

The operation being terminated, two fingers are passed into the os uteri through the wound, and two others into the vagina through the vulva, in order to ascertain that the intercommunication is perfectly free; we then proceed to the dressing. It has been asserted that the woman should be placed on her back, and the wound left to itself. This plan could be applicable only to Lauverjat's method, and even then it would be better to maintain the limbs in a state of demi-flexion by means of a cushion, and at the same time flex the upper part of the body on the pelvis—a position which would approximate the lips of the wound. If the incision is in the linea alba, the patient should be extended horizontally in bed, so as to make tense and bring together the edges of the wound. Sabatier rejected sutures entirely, and recommended strips of adhesive plaster alone; but, as these strips act merely on the integuments, the subjacent parts are not perfectly united, and the woman is exposed to all the dangers of eventration. Two or three points of the quilled suture may be usefully applied, remembering to leave at the lower part a free space for the exit of the fluids which escape from the abdomen. We then apply the adhesive plaster, then pledgets of charpie, compresses, and a body bandage drawn moderately tight.

The diet must be extremely strict, like that prescribed after all great surgical operations. It may be necessary to resort to general or local bleeding, more or less frequently repeated, according to the symptoms and constitution of the patient.

It has been proposed that the woman should suckle her child, in order that the movement of fluxion toward the mammæ should diminish the intensity of the inflammation in the abdomen. Whilst admitting the correctness of the physiological principles on which this opinion is founded, we are of opinion that its practical application is improper. The necessity of sitting up, and the action of the child on the breast, frequently give rise to colic in the newly-delivered woman. How much greater influence may these circumstances then not exert over her who has just suffered one of the gravest operations of surgery! We believe that, if any fluxion toward the mammary gland is deemed necessary, it is better to resort to artificial means, such as a pump, cups, or suction by a puppy.

FOURTH DIVISION.

OF LABOURS RENDERED ARTIFICIAL BY ANOMALIES.

In this order, the fourth and last of those we include among artificial labours, are comprised the anomalies which may be met with either in the seat, progress, or product of pregnancy, or in the termination of labour. We shall, therefore, examine successively extra-uterine pregnancy, abortions, compound pregnancy, and rupture of the uterus.

CHAPTER I.

OF EXTRA-UTERINE PREGNANCY.

Extra-uterine pregnancy, as its name indicates, is that in which the product of conception is developed out of the cavity of the uterus. We have previously stated that there were several species, designated by the terms ovarian, abdominal, tubular, utero-tubular, and interstitial, according as this development takes place in the ovarium, abdomen, fallopian tube, or the tube and uterus at once, or in the substance of the uterus itself.

Ovarian pregnancy would be of very frequent occurrence, were we to found our opinion upon the cases reported under this title in medical works. Many moderns, however, doubt its existence, asserting that, in the cases reported as such, there was only abdominal pregnancy, with development of the germ on the surface and not in the interior of the ovary.

Abdominal pregnancy may be either primitive or consecutive. It is called primitive when the product of conception, instead of being grasped by the fallopian tubes, falls into the abdominal cavity, and is there developed. It takes the name of consecutive or secondary when this product, having acquired a certain size in the tube, passes into the peritoneal cavity, after an accidental rupture of the parietes of the organ which, till then, had served as its nidus, and, as in the preceding case, there excites a sort of circumscribed inflammation, the result of which is the product of a cyst, which surrounds and protects it.

Tubular pregnancy is the most common of all. It presents numerous varieties; for the ovum may have attached itself not only to some point of the duct comprised between its uterine and abdominal extremities, but may also be developed partly in the tube and partly in the abdomen, or simultaneously in the abdomen, tube, and uterus.

But few examples are extant of interstitial pregnancy, or that which takes place in the substance of the uterus itself. Several ancient accoucheurs appear to have observed it, but their accounts are very imperfect, and it is only by the moderns, and M. Breschet particularly, that attention has been attracted toward it.

The causes of extra-uterine pregnancy are wrapped in profound obscurity. It has been pretended that a violent moral emotion experienced by the woman during copulation, or some external violence received by her soon after a fecundating coition, might disturb the action of the organ whose office it is to seize the ovum and transport it into the uterus. Even if this theory did not present numerous difficulties, it cannot account for all extra-uterine pregnancies; it can be applied only to those called primitive, and the secondary or con-

secutive, resulting chiefly from the rupture of the uterus in a very early stage of pregnancy, require another explanation. The wisest plan is to candidly acknowledge our complete ignorance of the subject.

It is very difficult, if not impossible, to ascertain the existence of an extra-uterine pregnancy during the first months. It has been asserted that the catamenia did not cease, that the woman was not subject to vomiting, and that milk was not secreted in the mammæ. These pretended distinctions are all illusory. Sometimes the catamenia continues, and sometimes ceases; the same varieties are observed in the secretion of milk, and some women suffer from continual vomiting from the beginning to the end. On the other hand, some women labour under a sanguineous discharge during the three or four first months of uterine pregnancy, and many never have any vomiting: amongst the latter, a large proportion have not the slightest appearance of milk in their breasts. It is important to observe that a fixed, constant and circumscribed pain is sometimes felt at some point in the abdomen, for example, in the groin or umbilical region, and also that the woman may be impregnated anew, and a second fœtus be developed in the cavity of the uterus. The belly increases more or less irregularly, and, in many cases, we can feel two distinct tumours, formed, one by the anormal cyst, the other by the uterus. By touching, we may perceive that this organ is empty, and frequently, that it has not preserved its natural position, that the tumour has pushed it more or less toward one of the parietes of the pelvis. An examination of the abdomen by the hand leads us to the supposition that the fœtus is unusually superficial, and its active motions are more easily discerned, and at the same time are more painful to the mother.

Nothing is more variable than the duration of extra-uterine pregnancies. It may be of only a few weeks, or extend through a long series of years. Cases are related of its continuing for twenty-five, thirty, and even forty-six years; but, in the majority of cases, it does not reach the fifth month. In this respect, extra-uterine pregnancies have been classed as follows: interstitial, tubular, ovarian and abdominal. From this order, deduced rather from theoretical views than from direct observation, the duration of the interstitial would seem to be the shortest, and the abdominal the longest.

It has been remarked, that in those which pass through all the phases of ordinary pregnancy, and of which several cases are on record, there occurs, toward the close, a sort of labour, characterized by intermittent pains, sometimes very acute, a commencement of dilatation of the os uteri, a discharge of mucous or sanguineous fluid, and true uterine contractions. These phenomena have even been known to recur at fixed or irregular periods, when pregnancy lasted for several years. We must, however, by no means consider them as constant.

The most ordinary termination of extra-uterine pregnancies, is the rupture of the cyst, which serves in loco uteri to the fœtus. Sometimes this rupture is suddenly effected after a blow, a fall, or some violent exertion; sometimes it takes place slowly and gradually. Of these two cases, the first is included in that of ruptures of the uterus, of which it presents all the phenomena, and is productive of all the consequences, a hæmorrhage rapidly fatal, or a violent peritonitis, which may, when it does not destroy the mother, give rise to the formation of a new cyst, and thus produce secondary results, analogous to those observed in the second case. The latter, though very dangerous, is rather more favourable, because it affords some chance for the formation either of an abscess, which may save the patient's life, or of a secondary cyst, in the interior of which the product of conception undergoes various alterations, as happens in another mode of termination, of which we are about to treat.

In this mode, the fœtus having perished, either from want of nutrition, or from the effect of the inflammation of the parts which temporarily protected it, is hardened, and as it were mummified, or passes into the state of adipocire; all the fluid parts are absorbed, and the cyst, contracted on itself, becomes gradually a solid and fibrous tumour, which may remain indefinitely in the abdomen without injury to the woman's life. Sometimes, however, this cyst is changed into a sac containing pus, in which the fœtus putrefies, and whose contents gradually find exit, either into the peritoneal cavity, or into some hollow viscus, as the intestine or bladder, or perhaps directly to the surface, bringing with it, at different times, fragments of the child's body. Lastly, under certain circumstances, the sac is replaced by a cyst, filled with a non-purulent fluid, thick or limpid, yellow, brown or reddish, in which float more or less considerable remains of the fœtus. Of these three cases, the first is evidently the most favourable, and to it must be referred those extra-uterine pregnancies which have lasted for a great number of years. The third, much more rare, may also afford the woman some chance of safety. But the second is very dangerous; the mother generally perishes, after a very variable period of time, from the effects of inflammation, the purulent sinuses which extend in every direction, and from hectic fever, which can rarely fail to supervene as a consequence of so much disease. Nevertheless, in some cases, unhappily of too rare occurrence, the abscess has been seen to gradually evacuate its contents, either by vomiting, by stool, or by an external aperture, and terminate in cicatrization, or at least be reduced to the dimensions of an ordinary fistulous sinus. There are some cases of fœtuses, the fragments of which have thus passed into the bladder, where they became the nuclei of calculi which were subsequently successfully extracted.

All the assistance we can render is, unfortunately, of very little moment. Previously to the rupture of the cyst, could we even be certain of the existence of extra-uterine pregnancy, it would be more than rash to attempt any thing, for a dangerous operation should never be performed at random, and here we can never exactly know on what parts we are to act. But, if we were called very soon after the rupture of the cyst, we are of opinion that gastrotomy might be tried; at least it would afford more chance of saving the mother than by abandoning her to the resources of nature alone, and it is now known that it has been sometimes successfully performed, and that it has preserved the life, sometimes of the woman or child only, sometimes of both. The danger of hæmorrhage after the delivery of the placenta, which caused Levret and Sabatier to reject it, has evidently been exaggerated. In all cases, the chances cannot be worse than those of the Cæsarian operation, which is, nevertheless, unhesitatingly prescribed. If we had to treat a cyst, the contents of which manifested a tendency to escape outwardly, it might be emptied by proper openings, at the same time observing all the precautions recommended in the treatment of large abscesses, complicated with purulent foci (*clapiers*) and fistulous sinuses.

CHAPTER II.

OF ABORTION.

Abortion is the premature expulsion of the product of conception.

Different names have been given by writers to this expulsion, according to the period at which it occurs. Aristotle called it *effluxion* when it took place before the seventh day, and *abortion* from the seventh to the fortieth day. This distinction is no longer admitted, and the term abortion is now used to express the expulsion of the fœtus from the uterus, at any period previous to its viability. Unprofessional persons call it *miscarriage*, when it occurs spontaneously, that is, without any appreciable cause, and *blessure*,* when it succeeds external violence or an accident.

Abortion most frequently occurs during the two or three first months of pregnancy. The cause of this frequency is that the connections between the ovum and uterus are quite feeble until after the third month.

Various authors have asserted there are more female than male fœtuses aborted. The contrary opinion, popularly believed, is an error to be attributed to the resemblance which, in small embryos, exists in the configuration of the genital organs of both sexes. The female sex exceeds the other in number, the more as abortion occurs near to the period of conception.

The causes of abortion may be divided into immediate and remote.

As in labour, the uterine contractions, assisted by the muscular efforts of the woman, constitute the immediate cause.

The remote causes are separated into two categories, according as they are predisposing or incidental.

The predisposing causes play so important a part in abortion, that, in many cases, it cannot occur without their agency. Thus, some women miscarry if they merely perceive a pungent odour, lift their arm, or sometimes only get out of bed, whilst, in others, the most serious accidents produce no effect. Mauriceau relates the history of a woman in the seventh month, who broke her arm by falling from the third story of a house, and her pregnancy experienced not the slightest interruption. The predisposing causes relate to the general state of the woman, uterus, or ovum.

It has been generally observed that plethoric, irritable, nervous, hysterical, lymphatic, weak, and unhealthy women, abort more frequently than others. The same remark may be applied to those who are enormously corpulent, if, indeed, they are not barren.

The rigidity of the fibres of the uterus, by impeding the distension of the uterus, predisposes to abortion. At least, the admission of this cause explains the phenomenon, presented by some women, who, after several abortions, more and more remote from the period of conception, at last carry their child to full term. It might be said that, in them, the uterus is obliged, as it were, to try its powers, and can reach only by degrees the extensibility necessary for its complete development. In other women, abortion depends on too great debility or relaxation, congenital or acquired, of the os uteri, on an acute or chronic phlegmasia supervening during pregnancy, but particularly, and most frequently, on some organic lesion of the uterus and its appendages, for example, a scirrhous or other tumour. In this last respect, it is worthy of remark, that tumours of the os uteri almost always produce abortion, whilst those in the interior of the organ frequently allow pregnancy to reach its full term. In short, we must sum up this category of causes, by stating that it includes all those which can prevent the complete and easy development of the uterus.

The causes inherent to the ovum are numerous; but we have no means of ascertaining them beforehand, and can recognize them only after its expulsion. They consist in debility of the product of generation, its death, diseases, unhealthy condition of the placenta or its membranes, extreme shortness of the cord, its being wrapped around the fœtus or twisted on itself, thus destroying the existence of the new being, either by subjecting it to great constriction or by impeding the flow of the maternal blood toward it.

There are likewise many incidental causes. Some act on the whole economy, while others exert a purely local influence.

Among the former, we may include the acute diseases which supervene during the course of pregnancy, fevers of all kinds, affections of the thoracic organs, of the abdominal viscera and the skin, syphilis, certain epidemics observed by the old authors, and of which the cholera has lately furnished an example, and, lastly, habit and inheritance. It is well known that a woman who has once miscarried is liable to suffer from the same accident again. Inheritance can act only by transmitting certain temperaments or organic dispositions favourable to the occurrence of abortion. Various remedies, too often used with criminal intentions, must also be included, such as emmenagogues, drastic purgatives, and stimulants of all sorts. In fact, these remedies frequently fail in producing their expected effect, but nearly always injure the health, and sometimes destroy the life, of those who have recourse to them.

Lastly, this category embraces likewise the moral causes, as fear, grief, anger, and all the passions which suddenly and violently affect the normal course of the circulation.

Not less numerous are the causes which exert only a local influence. To this class belong blows, falls, exercise on horseback, the abuse of dancing, and especially of coition, the source of more than one abortion in newly married persons, particularly in women affected with prolapsus uteri. We may also reckon here the diseases of the bladder and rectum, on account of the irritation they frequently communicate to the uterus.

The phenomena of abortion vary as the contents of the uterus are expelled wholly, or only partly. Sometimes the ovum escapes unbroken; and this generally happens until the beginning of the third month, after which period, the volume of the product of conception does not generally allow this to occur, although some authors, especially among the moderns, relate several cases of the contrary. When the membranes are ruptured, the expulsion of the placenta does not take place, in a majority of cases, until after that of the fœtus; but it has been seen to precede it. Under certain circumstances, the membranes, after their rupture and the expulsion of the germ, preserve their vascular connection with the internal surface of the uterus, and continue to grow, resulting in various species of moles. Under others, when they are not ruptured, the fœtus undergoes an atrophy which reduces it to the dimensions of an embryo of four or five

* The French word *blessure*, used in this sense, does not admit of translation. The English word miscarriage, is applied to both of the conditions here enumerated.

weeks, although the date of the pregnancy may be of several months. This atrophy sometimes even goes so far, without our being able to explain how, as to cause it to completely disappear, so that nothing remains but its appendages, which are frequently transformed into a veritable hydatiform or other mole. Lastly, the fœtus, although dead, may remain in the uterus for a greater or less length of time, and then experiences various alterations, according as the ovum preserves or loses its condition of integrity. In the first case, it resembles those animal substances which have been immersed for a long while in water; in the second, decomposition attacks it, violent fever supervenes, and a discharge of fetid fluid, loaded with putrefied fragments, takes place from the genital organs of the mother.

When abortion occurs during the first days of pregnancy, its phenomena present no remarkable features, and scarcely differ from those of difficult menstruation. Women then suppose that the catamenia have been merely retarded, and mistake for a coagulum the ovum entire or broken, which escapes, accompanied by a quantity of blood, in a more or less fluid state. At a more advanced period of gestation, the symptoms are more marked, but sometimes we observe only those which precede ordinary labour, and sometimes a certain train of precursory phenomena, such as chills followed by flashes of heat, loss of appetite, depression, tumefaction and lividity of the eyelids, a sensation of weight in the arms and vulva, pains in the loins, frequent desire to make water, withering and flaccidity of the mammæ. After some time, the pains become closer, extend from the umbilicus to the coccyx, and assume gradually the characters of true uterine contractions. A discharge, at first sanious, then sanguinolent, and lastly bloody, takes place from the genitals; the os uteri dilates more and more as the pains are more frequent; the membranes project through the orifice, they then engage in it, and are ruptured; the liquor amnii is discharged, and the fœtus is expelled, followed sooner or later by the placenta. All these phenomena, however, with the exception of the discharge of the liquor amnii, may exist without the occurrence of abortion, so that we must always be very guarded in our diagnosis, especially when we cannot pronounce with certainty on the death of the fœtus.

The prognosis, as regards the child, is always unfavourable, since the expulsion occurs at a period when the product of conception cannot exist out of the mother's womb. As regards the mother, it varies according to circumstances. The popular belief is, that abortion is more dangerous than delivery: this opinion is generally erroneous, when considered absolutely; but it has some foundation, because abortion is commonly produced by some dangerous affection. The least dangerous of all abortions are those which depend on some disease of the fœtus or its appendages, and the most alarming, those caused by external violence, and those particularly resulting from criminal attempts. Those which supervene during the course of an acute inflammation of an important viscus or the skin, almost always terminate fatally. With the exception of the last two cases, the degree of danger is generally proportioned to the progress of pregnancy, that is, to the development of the vessels of the uterus or placenta.

The indications to be fulfilled are, to prevent abortion, to assist the expulsion of the contents of the uterus when it has become inevitable, and remedy the accidents which may supervene.

The preservative treatment consists in removing, or at least diminishing as much as possible, the influence of the incidental causes. It must, therefore, vary according to circumstances. If the woman is feeble, we prescribe rest, a nutritious regimen, the bitters and ferruginous preparations. If she is plethoric, we must resort to blood-letting, cooling drinks, and light diet. The same remedies, with the addition of warm baths, are indicated when there is excessive irritability of the fibres of the body of the uterus. When, on the contrary, the os uteri is feeble and relaxed, we employ cold baths, cold mineral waters, cold injections into the vagina, always using the latter with great caution, lest they should produce the accident we are endeavouring to prevent. If the woman has already miscarried several times successively, we must redouble our vigilance, especially at the period of the occurrence of the catamenia before pregnancy, or at that of the preceding abortions: in these cases the patient must avoid all fatigue and violent exertion, and it is even more advisable for her to preserve absolute rest in a horizontal position, until the uterus has ascended above the superior strait. Should there be heat and pain in the hypogastrium, the congestion of the uterus must be relieved by blood-letting, sufficiently moderate withal not to act in opposition to the end at which we are aiming.

Popular prejudice is adverse to the abstraction of blood prior to the fourth month, for it is generally believed that before this period it causes abortion. This opinion, like all absolute propositions in medicine, is erroneous. No general rule can be given for blood-letting; it benefits some women, and injures others. From some, blood may be drawn at any time; from others, only at the commencement or towards the termination of pregnancy: in one case, a single bleeding is sufficient; in another, several are required. Mauriceau relates the history of two women, whose husbands were physicians, and who were bled, one forty-eight and the other eighty times during the course of their pregnancy, which, nevertheless, reached its full term. We must, therefore, be guided by the constitution of the subject, and the indications of each particular case. The arm is commonly selected for the operation, though it is sometimes necessary in the foot, and Levret has not feared to advise its performance. Prudence requires us to abstain from the application of leeches to the vulva.

The preceding remarks are equally applicable to baths. These do not suit all women, and, if too often repeated, they may do harm in the very cases in which they are formally indicated.

We should refrain as much as possible from purgatives, or at least, if they become necessary, use only the mildest and least irritating. It is important to keep the bowels soluble, and prevent the accumulation of fæces in the large intestine, where their presence would be an irritating cause, which might react injuriously upon the uterus. This end can be accomplished by simple enemata, to which are sometimes added one or two spoonfuls of oil.

If the patient is in imminent danger, notwithstanding all the precautions we have taken, and she is suddenly attacked by slight chills, and pains in the lower belly, if uterine contractions appear, and a mucous or even sanguinolent discharge takes place from the vulva, we should still not abandon all hope of preventing miscarriage. Blood-letting would then be useful only in a robust and plethoric woman, with a full and frequent pulse. The accident, however, generally occurs in delicate and nervous females, in whom loss of blood is contra-indicated. The proper treatment consists in placing the patient as horizontally as possible, giving her small narcotized enemata, and administering a sedative draught: by these means the uterine contractions are frequently arrested.

But, if the os uteri gradually disappears, if dilatation has commenced, and the ovum can be reached by the finger, the abortion can no longer be arrested, and the only hope left is, to be able to retard it. Whenever the hæmorrhage is not sufficiently copious to cause

alarm, we confine ourselves to watching the process of nature, and entrust the expulsion of the ovum to her efforts alone. The precept of those practitioners who have advised the membranes to be ruptured, must be carefully avoided, for this plan would infallibly retard the labour and render it more dangerous, on account of the difficulty the uterus would experience in expelling the fœtus and its appendages, after having provoked the exit of the former. It is always a favourable circumstance when the ovum escapes uninjured, as we have stated to generally happen in the first months of pregnancy.

When the violence of the uterine contractions has effected the rupture of the membranes, the discharge of the amniotic fluid, and the expulsion of the fœtus, the process is still not yet terminated. After a shorter or longer lapse of time the blood reappears, and hæmorrhage continues as long as the secundines remain in the uterus. Some authors advise us then to make an examination per vaginam, and when the finger discovers a portion of the placenta or membranes, to draw upon it; but this advice is erroneous, for its only effect would be to increase the hæmorrhage. We either wait for, or endeavour to excite the dilatation of the os uteri. If the woman were losing much blood, we must have recourse to the tampon, or to the introduction of a slice of lemon. The hæmorrhage being arrested, the finger may be passed into the uterus in order to detach the placenta; but should this manœuvre present the slightest difficulty, we must wait, and become calm and patient observers of an event with which prudence forbids us to interfere.

The process is not so simple when pregnancy is far advanced. Our conduct in these cases differs but little from that in labour at full term. The tampon must always be used if the hæmorrhage be copious, and the other rules we laid down when treating of this complication of labour at the ninth month must be observed. When the blood flows copiously, rest is ordered, and the utmost vigilance exerted. The expulsion of the placenta is occasionally retarded for some time; we have seen it delayed until the seventeenth day. It has been erroneously supposed that this organ was absorbed under certain circumstances; but it sometimes putrefies, and is detached in fragments, which are expelled with the lochia. The secale cornutum has been recommended in these cases: this remedy is rather injurious than useful, and we have never seen the least benefit result from its employment.

CHAPTER III.

OF COMPOUND PREGNANCY.

Compound pregnancies are those in which the uterus contains more than one fœtus. According to some authors they occur more frequently in certain localities. Pliny, for example, asserts that they are more common in warm than in cold countries. But the influence of climate upon the production of compound pregnancy, can never be ascertained until all nations adopt some uniform mode of registering births. Be this as it may, the occurrence of twins is not rare. In the hospital of La Maternité, there have been 444 in 37,441 births, or about 1 in 85. Triple pregnancies are much more uncommon, for in the preceding number there were but five. The statistics of 108,000 births in the Hôtel-Dieu and La Maternité, from 1761 to 1826, do not furnish a single example of quadruple pregnancy. Pau, Lauverjat, and some others, relate cases of quintuple pregnancy. The pretended cases of women who have been delivered of six, seven, eight, and even nine children at once, are founded upon no authentic documents, and may be justly doubted, if not treated altogether as fabulous.

Generally, in compound pregnancies, each embryo has its own membranes, the contact of which forms a septum with four superimposed layers; for there is never any caduca between the layers of the chorion and aminon which touch each other. Sometimes, however, the same ovum contains two embryos. Lastly, in some cases each embryo has its amnion, and we find but a single chorion. The placentas are sometimes distinct, sometimes joined in one mass, with or without vascular intercommunication. Whenever the placentas are separate, the fœtuses enjoy a distinct life, that is, one can perish without producing the death of the other, or may even be expelled from the uterus without the consequent termination of pregnancy. In the contrary case, they have a common existence, and the death of one inevitably produces that of the other.

The disposition of twins in the mother's womb is very various; sometimes they are placed alongside of each other, both presenting the head or pelvic extremity to the os uteri; but generally, one presents the head and the other the feet. In some cases, the head of one is turned toward the os uteri, and the other is disposed obliquely; in others, both are placed transversely in regard to the superior strait. We can merely glance at some of their dispositions, whence arise various indications to be fulfilled.

Some physiologists have thought that compound pregnancies were the result of one and a single act of impregnation, whilst others have maintained that they depended on two successive acts, or, to use the term particularly applied to them, were the result of superfœtation. These two opinions are equally correct, but only when not considered in an absolute manner. Two fœtuses contained in one ovum, that is, who have both only one amnion and one chorion, can evidently be produced by only one impregnation; and no other theory can be admitted as regards those in which, although the membranes constituting the ovum are distinct, there is complete fusion, or at least vascular connection between the placentas. Superfœtation, however, is possible when the latter are not united, each fœtus having its separate membranes. In fact, exclusive cases are needed to produce entire certainty in this respect; but these circumstances have occasionally occurred, and several examples of white women or negresses are extant, who, having had connection successively with a white man or a negro, have given birth to two children, one of which was black or white, and the other a mulatto. Nevertheless, superfœtation is only possible when the acts of copulation succeed each other at short intervals, with effusion into the uterine cavity of the coagulable lymph from which the membrana caduca arises. In our opinion this rule admits of no exception, except when the uterus is double, or in case of extra-uterine pregnancy. Those have been considered as examples of superfœtation, in which a woman, after being delivered of a well-formed child, gives birth, after some time, to a second more or less abortive; but these are cases not well understood, and should be referred to twin pregnancies, in which the development of one of the embryos has been arrested from some unknown cause. We attended a lady who, in the third month of pregnancy, experienced all the symptoms of abortion, and whose uterus actually expelled a small fœtus with its placenta. She was supposed to be completely delivered, nevertheless her abdomen continued to increase, and six weeks subsequently she felt motion in the hypogastrium; her pregnancy then progressed regularly, and at the ninth month, that

is, about six after having aborted, she was delivered of a healthy child. Another woman, having been violently agitated in the second month of her pregnancy, was attacked with a sanguineous discharge from the vulva. Fearing an abortion, and as she was a robust person, we took five or six ounces of blood from her arm, ordered absolute rest, which was observed for fifteen days, with the use of cooling and acidulated drinks. The symptoms ceased, the pregnancy went on regularly, and at nine months the woman was delivered of a boy. When attempting to remove the placenta we felt a hard body, which, after the expulsion of the secundines, we found to be a fœtus which had aborted at two or three months, was, as it were, mummified, and contained in a distinct sac, the fluid of which had been absorbed. According to all appearances, this fœtus had been destroyed at the period of the mental shock of which we have spoken, without injury to its brother, with which it had no communication, or otherwise its death would likewise have ensued. Other similar cases might be quoted from our own practice, or from that of others.*

The signs of compound pregnancy are of two orders: those which appear during the course of pregnancy, and those observed during labour. The former of these signs are all very equivocal.

Some writers have asserted that compound pregnancies could be recognized by the excessive size of the abdomen. Accidental circumstances, however, foreign to pregnancy, such as an effusion of fluid, an enlargement of one of the abdominal viscera, or an accumulation of fæcal matter, may occasion, likewise, considerable development of this part of the body.

It has been pretended that, when the uterus contained several fœtuses, the form of the abdomen was irregular; that almost always a depression nearly corresponding to the centre could be perceived, indicating the line of demarcation between the two ova. This depression may exist in some cases: but, usually, no trace of it can be discovered: if it is present, it is especially during labour, and particularly after the rupture of the first bag of waters. It may even be seen without twin pregnancy, and depend merely on the distension of one of the abdominal viscera, a case of which occurred in our practice.

The infiltration of the lower extremities, from about the third or fourth month, is, according to some writers, another sign of compound pregnancy. But it may result from the constitution or mode of life of the mother. A lymphatic woman, living in poverty, and obliged to work hard during the whole period of her pregnancy, would be more liable to it than a female of the same temperament whose fortune enables her to enjoy all the comforts of life.

The motions felt by the woman, are said to have a peculiar character in compound pregnancies. We believe this may be the case, but it can be appreciated only by a mother who has already borne several children, and consequently, able to compare her actual sensations with those of preceding pregnancies. Even in this case, her assertions are to be taken with great limitation, because the motions of the fœtus present infinite variations which she cannot always accurately discriminate. Nevertheless, when the uterus contains several fœtuses, their motions are sometimes felt at the same time at distinct points, instead of at one side only of the abdomen, as in ordinary pregnancies.

All the signs which may exist during pregnancy have, therefore, but little value: this is the less to be regretted, because it is a matter of perfect indifference, whether the uterus contains one or several fœtuses. But when labour supervenes, it is of importance, on account of the delivery of the secundines: fortunately, at this period the signs are no longer equivocal.

In the first place, the uterine contractions take place more slowly, at greater intervals and less energetically than in simple pregnancies, owing to the enormous distension of the parietes of the viscus, and the small degree of retraction afforded to its fibres. But, as soon as one of the bags of waters is ruptured, a marked depression occurs between the ovum, whose membranes are unbroken, and that the waters of which are discharged; the portion of the uterus corresponding to the latter, contracts more forcibly than the other. This inequality of the contractions of the organ is also one of the causes of the tediousness of labour in compound pregnancies.

It is particularly after the expulsion of one child, that it becomes necessary to ascertain whether the uterus is entirely emptied or not. In the latter case, the size of the viscus diminishes, indeed, but it continues to be larger than if the pregnancy were simple. By placing the hand on the hypogastrium, its fundus may be felt extending beyond the umbilical region, and motion may sometimes be perceived. On examination per vaginam, a new bag is found to be formed; or, if this is already ruptured, the head or limbs of the second fœtus may be felt.

The period at which labour occurs is a pretty good rule for ascertaining compound pregnancy. Experience has, in fact, proved that the latter rarely reaches the limit assigned to gestation, that is, two hundred and seventy days. It generally takes place from the seventh to the eighth month. This rule is, however, by no means absolute; exceptions frequently occur.

Nature can sometimes, unaided, terminate the labour in compound pregnancies. It is requisite, for this, that both fœtuses should be properly situated, and both present the head. Now, we have seen that this disposition is far from being constant. Their united size should not exceed that of a single child, for, in that case, the mother, exhausted by one labour, would not have strength sufficient for a second; nevertheless, we have seen twins, each of which weighed five or six pounds. The forceps were necessary to extract one of them, or at least the second. Turning will sometimes answer. Under some circumstances, even this is not indispensable. For instance, if the head of one fœtus, and the feet of the other presented, and we arrived in time, the feet of the latter could be kept up, whilst the head of the other engaged; if natural delivery did not follow, the forceps must be applied, and then the second fœtus extracted by drawing on its feet; or, if the feet of one were sufficiently engaged, we must introduce two fingers into the vagina, push up the head of the other, and keep it above the superior strait, whilst we disengage the one, the feet of which had descended into the cavity of the pelvis. Several objections, however, may be urged against this practice. It may happen that we can easily disengage the head of the first child; but that, when it has reached the external genitals, the head of the second engages in the cavity of the pelvis, above the thorax of the first, the escape of which is thus impeded. It is true, that for this to take place, the fœtus must be larger than is usual in compound pregnancies. The first child must then be entrusted to an assistant, who maintains it reversed on the mother's abdomen; the forceps must then be passed between it and the pelvis, the head of the second child grasped and extracted; the two are to be then disengaged, by delivering first the one which, according to the natural order should have been born last.

* A similar case occurred in the practice of the Editor, the dead fœtus having reached the third month before the accident caused its destruction.

When the first child is expelled from the mother's womb, we must not be in too great a hurry to deliver the other, lest the uterus, passing suddenly from a state of repletion to that of vacuity, be attacked by inertia, which might, as we have elsewhere seen, give rise to hæmorrhage or other accidents, such as inversion, etc. Neither should we wait three, four, eight, fifteen days, and even more. This delay, as Baudelocque well observes, can never be excused by well-informed persons; for if, under the pretext that the second child has not reached its full maturity, it is allowed to remain in the uterus, great danger may ensue to the mother. Some practitioners have done so, it is true, but because they committed the unpardonable mistake of being ignorant of the existence of a second fœtus. When, therefore, we have waited an hour or two, if the uterus does not contract on itself, we may be certain, unless the organ is distended by hæmorrhage, of the presence of a second child, which must be delivered without delay.

Whenever we are obliged to perform turning in cases of compound pregnancy, it is of the last importance to be sure that the feet upon which we exert traction, belong both to the same fœtus; for we might, accidentally, have seized the right foot of one and the left of the other, in which case we should draw down both trunks at once, and it would be impossible to terminate the labour. This mistake may be avoided by following the external part of the limbs with the hand, until it reaches the breech or the organs of generation.

CHAPTER IV.

OF RUPTURE OF THE UTERUS.

By rupture of the uterus is understood a more or less profound laceration of this viscus, which allows a portion or the whole, either of the fœtus merely, or of the ovum itself, to pass into the cavity of the abdomen. This accident, the most formidable of all those which can happen either during pregnancy or labour, admits of two orders of causes, one predisposing, and the other exciting or immediate.

Among the predisposing causes, the first rank is occupied by all those obstacles which, at the moment of delivery, may prevent the advance of the fœtus, and compel the uterus to the execution of prolonged and powerful contractions, such as deformity of the pelvis, strongly marked obliquities of the uterus, scirrhous, fibrous or other tumours, cartilaginous hardness and obliteration of its orifice, occlusion of the vulva and vagina, anormal positions, and some monstrosities of the fœtus. Another category of predisposing causes includes the weakening of the uterine parietes, either from blows, falls, or external violence, which have occasioned the injury, inflammation, softening or ulceration of some part of the organ, or from frequent pregnancies, at short intervals. Lastly, a third embraces the malpositions the woman may assume in her efforts during labour, the improper direction she may give these efforts, the sudden and irregular movements which she performs by throwing her shoulders backward and arching her abdomen, sneezing, fits of coughing, vomiting, bursts of anger and convulsions. In a word, among the predisposing causes, we must include, on the one hand, those circumstances capable of producing a partial weakening of the uterine parietes, and on the other, all those which cause the uterus to meet, during its contractions, with a resistance too great for its powers to overcome.

The immediate cause was ascribed by the majority of the old writers to the violent movements of the fœtus; but in this respect, it would appear that they had mistaken the effect for the cause, and that the movements felt by the woman, at the time of the occurrence of the rupture, were performed by the fœtus only after it had passed into the abdominal cavity. One circumstance corroborating this position, is that the acute and peculiar sensation, the origin of which is referred to the impression of these movements on the parietes of the uterus, is quite as manifest when the fœtus is dead, as in the contrary case. We must, therefore, seek elsewhere the true efficient cause of rupture. During pregnancy, there can hardly be any other that compression exerted on the uterus, either mediately, as might happen to a pregnant woman squeezed between a wall and a vehicle; or immediately, by the sudden contraction of the abdominal muscles. In these two cases, in fact, the uterus thrust against the vertebral column, which does not yield, and supported by the anterior paries of the belly, converted by its contraction into an almost solid plane, must yield and rupture at its sides, where it is not supported. During labour the action of the voluntary muscles is superadded to that of the uterus. If the child sometimes becomes the instrument of laceration, it is never actively, but, as remarked by Baudelocque, its agency does not differ from that of any inert solid body, with an angular surface, upon which the uterus might violently contract. The force necessary to produce the rupture, need not always be very considerable; it suffices that, in each given case, it should be superior to the resistance opposed by the point predisposed to laceration: for, except in the case of external violence, we cannot imagine the occurrence of the accident unless there should exist some of the predispositions just enumerated.

Rupture of the uterus sometimes results from the mode of termination of labour. We have, in fact, seen that, when the liquor amnii has been discharged for some time, it becomes very difficult, or even impossible, to perform version if the pains are strong and the parietes of the viscus embrace closely the body of the child. The most cautious introduction of the hand may then produce laceration; but most frequently in this case the accident is owing to violence, exerted either in bringing down the feet or in applying the forceps.

It has been pretended that there were peculiar signs by which we might predict the occurrence of this accident. It is said that the woman then presents considerable tension and projection of the abdomen; that her pains were violent and almost continual; that the contractions of the uterus were sudden, irregular, and, as it were, convulsive. As symptoms, no value can be attached to these phenomena; for rupture has been known to happen without being preceded by one of them; and in other cases, where, from the presence of all of them, it was supposed to be inevitable, it has not occurred. The accident can be known only at the moment of its taking place. It is accompanied by a crepitus perceptible to the woman, and sometimes loud enough to be heard by the assistants. The patient feels a sudden, acute, and piercing pain, causing her to utter an agonizing cry, and she complains of the falling of a heavy body in the abdomen. She becomes pale, her pulse weak, she faints, and cold sweats, nausea, and vomiting supervene. A gentle heat, like that proceeding from the effusion of a warm fluid, spreads over the cavity of the abdomen, and motion or an uncomfortable weight is felt where none was perceived previously. By applying the hand to the belly, the latter will be found to be sunken, diminished in size, and compressible; to have lost its spherical form, and to present projections and inequalities corresponding to the elevations of the child's body, the motions of which, if it be still alive, are unusually agitated and almost convulsive, but soon cease and give place to absolute immobility. The globe of the uterus is considerably reduced in size, and sometimes pushes aside from the median line. If the accident occurs during labour,

the pains, until then strong and powerful, are suddenly suspended. When it precedes the rupture of the bag of waters, the latter becomes soft and flaccid, although no fluid escapes externally; the os uteri contracts, and the part of the fœtus which till then had been accessible to the finger can no longer be reached.

We have just supposed that the whole fœtus has fallen into the abdominal cavity through the solution of continuity, but this does not always happen; perhaps only a part of the child, its head or body, passes into the belly, the rest, remaining in the uterus or the ovum, being uninjured, may close the gap more or less completely, or, lastly, the laceration may not extend to the outer coat of the uterus, so that none of the contents of the latter can escape into the cavity of the perineum. All these circumstances exert great influence on the diagnosis; in forming it, we are sometimes reduced to general phenomena alone, and sometimes, when consecutive accidents and lesions appear, we know not to what they can be positively attributed.

Ruptures of the uterus are always exceedingly dangerous. In the greater number of cases, both mother and child perish: the former, generally from hæmorrhage or the violent shock given to her whole economy; fainting fits succeed each other rapidly, soon followed by convulsions—the precursory symptoms of death. But if there be no case on record of the child having survived, there are several of women whose existence has been preserved by the formation of a cyst which isolated the fœtus from the abdominal viscera, by a process analogous to that which takes place in extra-uterine pregnancy. Unfortunately, this termination is too rare to allow us ever to hope for it.

All parts of the uterus are equally susceptible of laceration: in no point does it occur more frequently than in another. Much has been said of rupture of the fundus and lateral parts of the organ; but, in our opinion, those lacerations which in reality were in the cul-de-sac of the vagina, have been referred to the uterus. Experience has taught us that they are much more frequent than is generally supposed. We have seen several cases in which the child had passed into the abdominal cavity, and the facility with which we could always introduce our hand into the belly, has proved to us that there was only a rupture of the upper posterior part of the vagina. It may be readily understood, in fact, how common this accident may be, when we reflect that in labours, the termination of which is impeded by a contraction of the pelvis, or any other cause, the pains, exerting great influence on the head of the child, react on the posterior paries of the vagina, which is very thin. Nevertheless, even then, the rupture is generally produced by some bad management. A woman was brought to the Hôtel-Dieu, into whose abdomen the child had passed after several ineffectual attempts at version and the application of the forceps. Dupuytren, at first inclined to perform gastrotomy, afterwards resolved to bring down the feet, and succeeded in extracting the fœtus. He thought the uterus was ruptured, but the autopsy of the woman, who died in twenty-four hours, demonstrated that there was merely a laceration of the cul-de-sac of the vagina. Being sent for to see a woman who had been in labour for twenty-four hours, we found her in a frightful condition, with tympanitic abdomen, frequent pulse, and hurried respiration. The thighs of the child had been fractured, its extraction being impossible, as we were told, on account of the umbilical cord being between the limbs. After having ascertained that this pretended cord was only a loop of small intestine, we proceeded to the delivery, which was soon followed by death. It is probable that, in applying the forceps, the cul-de-sac of the vagina had been ruptured, and the fœtus had passed partly or wholly into the abdomen, and that, in bringing down the fœtus, a loop of intestine had been permitted to slip between the lower extremities. In a short time afterward we met with a similar case. Version and the application of the forceps had both been ineffectually attempted. On touching, we could not feel the child, although we were told that its head presented in the first position; the os uteri was closed, the neck of the womb contracted, and the belly flattened; the uterine globe could be felt behind the pubes, as well as the inequalities produced by the body of the child. Feeling certain that the latter had passed into the abdomen, we sought the feet, which were readily brought down: it was dead, and the mother survived only thirty or forty hours.

We might quote, either from our own practice, or from that of others, many similar cases, which prove that most frequently, rupture of the cul-de-sac of the vagina has been mistaken for that of the uterus. A strong inducement for this belief, is the facility with which the labour is terminated, which would not be the case if the child had passed into the abdomen through a laceration of the uterus, because the contraction of the organ would prevent this termination, whilst the relaxed state of the vagina would not present similar difficulties We do not, however, pretend to deny the possibility of ruptures of the uterus: after the occurrence of the accident, the organ may remain in a state of inertia, produced by the exhaustion of the woman, and we may then proceed in extracting the fœtus from the abdomen through the fissure in the uterine parietes: but, even in this case, the difficulties are much greater than in laceration of the vagina.

Women are subject, after rupture of the uterus, to all the consequences of hæmorrhage and inflammation: but, among all the accidents which may supervene, there is one altogether peculiar to this state, that is, the passage of a portion of intestine through the fissure, and its strangulation by the contraction of the organ. Death is the inevitable result of such a hernia, if it were not understood, as in a case related by Percy; hence, when we suspect rupture of the uterus, although the fœtus may not have passed into the cavity of the perineum, we should, immediately after the delivery, introduce the hand into the organ, and if a loop of intestine be felt, it should be returned to the abdomen, and kept there, until the contraction of the organ had rendered the laceration too small to allow of the reproduction of the hernia.

The indications in rupture of the uterus vary according to circumstances. Could we foresee the instant of their occurrence, they might be prevented, either by version, or the application of the forceps, or the Cæsarian operation, if delivery per vias naturales were impossible. But we are aware of the accident only after it has taken place.

If the child remains in the uterus, we must terminate the labour, by the natural passages, by means of turning or the forceps; and should resort to the Cæsarian section or to cephalotomy, according to the state of life or death of the fœtus, only when the condition, either of the soft parts, or of the pelvis, renders this impossible.

The same course is to be pursued if a part of the child merely has passed into the abdomen through the laceration, the rest remaining in utero; we should endeavour to extract the fœtus per vias naturales, by acting on the part remaining in the uterus, or in the os uteri, or vagina, unless, indeed, this part being too distant or affording no hold to the instruments, it becomes necessary to seek the feet, even through the fissure in the organ.

If the child has fallen wholly into the abdominal cavity, the indications to be fulfilled are not so precise. Some are of opinion, that it is preferable to open an artificial route, than to endeavour to extract it by the natural passages: others, on the contrary, advocate the latter plan, which consists in seeking the feet even in the mother's abdomen, bringing them into the uterus, and thence into the vagina, and afterward re-introducing the hand to deliver the after-birth. We have several times adopted this course: its very frequent failure in those cases in which it has been followed, would seem to authorize the boldness of those practitioners who recommend an incision in the abdominal parietes.

But when should gastrotomy be performed? We may here admit a period of necessity and a period of choice. We might have a choice, were we almost certain of seeing rupture of the uterus occur: we would then be ready to perform the operation as soon as the accident was manifest: and it would be necessary to be at the bedside at the very moment the laceration took place, and make an incision on one side or the other of the abdomen. Some few examples attest the success of the method; it has saved some women; even some children have, through its agency, been born alive. In all cases, the operation, after treatment and diet, would be the same as in the Cæsarian section.

SECTION III.

OF THE DELIVERY OF THE AFTER-BIRTH.

Delivery of the after-birth is the expulsion of the appendages of the fœtus, that is, of all the temporary organs which are indispensable to the latter during its intra-uterine existence, and from which it is separated at birth. Hence, it comprises the expulsion of the placenta, the different membranes and umbilical cord. These parts together constitute a mass designated by the terms, *after-birth* or *secundines*.

The assistance of the accoucheur is popularly supposed to be necessary for the delivery of the secundines. This opinion is founded on that, formerly prevalent, which considered the fœtus as the sole agent in its entrance upon this stage of life. Starting with this false principle, it was thought that the child might be born unassisted, because it possessed energy sufficient to overcome any obstacles it might meet, but that the secundines, deprived of life and action, would remain an indefinite time in the uterus, if not extracted by some helping hand; this is a mistake which should be corrected. In the delivery of the after-birth, as in that of the fœtus, the expulsion of the former is accomplished by the same means as that of the latter; it may, therefore, be called a sort of miniature labour, or rather the completion of delivery. Like the latter, it may sometimes be entrusted to nature alone, and sometimes the interposition of art becomes necessary. In order to discriminate between the two cases, we must first study the phenomena of simple or natural delivery of the after-birth.

CHAPTER I.

OF SIMPLE OR NATURAL DELIVERY OF THE AFTER-BIRTH.

The phenomena of natural delivery of the after-birth form two series, the former of which comprise those which take place when the placenta separates from the internal surface of the uterus, and the latter, those observed during its expulsion.

The separation of the placenta is rarely completely effected at the time of the exit of the fœtus. In general, when the child has escaped from the mother's organs, the previous violent agitation is preceded by a calm, and the woman experiences an indescribable happiness in exchanging her cruel sufferings for a state of repose. But, after some time, she is attacked by pains analogous to those which accompanied the expulsion of the fœtus, though less severe. These pains indicate the endeavours of nature to separate and throw off the placenta. The phenomena vary according to the mode of this separation.

When the placenta is inserted into the fundus uteri, it is detached from the centre toward the circumference. The central part of this mass, which is the thickest, and which, on that account, cannot yield to the retraction of the uterine parietes, separates from the internal surface of the viscus, and establishes a cavity, in which a greater or less quantity of blood accumulates. The placenta is gradually detached throughout its whole extent, and it falls on the os uteri, in the form of a cake, the accessible surface of which is convex and loose. As yet, the woman loses no blood, which flows only after the escape of the secundines.

If the insertions of the placenta are on the sides of the womb, its separation may commence at its upper or lower edge.

In the former case, the placental mass is inverted on itself and doubled, but the membranes then separate likewise; they protrude through the orifice of the organ, forming a cul-de-sac containing coagulated or fluid blood. This sac has sometimes given rise to the supposition of the presence of a second fœtus, until the momentary error is destroyed by its rupture and the consequent discharge. Here, also, when we do not interfere, the sac continues to increase, and the woman loses no blood until after the complete separation of the secundines.

In the latter case the placenta remains suspended to the paries of the uterus until it is entirely detached, and during all this time there is more or less copious hæmorrhage. As, in general, the placenta is folded on itself, and engages in the os uteri, rolled up like an inverted cone (*cornet d'oublie*); we may distinguish with the finger, no longer a smooth, but a rugose surface marked by the inequality of the uterine surface of the placenta, which then presents itself to the touch.

The os uteri, irritated by the substance which has fallen upon it, reacts on the body of the organ which contracts; its orifice expands and permits the placenta to pass into the vagina, the pressure exerted by this mass on the rectum excites the woman to efforts, the result of which is its expulsion.

Such are the phenomena usually observed. But even in simple cases, the interposition of art sometimes becomes necessary, as well as the greatest caution and prudence in acting at the proper time. We should not draw on the cord before the complete separation of the appendages of the fœtus; by a neglect of this precept we might produce prolapsus of the uterus, or rupture of the cord, and leave the placenta either wholly or partly in the mother's organs.

The proper time to interfere is during the after pains, and when on applying the hand to the hypogastrium, we feel the uterus contracted on itself, almost entirely hidden behind the pubes, its orifice expanded with the placenta engaged in it. The cord is then to be wrapped in a dry napkin to prevent it from slipping, and traction to be exerted on it in the direction of the superior strait. Some recommend the introduction of three fingers of the left hand into the pelvis, as far as the os uteri, so as to serve as a pulley over which the cord may traverse, after having thrust it forcibly backward. The idea is not bad; but it possesses the inconvenience of preventing the accoucheur from performing frictions over the hypogastrium, which are very useful in exciting contractions of the organ. When the placenta has descended into the vagina, a slight elevation of the breech will cause it to be expelled.

The whole process may, however, not be terminated by the mere expulsion of the placenta. Sometimes, in fact, only a part of the membranes are detached, the rest adhering more or less closely to the uterus. Were we to draw directly upon them, we lacerate this portion, which, remaining in the organ, might become the source of hæmorrhage, or give rise, by its decomposition, to all the symptoms produced by the presence of a putrefied substance. It is important, therefore, to deliver the woman completely. In order to accomplish this, as soon as the placenta has escaped from the uterus and reached the vagina, the hand which was applied to the hypogastrium, or which extended the cord, is carried toward the posterior commissure of the vulva in order to receive it, it is then grasped with the other hand and twisted five or six times on itself, in order to detach the membranes and form a solid cord of them, thus running less risk of laceration. This manœuvre will succeed in every case except one, which is, when the placenta is implanted in the vicinity of the os uteri, the membranes are torn at its edge; twisting on itself might then not be sufficient to unite them together backward, and after the expulsion of the placental mass it would be necessary to grasp them and twist them separately.

CHAPTER II.

OF THE CIRCUMSTANCES WHICH MAY RETARD THE DELIVERY OF THE AFTER-BIRTH, OR RENDER IT ARTIFICIAL.

The delivery of the after-birth may be retarded, or sometimes rendered artificial, by various circumstances.

Among those, the ordinary effect of which is to retard it, we include inertia of the uterus, spasmodic contractions of its orifice, the breaking of the cord, excessive size of the placenta, its being encysted, lastly, its morbid or preternatural adhesion.

The more dangerous circumstances which admit of no delay, and imperatively demand artificial delivery, are hæmorrhage, convulsions and syncopes occurring in the last stages of labour, or after the expulsion of the fœtus. We shall now consider the first of these alone, the other two having been sufficiently examined in the preceding chapters.

I. *Inertia of the Uterus.*

Hæmorrhage depending on the partial separation of the placenta, may or may not accompany the inertia of the uterus.

The former of these two cases requires the delivery to be, as it were, instantaneous: we must act immediately, because the loss of blood may be rapidly fatal to the woman. Here the hæmorrhage alone should attract our attention, and all those means capable of arresting it should be used as soon as possible.

When, on the contrary, the inertia is unaccompanied by hæmorrhage, and it depends on a feeble, lymphatic constitution of the woman, or privations she may have suffered during the last months of pregnancy, the exhaustion produced by a tedious labour, or the state of stupor into which the uterus has fallen after being too suddenly freed from the product of conception, far from hastening the delivery, it should be retarded, and time allowed for the uterus to recover its contractile power, and the energy necessary to the contraction and approximation of its parietes. Were we then to draw on the cord, the placenta would be too quickly separated, its vascular connections with the mother would remain patulous, and a frightful hæmorrhage might ensue. Moreover, the adhesions might be sufficiently strong for the traction to produce inversion of the uterus. In this case we should, therefore, endeavour to discover and remove the causes which have produced the inertia. Generally speaking, rest, sleep, a small quantity of broth, or good wine, will restore the woman's strength, excite the contractility of the uterus, and cause the state of atony into which it had fallen to disappear.

So long as the uterus does not contract, the vascular connections between it and the placenta remain unbroken, and the circulation continues, in the utero-placental vessels, nearly in the same manner as before the expulsion of the fœtus. Hæmorrhage might then take place from the cord. But this hæmorrhage, the possibility of which is indicated by theory, is not confirmed by practice.* Nothing can be more uncommon than a flow of blood from the umbilical vein: we have never seen a case of it, but it has been observed by Baudelocque, and the advice of this able practitioner, to apply a ligature to the end of the cord, should be followed. Even were this precaution useless, no inconvenience could ever result from it.

It is important to determine how long it is proper to wait before proceeding to artificial delivery. Some writers recommend four, five, six hours, or even several days. This practice is very erroneous: there may result from it either a slow, but constant hæmorrhage, which will exhaust the woman, or greater difficulty for the accoucheur, on account of the contraction of the os uteri. Experience has convinced us, that two hours are sufficient to arouse nature from her state of stupor: if, after this time, the stimulants we have administered do not excite contractions, we do not hesitate to effect without delay artificial delivery.

* This is only possible when a rupture of the membrane, intervening between the vessels of the fœtus and the blood of the mother, takes place.—Ed.

II. *Spasmodic Contractions of the Uterus.*

They may have their seat, either in the body of the organ, or the internal orifice of the neck, the body remaining in a state of temporary or complete atony. In the former case, if the woman is allowed to rest, the fibres will return to their natural state. The latter is particularly observed, when the discharge of the waters having preceded for some time the expulsion of the fœtus, the lower part of the neck is distended by the head, whilst the internal orifice is contracted. We must then, by gentle frictions on the hypogastrium, endeavour to excite the action of the fibres of the body of the uterus, which, contracting on themselves, act on those of the neck, force them to dilate, and afford a free passage to the placenta. Sometimes the dilatation of the os uteri is not so easily effected, and we are obliged to assist nature; in order to do this, we introduce three fingers into the orifice, and endeavour to enlarge it, by pressing on the hypogastrium, and drawing gently on the cord, if it still be present.

III. *Breaking of the Cord.*

The cord is frequently broken by want of skill on the part of the accoucheur, and the immoderate traction he may exert upon it. Its rupture may also depend on congenital weakness of the cord, its want of development, or its putrefaction, which occurs when a woman has been delivered of a child which had perished in her womb some time previously. But its most frequent cause is an irregularity of insertion of the cord, which, instead of adhering to the centre of the placenta, communicates with the edges of this mass by several prolongations expanded like a racket or a goose's foot. These prolongations being of unequal length, may be ruptured by any traction, however moderate, exerted on their common stalk. This state of things is easily recognized by habit, for the laceration of the first prolongation makes a peculiar crepitus, and gives to the hand the sensation of overcoming a resistance. This accident creates but little uneasiness in the mind of the truly well-informed man: for in artificial delivery of the after-birth, the cord plays only the secondary part of an assistant, and the finger is a much more certain guide to the placenta.

IV. *Excessive size of the Placenta.*

The excessive size of the placenta may be only apparent. This happens particularly when the mass, having lost its adhesions with the fundus uteri, contracts on itself, and forms, as it were, a bottom of a lamp (cul-de-lampe) in which the blood collects. In this case, by merely depressing the placenta with two fingers, it will pass through the os uteri. The same remark does not obtain when the increase of size of the placental mass depends on the simultaneous presence of several fœtuses. In compound pregnancies, the after-birth must never be delivered until after the expulsion of all the fœtuses; there is no exception to this rule, except when the various placentas are not united, and can escape separately, after the birth of each child; but then the interposition of art is unnecessary, and nature alone is sufficient. As we can never know, after the birth of the first child, whether vascular communication exists between it and others or not, prudence would dictate the immediate application of a ligature to the maternal end of the cord: for by the neglect of this precaution, the other fœtuses might perish from hæmorrhage, cases of which have occurred. So soon as the appearance of after-pains announces the impending expulsion of the placenta, the cords are collected together, and the mass in which they terminate is drawn to the orifice of the uterus: one is then relaxed, and traction exerted on the other alone, in order to partially disengage the mass. In this manner the delivery of the secundines is not more difficult than in ordinary cases.

V. *Of the encysted state of the Placenta.*

The placenta is said to be encysted when it is contained in a cell which, although making a part of the cavity of the uterus, appears sometimes as distinct as that of the body of this viscus is from the cavity of the neck in the natural state. This phenomenon has been differently explained by authors. The least rational is that of Peu, who ascribed it to a malformation of the uterus, dividing the organ into two separate cavities. According to Levret, it is produced by the part of the uterus corresponding to the placenta remaining inert whilst the other parts contract with more or less violence. Plesman had adopted this theory, with a slight modification; he said that after the discharge of the liquor amnii, the points of the uterus in contact with the child's body, being more highly stimulated than those at which the placenta was inserted, contracted more readily, and thus formed a sac occupied by the latter. Simpson ascribed it to the simple tendency of the organ to recover its pristine form, and, in his opinion, this tendency caused the internal orifice to produce a strangulation, above which the secundines were contained in the cavity of the body, that of the neck remaining below.

The true cause of encysted placenta appears to be in the arrangement itself of the fibres of the uterus. In fact, when this organ is distended by the product of conception, it assumes exactly the form of the body it contains, and, so long as the membranes are uninjured, it is, as it were, agglutinated to the surface of the ovum; but, after the rupture of the sac, the consequent depression causes it to close on itself, and its fibres contracting unequally, are moulded on the body of the fœtus; the head of the latter engaging in the lower part of the neck of the organ, its neck is embraced by the contraction of the internal orifice; hence, when the uterine contractions have overcome all obstacles and entirely expelled the fœtus, the fibres contracting to their greatest degree, produce a strangulation which divides the uterus into two parts, giving it the form of a gourd; hence, the placenta being usually inserted near the fundus of the organ, it must remain in the upper cavity, whilst the cord fills the contracted internal orifice, below which there exists a more or less spacious cavity. When the placenta is inserted toward the fundus uteri or its vicinity, its encysting is complete; it is incomplete, on the contrary, when the placental mass is attached to the sides of the body of the organ.

Leroux admitted another species of encysting, in which the placenta was embraced by the parietes of the uterus, nearly in the same manner as a watch-glass by its case, that is, the cyst containing it is not very deep, has a large aperture, and covers only a small part of its edge. This variety would be included in the explanation we have just given; the only difference would consist in the lesser degree of energy of the contractions of the inferior circle of the organ.

Levret has also spoken of a placenta encysted in a cell formed, indeed, at the expense of the uterine cavity, but nevertheless distinct from that of the body and neck of this viscus, so that, supposing the internal orifice contracted as in the first case of which we have spoken, there would then be three cavities or cells, instead of two. Here the accidental sac is on one side. It has been seen before and behind. These are very unimportant shades of difference, the mechanism of which does not differ essentially from that presiding over the formation of the most ordinary cysts, that is, those in which the uterus assumes the shape of a gourd.

The course to be followed in cases of encysted placenta, is the same as that pursued in spasmodic contractions of the uterus. If no dangerous symptom supervenes, we must wait; the spasm will cease at last, the uterus recover its natural shape, and the secundines be naturally delivered, in an hour or two. If the anomaly continues, we may resort to opiates and baths; blood-letting may be useful if there are symptoms of general plethora. But if the hæmorrhage be sufficiently copious to create alarm, we must effect dilatation of the os uteri, and artificial delivery.

VI. *Morbid adhesion of the Placenta.*

Much discussion has arisen from the question, whether the adhesion of the placenta to the uterus could ever be sufficiently powerful to prevent its delivery. According to some, this arrangement is never seen; and others, on the contrary, assert, that it is very frequent. Neither of these two opinions is strictly correct. It would be contrary to facts to deny the existence of preternatural adhesions of the placenta, and to maintain their frequent occurrence would be equally removed from the truth. The mistake has probably originated in the following manner. As the tractions exerted on the cord to hasten delivery are often fruitless, and end only in rupture of the cord, it has been supposed that there was some unnatural adhesion, whilst, in the majority of cases, the accident was merely the result of an erroneous direction given to the tractions. But morbid adhesions, although much more rare than is generally supposed, are sometimes met with. In some cases they proceed from excessive consistency of the cellular tissue comprised between the placenta and uterus; this peculiarity is particularly observed in strong, plethoric, sanguineous women. In others, they are owing to an incrustation of the arteries, common in old people and known by the name of ossification; we have seen some examples of it; in one woman, among others, whenever we attempted to pass our hand between the placenta and uterus, we heard a crepitus produced by the rupture of the calcareous coats of the vessels. It has been asserted that adhesion might sometimes be referred to a true scirrhous state of the placenta; for a long time we doubted the possibility of scirrhous degeneration, but practice has corrected our error, by exhibiting to us a placenta in which there was a scirrhus as large as an egg, and which we presented the Academy of Medicine.

Opinions are divided as regards the treatment to be pursued under these circumstances. The ancients, fearing the production of contusions, lacerations, in short, of more or less dreadful accidents, from excessive manipulation of the female organs, recommended patience. They even asserted that, when the efforts of nature were incompetent to effect the expulsion of the placenta, this body is either absorbed or destroyed by putrefaction, and carried away in fragments by the lochia. Although this practice has been revived by some moderns, it cannot be too warmly condemned, because it exposes the woman to a series of very dangerous symptoms, and may even prove fatal. No one can have more confidence than ourselves in the resources of nature; but we also believe that, if patience is a quality necessary to the accoucheur, it has its limits, and we are firmly persuaded that the only case in which we are justified in doing nothing, is that of abortion, because then it is impossible to introduce the hand into the uterus.

In the first place, we believe that absorption of the placenta can never occur after a pregnancy which has gone through all its stages. The facts quoted, even recently, do not, in our opinion, carry conviction into an exact and critical mind. At most, this absorption might be admitted after abortion, at an early stage of pregnancy, and, even in this case, it would remain to be proved that the expulsion of the appendages of the fœtus had not taken place in an unperceived manner.

Whenever the placenta remains in the uterus, two classes of accidents, one primary and the other secondary, may manifest themselves. To the former belongs hæmorrhage. A partial separation of the placenta taking place, the woman may lose a quantity of blood, which, without being considerable, may terminate in fatal collapse. Witness the following case. A young lady, the wife and daughter-in-law of a physician, was naturally delivered of a healthy child: the secundines did not follow; but, as no bad symptoms supervened, it was thought advisable, according to the then received usage, to wait. On the third day slight hæmorrhage occurred, which was ascribed to a commencing separation of the placenta: delay was still recommended. Several days passed in this way, with slight but continual loss of blood. On the seventh, her face was observed to be very pale; she was much weaker, and the blood exhaled a fetid odour: her physicians used frictions, injections, and some insignificant remedies. Lastly, on the eighth day, the patient appearing exhausted, we were sent for. We found her apparently anæmic, with a weak and frequent pulse; the belly was painful; the discharge imperfect; the umbilical cord hanging at the vulva, and the uterus strongly contracted on itself. Without concealing from ourselves the danger of the case, we proceeded immediately to effect the delivery of the after-birth, which was easily done. The placenta had formed, throughout about two-thirds of its extent, adhesions, which we gradually destroyed: the adherent portion was as fresh as in a newly-delivered woman, but the loose part was putrefied. Despite all our efforts, this lady died thirty hours afterward. With this case before our eyes in the commencement of practice, we have never hesitated since to effect artificial delivery under similar circumstances. Certainly, when the placenta is not expelled, and no bad symptoms arise, we may wait an hour or two; but, after this period, we should act without delay. The dangers of the manipulations practised on the genital organs have been exaggerated: when these dangers exist, it is because the operation has been performed by unskilful hands, and we ought not to ascribe to it that which is to be attributed to the awkwardness of the surgeon alone.

When the woman loses no blood, the placenta is gradually detached; but it becomes putrid, and communicates a pestilential odour to the fluids which escape from the vulva. The presence of this corrupted mass irritates the uterus, and gives rise to those fatal attacks of metro-peritonitis, which cannot be combated by antiphlogistics, and prove fatal to the patient; or to fevers of a character not less fatal. In this case, likewise, artificial delivery alone is indicated. We should be very wrong in reposing any confidence on the various means which have been proposed, and which we will pass in review.

The ancients employed emmenagogues, drastic purgatives, and a host of other irritating substances, the use of which has been wisely abandoned by the moderns, because their action could only add to the intensity of the inflammatory symptoms.

The use of the secale cornutum has been greatly lauded. Far from believing in its efficacy in hastening the expulsion of the placenta, we are persuaded that it merely creates an additional obstacle. A woman was naturally delivered at six months; but for three days subsequently the after-birth was retained, and our advice was asked. Although no urgent symptoms existed, we proposed an attempt at separation of the placenta; the secale cornutum, which had been already administered without success, was recommended. Two doses of this remedy excited after-pains, but without effecting the expulsion of the placenta. As we had foreseen, the os uteri contracted so much that two fingers could no longer be introduced into its cavity: we were, therefore, obliged to wait for this state to pass over. Thirty-six hours subsequently, a slight sanguineous discharge supervened, soon followed by hæmorrhage: we introduced a tampon, which dilated the orifice, and only then were we enabled to proceed to deliver the after-birth.

Injections into the umbilical vein, of cold water, either pure or mixed with vinegar or alcohol, have been recommended, with the design of destroying the adhesions between the placenta and the uterus, and of exciting the contractions of the latter. This remedy has succeeded in some cases, and failed in others. Its efficacy is by no means constant. Moreover, its harmlessness is not certain, as may be seen by the following example. The expulsion of the after-birth not taking place in a woman whose delivery had been perfectly natural, and traction on the cord having been ineffectually exerted, the physician in attendance injected some cold water into the umbilical vein. This injection produced no effect: it was repeated, but with vinegar and water. This time the woman almost immediately tasted the vinegar in her mouth; she was attacked with ptyalism and such an intense chill, that, during fifteen hours, it was with the greatest difficulty she could be kept warm. Nevertheless, as the after-birth was not expelled, we were sent for. We found the cord hanging in the vulva, and the placenta partly engaged in the os uteri, but not completely detached. We introduced our hand into the uterus, broke up the adhesions, and readily extracted it. All the symptoms ceased, the woman recovered, and has subsequently had several children. This curious fact seems to prove to us that injections of acidulated water into the umbilical vein are not so exempt from danger as might be at first supposed.

VII. *Of Uterine Hæmorrhage after the expulsion of the Fœtus.*

The hæmorrhages occurring after the expulsion of the fœtus, depend on various causes. Some of them are the consequence of lesions or lacerations of the neck of the uterus. When the laceration is not extensive, and interests only unimportant vessels, the loss of blood is inconsiderable; it may be mistaken for the lochia, and generally it ceases spontaneously, in consequence of the contraction of the uterus after the expulsion of the fœtus. If this contraction be insufficient, it can always be relieved by introducing between the lips of the laceration, or simply into the os uteri, a pledget of charpie previously soaked in some astringent liquid; the hæmorrhage ceases immediately.

In other cases the blood proceeds from the internal surface of the uterus, and three distinct varieties of this accident may be admitted. Sometimes the placenta still preserving all its adhesions with the parietes of the uterus, but this latter organ being seized with inertia, a slight discharge of blood takes place from the umbilical cord; sometimes the placenta is partly or wholly detached, and the effusion of blood into the cavity of the uterus arises from its separation; lastly, sometimes hæmorrhage takes place after the expulsion of the fœtus but likewise of the placenta. It may then depend either on a robust and vigorous temperament of the woman, or on a ***molimen hæmorrhagicum*** of the uterus, or on the state of general or local plethora; in a word, it may be active or passive.

In active hæmorrhage the blood is generally rutilant and plastic; it escapes abundantly from the uterus, flows in waves from the vulva, collects at the most depending part of the bed, coagulates readily, and moulds itself on the parts of the woman with which it is in contact. This species is, generally, not dangerous, and ceases suâ sponte; for as soon as the woman is freed from the superabundance of blood, the uterus, possessing all its contractile powers, closes on itself and the discharge is arrested.

But when the hæmorrhage is passive and results from the general atony, or from that of the uterus alone, it presents a still more serious character. Atony of the uterus may depend on a feeble constitution of the woman, either natural or acquired. It may also be the consequence of peculiar circumstances which have supervened during labour. Thus, when the uterus is too suddenly emptied, as when the product of conception is expelled as a whole without previous rupture of the bag of waters, the uterus falls into a state of stupor, because its fibres have, as it were, been taken off their guard. The same thing occurs if a large portion of the fluid contained in the sac be suddenly discharged. But, most frequently, atony of the uterus depends on the fatigue experienced by the viscus from the effects of a tedious labour. Whatever may be the cause, when it occurs, the blood, in rare cases, either flows externally, or as generally happens, it is effused into the cavity of the uterus. The parietes of the organ being flaccid, thus become distended and the blood accumulates. No outward signs reveal the existence of hæmorrhage, and without the greatest caution the woman may soon perish.

These hæmorrhages may be indicated by various signs, of which some are precursory, and others are manifest only at the very moment of the occurrence of the accident. The precursory signs are the following.

In general, when a newly-delivered woman is not attacked with horripilations and chills ten or fifteen minutes after the birth of her child, and her skin remains warm, we may be sure that the uterus does not contract, and that hæmorrhage will follow. An infallible sign is an acrid and dry heat of the palms of the hands and the soles of the feet, resembling that of hectic fever, or that which accompanies the last stage of phthisis. By attentive observation the following phenomena will be remarked. At first the woman states that she feels as usual; and then, suddenly, she complains of a sensation of heat in the abdomen, which is not painful; sometimes she feels as if a hot fluid were effused in the belly; she frequently loses the power of speech, she becomes pale, agitated, and anxious, and her respiration more or less embarrassed; her pulse is frequent but weak; there is a tendency to stupor, or perhaps an unconquerable desire to sleep. If the hand is applied to the hypogastrium, this part will be found soft and flaccid: the globe of the uterus is large, soft, and frequently extends beyond the umbilicus. The os uteri is moderately contracted; its lips are applied against each other so as to retain the blood; but if the finger be introduced into the uterus, a mass produced by the half coagulated blood may be felt, and, by exerting frictions over the abdomen, this blood is expelled.

Other circumstances may likewise cause hæmorrhage after delivery. We have said that this accident was frequently owing to the retention of the placenta in the uterus. But sometimes the placenta is not entirely expelled, and fragments of it may remain, or else the membranes connected with it separate at its periphery and continue to adhere to the parietes of the uterus, or lastly, a portion of these detached membranes forms a cul-de-sac, in which the blood accumulates and gradually distends the viscus to its size during pregnancy. We were one day sent for to see a woman in labour: we could not go immediately, and another accoucheur was called, who, finding the child expelled, drew on the cord and delivered the after-birth, but did not make sure that he had extracted the whole of it: on our arrival we also, from delicacy toward the feelings of a fellow-physician, neglected this precaution; but we soon saw the woman growing pale. On introducing the hand into the os uteri, we found that the membranes partly detached, had formed a sac, in which a great deal of blood had accumulated: we removed the causes of this hæmorrhage, and the effects immediately ceased. In other cases, we have seen hæmorrhages produced by causes foreign to the uterus, and occurring eight, twelve, or fifteen days after delivery. We saw one, for instance, which was owing to the accumulation of hardened substances in the large intestine. One woman, among others, suffered from most obstinate constipation which had resisted enemata and all other remedies; on the ninth day after delivery, she was attacked with alarming hæmorrhage. On examining the belly, we felt an unusual tumour in the right iliac fossa, which we ascribed to a collection of indurated fæcal matter; by means of a spoon-handle, used as a scoop, and introduced into the rectum, we emptied this intestine of its contents, and the hæmorrhage immediately ceased. The same plan was equally successful in another case. We are anxious to draw the attention of medical men to this peculiarity, which is not described by any author with whose works we are acquainted.

The remedies suited to the treatment of hæmorrhage following delivery, may be ranged in three distinct classes. The first comprises those which are applied externally; the second, those which are introduced into the digestive tube; and the third, those intended to act on the interior of the uterus.

Among the first we should never neglect general means, such as exposure to fresh air, free ventilation, and cooling drinks. Frictions made by the hand over the abdomen have been particularly recommended. They may be very useful, especially when used as a preventive measure. They are remarkably efficacious when the hæmorrhage has not reached its greatest degree, and the uterus still enjoys all its contractile power. By frictions over the abdomen, and grasping the uterus with the hand, the contractions of the organ may be excited, the coagula are expelled, and the uterus closing on itself, the hæmorrhage is arrested. It is, however, frequently merely an accessory remedy. The application of cold water, vinegar and water, or iced water, has also been recommended. Some benefit may undoubtedly be derived from them, but they should be resorted to only after having used the remedies of which we shall hereafter speak, and which must be directed to the interior of the uterus. Revulsives, such as manuluvia, ligature of the limbs, the application of fire to the extremities, and sinapisms between the shoulders have been proposed. These means act too slowly, and although their efficacy in some cases cannot be doubted, implicit confidence should not always be reposed in them, because the woman might perish before the expiration of the time necessary for their action. What benefit is to be expected from them, when a thousand vessels are pouring blood in torrents into the uterus? Although the revulsive effect of sinapisms between the shoulders is powerful, it is generally useless on account of the slowness of their action. Ligature of the limbs should be prohibited, because its only effect is to prevent the return of blood from the extremities to the heart, and the woman being already greatly debilitated by the discharge, a syncope, which might prove fatal, would infallibly ensue: and, moreover, it would increase the congestion of the uterus, and consequently, augment instead of diminishing the hæmorrhage.

The stimulants administered through the digestive tube, are either true astringents, or purely tonic substances, or remedies endowed with peculiar properties. The action of internal astringents is, in general, too slow, and can consequently be of no advantage. Tonics may be useful, but only when the woman is debilitated, and after the cessation of the hæmorrhage: to relieve her weakness we then use cordials, good wines, and refreshing drinks. Among those remedies which exert a special action on the uterus, the ergot is most celebrated. This substance should be used, in profuse hæmorrhage, only to prevent a return of the discharge, and not to combat the discharge itself. We think that in weak women who are labouring under inertia of the uterus, it is proper, after having relieved the first symptoms, to administer the secale cornutum, in order to excite the contraction of the fibres of the organ. But in the first period, surgical remedies alone, directed to the uterus itself, can be really efficacious.

The most innocent of all these remedies consists in titillating the uterus with two or three fingers of one hand, whilst the other applied to the hypogastrium, compresses it. This alone will sometimes suffice in causing the contraction of the organ, especially if seconded by exposure to fresh air and affusion of cold water: but, in copious hæmorrhage, it is not powerful enough. The hand must then be introduced into the uterus, passed over its internal surface, in order to separate the coagula which have collected, at the same time that frictions are exerted with the other hand over the hypogastrium. After having extracted the coagula, the hand should not be suddenly withdrawn, for the same thing might occur as when the fœtus is too suddenly expelled, and we would be obliged to reintroduce it, thus giving unnecessary pain. Before withdrawing the hand, we should wait for the manifestation of energetic contractions, and for the uterus to endeavour, as it were, to expel it: by observing this precaution, the organ will not again become distended, and secondary hæmorrhage need not be dreaded.

But this stimulation will only excite the action of the uterus when the woman retains a certain amount of energy; otherwise it will not arouse the organ from its state of stupor. It is in this case that injections of cold water, vinegar or alcohol and water, or diluted mineral acids have been recommended. It has been proposed to plug up the uterus by the introduction of a bladder, distended either by air, or some styptic fluid. Levret states that he has derived advantage from the use of ice; we ourselves have also employed it with benefit. We must be careful that the fragments of the ice are not too large; a piece of the size of an egg is quite sufficient to excite uterine contractions. Snow acts in the same manner, and does not differ from ice, except in being divided. This remedy is, however, liable to objections. Madame Lachapelle asserts that she has seen women, in whom it had been used, die, so that injections of cold water seem to merit the preference. Those of vinegar or alcohol and water are not exempt from danger. For a still stronger reason should we reject those of diluted sulphuric or nitric acid, which could not fail to excite more or less violent inflammation.

The introduction of a sponge soaked in vinegar into the uterus, has been highly recommended; after the advice of Evrat, that of a lemon has been subsequently substituted. This plan can be useful only when followed with great judgment, that is, when the uterus is in a state of inertia, and we perceive, on emptying it of its coagulated blood, that it is not disposed to contract. In order to use the lemon, the rind must be pared off so as to expose one or two of the external cells; it is then introduced by means of one or two fingers, and passed rapidly over the internal paries of the uterus. If the organ does not contract, the fruit must be squeezed so as to cause its juice to flow, and if this does not answer, it is left; the uterus expels it as soon as its fibres contract. M. Desgranges has pretended that a sponge soaked in vinegar was preferable; we maintain the contrary, because the stimulation produced by the vinegar must vary according to its strength, which is nearly always the same in the lemon. Moreover, a sponge absorbs the blood and thus increases in size, so that there is less safety in leaving it in the uterus, than one, two, or three peeled lemons. Let it be understood, that we do not positively reject the sponge, for we may sometimes be obliged to resort to it, for want of lemons, and we should deem ourselves too happy to have vinegar, however bad it may be, at our disposal. Even in this case, owing to the elasticity of the sponge, we should prefer a linen tampon.

These energetic remedies should, however, be used only in extreme cases. The others generally succeed, and we are rarely compelled to resort to the lemon or to vinegar. Evrat, who first used these agents, had recourse to it at most once in five or six years; and during twenty years that we have practised midwifery, we have never once seen it necessary.

The advocates of the introduction into the uterus of a bladder distended by air, could have had no idea of the mechanism of uterine hæmorrhage. This bladder can only distend the organ, and place it in circumstances most favourable to the maintenance of hæmorrhage, for it acts upon it precisely like the ovum, whilst our object should be to make it contract as soon as possible upon itself. The same remark applies to the tampon, which merely converts an external into an internal hæmorrhage, in addition to the possibility of producing contusion or laceration of the parietes of the uterus.

VIII. *Of Syncopes and Convulsions.*

The natural delivery of the secundines may be retarded by syncopes, the cause of which is unknown, or by convulsions. If the placenta is entirely separated and the cord broken, two fingers are introduced through the os uteri, the placenta seized and extracted; this case is very properly included in those of natural delivery. If the placenta is not detached, or only partly so, we must resort to artificial delivery.

CHAPTER III.

OF ARTIFICIAL DELIVERY OF THE AFTER-BIRTH.

Artificial delivery consists in the separation of the placenta effected by the hand of the accoucheur.

The first step, in this operation, is to give the woman a suitable position. This does not differ from that indicated for preternatural labours. The bed must be sufficiently elevated, the woman's breech project slightly over the edge, the legs flexed on the thighs, and the thighs on the pelvis, are supported by an assistant on each side, whilst a third takes hold of her arm, in order to prevent her body from slipping, and obviate any unseasonable movements.

The woman being thus placed and supported, one hand is applied to the hypogastrium, in order to fix the uterus and prevent it from ascending, and the other hand is introduced into the organ. If several days have elapsed since delivery, this introduction must be effected slowly, and one, two, or three fingers necessarily passed through the os uteri. The greatest patience is here necessary to success, the slightest violence might produce very injurious effects. But this precaution is useless when we attempt delivery two or three hours only after the birth of the fœtus. When the cord exists, it serves as a guide to reach the surface of the placenta. When it has been broken, its point of insertion into the latter must be found; this is easily known by its softness, a peculiar reticulation produced by the vessels which ramify over its surface, and the thickness of the parts comprehended between the hand placed on the belly and that in the interior of the organ; the woman, moreover, feels more sensibly when the internal surface of the uterus is touched.

A certain portion of the placenta is generally found to be detached. The operation is then partly performed, and the separation completed without difficulty, by gliding the hand between the uterus and placenta, and causing it to pass slowly until we have destroyed all the adhesions. The placenta being entirely detached, it is pushed before the hand, the action of which excites the uterine contractions, by which it is ultimately expelled. In cases of inertia of the uterus, it is proper to wait until these expulsive pains take place, in order to prevent the accidents which might result from the too sudden establishment of a vacuum. The same precaution is also necessary in hæmorrhage. But, generally speaking, in artificial delivery the excessive irritability of the uterus is more to be feared than its atony. The action of the viscus may become embarrassing, and prevent the complete separation of the placenta. Under these circumstances, we should be careful not to draw on the cord, for we might thus produce lacerations which would render the remainder of the operation still more difficult. We must then wait until the cessation of the pains, after which the separation of the placenta is effected, and traction should be exerted on it only when it has been totally detached.

Cases more difficult than the preceding sometimes present themselves. The placenta, for example, may be partially detached at its upper margin. As it is not always practicable to carry the hand so high, we must act as if there were no separation at all; that is, pass the hand along the inferior margin, elevate it, and gradually destroy the adhesions. When the placenta is detached at its centre, and adherent at its edges, it assumes the shape of a nipple. Some practitioners advise us to grasp this nipple, and give a motion of rotation in order to break up the bands which retain the placental mass; but this manœuvre is not of easy execution. It is better to rupture the placenta at some point of its periphery, and introduce the hand, or, as advised by Leroux, to tear it in its centre, pass one or two fingers in the opening, and detach it by drawing it from above downward.

Is it possible to always extract the whole of the placenta? We have constantly succeeded in so doing. Yet Smellie and Baudelocque state that they have been, more than once, obliged to leave a portion of it in the uterus. When such men assert a fact, we are constrained

to give it credence. But even were it more frequent than it appears to be, we should never neglect every precaution to remove the smallest fragment of the placenta. If, therefore, we perceive that a cotyledon or a part of the membranes were retained, we should not be afraid to re-introduce our hand, in order to remove these substances, the presence of which might give rise to dangerous symptoms, or even to death. We might quote several cases in which cotyledons had remained eight, ten, fifteen successive days in the uterus, without exciting any morbid phenomena, and then have suddenly produced an exhausting hæmorrhage. We have several times recognized the presence of such a foreign body two or three weeks after delivery, and extracted it; but, unfortunately, we have not been always able to prevent a fatal termination.

Accidents of the same kind may also supervene when coagula or fragments of the membranes are allowed to remain in the uterus. A woman being suddenly and unexpectedly delivered, had no time to send, until after the occurrence, for a physician, who proceeded immediately to extract the after-birth: on our arrival she had fallen into a state of syncope: we found the uterus still above the umbilicus: the placenta only had been extracted: the membranes blocked up the os uteri, and internal hæmorrhage was going on. We quickly removed this mass, and the woman, with proper care, recovered perfectly.

Fragments of the secundines left in the uterus do not always excite hæmorrhage. Sometimes they putrefy, and escape with the lochia, or produce phenomena of inflammation, and fevers of low type. We must then use internally the remedies indicated by each particular case. Their action is assisted by emollient injections, by means of a gum elastic tube introduced through the os uteri. These injections must be performed with great caution, for it is asserted, that if driven with too much force, they may be made to penetrate the abdominal cavity, through the fallopian tubes. Emmenagogues and drastics, recommended by some writers, cannot fail in being injurious.

SECTION IV.

OF THE CONDUCT OF THE ACCOUCHEUR AFTER DELIVERY.

The condition of the newly-delivered woman is serious and important, and merits our greatest care: and if the attentions demanded by her situation are not administered by the accoucheur himself, he at least directs and superintends their application.

When the woman is delivered, whether this operation has been natural or not, she is to be left for some time on the bed so recently the scene of her anguish. She is laid horizontally, with her lower limbs stretched out and approximated to each other, after having substituted dry for the wet towels which were around her. Rest and silence are enjoined; she is covered according to the season, to protect her from cold; she is to be furnished with fresh air, by opening a window; untimely visits are forbidden, and, as far as possible, must be removed all the causes capable of exciting immoderate joy or sorrow. She is left for a short time in the same part of the bed on which she was delivered, for two reasons: the first of which is to procure her some rest after the violent agitation she has just undergone; and the second to avoid the fainting which might attack her if too suddenly moved, and which is always to be feared when the labour has been preceded or followed by syncope or hæmorrhage.

The horizontal position is the best, because, if hæmorrhage supervenes, the surgeon can more conveniently arrest it.

The intention of the approximation of the thighs is to retain the blood in the vagina, and allow it to form a coagulum extending as far as the os uteri. The discharge of blood which ensues must be watched, especially in delicate women, and the formation of a coagulum in the vagina is the best means of arresting it.

After the lapse of fifteen or twenty minutes, we introduce two fingers into the vulva, at the same time compressing the hypogastrium with the other hand, and remove the clotted blood contained in the vagina. This is a sage precaution; for, by stimulating the uterus by frictions with the hand on the abdomen, its contraction is assisted, and the after-pains resulting from the accumulation of blood in its cavity are diminished or prevented.

The woman is then to be dressed. The first care is to wash the genital organs and thighs. If the delivery has been natural, tepid water is employed for this purpose; but should hæmorrhage threaten, cold water must be used. This water may be pure or mixed with a little wine, when the genitals have suffered no serious injury: in the contrary case, we should have recourse to an infusion of marsh mallow (Althæa officinalis). As soon as the parts are cleansed, they are wiped with very dry and warm towels; the soiled garments are then removed, and replaced by others, taking especial care to protect well the arms and chest. A warmed cloth is placed between the thighs and a body bandage around the belly. This bandage being purely compressive, should be moderately tight: it has thus the advantage of supporting the abdominal viscera, making amends for the pressure which the relaxed parietes of the lower belly no longer exert, of assisting the contraction of the uterus, diminishing somewhat the after-pains, and of preventing syncope; but, if drawn too tightly, instead of being useful, it would be injurious, and might produce dangerous congestions. All these preparations being made as quickly as possible, the woman is put to bed, which has been made beforehand, warmed and protected by cloths arranged in several folds: she should be covered sufficiently to guard her against cold.

After delivery, when the labour has terminated happily, women feel a sort of fatigue resembling that caused by violent and immoderate exercise. Frequently, they are no sooner put to bed than they are seized with horripilation, chills, extending sometimes even to shaking, and chattering of the teeth. When these chills are moderate they are favourable, and announce that the nervous energy and circulation will soon recover their natural standard. In fact, the pulse, until then small and frequent, becomes full and soft: warmth returns, the skin is covered with a gentle moisture, all the functions assume their usual condition, and the woman enjoys a refreshing sleep, which must be by no means disturbed, but carefully watched, lest hæmorrhage supervene. Too long continued a chill, on the

contrary, may excite alarm, for it is frequently the forerunner of convulsions. Likewise, if the woman remains agitated, and talkative, with a dry skin, hæmorrhage is to be dreaded.

CHAPTER I.

OF THE PHENOMENA WHICH OCCUR AFTER DELIVERY.

The return of the uterus to its original volume takes place in a slow and gradual manner. This return is sometimes effected without any painful sensation; but sometimes also it produces pains very analogous to those of labour, and known by the name of *after-pains*, *dolores postpartum* (*coliques*, *tranchées utérines*.) At the same time a more or less copious discharge takes place from the vulva, constituting what is called the *lochia*. Lastly, the establishment of the secretion of milk is accompanied by a series of phenomena which have collectively received the name of *milk-fever*.

ARTICLE I.—OF THE LOCHIA.

The lochia are the discharges which escape from the external genital organs, from the moment of the delivery of the secundines, until the uterus has recovered its normal proportions and consistence.

The lochia are divided into *bloody*, *serous*, and *purulent*, accordingly as they are composed of pure blood, of serum mixed with more or less blood, or of a purulent mucus.

The first discharge is constituted of nearly pure blood, and begins soon after the delivery of the placenta. Its duration, greatly various, depends on the constitution of the woman: in those of a sanguine temperament it continues until the milk-fever; in those of a feeble, debilitated, lymphatic complexion, it rarely lasts longer than twenty-four or forty-eight hours.

The bloody lochia are succeeded by the serous, more or less tinged with blood, which do not extend beyond the milk-fever. After these come the puriform lochia, called also purulent, white or milky, which result from actual suppurative irritation.

The white lochia have quite a peculiar odour, the intensity of which varies greatly according to the individual, and degree of cleanliness practised. Sometimes they exhale a pestilential smell. This fœtor of the lochia may depend on many various causes. Occasionally it is owing to the putrid decomposition of a portion of the placenta or membranes, which has remained in the uterus; sometimes to that of a coagulum which the organ has been unable to expel; or it may depend on circumstances unconnected with delivery. We should always endeavour to ascertain the cause. Should we on examination discover any fragment of the secundines engaged in the os uteri, it must be removed. Were we to ascertain the presence of a coagulum, it must be extracted with the finger; or, if it is soft and fluid, we must endeavour to wash it out by emollient injections. When the fœtid smell is the effect of neither of these causes, it is the index of the existence of a not less dangerous morbid condition; then we must not only use injections, but likewise administer diaphoretic and tonic drinks, excite the cutaneous and other excretions, see that the cloths are frequently renewed, and that no soiled napkins or garments be allowed to remain in the room.

The purulent lochia continue for a longer time than the bloody. The more or less thick yellowish-white discharge which constitutes them, lasts two, three, or four weeks, generally in an uniform manner, but sometimes also with marked intermissions for twelve or twenty-four hours. In some women the lochia continue for six weeks or two months, that is, until the reappearance of the *catamenia*, or, as it is commonly called, *retour des couches*.

The first menstrual discharge is generally more copious than usual, and may even assume the character of actual hæmorrhage. If not very abundant, moderate exercise may be used during the two first days of their appearance. In the contrary case, the woman must keep quiet, in a horizontal position, as long as the discharge continues copious. This precaution is absolutely necessary to those who suffer from relaxation or prolapsus uteri.

ARTICLE II.—OF AFTER-PAINS.

Uterine colics or after-pains, are the consequence of contractions of the uterus, and the compression of its nerves during its efforts either to expel a clot of blood, or the fluids infiltrated into its tissue, to relieve the congestion of its parietes. Their causes are therefore identical with those of labour pains. They are not observed in all women, nor do they present the same intensity and duration in all.

They are rarely seen in primiparous females. The uterus, distended for the first time, then enjoys great contractility; it readily recovers itself, and the stronger its contractions are, the less chance is there for the formation of coagula, or extravasations of blood in its interior. On the contrary, after-pains are very common in women who have had several children, for their uterus has lost its strength and energy, and is more easily permeated by fluids, which are infiltrated into its tissue. The greater the distension of the organ by the product of conception, the greater the size of the fœtus, the more tedious and painful the labour, the greater is the liability of the woman to after-pains.

They should not be mistaken for intestinal colics, for they are felt in the hypogastrium, and are unaccompanied by alvine dejections. It is highly necessary to distinguish them from the pains which mark the commencement of peritonitis. In the latter, there are always chills, fever, and tension of the abdomen; pain, which did not exist in the absence of pressure, is excited by applying the hand to any part of the belly. After-pains, on the contrary, are neither preceded by chills nor accompanied by fever: they are intermittent; pressure seems rather to relieve than increase them, and each one is followed by a more or less copious discharge of lochia: frequently small coagula escape from the vulva.

After-pains commence during the first hours after delivery, generally cease on the appearance of the milk-fever, and rarely continue longer than the serous lochia. When they are of greater duration, we would have reason to fear the commencement of metritis or peritonitis. They are sometimes so severe as to produce nervous phenomena and convulsions. When they are moderate, nature is competent

to their relief. When more intense, they almost always yield to gentle and uniform pressure over the hypogastrium by a belly bandage drawn moderately tight. If this fails, we must resort to emollient injections, cataplasms to the hypogastrium, anodyne enemata, antispasmodic draughts, and hip-baths. In plethoric women, a copious bleeding is sometimes necessary.

ARTICLE III.—OF MILK-FEVER.

Among the phenomena manifested after delivery, one of the most important is the febrile excitement which accompanies the establishment of the secretion of milk, and is called milk-fever. This fever generally comes on from the sixtieth to the seventy-second hour after delivery. But, like all other vital phenomena, it is subject to great variations. Sometimes it makes its appearance at from twenty-four to thirty-six hours, announcing some complications; in other cases, it is discernible only after three, four, or five days; and we knew a lady who was attacked only on the ninth day: these are purely exclusive cases.

In the majority of women, milk-fever scarcely deserves the name of fever, so slight is its reaction. It is announced, not by chills, which are always the herald of metritis, peritonitis, or pneumonia, but by lassitude, weariness in the limbs, headache, a pricking sensation in the breasts, restlessness, and loquacity. The skin is at first dry, but soon becomes soft and warm, with dryness of the mouth and thirst, but without any foulness of the stomach, for the tongue retains its natural appearance. The pulse is quickened, although moderately, the pulsations not exceeding ninety or one hundred per minute: when more frequent, the milk-fever is no longer normal.

During this febrile excitement, the lochia cease entirely, or are greatly diminished; the breasts become hard and swollen; the tumefaction extends to the axilla, so as sometimes to interfere with the movements of the arms and thorax.

This fever generally lasts from eighteen to twenty-four hours. It terminates by moisture of the skin, then by perspiration, which continues twelve, eighteen, or twenty-four hours at furthest. As the latter becomes less copious, the pulse loses its rapidity, the swelling of the breasts decreases, and from the nipple there exudes a serous fluid, called colostrum, which disappears in one or two days and gives place to the milk properly so called. Things then pursue their natural course, and the secretion is established.

Some care is indispensable during the course of the milk-fever. All animal food should be prohibited, and the woman allowed only diluent drinks, barley water, sugar and water rendered agreeable by the addition of aromatics. She should not be much covered, nor her breasts compressed, according to the preposterous custom generally adopted. By too much clothing, we excite perspiration, which weakens without relieving her, incurs the risk of producing congestions of the chest, and consequently great danger—or we may cause the development of miliary fever. But we must be careful not to fall into the opposite extreme, for cold might give rise to peritonitis, or some other not less formidable phlegmasia.

CHAPTER II.

OF THE MANAGEMENT OF THE LYING-IN WOMAN.

The atmosphere of the chamber occupied by a woman recently delivered, should be frequently renewed; but we must not allow the external, always colder than the internal air, to blow directly upon her: we must be careful that the room contains nothing which can deteriorate the purity of its atmosphere by loading it with exhalations; therefore, all soiled linens, and excretions of every kind, as well as odoriferous flowers and perfumes, must be removed.

Too elevated and too low a temperature are equally injurious to the newly-delivered woman. The proper temperature is about 12 or 15 degrees of Réaumur. It is prudent to keep up a little fire in the room, even in summer, and particularly at night: we thus avoid those sudden changes of temperature which so frequently produce peritonitis, pleurisy, and phlebitis.

The best of all drinks is sugar and water: if we wish, for the sake of variety, or for any other reason, to prescribe something else, it should always be diluent, mild, and sweetened with sugar, simple syrup, or syrup of capillaire, (adiantum capillus veneris.) Stimulating drinks, of whatever nature they may be, cannot fail to be injurious: they must be the more rigorously prohibited, because popular prejudice, too widely spread, has long considered them as indispensable. The drink selected should always be tepid, during at least three weeks: cold drinks are admissible only during the first hour succeeding delivery.

As regards food, we must not forget that a lying-in woman is not sick, but merely convalescent. If she has appetite, she must be nourished, but in moderation; not having sufficient food, she would fall into a state of debility which would predispose her to purulent absorptions, and their consequent serious and dangerous maladies. By modifying the customs of the hospital of La Maternité, where, before our time, the women were subjected to the most rigorous diet, we have greatly diminished the mortality in this establishment. During the twenty-four hours which succeed delivery, we allow two or three bowls of porridge during the day, and a little weak broth at night: never more. Complete abstinence should be observed only during the milk-fever; when it is over, we permit a small quantity of meat, graduating the regimen, so that in twelve or fifteen days the woman returns to her usual habits of life.

The nervous system of newly-delivered women is generally so excitable, that we should carefully remove every thing which might be the cause of sudden or violent emotion of any kind whatever.

It is of great importance that she should remain in bed for the first eight or nine days. This is the only means of preventing prolapsus uteri, so common in women who refuse to observe this precaution, and in those whom necessity obliges to neglect it. The bed has, moreover, the advantage of keeping up a gentle heat, favourable to the cutaneous exhalation. Formerly, the newly-delivered woman was forced to remain extended on her back for the first twenty-four hours. Unless hæmorrhage exist, or it is to be feared, this inconvenient situation is of no real utility after an hour at most. After this period, the woman should be permitted to turn, at pleasure, upon one side or the other, and even to raise herself slightly on her breech, in order to refresh herself.

The genital parts, constantly soiled by the lochial discharge, should be preserved in the state of greatest cleanliness by frequent

ablutions. Tepid water, or some emollient decoction, is most suitable for this purpose. An infusion of chervil (chærophyllum sativum) in milk is frequently used. An infusion of red rose leaves has been recommended in lymphatic women, and those disposed to prolapsus uteri; it should not be used during the sanguine lochia, and only when the discharge has assumed a purulent character. The intention of lotions is not only cleanliness, but to calm the irritation produced by the contusions or lacerations suffered by the genital organs during labour.

Three excretions demand particular attention: perspiration, the urinary secretion, and alvine dejections.

It is sufficient to keep the skin in a state of moisture, which can readily be effected by remaining in bed and the use of warm drinks. Profuse perspiration would be injurious rather than beneficial. Some lying-in women experience difficulty in urinating, others suffer from incontinence, either because the urethra has been contused by the child's head during labour, or because the bladder has lost its tone. Retention of urine requires peculiar attention, because the woman does not always complain of it at first. The only plan of relieving it is to introduce the catheter two or three times daily, until the urine passes freely, which sometimes requires considerable time. Incontinence of urine has generally a more serious character. When it occurs during the month, astringent lotions are prescribed. Subsequently to that period, sea water baths, local affusions of Barèges water on the pubes, the chalybeate waters of Spa, Balarne, are recommended; but generally, time alone will effect a cure.

The dangers of constipation are very great in recently delivered women; it may produce hæmorrhage, congestion and inflammation of the abdomen. It must, therefore, be relieved, and the bowels kept soluble. If enemata, rendered gently laxative by the addition of honey, are not sufficient, we prescribe half an ounce of oleum ricini, which always excites one or two evacuations.

The greater part of women wish to be purged after delivery, and some, who have not been, attribute to this cause all the diseases which may attack them subsequently during fifteen or twenty years. It is a popular opinion, likewise, that those who do not suckle their child, can be relieved of their milk only by purgatives. If no absolute contra-indication exist, we may, without impropriety, yield to this prejudice, taking care to select mild purgatives, such as sulphate of soda, oleum ricini, Seidlitz or Pullna waters. But we should never purge previously to the milk-fever, and during the lochial discharge; for it would be taking a useful work from nature's hands, and preventing the disengorgement of the vessels of the uterus.

CHAPTER III.

OF THE MANAGEMENT OF THE NEWLY-BORN INFANT.

The particular cares required by the child vary with its condition at birth, that is, accordingly as it is strong and healthy, or feeble and diseased. When the child is healthy, the first thing to be done is to receive it; we examine if the cord is twisted around the neck or trunk, and if so, disengage it; after which the infant is laid on its side, between the mother's limbs, its face turned in an opposite direction from the vulva, so that it may breathe freely, and not be exposed to the chance of suffocation by the fluids escaping from the genital parts. The cord is then divided with scissors or otherwise. This section should be made at two or two and a half inches from the abdomen. By performing it closer, we would have difficulty in applying the ligature, and if, as sometimes happens, a loop of intestine were engaged in the cord, it might be included. If a greater length of cord be left, its subsequent putrefaction might be very unpleasant.

If the child cries, we may immediately proceed to apply the ligature. But if it does not cry, we must endeavour to ascertain the cause of the absence of respiration. Now, this cause may depend on two opposite conditions, called, one apoplexy, and the other asphyxia neonatorum.

Apoplexy is observed in large children whose expulsion has been painful and tedious, especially when, after the escape of the head, the body has been more or less squeezed and compressed. These peculiarities are principally manifest in first-born infants, when the liquor amnii has been discharged several hours before delivery. In this case, in fact, the relations of the placenta and uterus are no longer the same as they were previously, and the circulation between these two organs is not effected in a normal manner. Hence there is an accumulation of blood in the vessels of the encephalon, constituting an apoplectic condition, which becomes true apoplexy when the blood is effused on the surface of the meninges, or in the substance of the brain itself. In this case, the surface of the child's body, especially the face, is of a livid, violet, or rather a bluish-black hue: its limbs are flexible, but without any elasticity; its body retains its heat, but the pulsations of the cord as well as of the heart are very indistinct or almost imperceptible. The first and most urgent indication is to relieve the congestion of the brain. This may be done by promptly dividing the cord, and allowing the escape of a small quantity of blood. If respiration is not immediately established, the finger must be introduced into the pharynx, in order to remove the mucus which may have collected there. These means being still insufficient, and the cord furnishing no blood, or not enough, it is to be again divided higher up: the infant placed in a tepid bath, and rubbed with acidulated water. As soon as respiration commences, the blood is to be arrested; the violet colour of the integuments gradually disappears, giving place to a roseate hue, which appears first on the lips, then on the cheeks, and over the rest of the body.

In asphyxia neonatorum, or of newly-born infants, the skin is extremely pale, the flesh soft and flaccid, the heat of the body lessened, the pulsations of the heart continue, respiration does not take place, although sometimes efforts at its establishment are perceived. This state occurs in feeble children after a laborious and tedious delivery, in which the contractions, without being powerful enough to expel the fœtus, have nevertheless changed the relations between the uterus and placenta, so that the child continuing to give out without receiving blood, is weakened in proportion to the duration of these anormal conditions. We may hence appreciate the worth of the advice given by some practitioners, not to divide the cord, under the pretext that the mother's blood will restore the child to life. On the contrary, it must be immediately cut and tied, or else the child will continue to grow weaker. Its mouth is to be freed from the mucus which may have collected in it: its body must be rubbed with a piece of dry flannel: gentle percussion applied to its shoulders and breech: it must be held before the fire, and immersed in a warm bath mixed with wine or brandy. It may be useful to tickle its nostrils with a

feather dipped in vinegar or lemon-juice: but we should never use spirit of ammonia, which might irritate the nasal mucous membrane: we have seen a child perish from a kind of false croup produced by the employment of this remedy. Enemata of the smoke or decoction of tobacco are equally useless. Pulmonary insufflation has often succeeded: but it must be performed with great caution, lest it should rupture the extremities of the bronchial vessels, the consequence of which would be emphysema of the lungs and death.

When respiration is once established in the child, the circulation begins to assume the new course it is to follow in after life. The ligature of the cord would be, therefore, useless, if respiration were always perfectly executed. Pain felt by the child, compression of the thorax, or any other cause, may derange or suspend this function: the circulation might return to the condition of intra-uterine life, and hæmorrhage supervene, several examples of which are actually on record. It is, therefore, always more prudent to tie the cord.

For this purpose we use, not a single thread, which might divide the cord, but a narrow ribbon, or a ligature made of several threads twisted and well waxed. It is applied at two inches from the umbilicus, and drawn sufficiently tight to obliterate the vessels without cutting their coats. If the umbilical cord is very thick, or as it is called, fat, a single ligature will not suffice, the evaporation of the gelatine of Warthon, would relax it so as to allow the vessels to regain their size, and hæmorrhage might ensue. The cord should then be scarified, and two ligatures applied at some distance from each other. The ligature must not be applied on the skin when this extends over the cord, for there would result great pain to the child, and ulcerative inflammation very difficult to heal. It is popularly supposed that the projection or depression of the navel, is owing to the manner in which the cord has been tied: this is a mistake. The cord always separates at a point determined before-hand, and we can judge of the form of the navel, from the relation of the abdominal integuments to the cord: if the skin extends over the latter, the navel will project: and, on the contrary, will be depressed, if the cord extend over the belly.

The cord being secured, the child is to be washed and cleansed of the mucus, blood, and sebaceous matter which covers it.

If the sebaceous coat were not removed, it might produce irritation and erysipelas. It must be taken away, but it will not mix with water. Many nurses use dry friction alone, which never detaches it completely. It may be quickly and easily separated by anointing the child's body with oil or fresh butter, and then wiping it gently with a warm cloth, especially in the axillæ, the folds of the groin, and the labia pudendi of female children.

When this coat is removed, the child should be immersed in a bath of water, either pure or mixed with wine, of about the temperature of 25 degrees of Réaumur. Cold baths are improper, even if the only objection to them were a liability to produce induration of the cellular tissue. Neither should we permit the child to be washed with wine, and especially with brandy. Wine, by irritating the skin, sometimes causes the eruption of small pimples which terminate in suppuration, and even in death, as in a case related by Baudelocque. Similar accidents are undoubtedly rare; but the practitioner should remember that they are possible.

The child, after being well cleansed and wiped dry, should be dressed; but previously, the umbilical cord must be secured from injury. It is wrapped in a square piece of linen, with a hole in the centre sufficiently large to allow it to pass through, and placed on the upper left part of the abdomen, on account of the diminution which the liver undergoes, the whole is covered by a second compress, kept in place by a belly-band drawn moderately tight about the body. The loose portion of the cord soon desiccates; a line of demarcation is formed toward the umbilicus, between the sheath and the skin of the belly, a circular ulcerative inflammation supervenes, which gradually destroys its connection with the child's body. When the cord is fat it does not desiccate, but discharges an acrid and irritating fluid, which sometimes excites erysipelatous inflammation. It generally falls off on the fourth or fifth day, and is perfectly cicatrized in thirty-six hours afterward. In some cases, however, a slight oozing remains and continues, occasionally, for six weeks or two months. In others, after the fall of the cord, slight fungous excrescences pouring out a little pus, are discovered. If they do not disappear spontaneously, they may be kept down by lotions of sweetened wine, or dusting them with pulverized sugar candy. If necessary, they may be destroyed by the application of a fine silk ligature.

The bandage should be continued for five or six weeks after the fall of the cord. Without this precaution umbilical hernia might occur. New-born children are more liable to this accident if the cord was very voluminous, and the ring consequently large. It is not, however, always produced by neglect in applying the bandage. In some cases, which are not very uncommon, it depends on actual malformation. Congenital umbilical hernia has been known to attain an enormous size, so as to contain a great part of the abdominal viscera, and even the liver itself. But generally it is much smaller, and includes merely a small loop of intestine. We have for a long time used with success, the following plan for their cure: we make small bags of an inch square, filled with oak bark and cinchona, these are soaked in wine and then applied to the umbilicus, and maintained there by an ordinary bandage. We have never seen an umbilical hernia resist this treatment more than two months. The dressing should be renewed twice or thrice daily, and when the bags have been used for five or six days, fresh ones may be substituted.

In dressing or swaddling the new-born babe, convenience and comfort are much less consulted than custom and fashion. Every nation, every class of society has its peculiar mode. It is, however, proper to point out the objections to some methods, and indicate the proper course to pursue. The head is first covered with a flannel cap, over which is placed another cap of different material, a small woolen shirt and vest, fastened behind by pins, is then put on, and the body is wrapped in worsted or woolen swaddling clothes. As new-born children generate but little heat, it must be communicated to them, or otherwise they would be liable to fatal attacks of colic and peritonitis. The swaddling clothes are fastened around the thorax with pins or tapes, and the lower part thrown up over the legs. A little handkerchief surrounds the neck. After this plan, which is that generally adopted in France, we should prefer that of the English and Americans, who simply wrap their children in a long flannel robe or sort of bag; but they leave the upper part of the chest and arms naked, thus incurring the danger of bronchitis or pneumonia, always dangerous in new-born children. The most important point in the swaddling clothes is that they should not compress the thorax so as to impede respiration, but should be loose enough to fall from the child when it is held erect. For a still stronger reason should we forbid tight bandages, which are still used in some provinces, in order to consolidate the child, and in case of necessity to hook it against the wall, as is the custom in Normandy.

These details do not properly fall within the province of the accoucheur, but he must not be ignorant of them, as he is frequently called upon to direct the nurse, and may even be placed in circumstances in which he must perform the duty himself.

When the mother intends to nurse her child, the latter must be put to the breast as soon as she has rested, that is in four, five, or six hours after delivery. Some women desire to do so in a couple of hours, which may be permitted if they are strong and healthy. As to the question of suckling itself, consideration for the mother's health should alone influence the practitioner.

A woman affected with tubercles, or even belonging merely to a family in which several members have perished from phthisis, should not nurse her child. Experience has proved to us that suckling excites or accelerates the development of these morbid productions, which by proper care, may be carried in the system dormant for many years. The woman's breasts become the centre of an affluxus, which soon extends to the lungs, and produces a catastrophe, which, but for this cause, might have been avoided, or at least retarded. We have known consumptive sisters, some of whom chose to suckle their children and have died, whilst those whom we persuaded to renounce this project, have lived for a long time, and even borne several children. Women who are subject to dyspepsia or diarrhœa, should not nurse their infants; it is with difficulty that they can supply their present losses, and are unable to withstand additional irritation produced by suckling a child.

It is a popular opinion that purgations are unnecessary to the child suckled by its mother, but indispensable to those brought up by hand. It is said they supply the place of the first milk or colostrum, to which, because it is richer in butyraceous matter, is ascribed the greater facility of expelling the meconium. Formerly, indeed, a child was never confided to a strange nurse, without a previous dose of syrup or chicory, mixed with almond oil or water, to protect it from jaundice. This practice cannot be too severely condemned. The syrup is more apt to produce than to prevent jaundice, from the irritation it causes in the stomach, liver, and intestines. The symptoms which occur sometimes in children, whom their mother cannot suckle, frequently arise from the necessity of waiting for some time for a nurse, during which the infant is without nourishment; this prolonged abstinence causes suffering in the alimentary canal, and the milk with which they gorge themselves occasions indigestion, the consequences of which may be more or less serious. The milk of animals is preferred by some persons to that of a strange nurse. This is wrong. The milk of any animal whatever is always less suitable for a child than that of a being of its own species. We should resort to it only in cases of syphilitic children, who would infect the nurse to whom they are confided. The best plan is to draw it from the udder itself, giving the preference to the goat, which, in all respects, for this purpose, is superior to any other animal. The advantages of this direct lactation are very great. The child sucks a milk the temperature of which is equal to its own, and which consequently does not expose it to colic, like that procured from any other source, and which it is very difficult to have always of the same degree of warmth; but, above all, when it is obliged to suck, that is, to imbibe by an active motion of the muscles of mastication, which stimulates the salivary glands; now, the saliva exerts upon milk the same influence as on other food, it assists in rendering its assimilation more easy, for insalivation is, in reality, only the first stage of digestion. Circumstances, however, will not always permit us to use this mode of suckling the child; we must then resort to the milk boat or sucking bottle.

Of these two modes the latter is by far the better. It consists in putting the milk into a bottle, and causing the child to suck it through an artificial nipple of linen, ivory, or a heifer's teat. A sponge covered with cambric or muslin, is not so good as an artificial nipple; if it is too tight, the child is fatigued by the efforts it is obliged to make; and if not sufficiently so, the child no longer sucks, but drinks, and we have all the inconveniences of the milk boat.

This last plan is the most defective of all, especially when the mother does not take charge of it herself, and entrusts it to mercenary hands. On the one hand, the milk is rarely given in the same quantity, degree of consistence, and temperature. On the other, as the child merely drinks, the saliva is not mixed with the fluid, which is less readily digested. Hence arise gastro-intestinal irritation, producing marasmus and death. The use of the milk boat has been abandoned in the public hospitals, on account of the enormous mortality of which it was the cause. It has been calculated, that of ten children brought up in this way, seven perish, whilst more than one half survive with the sucking bottle or a nurse, and more than seven of those in private families.

The choice of a nurse is not a matter of indifference, for her health may exert great influence on the child about to be entrusted to her care. All nurses born of phthisical parents, those in whose families cutaneous and scrofulous diseases are hereditary, and, à fortiori, those who are affected with or bear traces of these morbid states and temperaments should be rejected. A good nurse should have a well developed thorax, free respiration, and modrate corpulency. If too fat, her milk is almost altogether serous, her organism appropriating to itself nearly the whole of the materials furnished by assimilation. If too thin, she may indeed prove to be an excellent nurse, but generally at the expense of her health. Her teeth should be good, for a woman who chews well digests well, and her milk is nutritious; moreover, bad teeth infect the breath, which may injure the child. Her breasts should be large, hard, movable, the nipples projecting, erectile, and surrounded by small tubercles, and the surface of the mamma should be marked by bluish veins. On pressing with the finger, the milk should escape by a number of holes: if only by four or five, the nurse is to be rejected. This fluid should be copious in quantity, and of a dead white colour, or of a bluish white when collected in a vessel. A drop of good milk placed on the finger nail, adheres to it, and when the finger is bent downward, runs off in an elongated drop; if it falls in a sheet, it is proof that the milk has not sufficient consistence. As to the signs drawn, in these modern days, from microscopic inspection, we believe that they are merely auxiliary, and unworthy of absolute confidence.

There are no fixed rules for the period at which it may be proper to give the child any food other than that furnished by nature. We begin when the mother or nurse are fatigued, or when, notwithstanding the abundance of milk, the child does not increase uniformly; that is, remains stationary after having grown. This period varies, according to circumstances, from six weeks to four months. We never exceed this latter term. In order to follow nature, who never does any thing by starts, we first prescribe that food which most resembles the mother's milk, namely, that of animals. Some children cannot digest it; it must then be diluted by the addition of one third, of a weak decoction of oatmeal; of which mixture, a cupful is given morning and evening. The child is kept on this regimen for a month, and then put on the use of creamed rice, (crême-de-riz,) panada with sugar or salt, the quantity of which is gradually increased. Porridge is an indigestible food, which must be prohibited, unless made with flour slightly roasted. The stomach resembles all the other organs; it requires education. The nature and quantity of the substances introduced into it should be nicely studied; they should also be changed, in order to discover that which agrees best with it. It can bear greasy soups only when it has acquired a certain degree of strength.

About the third or fourth month, we begin with one meal of soup and two of milk porridge per diem; after some time, two of the former and one of the latter, until, in this way, we gradually reach the period of weaning. According to nature, we should wait for the first appearance of dentition to wean the child; but the customs of society do not permit it, and, on that account, we are forced to begin to give food before the cessation of lactation; for a child who had been supported by the breast alone, would be as difficult to wean, even at eighteen months, as others at eight or ten. The child, on the other hand, should never be weaned suddenly. By a neglect of this important precaution, inflammatory symptoms may be excited, and too often ascribed to dentition, which is perfectly innocent of their production.

REMARKS

ON

PERFORATION OF THE PERINEUM,

AND ON THE PASSAGE OF THE CHILD THROUGH THIS PART.*

READ AT A MEETING OF THE ROYAL ACADEMY OF MEDICINE, JUNE 1st, 1830,

BY PROFESSOR MOREAU.

The musculo-membranous septum, which terminates the pelvis inferiorly, and separates the vulva from the anus, is liable, in the last stage of delivery, to be more or less extensively injured.

Simple laceration of the perineum is too frequent and too unimportant, when the sphincter ani muscle or rectum is not interested, to permit me to occupy the time of the Academy long upon this head. But there is another species of lesion, much more rare, in which the fœtus and its appendages pass through the perineum, leaving uninjured the anus and the posterior commissure of the vulva. This species of lesion, which I shall call perforation of the perineum, to distinguish it from simple laceration, merits, I think, the attention of practitioners, the more so because, in my opinion, the causes of this accident appear to have been unknown or badly understood.

At the first glance, it is difficult to perceive how a part, which generally has a breadth of eighteen lines only, can dilate sufficiently to allow of the passage of a body as large as that of a child at term: but, before entering on the explanation, let us begin by detailing facts.

I shall relate:—1st. A case taken from the practice of M. Evrat, and which I have been able to report, as I attended the patient from the moment of the accident until that of her perfect recovery. 2d. I shall compare with this case similar facts well known to me. 3d. I shall then endeavour to determine the causes of this accident. 4th. I shall point out the means which, in my opinion, may prevent it. 5th. Lastly, I shall enumerate the practical consequences which may be drawn from these facts.

Madame D——, living in Paris, nineteen or twenty years of age, of a sanguine temperament, pregnant for the first time, was delivered on the 3d of March, 1815. Labour came on naturally, and followed a regular course; the child presented in the fourth position of the head; the os uteri dilated in five or six hours; the membranes were spontaneously ruptured. When the dilatation was complete, the head descended without difficulty into the pelvic excavation; but, when on the point of escaping through the inferior strait, it had great difficulty in passing under the arch of the pubes. During a very acute pain, M. Evrat, who was attending this young lady, thought that he felt the middle of the perineum, corresponding to the palm of his hand, lose its thickness and elasticity, and yield sensibly to the pressure of the child's head. He was reflecting how he could prevent laceration of the perineum, which appeared to him on the eve of occurring, when a violent pain, the effect of which he could not oppose, expelled the child, but in such a way that the head, instead of escaping per vias naturales, passed through the perineum, leaving in front the posterior commissure of the vulva, and behind, the orifice of the anus uninjured. The irregular wound resulting from this perforation extended to the right, in the direction of the ascending ramus of the ischium and descending of the pubes; anteriorly, beyond the posterior commissure of the vulva, and posteriorly, wound slightly around the anus; then it passed transversely from right to left, between the anus and vulva, nearly as far as the tuberosity of the left ischium. The after-birth was soon expelled, and escaped by the passage which had given exit to the child. A finger introduced into the anus assured us that the intestine was not comprised in the laceration.

Two days subsequently, M. Evrat having been obliged to go to England to attend one of our princesses who required his services, the sole care of the young lady devolved upon me; but, being then young, I requested the attendance and advice of M. Désormeaux, who continued to visit her with me until her recovery. The treatment pursued, and agreed upon by MM. Evrat, Désormeaux, and myself, was extremely simple: the patient was laid upon her side, with her legs and thighs closed and in a state of demi-flexion; the wound was dressed externally with charpie; she was strictly dieted; the bowels kept free by enemata and gentle laxatives, lest any efforts to expel indurated fæces, and the passage of these substances through the anus, might oppose or destroy the cicatrization in its formation. For a

* Extracted from La Revue Médicale for June, 1830.

moment the question arose, whether it would be proper to place a gum-elastic tube in the vulva, to facilitate the discharge of the lochia and prevent their escape through the wound; but we agreed that the use of this instrument was liable to objections, and the idea was abandoned: and, moreover, the swelling of the lips of the wound soon opposed the escape of the lochia through the laceration. The patient followed our directions with scrupulous exactness: in five weeks she was perfectly cured, and the wound entirely cicatrized.

Subsequently, this young lady was delivered at term and naturally: the cicatrix resisted the efforts of expulsion; and, during the passage of the child, there was only a slight laceration of the fourchette, as frequently occurs in women with their first child.

Cases similar to that just described, although rare, are sufficiently numerous to induce us to endeavour to assign the causes which may produce them, and indicate the means of sometimes preventing them.

The most ancient with which I am acquainted, although not observed in the human species, deserves to be mentioned here, because it may throw some light on the causes of the accident in question.

Harvey, in his *Exercitationes de generatione animalium*, relates the history of a white mare belonging to the Queen of England, which, on account of its great beauty, and to prevent connection with the male, had been infibulated; but whether this precaution had been taken too late, or despite of it, the mare became impregnated. The termination of gestation having arrived, the foal not being able to escape through the vulva, was expelled through the perineum. After stating his ignorance as to the possibility of the impregnation of the mare, Harvey uses the following language: "*Tandemque, cum nihil tale suspicarentur, noctu peperit, pullusque vivens mane ad matris latera corespicitur. Id cum mihi nunciaretur, adii illico locum, vidique ambo vulvæ labia annulis consuta, totumque pudendum versus sinistrum latus detrusum, abruptum et a dextera coxendice laceratum, adeo ut, soluta, per incredibilem fœtas viru, partis robustissima unitate, facile ei per ingentem illum hiatum exitus patesceret.*"

In 1778, Nedey, a surgeon of Besançon, sent to the old Royal Academy of Surgery, an essay on rupture of the central part of the perineum, through which he asserted that a child at term had passed without laceration of the fourchette or sphincter ani; the wound, examined on the sixth day after the accident, was two inches and four lines in length, and extended along the raphé on each side of the anus; it was shaped like the letter Y, and torn in several places. This case, which excited the astonishment of the Academy, can appear doubtful, says Baudelocque, only to those who are ignorant of the great extension the perineum can undergo in the last stage of delivery.

In 1788, a similar accident happened in the hands of Coutonly. The following is his account of it: "On the 13th of January, 1788, I was sent for to visit the woman Leroy, residing at the house of Madame Luizerne. She was twenty-five or twenty-six years of age, moderately tall, and not very corpulent. I had attended her the year preceding with twins, between the fifth and sixth months; she was attacked with a violent cough, for which I prescribed such remedies as would relieve it.

"The next morning I was requested to see this woman, she was in labour and suffering severe pains; on examination I found the head in the lesser pelvis pressing against the perineum, which was so much distended, that all my endeavours were confined to preventing its laceration, as well by emollients as by pressure with my hand on the part. I desired the woman, moreover, not to separate her knees, and to moderate as much as possible the efforts she was making in the hope of being quickly delivered.

"All these precautions were useless, the central part of the perineum was lacerated; and the head continuing to be pressed with the same violence against my hand, I was forced to allow it to pass through the laceration, and extract through the same opening a child at term, as well as the placenta which soon followed. I immediately endeavoured to ascertain the nature of the accident.

"Above the anus toward the centre of the perineum, I saw a jagged hole, from which extended two lacerations, one following the direction of the raphé and stopping a little short of the vulva, the other turning to the right side, thus forming a wound somewhat resembling the letter Y.

"The sphincter ani, rectum, and fourchette, were not comprised in the laceration."

Coutonly then describes the treatment he adopted, for which Baudelocque was called in consultation, and, after a few unimportant symptoms, the wound was healed in five weeks.

Thomas Denman, in his *Introduction to the Practice of Midwifery*, relates under the title of special rupture of the perineum, a similar case, in which the child passed through the part of the perineum adjoining the anus, whilst the other was unhurt. He says, "I felt a laceration before the expulsion of the head, which I was guiding through the natural passage, by supplying with the palm of my hand the want of perineum. The external parts of this woman were rigid and contracted, and as I was taking great trouble to spare them, I ascribed the accident rather to this circumstance than to the necessity of the case. The woman did not complain much immediately after delivery, but the following day violent inflammation supervened, accompanied by suppression of urine, the lochia passed through the laceration, but no fæcal matter was observed to escape from the vagina." By means of fomentations, cataplasms, opiates, etc., the lacerated parts were healed in six weeks; the woman recovered perfectly, and was consequently safely delivered of another child.

In 1811, M. Champenois published in the forty-first volume of the *Journal général de Médecine*, page 167, the following case:

"The wife of a merchant had had in childhood an abscess in the vicinity of the fourchette, which at the moment of delivery could not relax. The perineum, greatly stretched and thinned, opened in its centre, and the child passed through the aperture, which extended to the sphincter ani inclusively, a horrible accident, which might have been prevented by an incision in the perineum. I was sent for just as the child had escaped through the aperture; the fourchette was uninjured for a whole finger's breadth: I recommended the division so as to make but one wound: my advice was not followed; several means were unsuccessfully tried to effect the union. After the lapse of two weeks, M. Boyer was called in consultation. This celebrated surgeon advised the division of the fourchette; it was done; the patient soon recovered; but she remained unable to retain her fæces."

M. Champenois afterward relates the history of a young woman, in whom he prevented perforation of the perineum, by incising, with a bistoury, guided on a grooved conductor, a hard, thick and callous ring, resulting from a burn of the external genitals during infancy: this cicatrix, which had originally contracted the vulva, had resisted all the efforts of the patient, and the various means which had been employed during the progress of her labour.

In 1822, Dr. Joubert published, in the *Bulletins de la Société Médicale d'émulation*, an analogous case, from which the following is extracted.

"Madame * * * *, twenty-three years of age, in her first pregnancy, sent for him on the 14th of December, 1812, at six o'clock, P.M.: the os uteri was slightly dilated, the head of the child presented in one of the three last positions, which was ascertained only at the moment of the passage of the head through the perineum: the labour was tedious, the orifice being not sufficiently dilated; the patient was bled on the 15th at four o'clock, P. M.; the head soon descended, and the labour terminated by the rupture of the central part of the perineum, which, owing to its great distension, had an extent of at least five inches. The after-birth escaped through the wound: no bad symptom followed, the accoucheur was much alarmed, etc.

"The laceration extended on each side of the anus, in the shape of a Y: the wound was first dressed with charpie, soaked in some emollient decoction, then with dry charpie covered by graduated compresses, and fixed by a T bandage: the patient was laid upon her side, the legs fastened together by a fillet: she was placed on strict diet, enemata regularly administered for twelve days, and in five weeks she was completely cured."

The same woman, in a subsequent pregnancy, was naturally delivered, without any accident whatever.

To these cases might be added another which, according to Coutonly, was seen and communicated by Baudelocque to the old Royal Academy of Surgery: but Baudelocque makes mention of it nowhere in his works, although he has quoted in a note that of Nedey, and the one he attended with Coutonly.

To what causes may this series, this succession of similar cases be attributed?

At the period when the fœtus was regarded as the agent of its own expulsion, it was natural to think that, during the violent efforts it was supposed to make to rupture the bonds which united it to the mother, it might be the cause of the phenomena of labour, and the lesions which might be the consequence of it; this was the opinion of Harvey, and the fact of the foal escaping through the perineum of the infibulated mare, is quoted by him as an irresistible proof of the force used by the fœtus to reach the external world. But as it is now proved that the fœtus is passive, or nearly so, in labour, that the agency of its expulsion, in some cases, is in the uterus alone, and in the greater number, in the simultaneous action of this organ, the abdominal muscles and diaphragm, we shall not attempt to refute the opinion of Harvey, and will carefully avoid ascribing to it any decided influence in the production of the accident under consideration.

In Nedey's case, the laceration was attributed to the unfavourable position of the woman, at the moment when the efforts of the head against the perineum kept this part in a state of extreme tension, with the greater appearance of reason, adds Coutonly, because the midwife, finding the pains to slacken, and the woman desirous of relieving herself by an alvine dejection, overturned a wooden chair, between the legs of which she placed a pot-de-chambre: she then seated the patient on this sort of easy chair, and in this position at the second pain, the child began to cry and was removed from under the chair.

We do not doubt that so improper a position of the woman may have somewhat assisted the production of this laceration, but we do not think that it should be regarded as the sole and principal cause.

Should this perforation be ascribed to the fact that the perineum has been badly supported, or not supported at all? If so, why does it not happen more frequently? Why is is not observed in women who are delivered without the presence, sometimes, of any one? And again, the men in whose hands these accidents occurred, were too well skilled in the practice of the art of midwifery, to permit us to attribute to their neglect, or want of dexterity, an accident which they could not prevent. There must be some other causes, which it is now our duty to investigate.

Perforation of the perineum seems to me to depend on very different causes; some of which are predisposing or remote, and others determining or proximate.

Of the remote causes, some pertain to the mother, and the others are inherent to the fœtus itself.

On the mother's side, I shall include in the first class certain malformations of the pelvis; as 1st, a too great projection of the promontory of the sacrum, which, by carrying the lower end of the sacrum and coccyx too far backward, increasing the antero-posterior diameter of the inferior strait, inclining unnaturally downward and backward the axis of this strait, and by diminishing the inclination of the plane which must direct the head of the child from behind forward, under the symphysis pubis, compels it to remain longer on the perineum, and press with more force and more perpendicularly on this part.

2d. An excessive elongation of the symphysis pubis, which, by maintaining the head too long in a state of forced flexion, prevents its motion of extension and disengagement, under this same symphysis, forces it to incline more downward and backward, and to leave in front of it a large portion of the perineum.

3d. The contraction of the arch of the pubes will also produce similar effects.

4th. An anterior obliquity of the uterus to a certain degree, may, in some cases, have an analogous result.

5th. Excessive breadth of the perineum. Although this part has, generally, only an extent of sixteen or eighteen lines in women who have never had children, I am convinced that in some subjects it is much larger; and to this variable extent of the perineum must be in a great measure attributed the inverse proportion of that of the vulva. When the perineum is larger than it should be, there results, on the one hand, a greater contraction of the passage through which the child must escape, and on the other, greater difficulty in the posterior commissure of the vulva slipping over the child's head.

6th. Lastly, any obstacle in the vulva, such as an occlusion resulting from the adhesion of the labia pudendi, from a cicatrix, or child-birth, in short anything which may oppose, or merely render difficult the exit of the head, are predisposing causes of the accident now occupying our attention.

As regards the child, I shall range among these causes, in the last stage of labour—

1st. The want of the motion of extension of the head for the escape of the occiput in the three first positions of the vertex.

2d. The want of the motion of rotation in the three last positions.

3d. The want of the motion of flexion, when the face disengages in front, that is, under the symphysis pubis.

In fact, whenever the head presents in one of the three last positions of the vertex, or, in other words, whenever the occiput corresponds to the posterior half of the circumference of the pelvis, it can pass only with great difficulty behind the symphysis pubis, and very frequently does not reach this point; and thus it is forced, in this case, to disengage in front of the perineum. Under these circumstances, the forehead being generally too large to disengage under the arch of the pubes, remains fixed behind the symphysis of these bones; the head at first undergoes a very violent motion of anterior flexion, during which the head glides slowly and with difficulty over the inclined plane presented by the coccyx and perineum. If this motion of anterior flexion is not carried as far as is necessary to bring the head beyond the posterior commissure of the vulva, the occiput bears strongly on the centre of the perineum, is arrested there, compresses it, and perforation may ensue.

Such are, in my opinion, the predisposing causes of these perforations. But, of all these causes, those which appear to me to have most influence, are the presentation of the head in the three last positions of the vertex, the obstacles which may be met with at the vulva, and the excessive breadth of the perineum. The immediate causes are found in labour itself: in the sudden and energetic action of the uterus, abdominal muscles and diaphragm.

When one or several of the above causes are present, the head having descended into the pelvic excavation and reached the inferior strait, the following phenomena occur. If the pains are sharp; if the woman is strong; if the efforts she makes to hasten her delivery are proportioned to the intensity of the pains, the perineum being immeasurably distended can stretch no longer, and must yield; but the rupture takes place differently, accordingly as the head does or does not perform the motion of extension, which would assist its expulsion. If the occiput has already engaged in the vulva, the laceration will be as usual, that is, will commence at the fourchette and posterior commissure of the vulva, and extend, in the direction of the raphé, nearly to the anus; sometimes even it will interest more or less the sphincter ani, or the termination of the rectum, of which there are several examples. If, on the contrary, the occiput has not engaged in the vulva, and the motion of extension does not take place, the laceration of the perineum happens in its centre, beginning from within outward; at first, the mucous membrane lining the lower part of the vagina is torn behind the fourchette, the latter remaining uninjured. In consequence of this first laceration, the vulva is no longer stretched; the labia pudendi undergo a retraction which tends to bring forward and approximate more and more the posterior commissure of the vulva to the symphysis pubis, and consequently to elongate the perineum in this direction. It follows, hence, that the perineum can no longer slip backward, as it should do; that it covers the child's head; that this head, meeting in front the fourchette uninjured, which recedes from it, has less difficulty to overcome in tearing the adipose and different tissues which compose the perineum, than in following the route intended by nature. If the pain is severe and aided by the woman's efforts, the perforation is instantaneous. The assistants are greatly alarmed at this accident; but, as we have just seen, its prognosis is favourable, and the wound generally heals rapidly, when the sphincter ani or rectum are not interested; for, under these circumstances, women are frequently subjected to the disgusting infirmity of incontinence of urine or fæces, which, instead of escaping externally, pass into the vagina, and render this organ a veritable cloaca. This accident, as may be seen by the cases of Denman, and MM. Joubert and Evrat, does not affect subsequent labours, since women are delivered as naturally as though it had not happened.

Is there any means of foreseeing this laceration? If the causes I have indicated are correct, I think, that in many cases, we may not only foresee, but in fact prevent this perforation. 1st, By remedying during labour, by proper means, which cannot be here enumerated, the prejudicial effects of some of the predisposing causes, such as the too great projection of the promontory of the sacrum, the anterior obliquity of the uterus, etc. 2d, In the last stage of labour, by assisting the motion of extension or flexion of the head, according to the position in which it may be found; by aiding by all suitable means the relaxation, dilatation and slipping of the vulva and perineum; by keeping the woman in a perfectly horizontal position; moderating her efforts as far as possible; lastly, if all these precautions are useless, by resorting, at an early period to the forceps, either as the means of hastening the motions which the head should execute, or of correcting the malposition this head has sometimes a tendency to maintain.

Should we, in these cases resort to section of the perineum, as has been done with other views by different persons, and in the case under consideration by M. Champenois? It certainly would be the most efficacious of all the means proposed: but I think that this advice cannot be given in an absolute and unrestricted manner: 1st, because in the greater number of cases, this section is evidently useless. 2d. Because, under some circumstances, it might be injurious. 3d. Lastly, lest persons unskilled in the practice of midwifery might be tempted to perform it whenever the child's head met with any difficulty in its expulsion, or remained some time in the passage.

Consequently, to avoid the abuse which might be made of the section of the perineum, and the injurious consequences which might ensue, it is important to determine exactly the cases in which it may be necessary. For that reason, I shall confine its employment to those cases alone in which there exist bridles, anormal adhesions, indurated cicatrices, very little or not at all extensible; and even then, to derive any actual benefit from it, it should be performed with the greatest caution. Thus, I think that it should never divide any part but the bridle or cicatrix; and even in some cases, only a portion of these: and in all, that it never extend beyond them: for then the aperture might be made too large. If, the bridle being divided, the opening is yet too small, I am convinced that the escape of the child's head will enlarge it sufficiently.

The treatment, as we have seen, is extremely simple; that which we have always adopted consists in bringing the legs of the patient together, and keeping her on her side in a state of demi-flexion. Coutonly and Joubert tied the woman's legs with a fillet; this we have never done, and never have regretted its omission: in covering the wound with pledgets of charpie, either dry or soaked in some emollient decoction; or covered with a cataplasm of the same nature, the whole maintained by a T bandage; in keeping the bowels free by enemata and mild laxatives: in restricting the patient to low diet: relieving inflammatory symptoms, retention or difficulty of urine, by appropriate means; but I think it is never necessary to introduce a dossil of lint into the vulva, as advised by Baudelocque, and much less a gum elastic canula. By this simple plan, the wound is generally perfectly healed in thirty or forty days.

From the foregoing considerations, I conclude that, for the occurrence of perforation of the perineum, it is necessary: 1st. That at least one, or several of the above mentioned causes should be present. 2d. That the child should be of moderate size. 3d. That the mother should be strong, the pains violent, energetic, and assisted by a will, a desire, a pressing necessity of being promptly delivered.

4th. That this perforation, however frightful it may appear at first sight, is not dangerous in itself, since in the various cases I have quoted it has been accompanied only by slight symptoms, such as are observed after the most natural labour. 5th. That it does not appear to exert any influence on subsequent labours. 6th. That, in a practical point of view, it might authorize us to try, with some hopes of success, the interrupted or twisted suture, in cases of simple laceration of the perineum in females, to whom it was of great importance, to remove the marks of the accident. 7th. Lastly, in a medico-legal point of view, it confirms what was already known, that the integrity of the vulva is not a proof that a woman has not had a child, and that the integrity of the hymen is not an indisputable sign of her virginity.

REMARKS

ON

A CASE OF LABOUR

RENDERED DIFFICULT BY THE PRESENCE OF A TUMOUR

IN THE

CAVITY OF THE PELVIS.*

BY PROFESSOR MOREAU.

Those tumours which may present obstacles to parturition, have scarcely been noticed in dogmatical works on midwifery, although they are one of the most serious complications of this painful and dangerous function. On this account have we been induced to collect here the principal analogous cases. We shall not mention those, happily very rare, of osseous tumours or exostoses: cases also less serious than the others, because, their development being very slow, they may be recognized before pregnancy exists.

Fibrous tumours of the uterus are generally not developed until after the period of conception, and, not being always sufficiently low in the uterus to prevent the passage of the child through the superior strait, rarely impede delivery. Nevertheless, Béclard saw, at the Hospital of La Maternité, in 1813, a case of this kind, in which a fibrous tumour of the uterus filled the pelvis, so as to leave a space of only about eighteen lines for the transverse diameter. The child was born naturally, but dead and very much flattened. The mother recovered. Another case has been communicated by M. Chaussier. The child was born dead; the woman also perished; and the uterus, which contained, in the substance of the posterior lip of its neck and orifice, a fibrous tumour as large as a child's head, was presented to the Society.

The following are some cases of this nature—

1st. In one reported by Mackenzie, in 1776, the child was turned: both mother and child died.†

Denman relates two similar cases, taken from Dr. Ford.

2d. In one case cephalotomy was performed: the mother died.

3d. In the second case the tumour was opened: the child was born alive, and the mother survived six months.‡

4th. Van Doeveren, in a similar case, turned the child: both woman and child died.

5th. Baudelocque, in an analogous case, followed the same practice with the same ill success.

Park in an essay relates six cases of this nature.§

6th. In one cephalotomy was performed: the mother recovered. It was supposed that the tumour burst.

7th. Another case contains the history of several deliveries of the same woman. In her sixth, the tumour was incised through the vagina: the child was expelled with difficulty, and the woman had a tedious recovery.

8th. In the following case the expulsion was left to nature: the mother died. It is not known if the child lived.

9th. In another, the tumour was opened; cephalotomy was performed: the mother recovered, and was cured and delivered subsequently.

10th. In another, the tumour was opened; the child was expelled with difficulty, and dead: the mother recovered.

11th. In the last case reported by Park the woman was not pregnant.

12th. Merriman‖ relates a case of twins, rendered difficult by a tumour of this kind. Cephalotomy was performed on one of the children, the other was born dead, and the woman died also.

* Extracted from the Bulletins de la Faculté de Médecine de Paris, No. 5, 1820.

† Med. Chir. Trans. vol. x.

‡ Loc. cit.

§ Med. Chir. Trans. vol. ii.

‖ Med. Chir. Trans. vol. iii.

13th. He reports, likewise, after this case, that of a woman in Westminster Hospital, where cephalotomy was performed, and the woman died.

The same author* records six additional cases of the same kind.

14th. In one, the child was turned: both child and mother perished.

15th. In another, version was performed: the mother recovered, but the child, born living, soon died.

16th. In another woman, who had been previously delivered of a dead child, the cranium was perforated, and the child removed with great difficulty: the mother never recovered perfectly.

17th. In another, after having opened the tumour, embryotomy became necessary: the mother survived eighteen months.

18th. In another woman, the tumour was raised up below the superior strait: the child was born alive, and the mother survived.

19th. In the last case reported by Merriman, the tumour was opened, and cephalotomy afterwards performed: the mother died in a few days.

20th. In a case seen by Béclard, in 1820, at La Maternité, the tumour was opened and about a pint of fluid discharged; the child was then turned and born dead: the mother did not survive.

21st. M. Récamier attended a woman in the seventh or eighth month of pregnancy, who had a tumour occupying her right flank, the iliac fossa of the same side, and a great portion of the cavity of the pelvis.

Désormeaux examined a woman of about twenty-five years of age, who had a tumour between the rectum and vagina, which filled nearly the whole pelvis. This woman was not pregnant.

The following case fell under my own notice:—

Mrs. B****, the wife of a wood-seller, living at No. 11 Rue de Sèvres, thirty-six years of age, of a lymphatico-sanguine temperament, a constitution originally robust, but debilitated by several pregnancies, and especially by a chronic pulmonary catarrh which troubled her for several months, reached, without any remarkable symptoms, the eighth month of a fifth pregnancy. About this time a pretty copious discharge of blood took place from the vulva, giving the patient an idea that she was about to be delivered: in consequence of which she sent for the midwife, who was to attend her. She prescribed rest, light diet, slightly acidulated drink, and did not think blood-letting necessary, on account of the emaciation and debility of the patient. Thirteen days after the accident a second discharge more copious than the first took place. The same means were resorted to, which relieved but did not entirely arrest the symptoms. Lastly, on the 17th of October, 1819, about midnight, Mrs. B. was attacked by another discharge without pain. The midwife, alarmed at the enormous quantity of blood, and astonished that there were no signs of delivery, nor any of the parts which can be usually reached by the finger, sent the husband for me.

I immediately accompanied him, and an account of the occurrence was given to me. I found the patient in the most deplorable condition; her face was pale, her eyes closed, limbs and extremities cold, pulse excessively feeble, respiration slow, with almost continual syncope: the discharges had ceased, but there were no labour pains. It was necessary to ascertain the state of the patient by a manual examination, in order to act promptly and prudently; for, in her state, the slightest loss of blood might have been fatal to mother and child. From the period of the appearance of the hæmorrhage and the course it had followed, and from the assertion of the midwife that she could find neither the os uteri nor the child, I thought it was a case of placenta prævia. With this idea I made an examination; above, to the rear and left, I felt the left part of the circumference of the os uteri, flaccid and patulous; passing my finger around the whole periphery of the orifice, I found a hard elastic tumour filling at least two-thirds of the cavity of the pelvis. This tumour occupied the right part of the circumference of the os uteri and corresponding portion of the vagina, by which it was covered and appeared closely united; on continuing the examination I soon ascertained, amongst the coagula contained in the vagina, between the tumour just mentioned and the left part of the orifice, the presence of the membranes. I raised these membranes with the greatest care, in order to reach the child, and ascertain what part presented; this simple manœuvre served to make the diagnosis perfectly clear.

1st. By raising the membranes with precaution I felt a part of the child, which I could not ascertain on account of its mobility and elevation.

2d. I perceived that a certain quantity of fluid blood came from the left side of the uterus, and flowed between this organ and the membranes. It was then evident that the hæmorrhage was owing to the separation of the placenta, and not to its insertion over the os uteri.

3d. I ascertained that the tumour adhered to the uterus, and followed the movements communicated to this organ.

4th. On applying my left hand on the abdomen of the patient, with a view of finding the uterus, in order to ascertain the presence of the child, I found a strongly marked left lateral obliquity.

5th. A pyriform tumour, as large as the head of a child at full term, occupied the right iliac fossa, and extended from the crest of the ilium as far as the cavity of the pelvis.

6th. A deep fissure, distinctly felt, and even visible, separated this tumour, so that at first it might have been supposed that there were two children in the uterus, or rather that there were at the same time a natural and an extra-uterine pregnancy.

Under these serious circumstances, I felt the necessity of prompt action; the flaccid state of the os uteri, the weakness of the patient, made me certain of being able to turn the child, without meeting too much resistance on the part of the uterus or of the mother; but the presence of the tumour caused me to fear, on the one hand, that it would be impossible to introduce my hand, and on the other, that when I had succeeded in introducing it and effecting version, the child could not be extracted.

Aware of the difficulties I might meet, and of the imminent danger to which the mother and child were exposed, I desired the woman's husband to go for M. Evrat, who lived next door, and request his presence and advice. He soon came, I related to him all that had occurred before my arrival, informed him of the examination I had made, and told him that I saw no mode of relief but to turn, if, indeed, that were practicable. I requested him to verify for himself the correctness of my diagnosis.

* Med. Chir. Trans. vol. x.

M. Evrat ascertained that I was not mistaken; he approved my resolution, rather not to let the woman perish unaided than in any hope of saving her. The patient was so feeble as to be unable to offer any resistance. She was placed in a convenient position, and after having freely anointed my right hand, I introduced it into the vagina: I pushed back the tumour with the palm of my hand, whilst my fingers penetrated easily between the membranes and uterus. I found the placenta completely separated at a distance of about three inches above the os uteri; I ruptured the membranes laterally and to the left. The breech presented; I could easily grasp the feet and bring them to the vulva: and I disengaged, without great difficulty, the trunk and arms, being as careful as possible to bring the child in the second position of the feet, on account of the tumour on the right side. When the arms were disengaged, I soon perceived, as I feared would be the case, that the tumour had redescended into the cavity of the pelvis, and that the child's head remained above the superior strait. I therefore introduced my right hand in front of the trunk of the child, following the concavity of the sacrum, and, with the ends of my fingers, again pushed up the tumour: I then turned the face of the child to bring it in front of the left sacro-iliac symphysis. This motion being performed, it was easy to cause it to plunge into the pelvic excavation and escape from the vulva. The after-birth followed immediately.

The version was very rapidly performed; and we had the satisfaction of delivering a male living child; but it was very weak and bloodless, and only lived four days.

After delivery, the tumour, which I think was formed by the right ovarium, preserved the relations and volume I have assigned to it: the uterus was to the left, and nearly in the iliac fossa of that side, giving to the whole mass the figure of a heart on a playing-card, or, perhaps more correctly, the shape assigned to the uterus, when it is double or bilobed.

The mother recovered rapidly, so that in five weeks she was able to move to a new residence near the Invalides. Three months have elapsed since her delivery and she continues in good health. I examined the patient six weeks after delivery; the uterus had recovered its natural size and situation; but the tumour retained the position, volume and density that it had previously.

By adding this case to those before mentioned, we have a total of twenty-three women affected with tumours in the pelvis. Subtract three, two of whom were not pregnant, and one not yet delivered, there remain twenty cases of tumour, and twenty-two labours rendered difficult by tumours in the pelvis, which appear to be located in the ovarium. Of these twenty women, seven recovered perfectly, three imperfectly, and ten died. Of the children, three were born alive, one born alive but not viable, sixteen were dead, and two not observed. One was probably living, the other dead.

Thus of forty-two individuals, fourteen have been preserved, and twenty-eight perished.

From these facts we can, therefore, draw the following conclusions: 1st. That the tumours under consideration deserve the peculiar attention of the practitioner on account of the obscurity of their diagnosis. 2dly. That when the tumour occupies a large portion of the pelvis, neither version, nor cephalotomy will suffice. 3dly. That the tumour should be raised up whenever it is movable. Two women and two children appear to have owed their lives to this plan of treatment. 4thly. That the opening of the tumour is of great importance, since of the nine women who recovered, five, and two of the four children born alive, appear to have been saved by this opening. 5thly. That in some cases, those in which the tumour occupying the whole pelvis is not diminished by incision, the Cæsarian section is our only alternative.

Fig. 1.

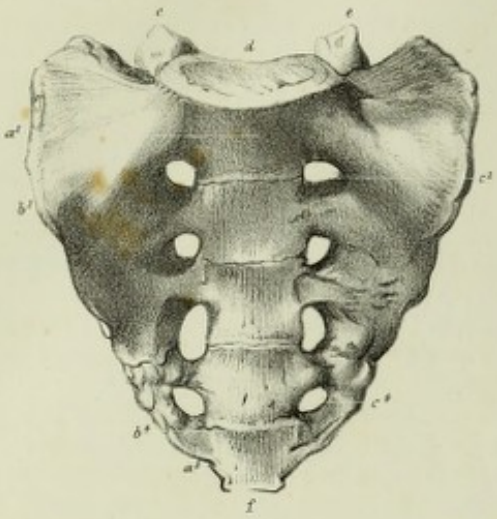


Fig. 2.

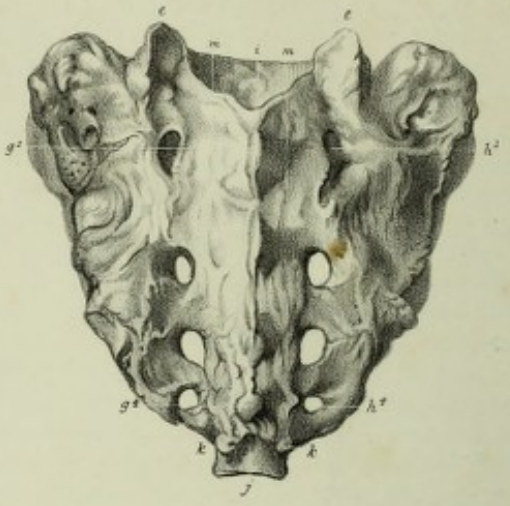


Fig. 5.

Fig. 7.

Fig. 3.

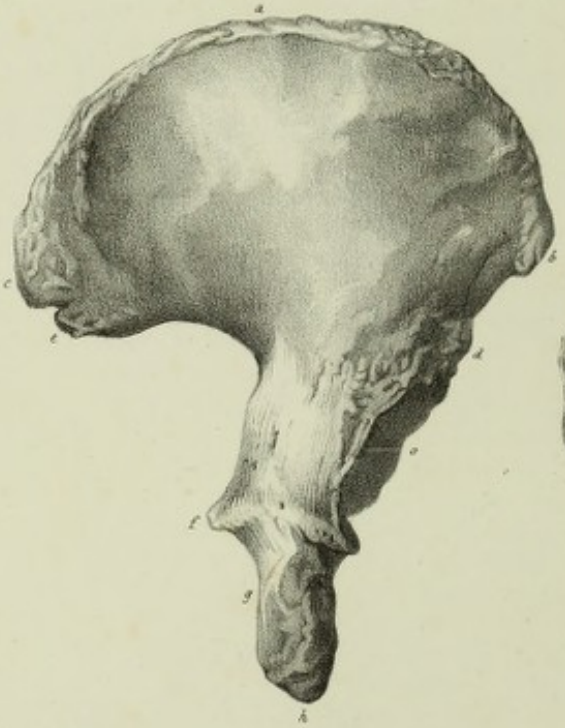


Fig. 4.

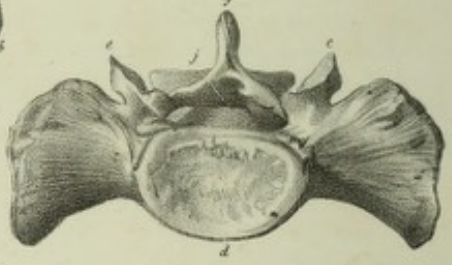
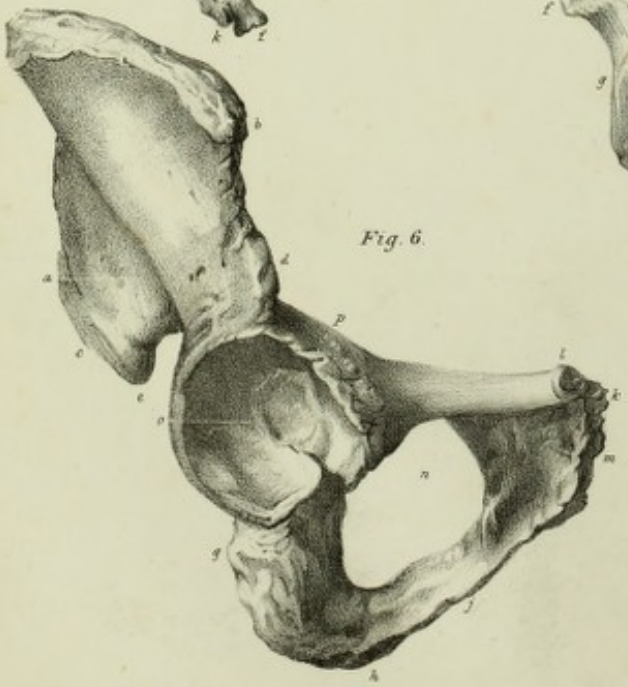


Fig. 6.



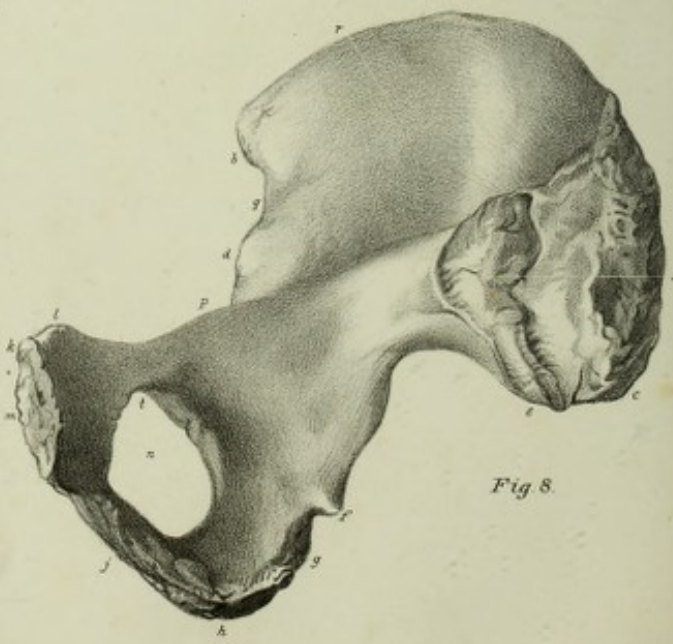


Fig 8.

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PLATE I.

BONES OF THE ADULT FEMALE PELVIS.

(Half Size.)

Sacrum.

Fig. 1, Anterior face.
Fig. 2, Posterior face.
Fig. 3, Lateral border.
Fig. 4, Base.
From a^1 to a^5, Fig. 1, The five false vertebræ or pieces forming the sacrum.
From b^1 to b^4, Fig. 1, The four ridges formed by the union of these pieces.
From c^1 to c^4, Fig. 1, The four anterior sacral foramina on each side, analogous to inter-vertebral.
d, Figs. 1, 3, 4, The surface of articulation for the last lumbar vertebra.
e, Figs. 1, 2, 3, 4, The oblique or articulating processes.
f, Figs. 1, 3, Apex of the sacrum articulating with the base of the coccyx.
From g^1 to g^4, Fig. 2, The spine of the sacrum formed by the union of four spinous processes.
From h^1 to h^4, Fig. 2, The posterior sacral foramina.
i, Fig. 2, and *j*, Fig. 4, The superior opening of the canal for the cauda equina.
j, Fig. 2, The inferior orifice of the same canal.
k, *k*, Figs. 2, 3, Cornua of the sacrum formed by the splitting of the last spinous process.
l, Fig. 3, Sacro-iliac articular surface.
m, *m*, Fig. 2, Gutter on each side of spine.

Coccyx.

Fig. 5, Posterior face.
1, 2, 3, 4, The four pieces which compose the coccyx.
a, *a*, The cornua of the coccyx.
b, *b*, Tubercles, rudiments of transverse processes.

Innominatum.

Fig. 6, 7, External or femoral aspect.
Fig. 8, Internal or pelvic aspect.
a, Figs. 6, 7, Dorsum of the ilium.
From *b* to *c*, Figs. 6, 7, 8, Crista of the ilium.
From *b* to *d*, Figs. 6, 7, 8, Depression between the anterior spinous processes of the ilium.
From *c* to *e*, Figs. 6, 7, 8, Space between the two posterior spinous processes.
From *e* to *f*, Figs. 7, 8, Great sciatic notch.
From *f* to *g*, Figs. 7, 8, Trochlea for the tendon of the obturator internus, called small sciatic notch.
From *g* to *h*, Figs. 6, 7, 8, The tuberosity of the ischium.
From *h* to *j*, Figs. 6, 8, The ramus of the ischium.
From *j* to *k*, Figs. 6, 8, The ramus of the pubes.
From *k* to *p*, Figs. 6, 8, Body and horizontal portion of the pubes.
a, Figs. 6, 7, Dorsum of the ilium.
b, Figs. 6, 7, 8, Anterior superior spinous process.
c, Figs. 6, 7, 8, Posterior superior spinous process.
d, Figs. 6, 8, Anterior inferior spinous process.
e, Figs. 6, 7, 8, Posterior inferior spinous process.
f, Figs. 7, 8, Spine of the ischium.
g, *h*, Figs. 6, 7, 8, Tuberosity of the ischium.
j, Figs. 6, 8, Junction of the rami of the pubes and ischium.
k, Figs. 6, 8, Angle of the pubes.
l, Figs. 6, 8, Spine of the pubes.
m, Figs. 6, 8, Symphysis of the pubes.
n, Figs. 6, 8, Obturator or thyroid foramen.
o, Figs. 6, 7, Acetabulum.
p, Figs. 6, 8, Linea ilio-pectinea.
q, Fig. 8, Anterior border of the ilium.
r, Fig. 8, Costa or venter of the ilium.
s, Fig. 8, Articulating surface for the sacrum.
t, Fig. 8, Groove for the obturator vessels and nerves.

(See page 10.)

PLATE II.

DIFFERENCES OF THE PELVIS FROM SEX AND AGE.

(Half Size.)

Fig. 1, Pelvis of an adult male
Fig. 2, Pelvis of an adult female.
Fig. 3, Pelvis of a fœtus at term.

References to Figures 1 *and* 2.

a, Anterior face of the sacrum.
b, Venter of the ilium.
c, Posterior superior spinous process.
d, Anterior superior spinous process.
e, Anterior inferior spinous process.
f, Spine of the ischium.
g, Acetabulum.
h, Tuberosity of the ischium.
i to *j*, Arch of the pubes.
k, Thyroid foramen.
l, Spine of the pubes.
m, Linea ilio-pectinea.
n, Symphysis pubis.
o, Sacro-iliac junction.
p, Promontory of the sacrum or sacro-vertebral angle.
q, Superior strait.
r, The two last lumbar vertebræ.
s^1, s^2, Transverse processes.

References to Figure 3.

a, a^1, Points of ossification of the bodies of the sacral vertebræ.
b, b^1, Points of the lateral masses.
c, Venter of the ilium ossified.
d, Body of the pubes ossified.
e, Body of the ischium ossified.
f, Crista of the ilium yet cartilaginous.
g, Acetabulum cartilaginous.
h, Symphysis pubis very wide.
i, The two last lumbar vertebræ.

(See page 12.)

Fig. 1.

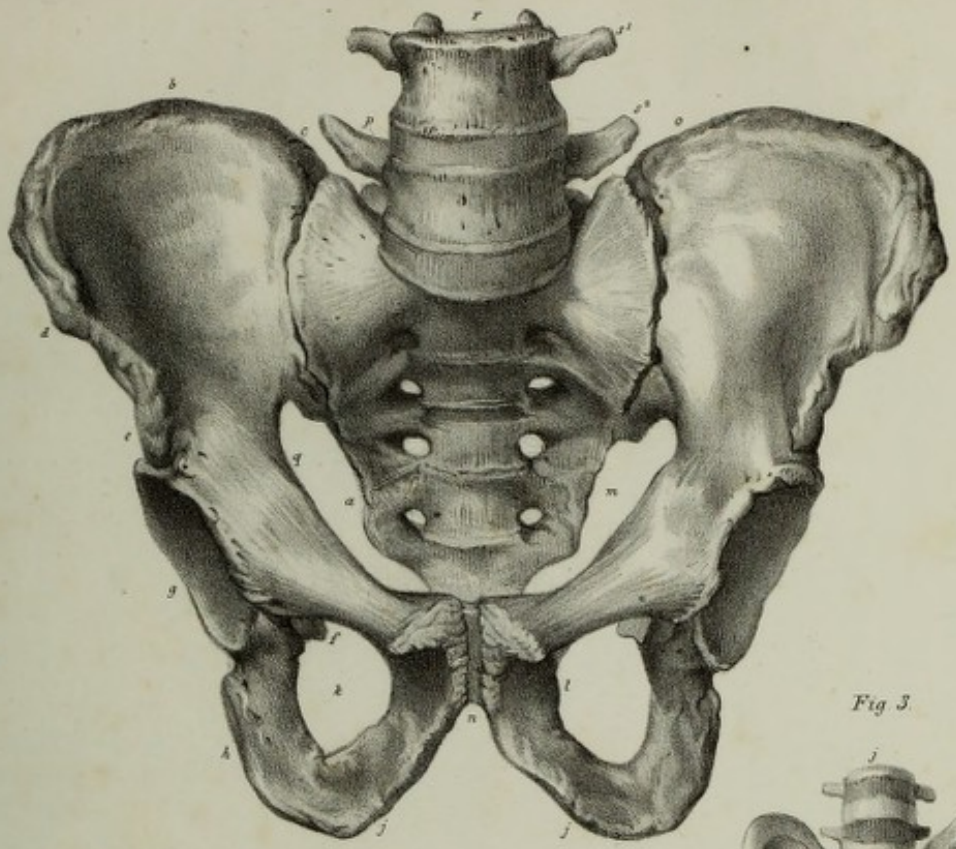
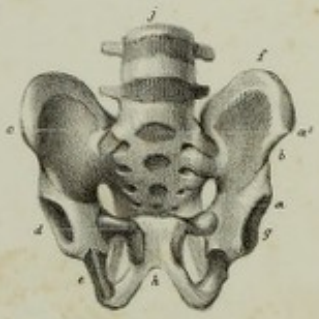


Fig 3.



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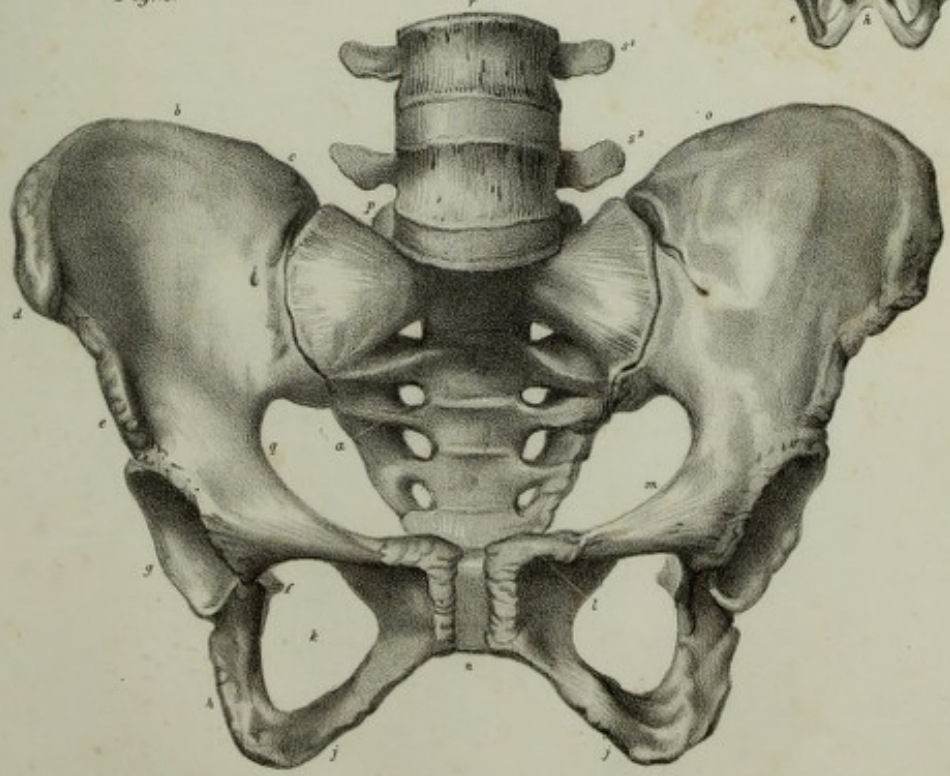

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Moreau.

Fig. 1

Plate 3

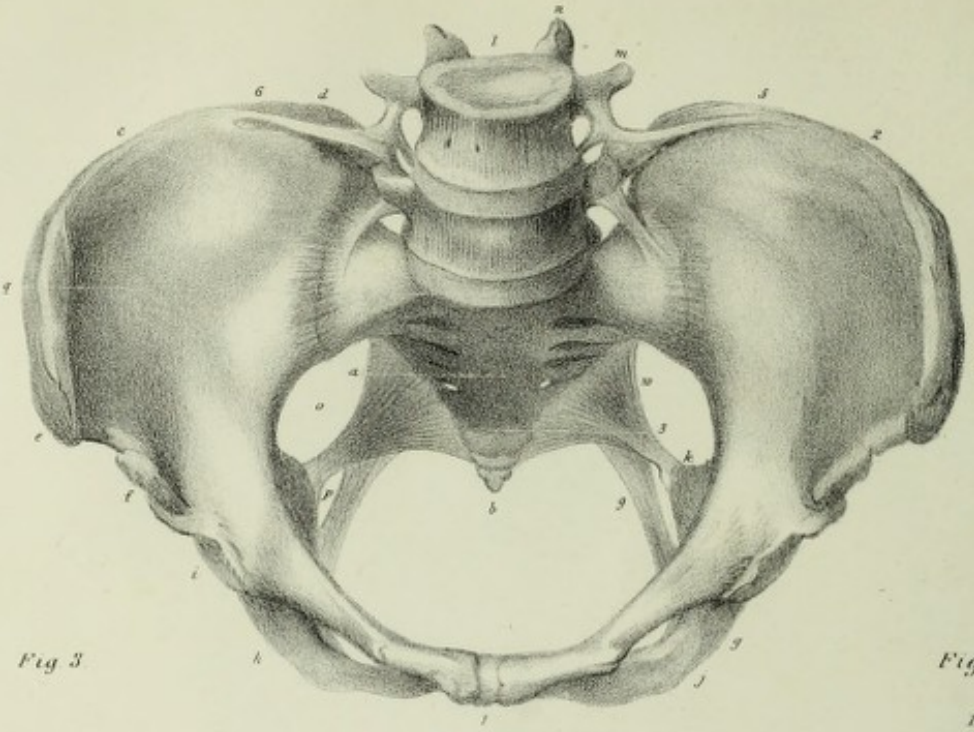

Fig 3

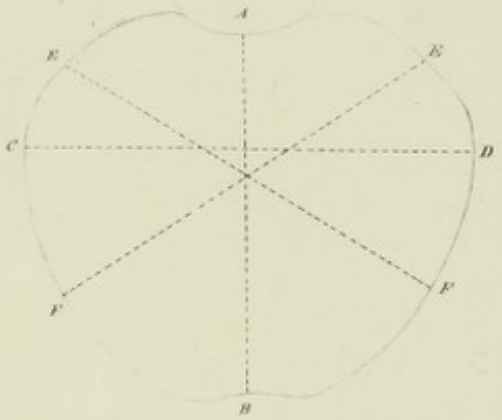

Fig 4.

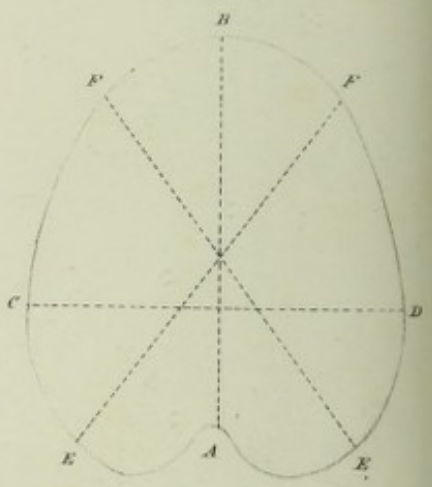

Fig 2.

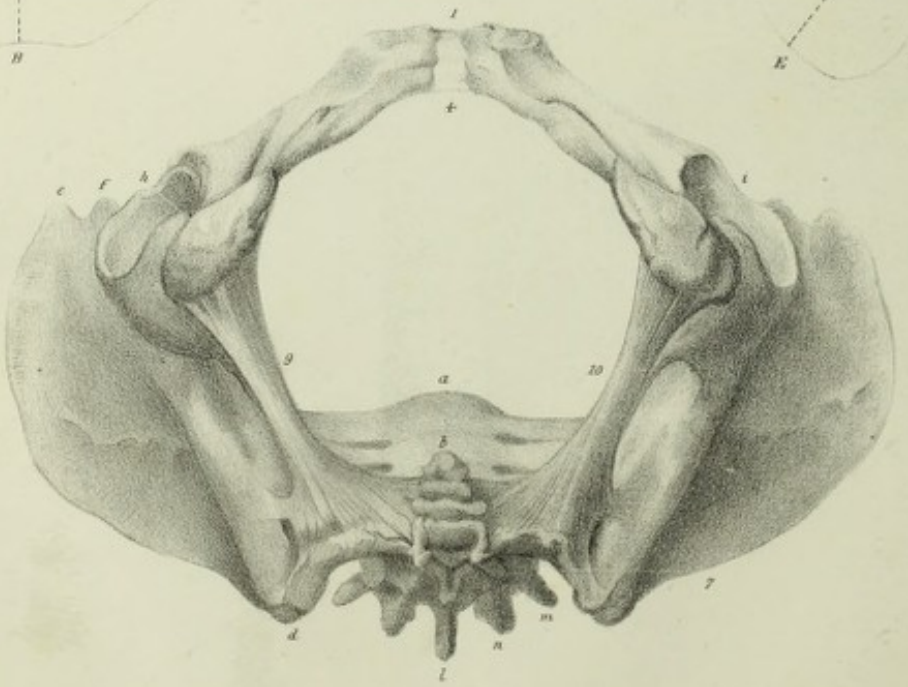

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PLATE III.

VIEW OF THE SUMMIT AND BASE OF AN ADULT FEMALE PELVIS.

(Half Size.)

Fig. 1, Greater pelvis, articulations and abdominal strait.
Fig. 2, Perineal, or inferior strait.
Fig. 3, Outline of superior strait and diameters.
Fig. 4, Outline of inferior strait, (Chaussier's plan).

References to Figures 1 *and* 2.

a, Anterior face of sacrum.
b, Point of coccyx.
c, Venter of the ilium.
d, Posterior superior spinous process of ilium.
e, Anterior superior spinous process of ilium.
f, Anterior inferior spinous process of ilium.
g, Horizontal position of the pubes.
h, Tuberosity of the ischium.
i, Acetabulum.
j, Foramen thyroideum.
k, Spine of the ischium.
l, The two last lumbar vertebræ.
m, Transverse process of fourth lumbar vertebra.
n, Transverse process of fifth lumbar vertebra.
o, Superior or greater sacro-sciatic notch, transmitting the pyriformis muscle, the sciatic nerve, and the gluteal and ischiatic vessels and nerves.
p, The inferior or lesser sacro-sciatic notch transmitting the obturator internus tendon and the internal pudic vessels and nerves.
q, Intervertebral cartilage, forming the sacro-vertebral angle.
1, Symphysis pubis.
2, Sacro-iliac symphysis and anterior and superior sacro-iliac ligaments.
3, Sacro-coccygeal symphysis.
4, Inferior or sub-pubic ligament.
5, Sacro-lumbar ligament.
6, Ilio-lumbar ligament.
7, Sacro-spinous ligament.
8, Intervertebral substance.
9, Greater or posterior sacro-sciatic ligament.
10, Lesser or anterior sacro-sciatic ligament.

References to Figure 3.

SUPERIOR STRAIT.

A, *B*, Antero-posterior diameter, four inches.
C, *D*, Transverse or bis-iliac diameter, five inches.
E, *F*, Oblique diameters, four and a half inches.

References to Figure 4.

INFERIOR STRAIT.

A, *B*, Antero-posterior or coccy-pubal diameter, four inches.
C, *D*, Transverse or bis-ischiatic diameter, four inches.
E, *F*, Oblique diameters, four inches.

(See page 15.)

PLATE IV.

SECTIONS OF THE PELVIS TO EXHIBIT THE FORM, DIRECTION AND EXTENT OF THE PELVIC EXCAVATION.

(Half Size.)

Figures 1 and 2 are cut through the bis-iliac diameter, whilst 3 and 4 are divided in the course of the antero-posterior. Both are vertical sections.

Fig. 1, Posterior half of an adult female pelvis.
Fig. 2, Anterior half of the same pelvis.
Fig. 3, Right half of adult female pelvis.
Fig. 4, Outline of left half of same pelvis, showing diameters.

References to Figures 1, 2 *and* 3.

a, Anterior face of sacrum.
b, Point of coccyx.
c, Crista of the ilium.
d, Tuberosity of the ischium.
e, Acetabulum.
f, The two last lumbar vertebræ.
g, Spine of the ischium.
h, Greater sacro-sciatic notch.
i, Lesser sacro-sciatic notch.
l, Canal for the cauda equina.
m, Opening for the obturator vessels and nerves.
1, Ilio-lumbar ligament.
2, Sacro-vertebral ligament.
3, Anterior or lesser sacro-sciatic ligament.
4, Posterior or greater sacro-sciatic ligament.
5, Anterior sacro-coccygeal ligament.
6, Sacro-iliac symphysis.
7, Sacro-vertebral angle.
8, Inter-vertebral substance.
9, Symphysis pubis.
10, Sub-pubic ligament.
11, Obturator ligament.
12, Posterior inclined plane.
13, Anterior inclined plane.

References to Figure 4.

A, *B*, Sacro-pubic diameter, four inches.
C, *D*, Coccy-pubic diameter, four inches.
E, *F*, Antero-posterior diameter of the pelvis, measured from the most concave part of the sacrum to the back of the pubes, four inches eight lines.
G, *H*, Height of the pubes, eighteen lines.
I, *J*, Thickness of the symphysis, six lines.
K, *L*, Thickness of the sacrum at its base, two and a half inches.
M, *N*, Whole height of the pelvis measured from the middle of the iliac crest to the tuberosity of the ischium, seven inches.
O, *P*, Height of the sacrum, four inches.
Q, *R*, Length of the coccyx, one inch.
S, *T*, From the symphysis pubis to the end of the first spinous process of the sacrum, seven inches.

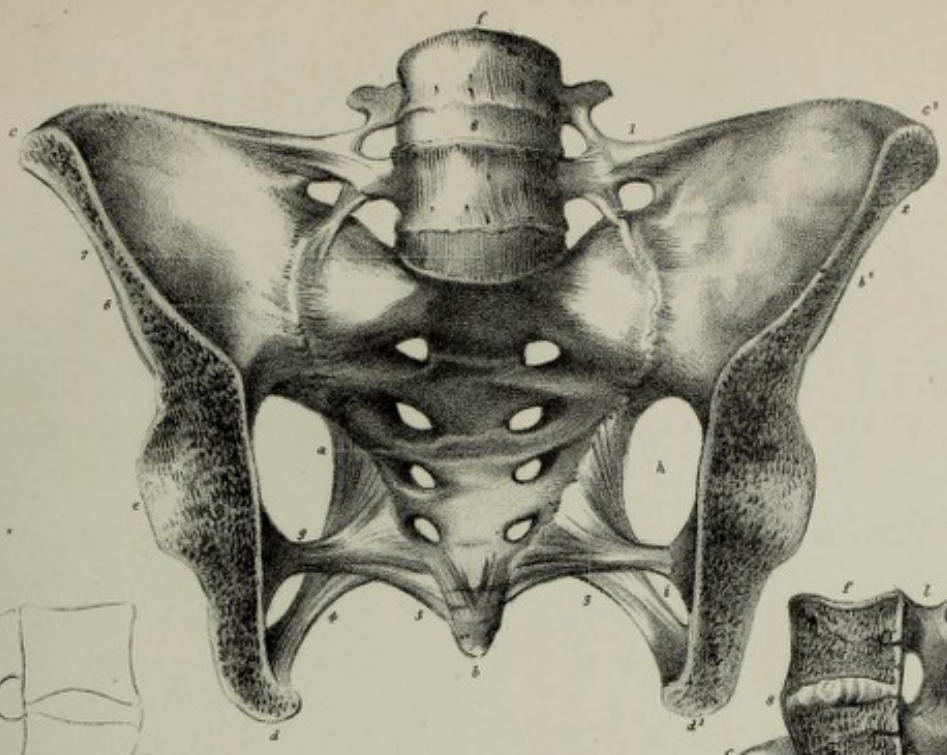


Fig. 4

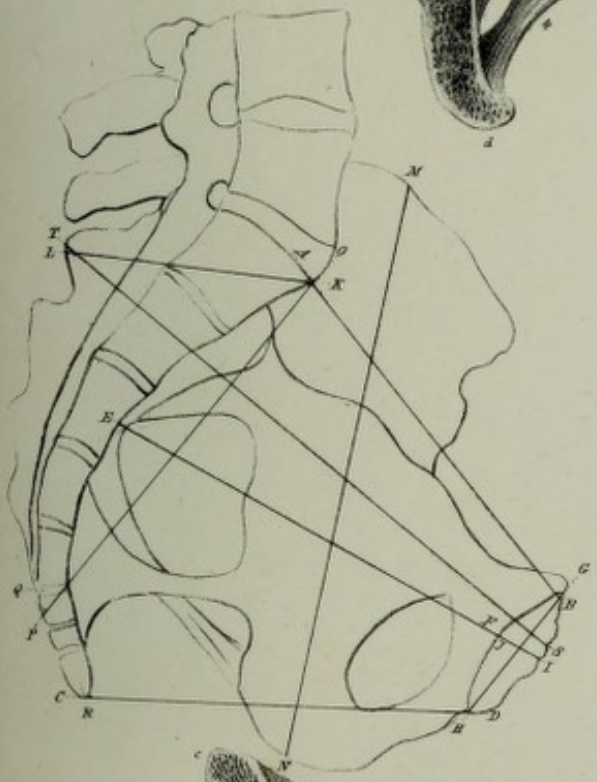


Fig. 3

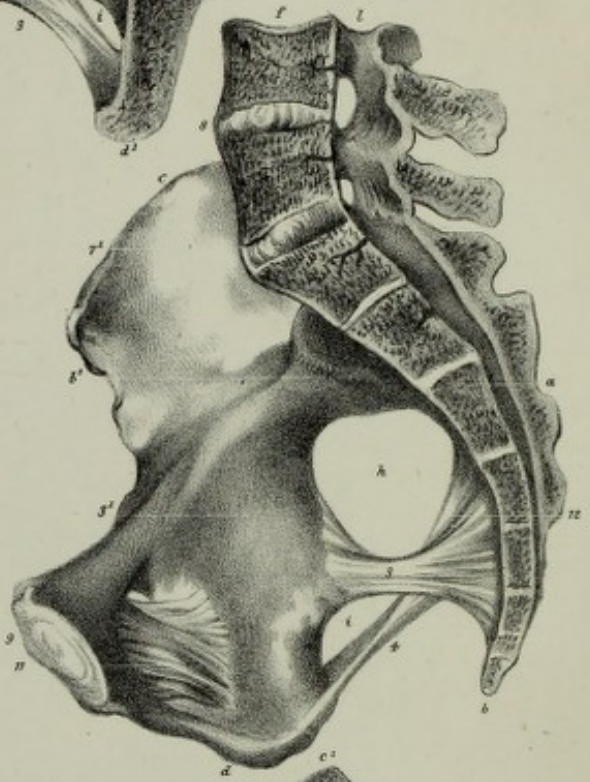
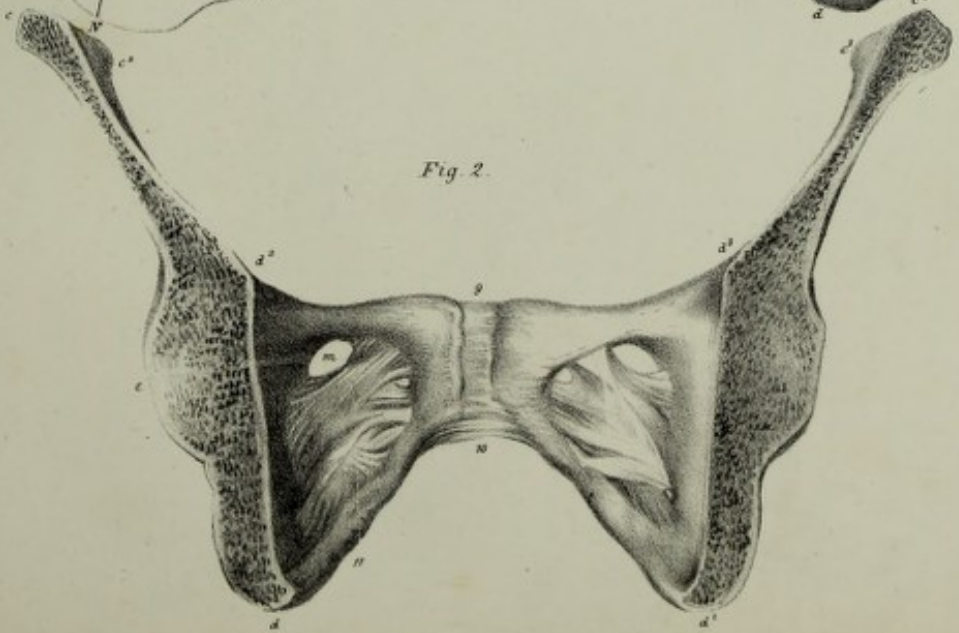


Fig. 2



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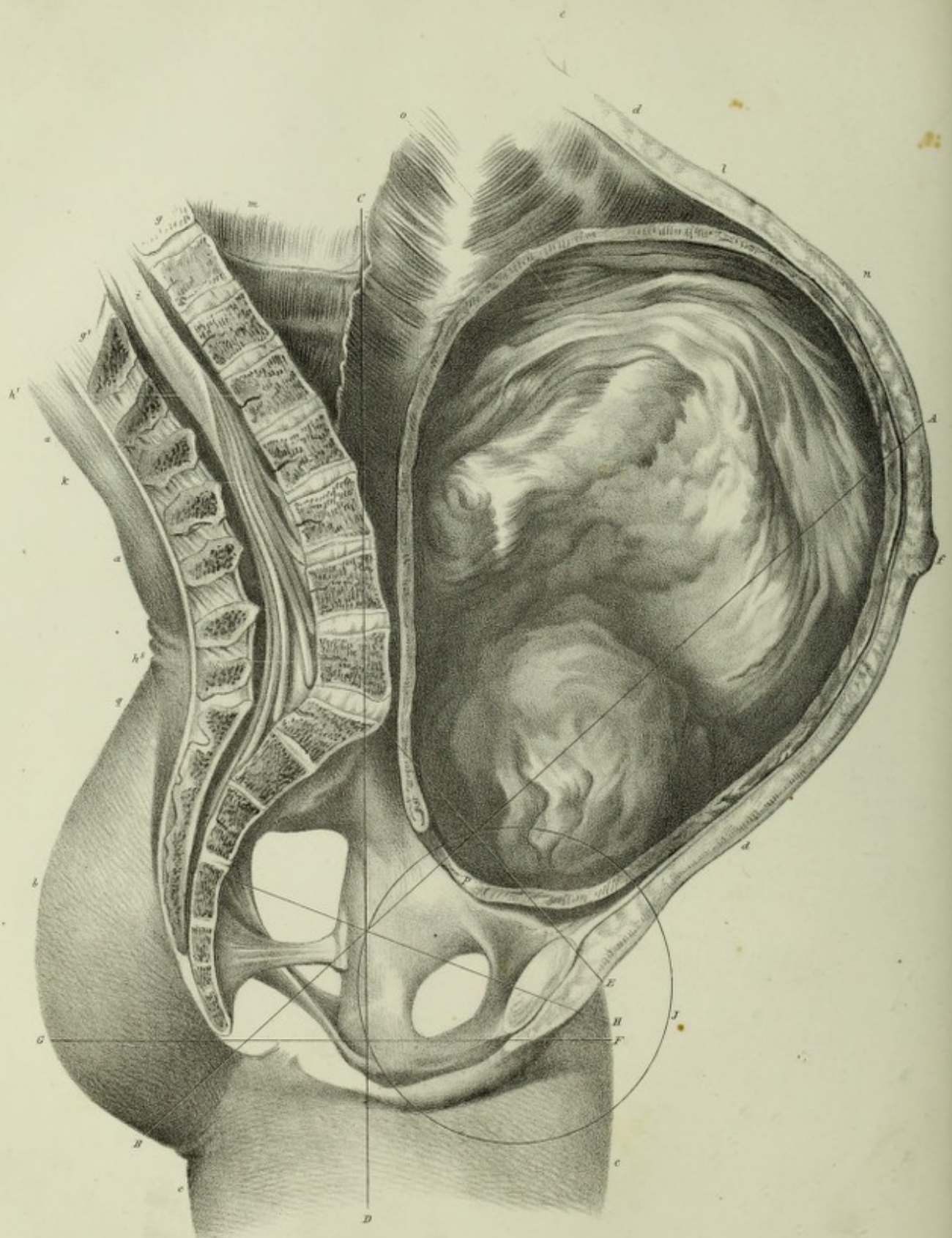

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PLATE V.

DIRECTION AND AXES OF THE PELVIS.

(Half Size.)

a, *a*, Left portion of the lumbar region.
b, Left breech.
c, *c*, Internal and superior surface of the left thigh.
d, *d*, Section of the anterior paries of the abdomen, divided by the linea alba.
e, Anterior left thoracic region.
f, Umbilical cicatrix.
g, Bodies of the last dorsal vertebræ, sawn through their middle.
g^1, Spinous processes of the above-named vertebræ.
From h^1 to h^5, The five last lumbar vertebræ, divided through their middle.
k, Cauda equina.
l, Transversalis abdominis muscle.
m, Intercostal muscles.
n, Section of the parietes of the uterus.
o, Internal and left surface of the uterus.
p, Os uteri.
q, Sacro-vertebral angle.
A, *B*, Axis of the superior strait, forming with the axis of the body an angle of 49 degrees; the imaginary line representing it should pass two inches above the umbilicus, and two lines in front of the coccyx: it is obtained by dropping a perpendicular line on the middle of the plane of the superior strait.
C, *D*, Axis of the inferior strait, parallel to the axis of the body.
E, Plane of the superior strait.
G, *F*, Plane of the inferior strait: it is parallel to the horizon, and the line representing it passes immediately under the arch of the pubes, and over the summit of the coccyx.
H, Antero-posterior diameter of the cavity of the pelvis.
J, Circle of Carus, described around the symphysis pubis, taking as a centre the middle of the symphysis itself, at the point of termination of the antero-posterior diameter of the excavation, and as a radius the half of this diameter. The points of intersection of the circle with the diameters of the straits and of the excavation, meet at the middle of these diameters: the portion of the circle passing over the pelvis indicates the direction followed by the fœtus whilst traversing the pelvic excavation.

(Vide page 15 et seq.)

PLATE VI.

MALFORMATION OF THE PELVIS.

(Half Size.)

Fig. 1, Pelvis malformed from excess of size, belonging to M. A. C. Baudelocque, seen from its base.

Fig. 2, Pelvis malformed from want of size, No. 5 in the collection of the Lying-in Hospital of Paris, seen from its base.

Fig. 3, Outline of the circumference of the superior strait of Fig. 1.
A, *B*, Antero-posterior diameter, four inches eight lines.
C, *D*, Transverse diameter, five inches nine lines.
E, *F*, Oblique diameters, five inches.

Fig. 4, Outline of the inferior strait of Fig. 1.
A, *B*, Coccy-pubal diameter, five inches.
C, *D*, Bis-ischiatic diameter, four inches nine lines.
E, *F*, Oblique diameters, five inches.

Fig. 5, Outline of the superior strait of Fig. 2.
A, *B*, Antero-posterior diameter, three inches.
C. *D*, Transverse diameter, four inches.
E, *F*, Oblique diameters, three inches eight lines.

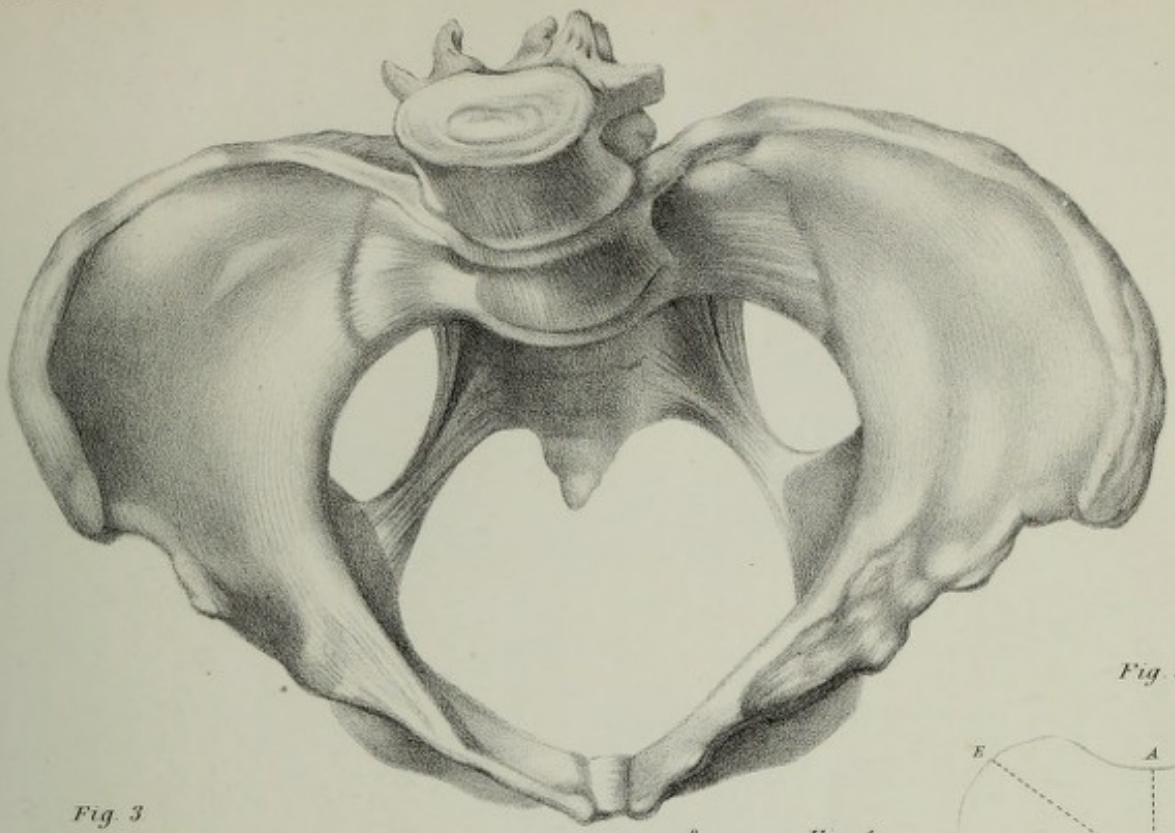
Fig. 6, Outline of the inferior strait of Fig. 2.
A, *B*, Coccy-pubal diameter, two inches nine lines.
C, *D*, Bis-ischiatic diameter, three inches nine lines.
E, *F*, Oblique diameters, three inches seven lines.

(Vide page 23 et seq.)

Moreau.

Fig. 1

Plate 6.



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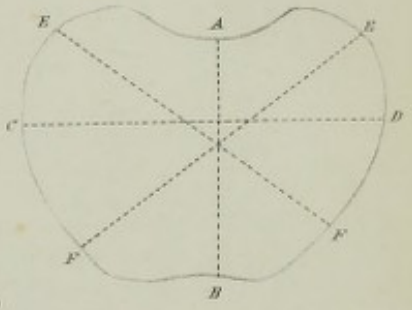

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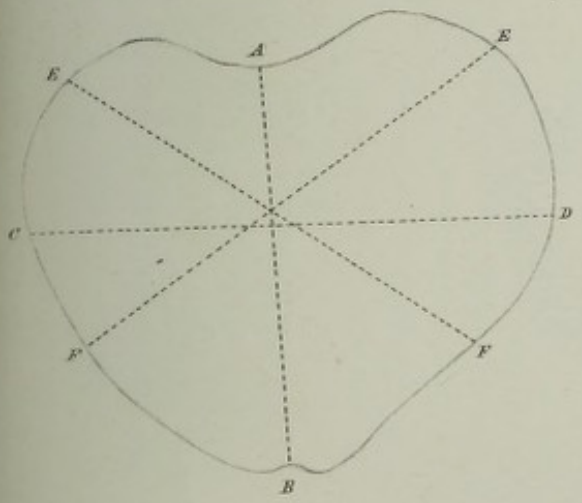

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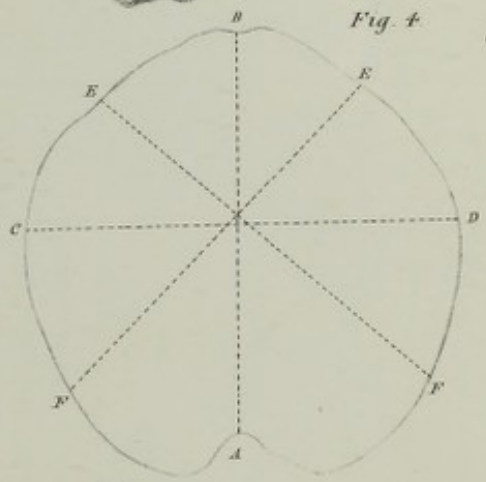
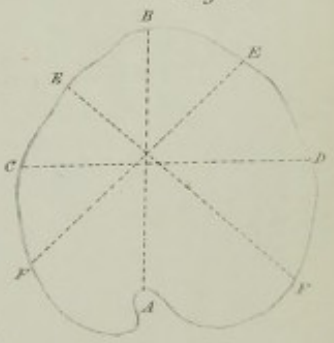


Fig. 6



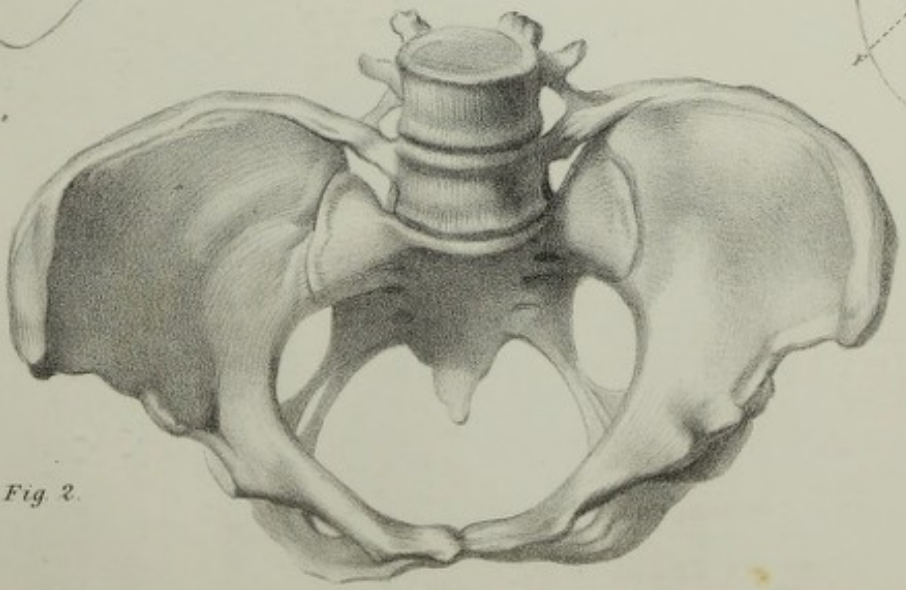


Fig. 2.

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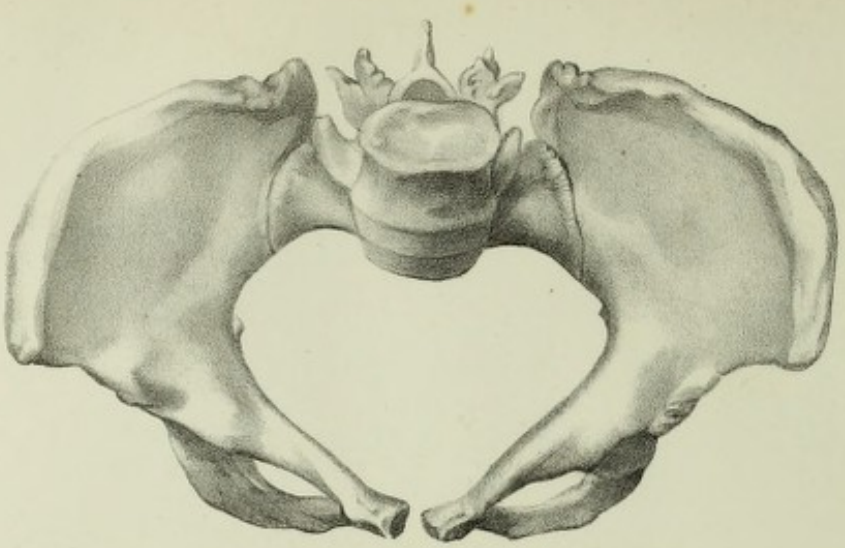
P. S. Duval, Lith. Phil.a

Moreau

Fig. 1.

Plate 7.



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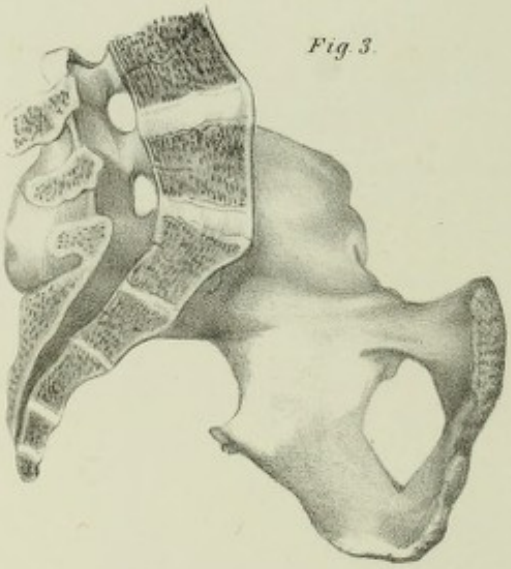

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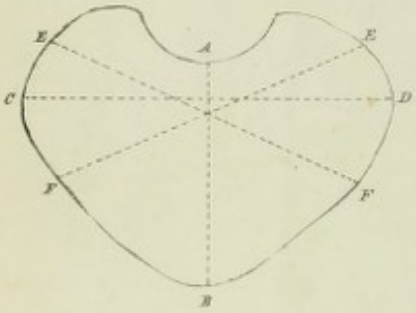

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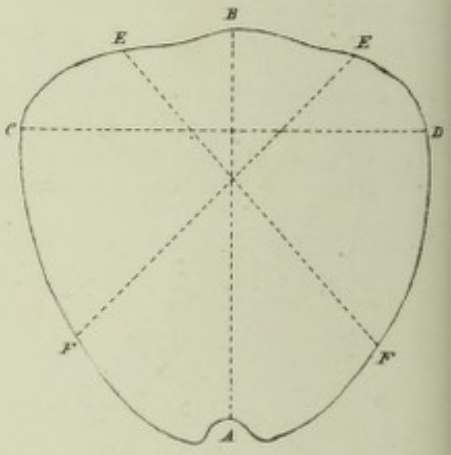

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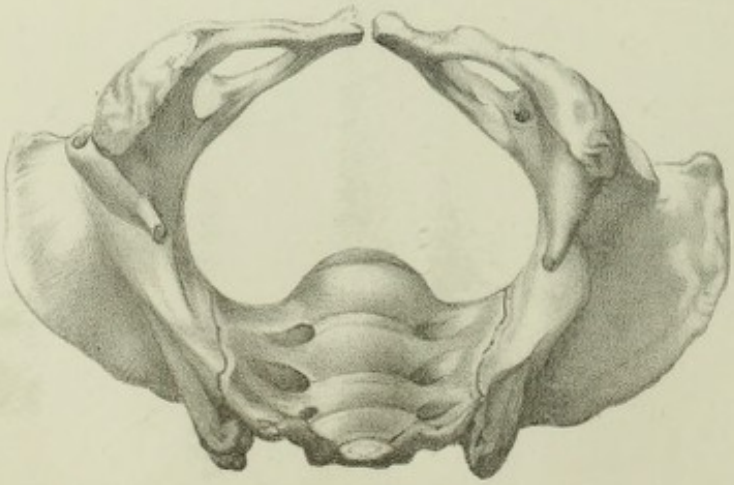

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PLATE VII.

MALFORMATION OF THE PELVIS.

(Half Size.)

Independently of an actual narrowness of its superior strait, the pelvis, figured in this Plate, is flattened as if it had been compressed between two planes acting, one from above downward and from behind forward, and the other from below upward and from in front backward; the sacrum is straightened, its base projected forward, its vertex backward; the iliac bone is, as it were, bent from behind forward, on the level and above the great ischiatic notch. The effect of this flexion has been to carry forward and outward the tuberosities of the ischia, whence there results a contraction of the superior and an enlargement of the inferior strait.

Fig. 1, Pelvis, No. 10 in the collection of the Lying-in Hospital of Paris, seen from its base.

Fig. 2, The same, seen from its vertex.

Fig. 3, Section through the median line.

Fig. 4, Outline of the superior strait of Fig. 1.
A, *B*, Antero-posterior diameter, two inches four lines.
C, *D*, Transverse diameter, four inches.
E, *F*, Oblique diameters, three inches nine lines.

Fig. 5, Outline of the inferior strait of Fig. 2.
A, *B*, Coccy-pubal diameter, four inches seven lines.
C, *D*, Bis-ischiatic diameter, five inches.
E, *F*, Oblique diameters, four inches six lines.

(Vide page 23 et seq.)

PLATE VIII.

MALFORMATION OF THE PELVIS.

(Half Size.)

In the Figures of this Plate, the sacrum, at an inch and a half from its summit, is reflected forward in a horizontal direction; the coccyx, succeeding it, looks slightly upward, so as to present a deep excavation toward the inferior region of the sacrum; the horizontal branches of the pubes, for the extent of two inches, are parallel to each other, and, behind the symphysis, form a groove of five lines in breadth; the articular surfaces of the pubes curve inward to be united to each other. Viewed as a whole, this pelvis presents a lateral flattening; the arch of the pubes is very narrow; the ischia are approximated; there hence results a great excess of dimensions of the antero-posterior diameter.

Fig. 1, Pelvis, malformed in its totality, seen from the base. (Museum Dupuytren.)

Fig. 2, The same, seen from its summit.

Fig. 3, Anterior region of the pelvis of the two preceding figures.

Fig. 4, Outline of the superior strait of Fig. 1.
A, *B*, Antero-posterior diameter, four inches six lines.
C, *D*, Transverse diameter, three inches six lines.
E, *F*, Oblique diameters, three inches eight lines.

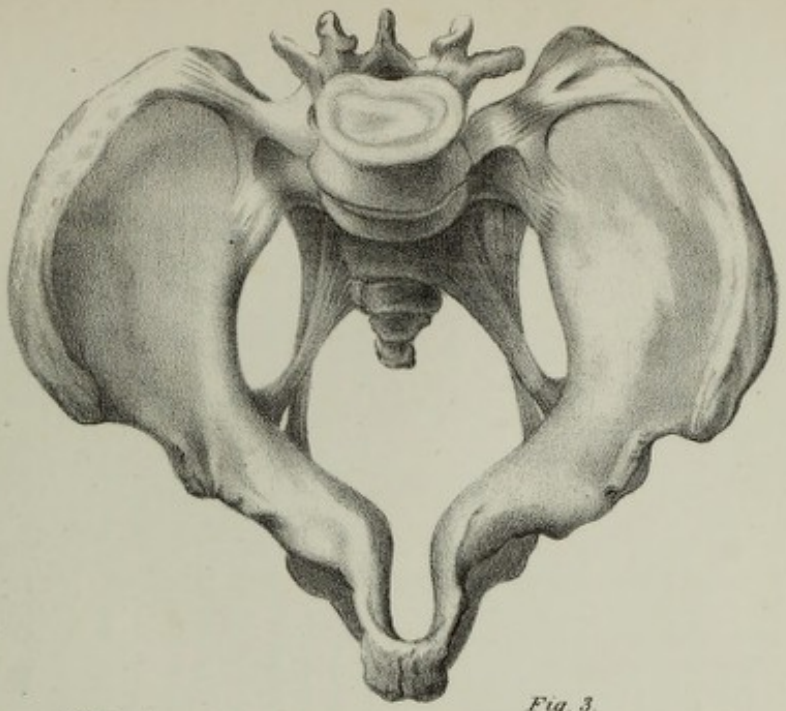
Fig. 5, Outline of the inferior strait of Fig. 2.
A, *B*, Antero-posterior diameter, three inches six lines.
C, *D*, Transverse diameter, two inches six lines.
E, *F*, Oblique diameters, three inches.

(Vide page 23 et seq.)

Moreau

Fig. 1

Plate 8.



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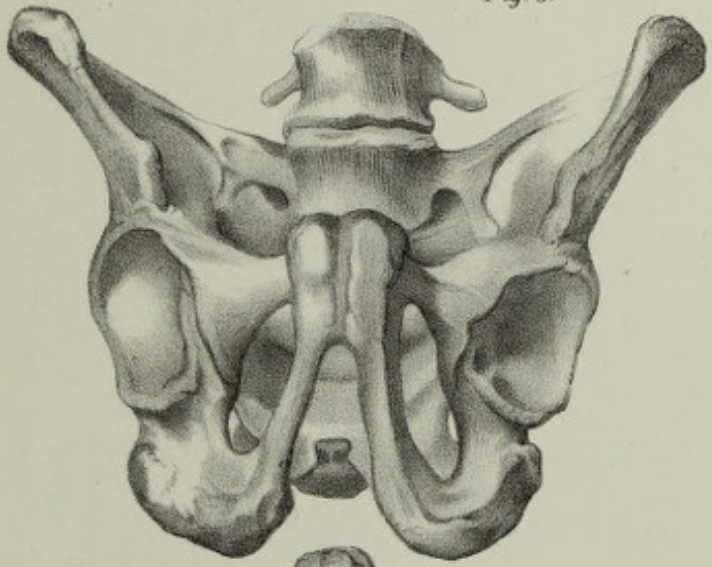

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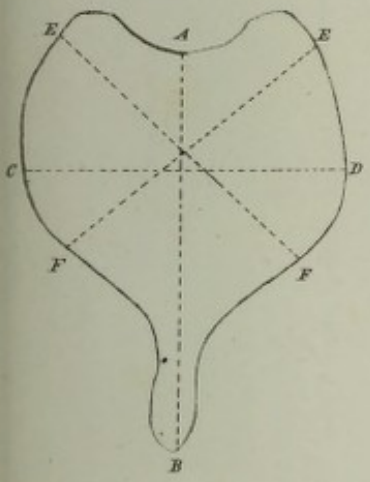

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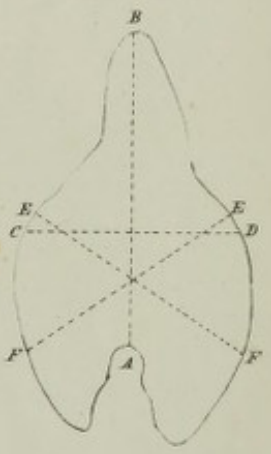

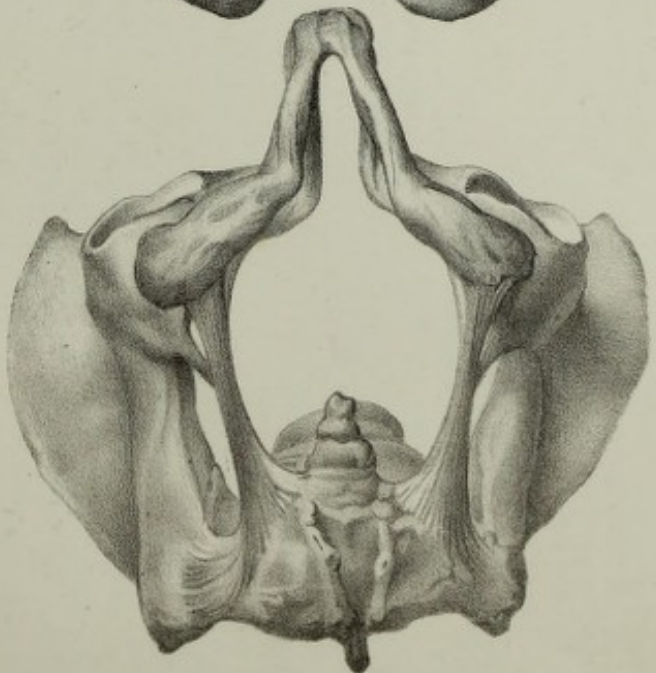

Fig. 2.

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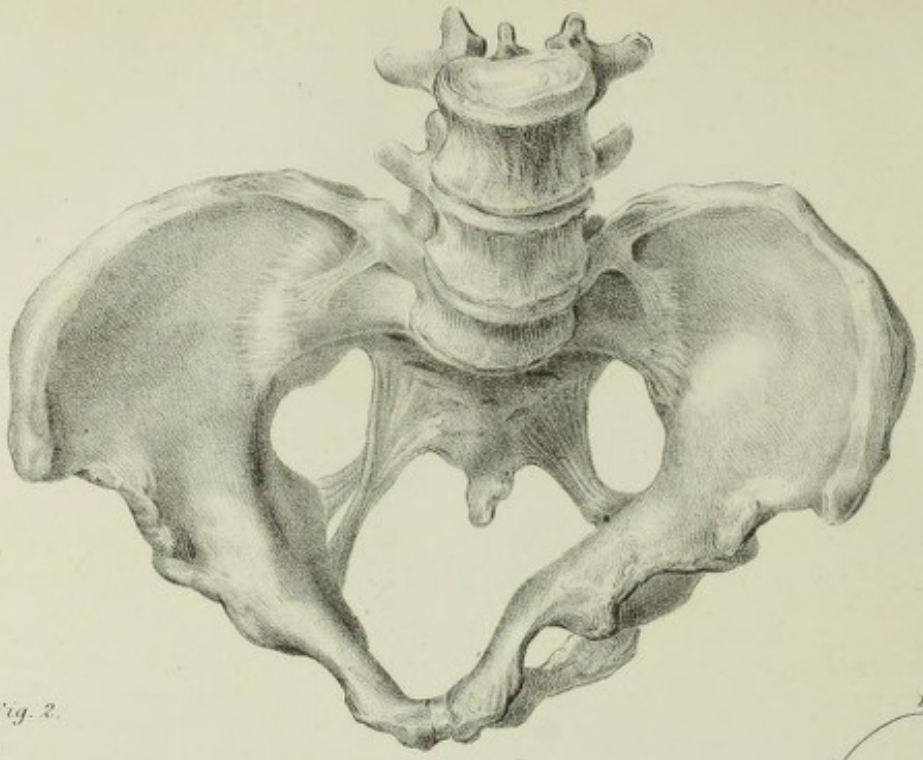

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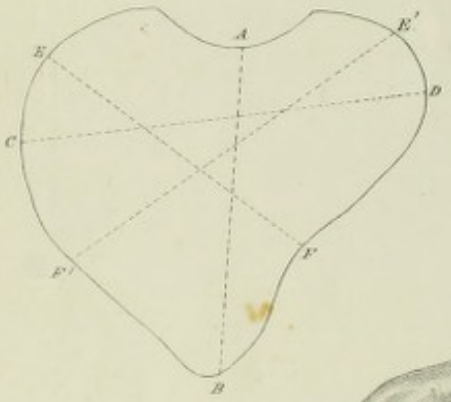

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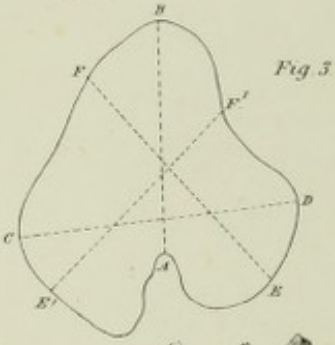
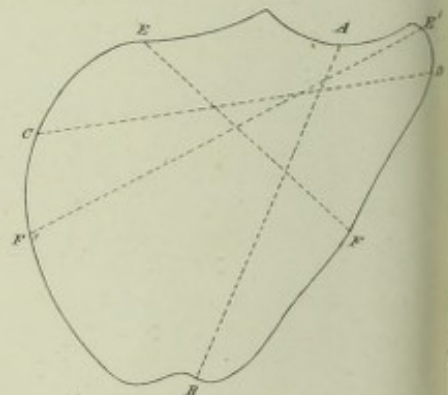


Fig 5



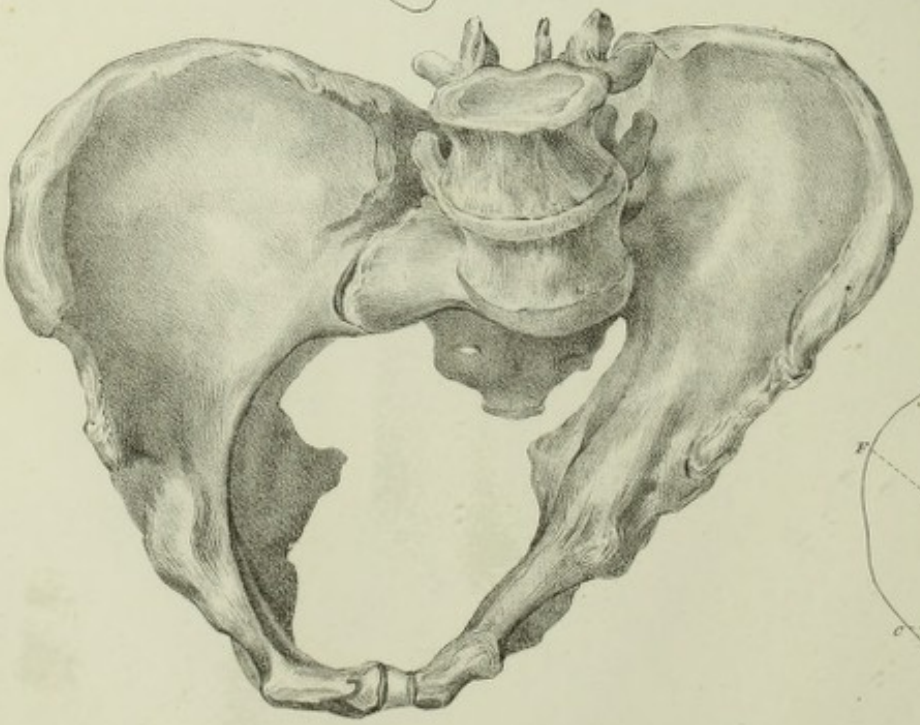


Fig 4.

Fig 6

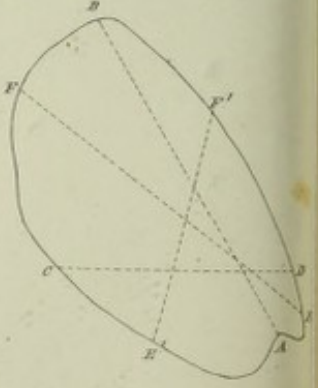


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PLATE IX.

MALFORMATION OF THE PELVIS.

(Half Size.)

Fig. 1, Female pelvis, seen from its base. (Anatomical Collection of the Lying-in Hospital of Paris.)

It differs from the normal condition, because the symphysis pubis forms a projection forward, and a groove behind, resulting from the curvature anteriorly of the horizontal branch of the left pubes. Its dimensions are likewise universally defective.

Fig. 2, Outline of the superior strait of Fig. 1.

A, *B*, Antero-posterior diameter, three inches six lines.
C, *D*, Transverse diameter, four inches four lines.
E, *F*, Right oblique diameter, three inches nine lines.
E^1, F^1, Left oblique diameter, four inches.

Fig. 3, Outline of the inferior strait of Fig. 1.

A, *B*, Coccy-pubal diameter, two inches eight lines.
C, *D*, Transverse diameter, three inches.
E, *F*, Right oblique diameter, three inches.
E^1, F^1, Left oblique diameter, two inches eight lines.

Fig. 4, Female pelvis, seen from its base. (Anatomical Collection of the Lying-in Hospital of Paris.)

In this pelvis can be seen the consolidation of the left sacro-iliac articulation, without the possibility of discovering any traces of it: there are no osseous projections nor inequalities. The corresponding iliac fossa approaches very closely the middle of the sacrum: the base of this bone has lost all that part which is exterior to the first left sacral foramen, which is very much contracted at the point of union of the two bones. The deformity bears in a manner only on the left half of the pelvis, and the promontory of the sacrum, instead of corresponding to the symphysis pubis, corresponds to the left acetabulum.

Fig. 5, Outline of the superior strait of Fig. 4.

A, *B*, Antero-posterior diameter, four inches.
C, *D*, Transverse diameter, four inches three lines.
E, *F*, Right oblique diameter, two inches nine lines.
E^1, F^1, Left oblique diameter, four inches nine lines.

Fig. 6, Outline of the inferior strait of Fig. 4. The sacro-ischiatic ligaments are supposed to be restored.

A, *B*, Coccy-pubal diameter, four inches six lines.
C, *D*, Transverse diameter, three inches.
E, *F*, Right oblique diameter, four inches.
E^1, F^1, Left oblique diameter, two inches six lines.

(Vide page 23 et seq.)

PLATE X.

MALFORMATION OF THE PELVIS.

(Half Size.)

Fig. 1, Pelvis of a rachitic woman, seen from its base. (Anatomical Collection of the Lying-in Hospital of Paris.)

Fig. 2, The same pelvis, seen from its summit. In the skeleton from which this pelvis was taken, the femur, tibia and fibula were greatly curved; the vertebral column presented two enormous curvatures, one of which occupied the whole extent of the lumbar portion and the four last dorsal vertebræ, with its convexity turned to the left; the other, formed at the expense of the remainder of the dorsal portion, presented its convexity turned to the right: the ribs were also deformed, and the antero-posterior diameter of the thorax was much larger than natural.

The promontory of the sacrum projects considerably, on account of the great curvature of the sacrum. The fifth lumbar vertebra projects greatly forward, and is separated from the right cotyloid paries only by a finger's breadth. The apex of the coccyx is only an inch and a half distant from the anterior part of the base of the sacrum.

The coxal bones have been doubly flexed forward and backward, in consequence of the crushing in of the two acetabula; consequently, the superior strait has assumed very nearly the shape of the heart on a playing card.

Fig. 3, Outline of the superior strait of Fig. 1.
A, *B*, Antero-posterior diameter, two inches.
C, *D*, Transverse diameter, three inches nine lines.
E, *F*, Right oblique diameter, two inches ten lines.
E^1, *F*^{1}, Left oblique diameter, two inches nine lines.

Fig. 4, Outline of the inferior strait of Fig. 1.
A, *B*, Coccy-pubal diameter, two inches seven lines.
C, *D*, Transverse diameter, one inch ten lines.
E, *F*, Right oblique diameter, two inches three lines.
E^1, *F*^{1}, Left oblique diameter, two inches eight lines.

Fig. 5, Pelvis of a rachitic subject. (Museum Dupuytren.)

The sacrum is straight until within an inch of its summit; it is of normal width, and of inconsiderable thickness.

The body of the pubes and ascending rami of the ischia are very thin: the body of the pubes is only two lines in thickness. The infra-pubic foramina are very large; the left iliac portion approaches a vertical direction. The entire pelvis is greatly flattened from before backward.

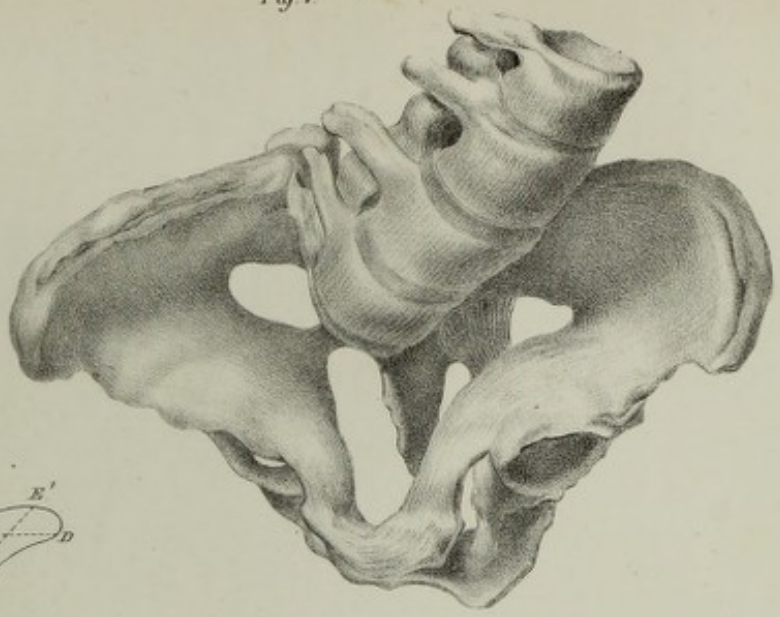
The lumbar portion of the superincumbent vertebral column is carried nearly directly backward and slightly to the right.

Fig. 6, Outline of the circumference of the superior strait of Fig. 5.
A, *B*, Antero-posterior diameter, one inch eight lines.
C, *D*, Transverse diameter, five inches.
E, *F*, Right oblique diameter, four inches.
E^1, *F*^{1}, Left oblique diameter, four inches seven lines.

Fig. 7, Outline of the inferior strait of Fig. 5.
A, *B*, Coccy-pubal diameter, two inches.
C, *D*, Transverse diameter, five inches.
E, *F*, Right oblique diameter, three inches nine lines.
E^1, *F*^{1}, Left oblique diameter four inches three lines.

(Vide page 23 et seq.)

Fig 1.



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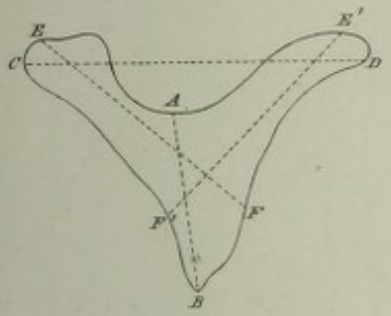

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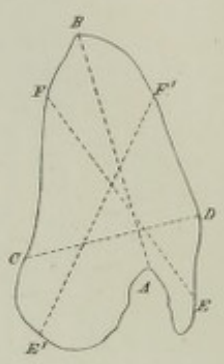

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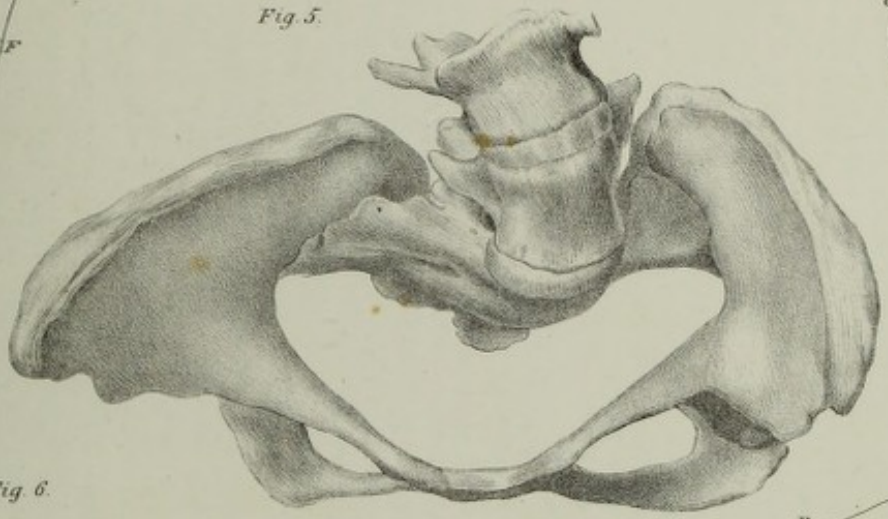

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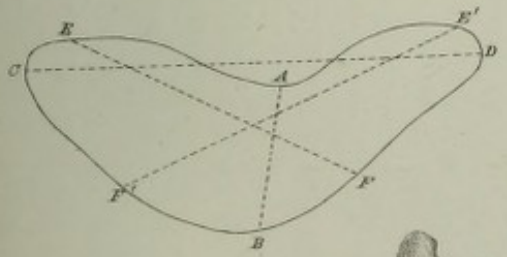

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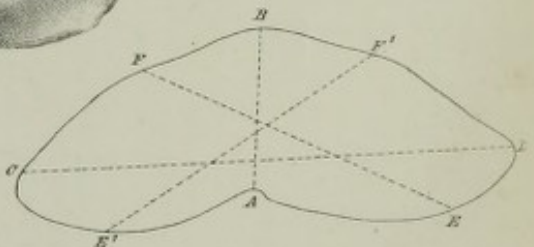

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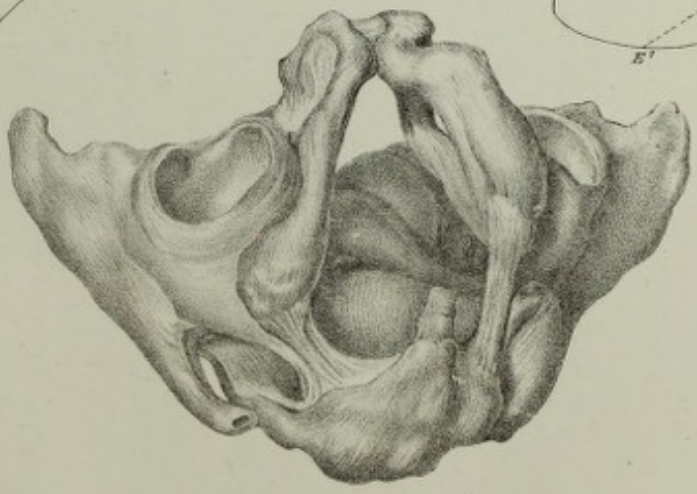
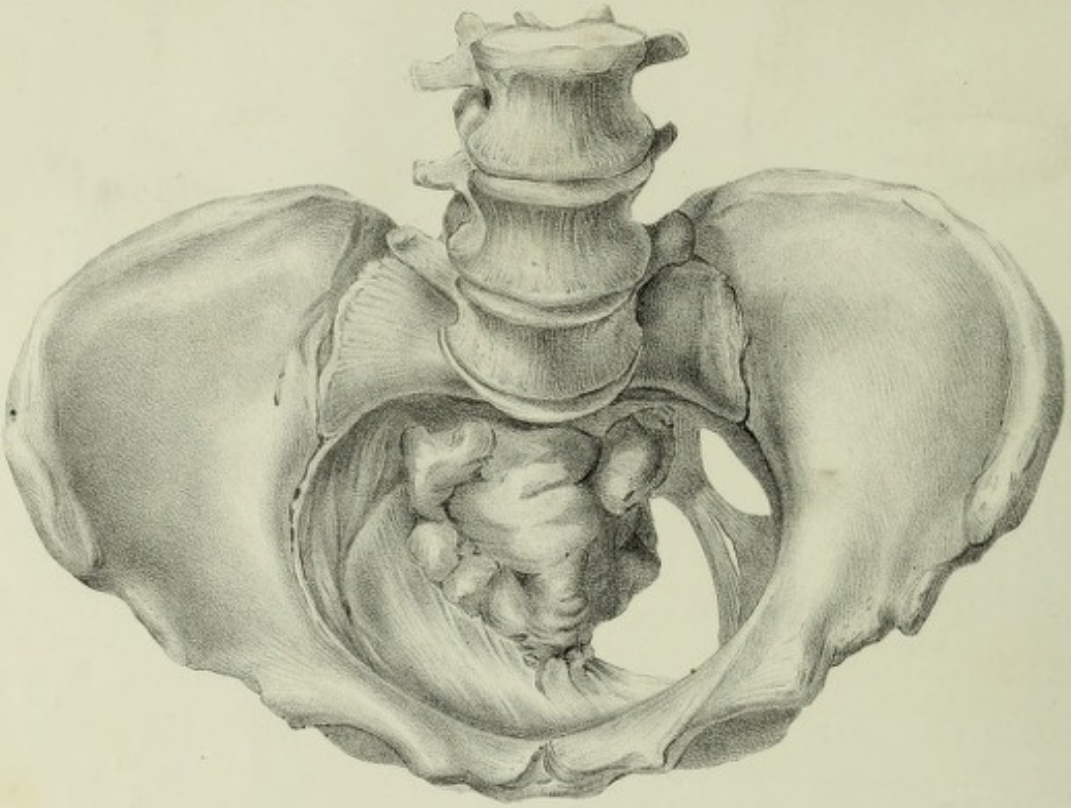


On Stone by A. Hoffy

Philadelphia, Published by Carey & Hart.

P. S. Duval, Lith. Phil.ª

Fig. 1.



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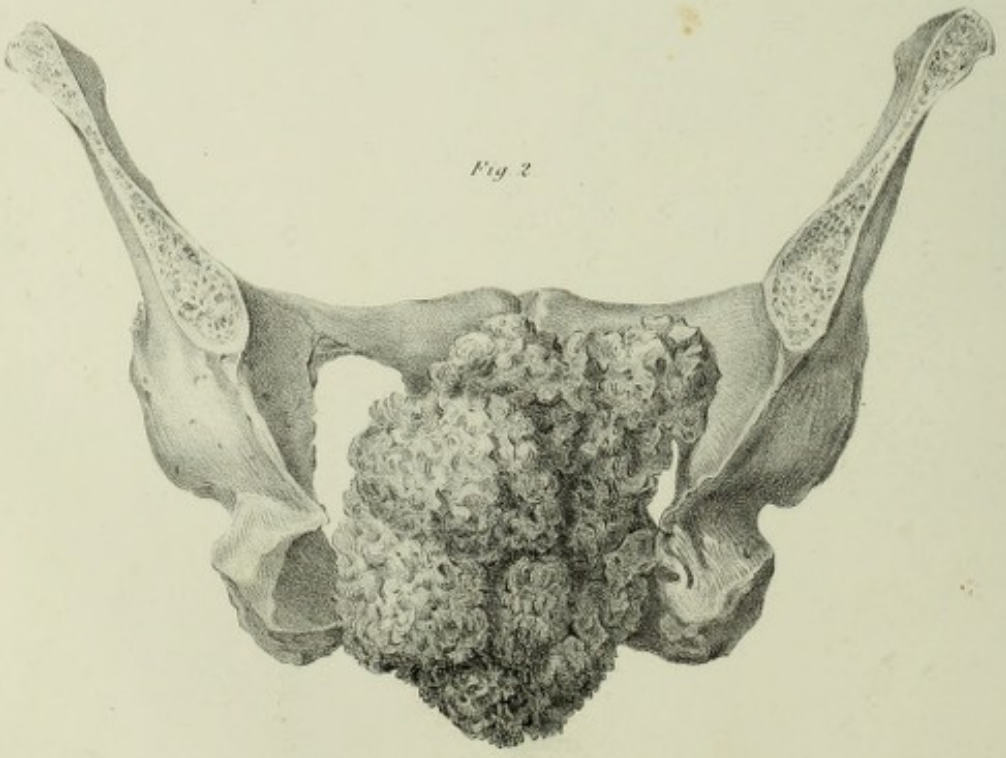

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PLATE XI.

MALFORMATION OF THE PELVIS.

(Half Size.)

TUMOURS DEVELOPED IN THE CAVITY OF THE PELVIS.

(Pelves from the Museum Dupuytren.)

Fig. 1, Represents a pelvis regularly formed, in which there exists a nodulated rounded fibro-cartilaginous tumour, having a diameter of two inches and nine lines, resting posteriorly on the anterior surface of the sacrum, from its apex to within an inch of its promontory; its free portion is at the distance of one inch from the symphysis pubis.

The sacrum on which it rests, has undergone no alteration; the tumour is not even intimately united to the periosteum, which cannot be its point of origin. It is a fibrous body, which, being developed in the middle of the soft parts of the cavity, has contracted adhesions with the anterior surface of the sacrum.

The membranous septum, which closes the pelvis below and to the right, belongs to the peritoneum and superior perineal aponeurosis.

Fig. 2. This pelvis is also well formed. It is divided behind the acetabula so as to present its internal and anterior surface. Nearly the whole cavity is filled by ane normous nodulated, irregular tumour, covered by a great number of asperities; its great diameter, which is vertical, is four inches and five lines in length. It adheres to the inferior part of the symphysis pubis, to the internal surface and ascending ramus of the ischium, the descending of the pubes, and to the wall of the right acetabulum. A portion of the tumour projects through the right infra-pubic foramen; it descends two inches lower than the ischia, at the points of union designated. The iliac bone is neither altered nor deformed; and, notwithstanding the hardness of the tumour, it evidently has not been developed at the expense of this bone. The asperities of the surface appear to be formed of a chalky matter divided into large grains crystallized and united in a mass by a fibrous organic substance. It closely resembles an exostosis.

(Vide page 23 et seq.)

PLATE XII.

MALFORMATION OF THE PELVIS.

(Half Size.)

Fig. 1, Deformed pelvis belonging to M. A. C. Baudelocque, seen from its base.

The superior strait has a tendency to approach a regular circular shape; but the antero-posterior diameter exceeds the others. The sacrum is straight. The ischia are closely approximated to each other; the arch of the pubes is very narrow.

Fig. 2, Outline of the superior strait of Fig. 1.

A, *B*, Antero-posterior diameter, four inches six lines.
C, *D*, Transverse diameter, four inches.
E, *F*, Oblique diameters, four inches three lines.

Fig. 3, Outline of the inferior strait of the same pelvis.

A, *B*, Coccy-pubal diameter, three inches six lines.
C, *D*, Bis-ischiatic diameter, one inch eight lines.
E, *F*, Right oblique diameter, three inches six lines.
E^1, F^1 Left oblique diameter, three inches.

Fig. 4, Fracture of the pelvis, badly united, right half. (Museum Dupuytren.)

The consequence of the fracture has been a crushing in of the acetabulum. The internal wall forms a rounded tumour which projects to the distance of an inch and a half. The iliac bone has been at the same time divided exteriorly to the right sacro-iliac symphysis. By its consolidation, the external portion of the iliac fossa, has inclined inward so as to approach closely to the sacrum; thus bringing the tumour formed by the wall of the acetabulum very near to the promontory of the sacrum.

(Vide page 23 et seq.)

Moreau.

Fig 1.

Plate IX.

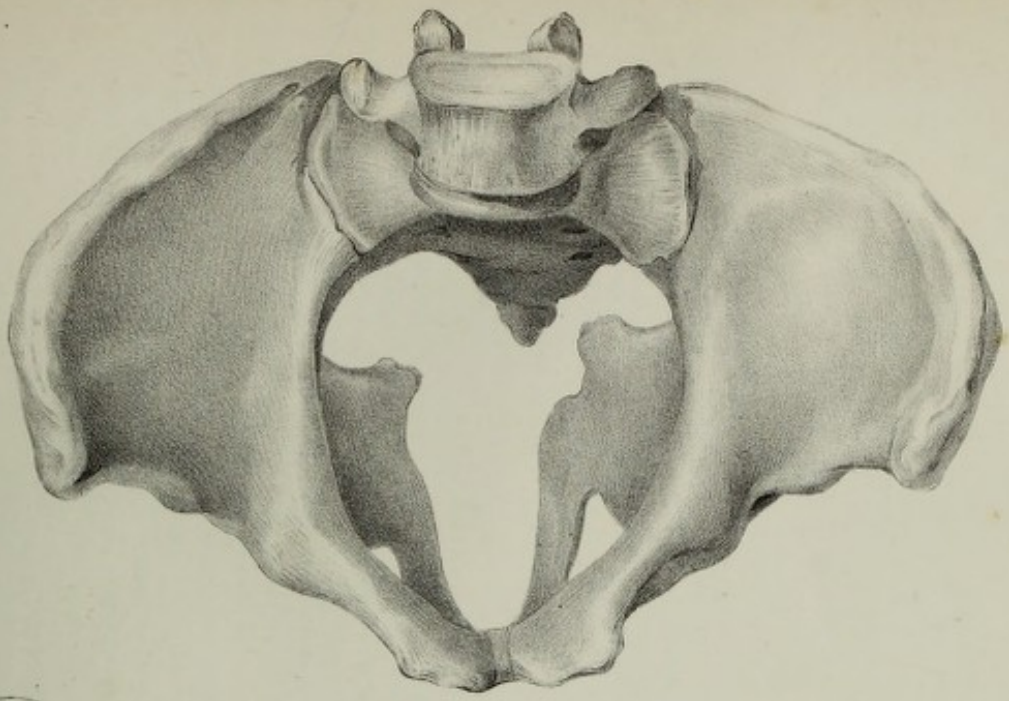

Fig 2.

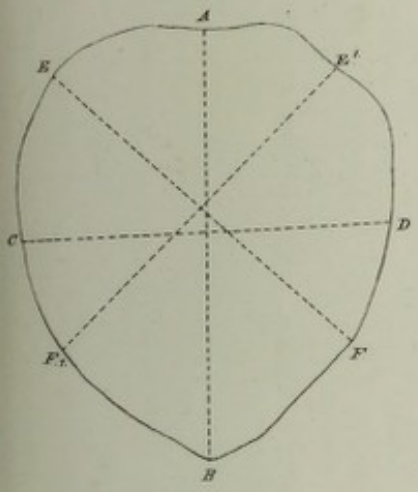

Fig 3.

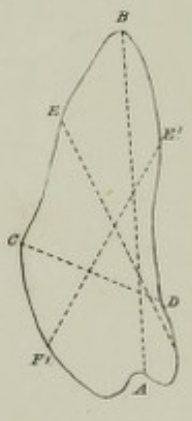

Fig 4.

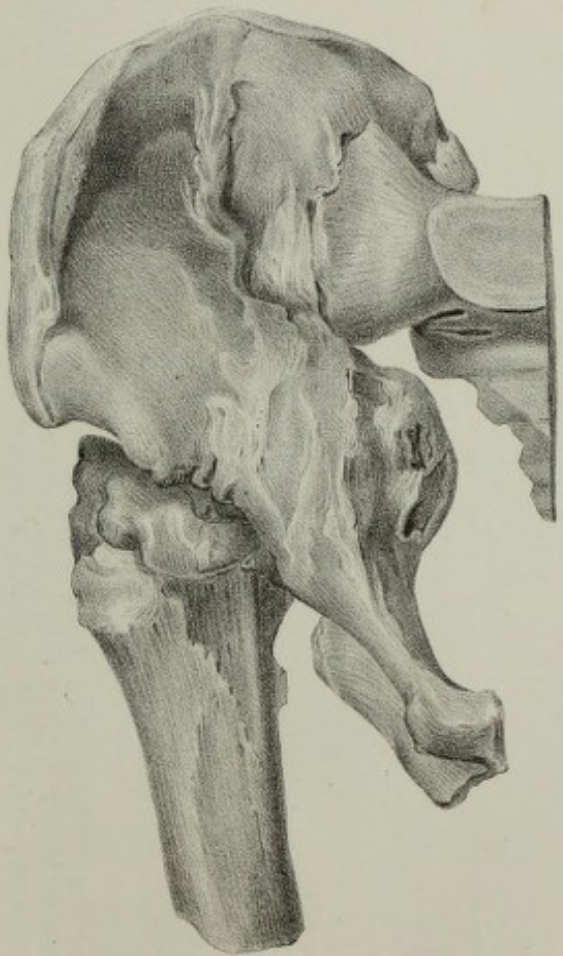

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Fig. 1.

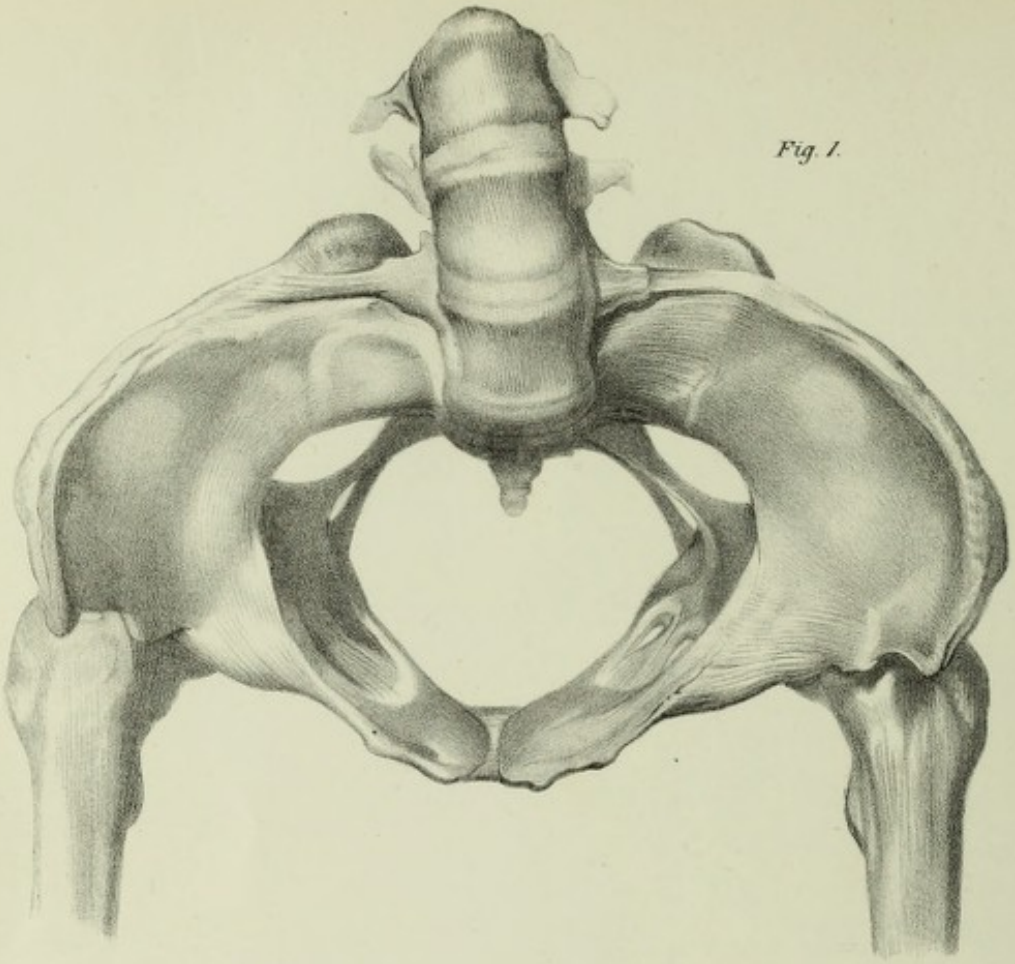
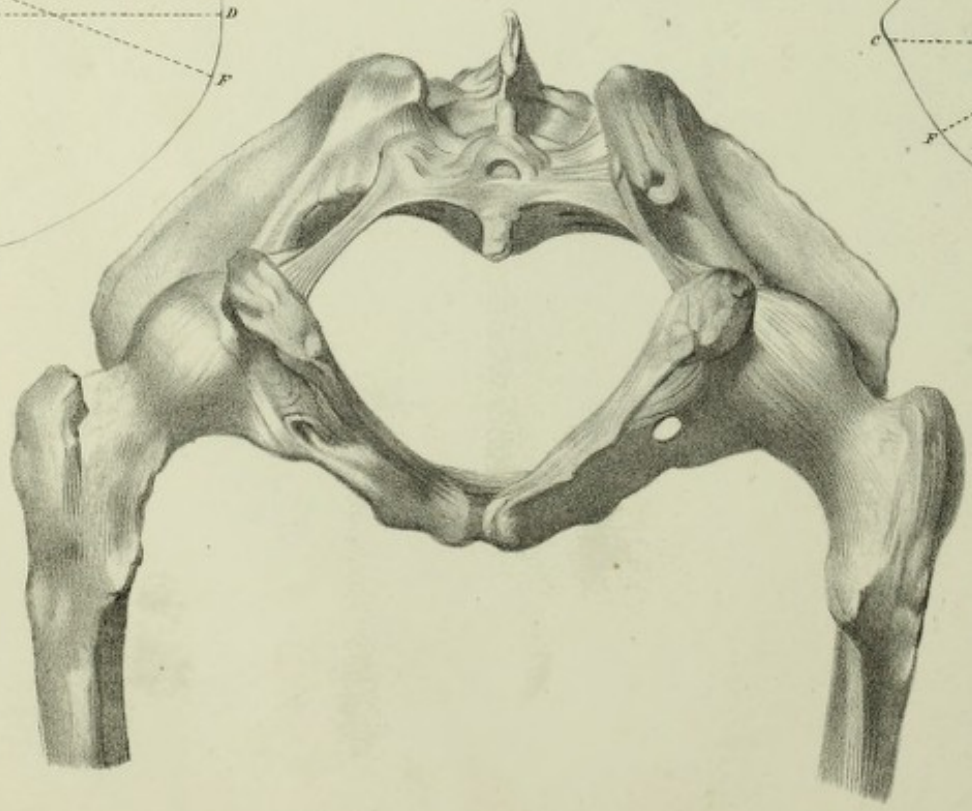


Fig. 2.



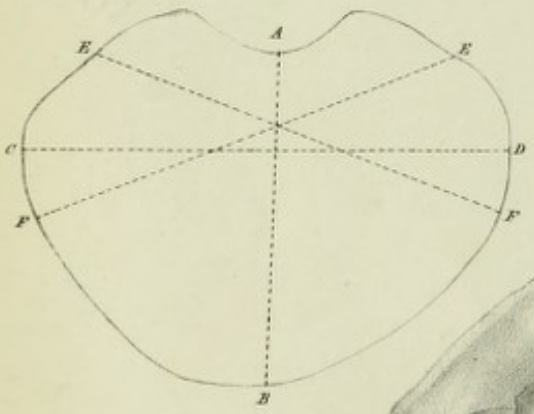


Fig. 3.

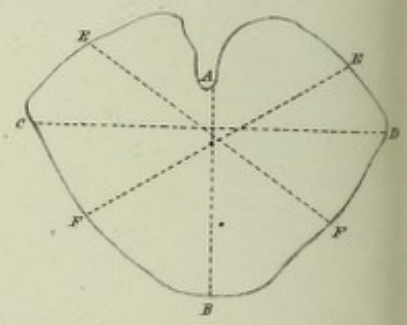


Fig. 4.

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PLATE XIII.

MALFORMATIONS OF THE PELVIS.

(Half Size.)

Fig. 1, Pelvis of a rachitic woman, belonging to the collection of M. Moreau, seen from the superior strait.

In this plate can be seen the direction of the pelvis in the living subject and in the erect position. The inclination forward is such that the anterior face of the sacrum looks directly downward; the direction of the cavity and its straits is nearly parallel to the horizon. The inferior strait is directed backward and slightly upward. The vertebral column appears to rest on the posterior face of the sacrum, owing to the change of direction of the articular surfaces. This pelvis presents a striking analogy to that of quadrupeds.

Fig. 2, The same pelvis, seen from the inferior strait. This figure, compared with the preceding, exhibits the disproportion which exists between the two straits; whilst the superior is evidently enlarged, the inferior strait is considerably contracted.

Fig. 3, Outline of the superior strait.

A, *B*, Antero-posterior diameter, five inches two lines.

C, *D*, Transverse diameter, five inches two lines.

E, *F*, Oblique diameters, four inches six lines.

Fig. 4, Outline of the inferior strait.

A, *B*, Coccy-pubal diameter, two inches six lines.

C, *D*, Transverse diameter, three inches eight lines.

E, *F*, Oblique diameters, three inches two lines.

(Vide page 25 et seq.)

PLATE XIV.

MALFORMATIONS OF THE PELVIS.

(Half Size.)

Fig. 1, Pelvis represented in Plate XIII., seen on its external surface.

Fig. 2, The same pelvis, sawed through its middle, and seen on its internal surface.

Fig. 3, Here another peculiarity of this very curious pelvis is seen, namely, that the sacrum, entirely straight, forms an inclined plane forward, whilst the pubes are directed backward and inward, whence there result two planes inclined in opposite directions, greatly separated above and approximated below, between which the head of the fœtus became more and more tightly wedged in proportion as it advanced.

(Vide page 25 et seq.)

Moreau.

Fig. 1

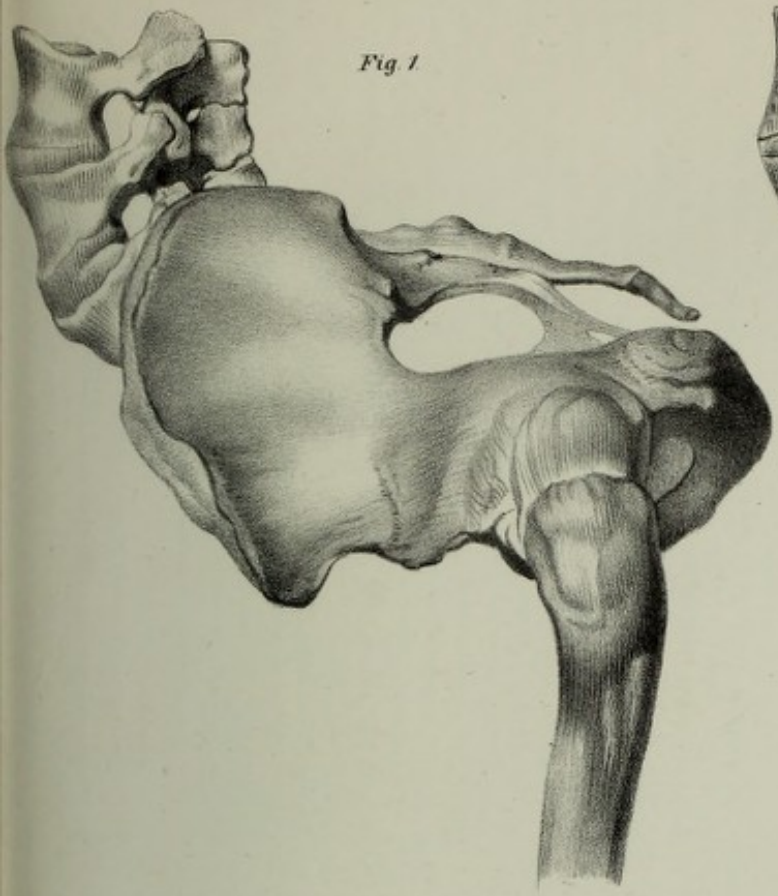

Fig. 2.

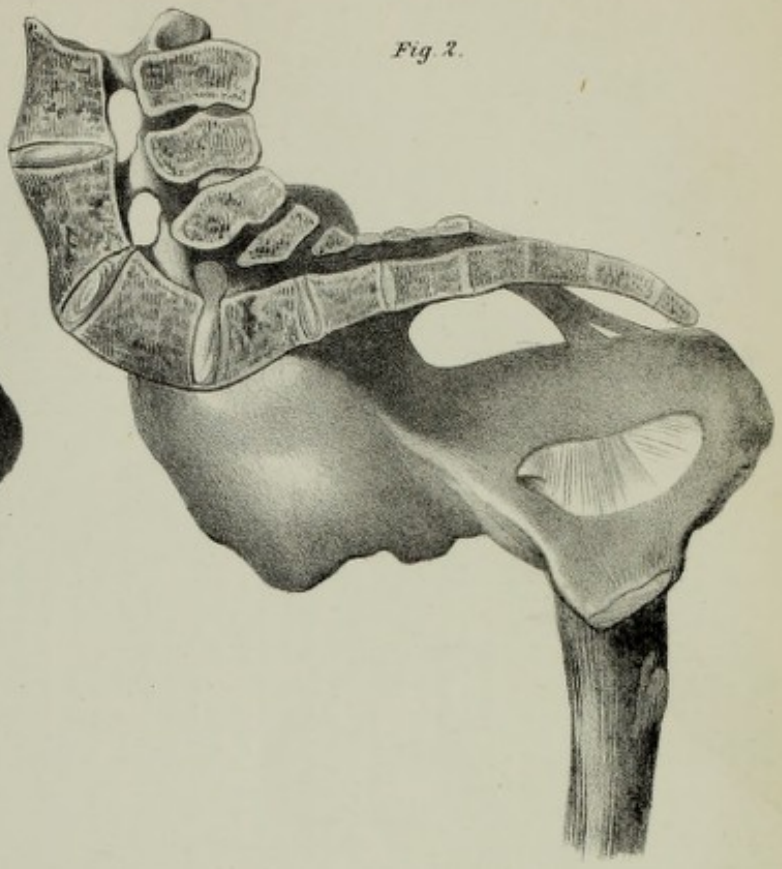

Fig. 2.

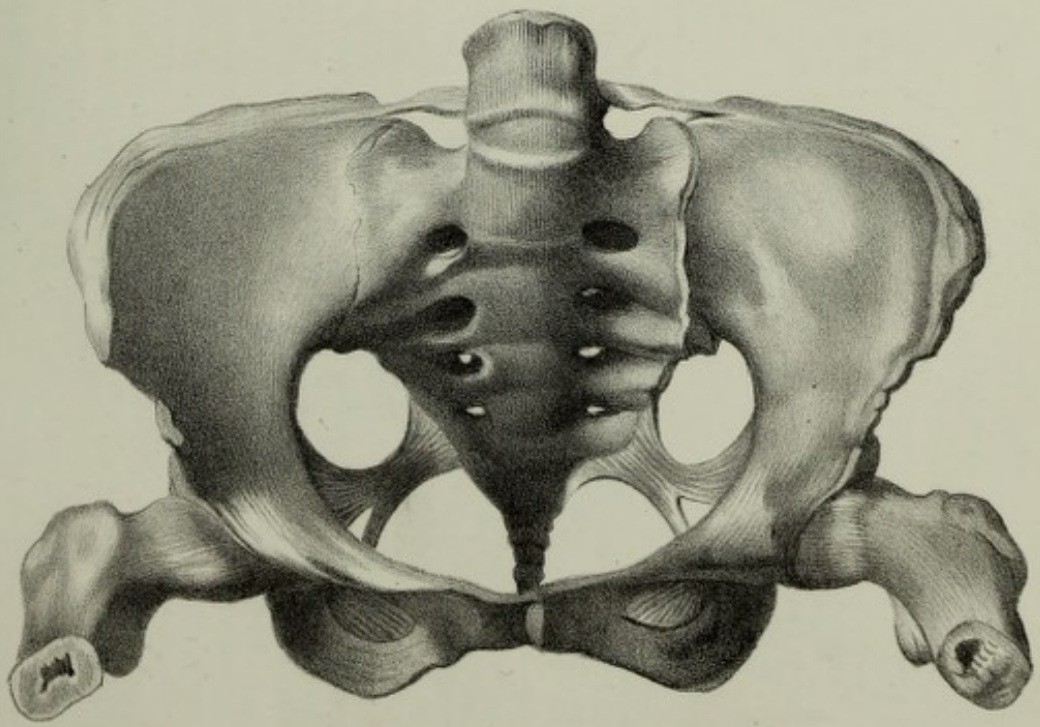

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Fig. 1.

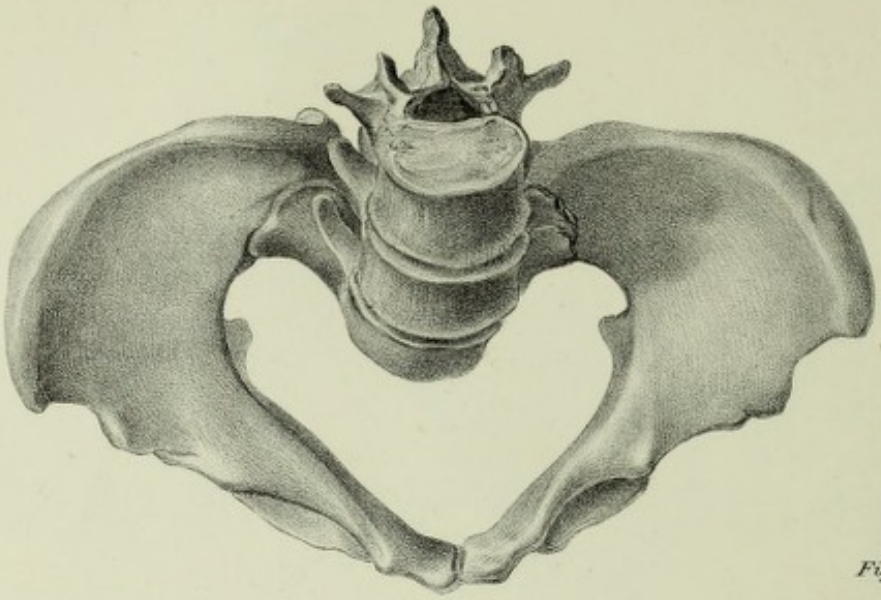

Fig. 4.

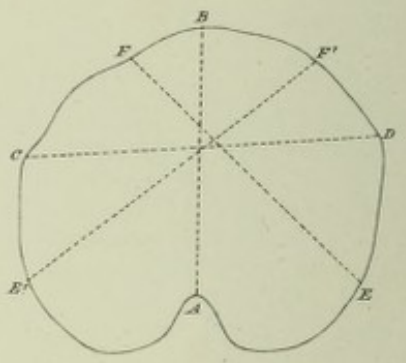

Fig. 3.

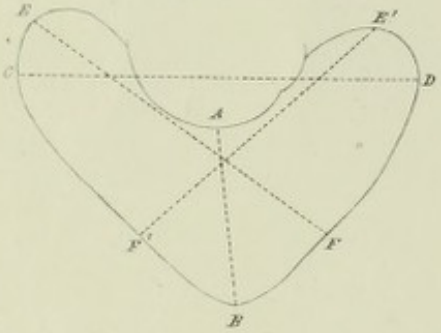

Fig. 2.

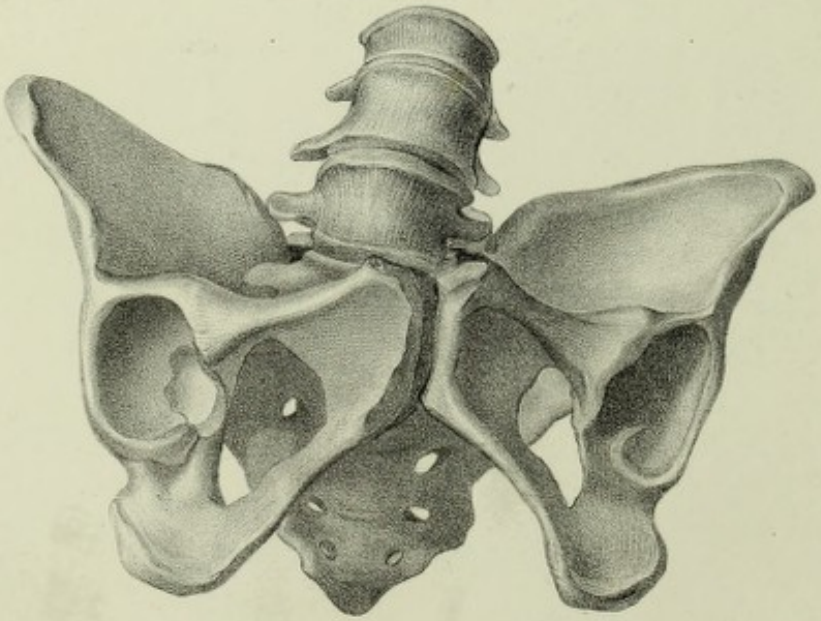

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PLATE XV.

MALFORMATIONS OF THE PELVIS

(Half Size.)

Fig. 1, Malformed pelvis of an adult woman, seen from the superior strait. (Museum Dupuytren.)

The superior strait in this pelvis resembles very closely the heart on a playing card. It is contracted in every direction, but unequally; the transverse diameter passes through the very centre of the promontory of the sacrum, so as no longer to correspond to the middle part of the interior of the pelvis.

Fig. 2, The same pelvis seen from its anterior surface.

In this position, the defect in the inclination forward is more apparent. The pubes are more elevated than the promontory of the sacrum. The axis of the superior strait is perpendicular to the horizon.

Fig. 3, Outline of the superior strait.

A, *B*, Antero-posterior diameter, two inches.
C, *D*, Transverse diameter, four inches four lines.
E, *F*, Right oblique diameter, four inches.
E,[1] *F*,[1] Left oblique diameter, three inches four lines.

Fig. 4, Outline of the inferior strait.

A, *B*, Coccy-pubal diameter, two inches two lines.
C, *D*, Transverse diameter, three inches eight lines.
E, *F*, Right oblique diameter, three inches six lines.
E,[1] *F*,[1] Left oblique diameter, three inches ten lines.

(Vide page 25 et seq.)

PLATE XVI.

PERINEUM OF AN ADULT WOMAN, SEEN FROM ITS INFERIOR SURFACE.

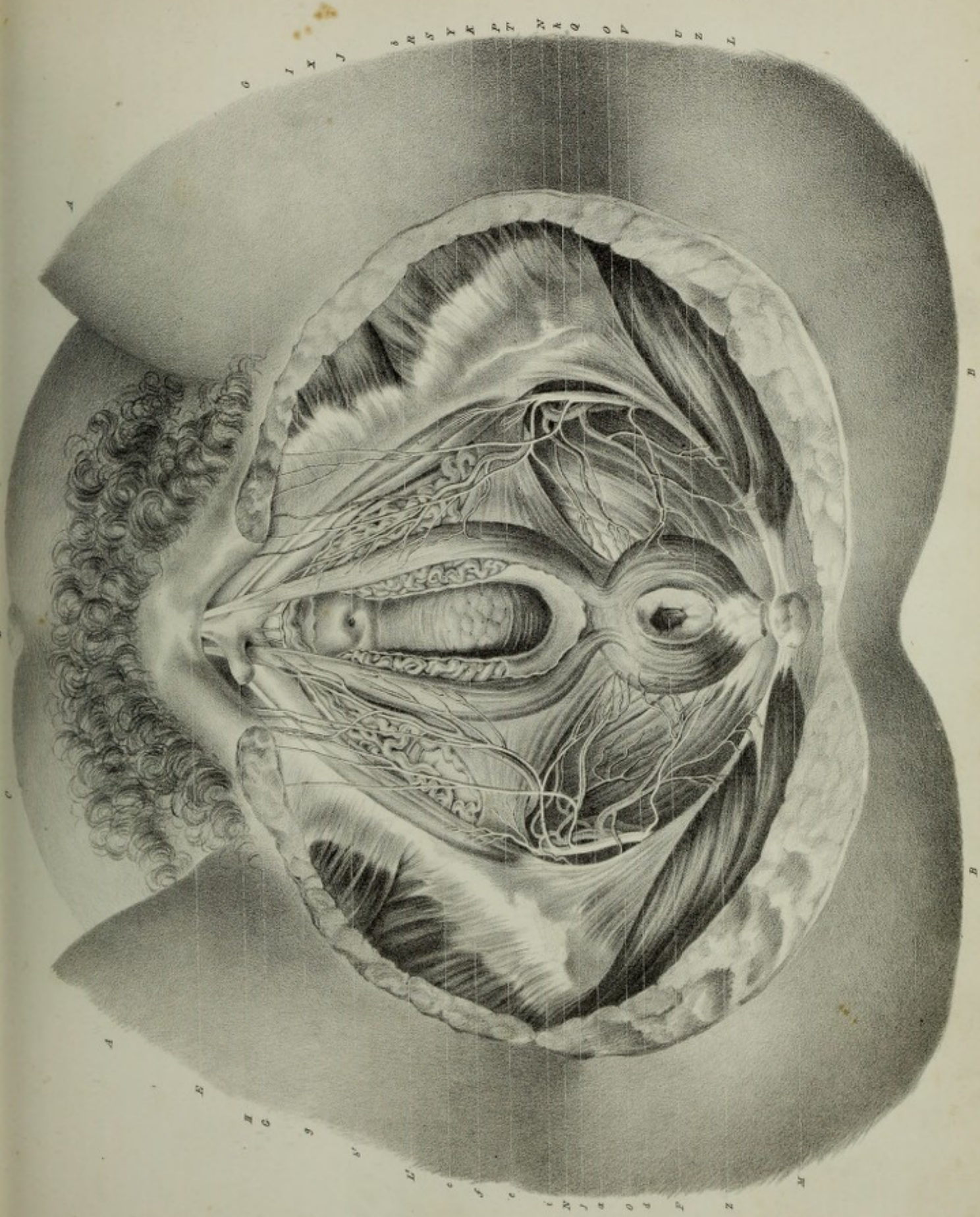
(Size of Nature.)

A, *A*, Superior and internal part of the thighs.
B, *B*, The breech.
C, *C*, Anterior paries of the abdomen.
D, Umbilicus.
E, Anterior commissure of the vulva.
F, Orifice of the anus.
G, *G*, Section of the labia pudendi at an inch from the anterior commissure.
H, Clitoris.
I, Root of the corpus cavernosum clitoridis.
J, Inferior orifice of the canal of the urethra.
K, Entrance of the vagina, through which is seen the bulbous portion of the anterior paries of this canal.
L, Section of the adipose tissue of the breech and integuments.
L^1, Section of the skin of the internal superior part of the thighs and breech.
M, Summit of the coccyx.
N, *N*, Tuberosities of the ischia.
O, *O*, Great sacro-sciatic ligaments.
P, Constrictor vaginæ muscle.
Q, Vulvar portion of the constrictor.
R, Erector clitoridis muscle.
S, Ischio-cavernosus muscle.
T, Transversalis perinæi muscle.
U, Sphincter ani muscle.
V, Levator ani muscle.
X, Gracilis muscle.
Y, Adductor magnus muscle.
Z, *Z*, Glutæi magni muscles.
a, Internal pudic artery and vein, after their passage between the sacro-sciatic ligaments.
b, *b*, Superior branch of the internal pudic artery.
c, Inferior or perineal branch of the same artery.
d, Inferior hæmorrhoidal arteries.
e, Branches of the pudic vein, forming a kind of plexus in front of the transversalis muscle.
f, Vaginal venous plexus.
g, Anastomotic, arterial and venous arches, placed at the root of the clitoris.
h, Trunk of the internal pudic nerve, after its passage between the sacro-sciatic ligaments.
i, Superficial or perineal branch of the internal pudic nerve.
j, Second superficial branch furnished here by the trunk of the pudic nerve, which is distributed to the labia pudendi.

(Vide page 30.)

Moreau

Plate 16.



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Moreau

Plate 17.

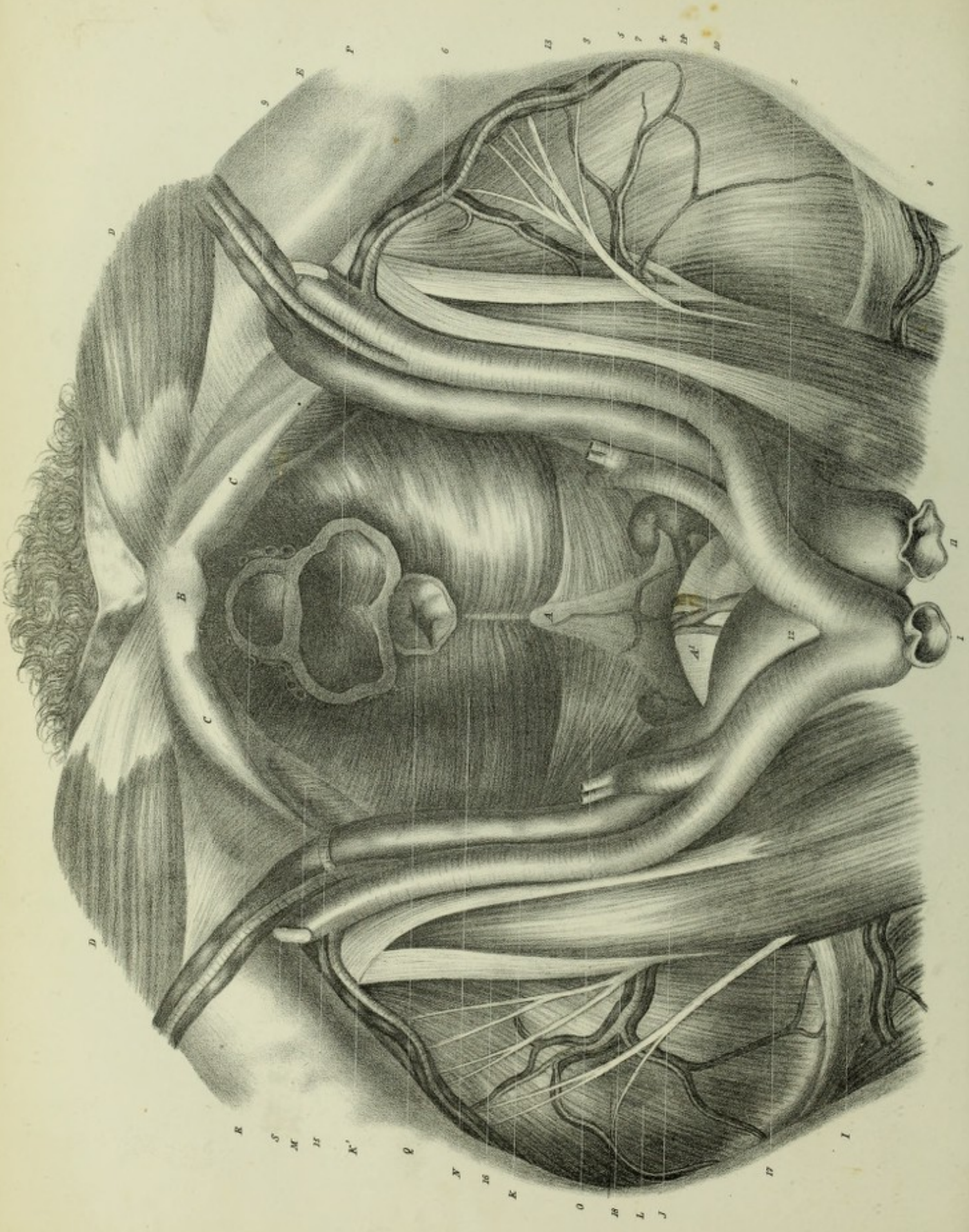

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PLATE XVII.

THIS PLATE REPRESENTS THE ABDOMINAL PLANE OF THE PELVIS OF AN ADULT WOMAN, WITH THE SOFT PARTS COVERING IT, THE SUBJECT BEING ON HER BACK: THE PERITONEUM AND SUBJACENT APONEUROTIC LAMINÆ ARE REMOVED.

(NATURAL SIZE.)

A, Coccyx.
A^1, Promontory of the sacrum.
B, Pubes.
C, *C*, Body of the pubes.
D, *D*, Recti muscles.
E, *E*, Parietes of the abdomen.
F, Obliquus externus abdominis muscle.
G, Obliquus internus abdominis muscle.
H, Transversalis abdominis muscle.
I, Ilio-lumbar ligament.
J, Psoas magnus muscle.
K, Psoas parvus muscle.
K^1, Aponeurosis of the psoas parvus muscle.
L, Iliacus internus muscle.
M, Obturator internus muscle.
N, Levator ani muscle.
O, Coccygeus muscle.
P, Aperture of the vagina.
Q, Superior orifice of the anus.
R, Vesical aperture of the urethra.
S, Round ligament of the uterus, divided.

1, Aorta.
2, Right primitive iliac artery.
3, External iliac artery.
4, Internal iliac artery.
5, Origin of the obturator and umbilical arteries.
6, Circumflex iliac artery and veins.
7, Vascular branches of the iliac fossa.
8, Inferior lumbar vessels.
9, Epigastric artery and veins.
10, Middle sacral arteries and veins.
11, Vena cava inferior.
12, Left primitive iliac vein.
13, External iliac vein.
14, Right internal iliac vein.
15, Obturator artery, given off in this subject by the epigastric.
16, Crural nerve.
17, 18, Musculo-cutaneous branches, furnished by the crural plexus.

(Vide page 35 et seq.)

PLATE XVIII.

SECTION OF AN ADULT FEMALE PELVIS, DIVIDED IN FRONT AT THE SYMPHYSIS PUBIS AND BEHIND AT THE LEFT SACRO-ILIAC JUNCTION.

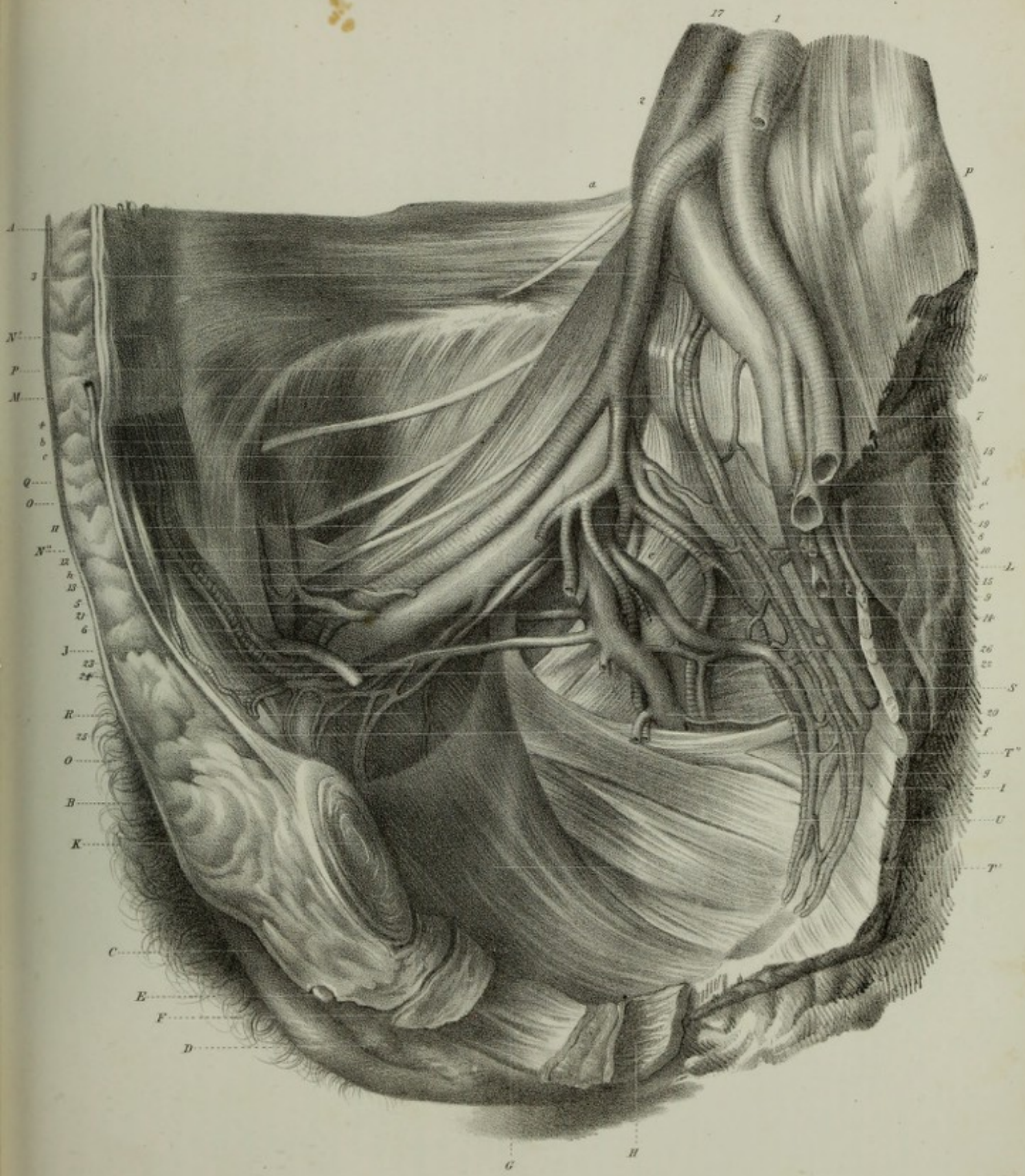
(Size of Life.)

A, Integuments of the abdomen.
B, Adipose tissue, forming the mons veneris.
C, Labium major.
D, Labium minor.
E, Clitoris.
F, Urethra.
G, Perineal portion of the vagina.
H, Anus and lower part of the rectum.
I, Lesser sacro-sciatic ligament.
J, Round ligament of the uterus.
K, Symphysis pubis, covered with its cartilage.
L, Sacro-iliac junction or symphysis.
M, Promontory of the sacrum.
N, Internal face of the transversalis abdominis muscle.
N^1, Sheath of the rectus muscle.
N^2, Fascia transversalis.
O, Rectus abdominis muscle.
P, Psoas magnus muscle.
Q, Iliacus internus muscle.
R, Obturator internus muscle.
S, Origin of the pyriformis muscle.
T^1, Levator ani muscle.
T^2, Pelvic aponeurosis.
U, Coccygeus muscle.

1, Aorta.
2, Origin of the inferior mesenteric artery.
3, Right primitive iliac artery.
4, Right external iliac artery.
5, Circumflex iliac artery and veins.
6, Epigastric artery and veins.
7, Internal iliac artery.
8, Gluteal artery.
9, Internal pudic artery.
10, Ischiatic artery.
11, Remains of the umbilical artery, giving off the vesical arteries.
12, Uterine artery.
13, Obturator artery.
14, Middle hæmorrhoidal artery.
15, Lateral sacral artery.
16, Middle sacral artery and veins.
17, Vena cava ascendens.
18, External iliac vein.
19, Internal iliac vein.
20, Ischiatic vein.
21, Gluteal vein.
22, Internal pudic veins.
23, Obturator vein.
24, Muscular veins.
25, Lateral sacral veins.

a, *b*, Abdomino-crural nerves.
c, External cutaneous nerve.
d, Anterior crural nerve.
e^1, Spermaticus externus nerve.
e, *f*, *g*, Sacral plexus.
h, Obturator nerve.

(Vide page 37.)



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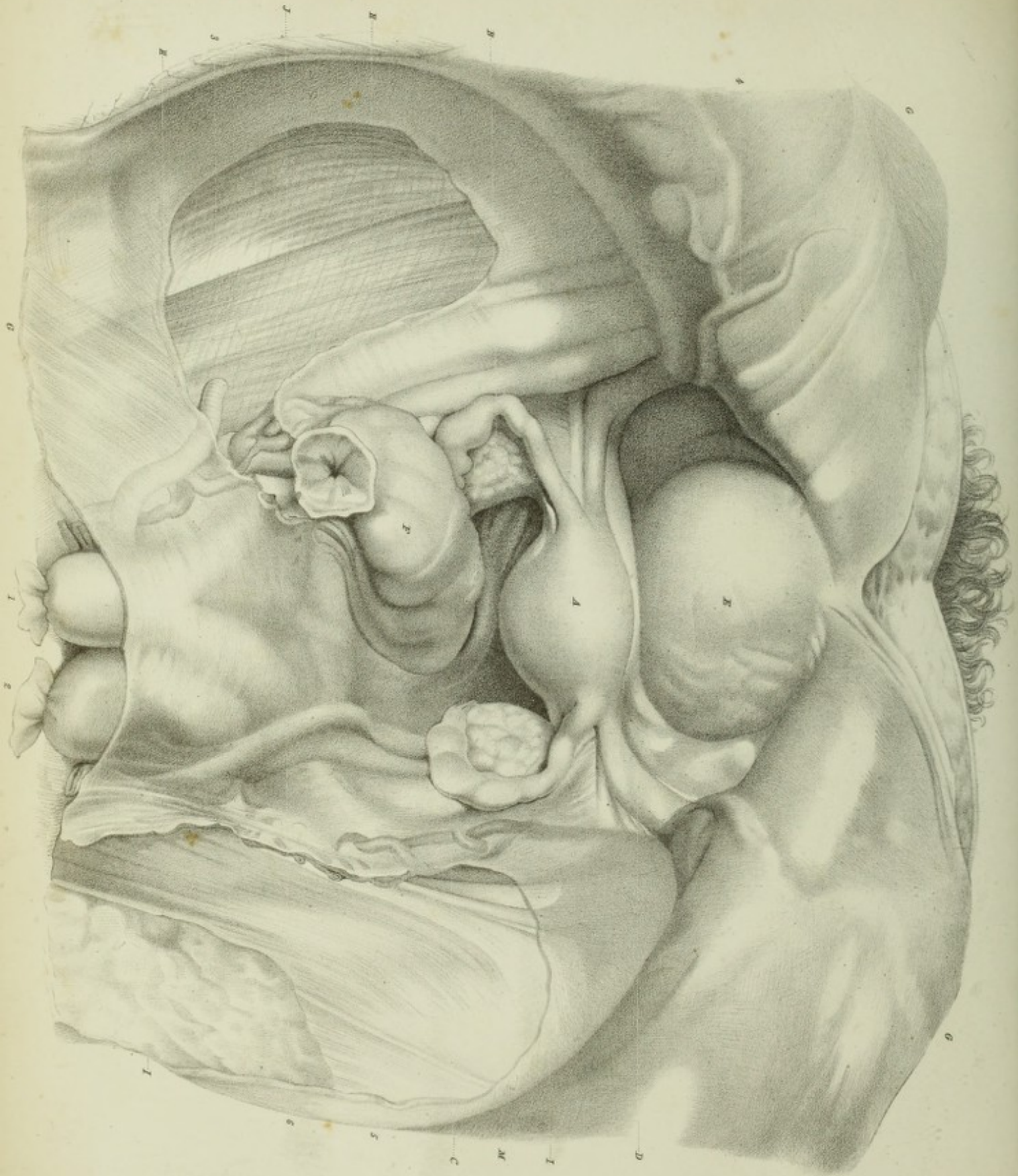

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PLATE XIX.

THIS PLATE IS A VIEW FROM ABOVE OF THE PELVIS OF AN ADULT FEMALE WITH THE CONTAINED VISCERA COVERED BY PERITONEUM.

A, Body of the uterus.
B, Left ovary.
C, Right fallopian tube.
D, Round ligament of the right side.
E, Upper and posterior part of the bladder.
F, Rectum.
G, *G*, Posterior face of the anterior wall of the abdomen.
H, *H*, Section of mesocolon.
I, *I*, Section of peritoneum binding down the cœcum.
J, Iliacus internus muscle covered with the iliac fascia.

1, Aorta.
2, Vena-cava ascendens.
3, Inferior mesenteric artery.
4, Epigastric vessels under the peritoneum.
5, Spermatic arteries and veins seen through the peritoneum.
6, The right ureter under the peritoneum.

(See page 35.)

PLATE XX.

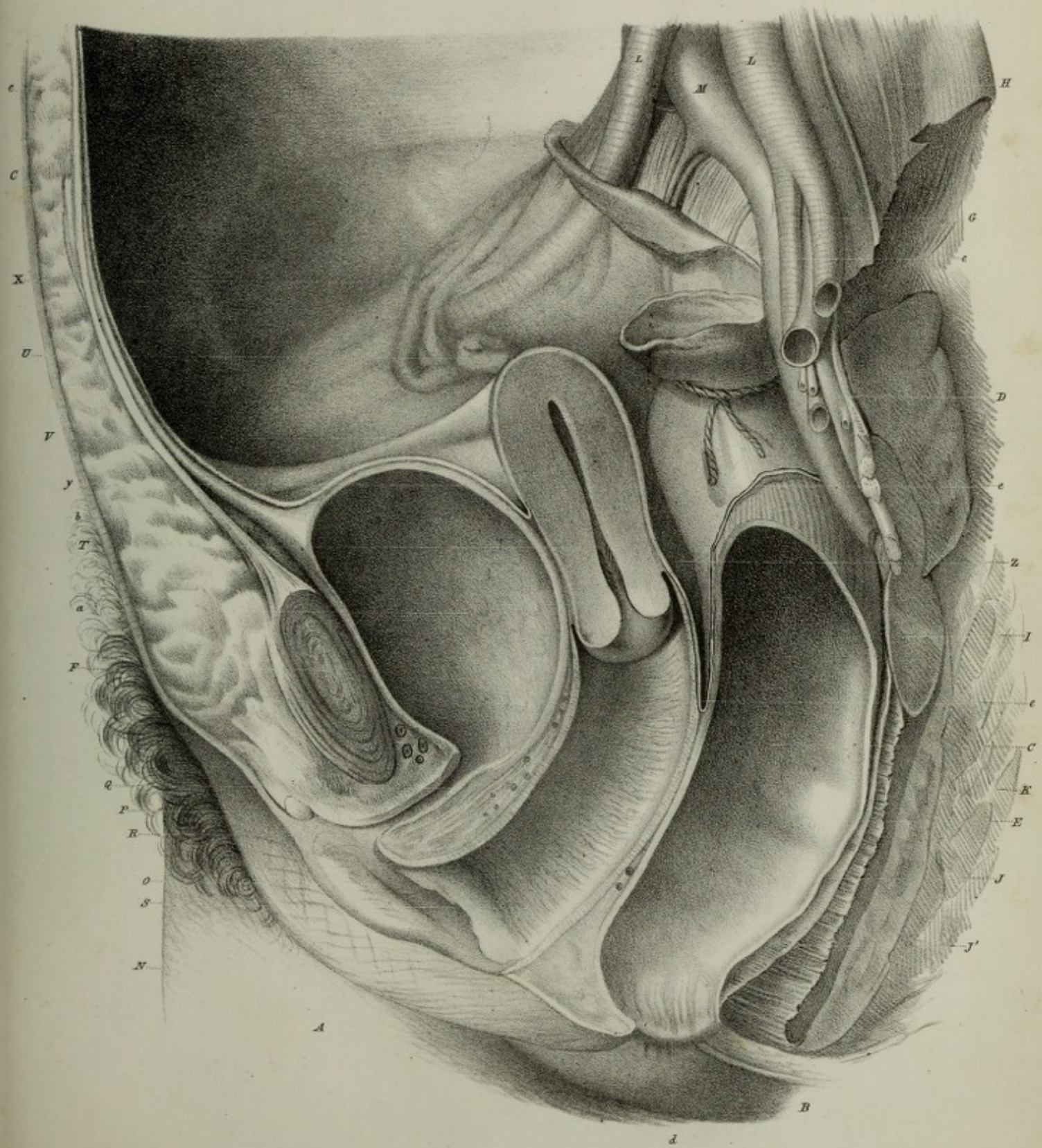
SECTION OF AN ADULT FEMALE PELVIS, DIVIDED ANTERIORLY AT THE SYMPHYSIS PUBIS, AND POSTERIORLY AT THE LEFT SACRO-ILIAC ARTICULATION: THE BLADDER, VAGINA, AND UTERUS ARE DIVIDED AT THE MEDIAN LINE: THE RECTUM IS DIVIDED ONLY AT ITS INFERIOR PORTION.

(Natural Size.)

A, Upper part of the right thigh.
B, The breech.
C, Anterior abdominal paries.
D, Left sacro-iliac symphysis.
E, Projection of the point of the coccyx through the posterior paries of the rectum.
F, Articular surface of the symphysis pubis.
G, Promontory of the sacrum.
H, Psoas muscle.
I, Pyriformis muscle.
J, Levator ani muscle.
J^{1}, Superior perineal aponeurosis.
K, Glutæus muscle.
L, Aorta.
M, Vena cava ascendens.
N, Labium pudendi.
O, Labium internum.
Q, Canal of the urethra, opened laterally.
R, Spongy portion of the vagina.
S, Rectum, opened laterally.
T, Right lateral half of the uterus.
U, Origin of the fallopian tube.
V, Round ligament.
X, Ovarian vessels under the peritoneum.
Y, Anterior cul-de-sac of the peritoneum, between the bladder and the uterus.
Z, Posterior cul-de-sac of the peritoneum, between the vagina and rectum.

a, Left half of the bladder.
c, Rectum, opened laterally.
d, Anus.
e, *e*, *e*, *e*, Section of the peritoneum.

(Vide page 36 et seq.)



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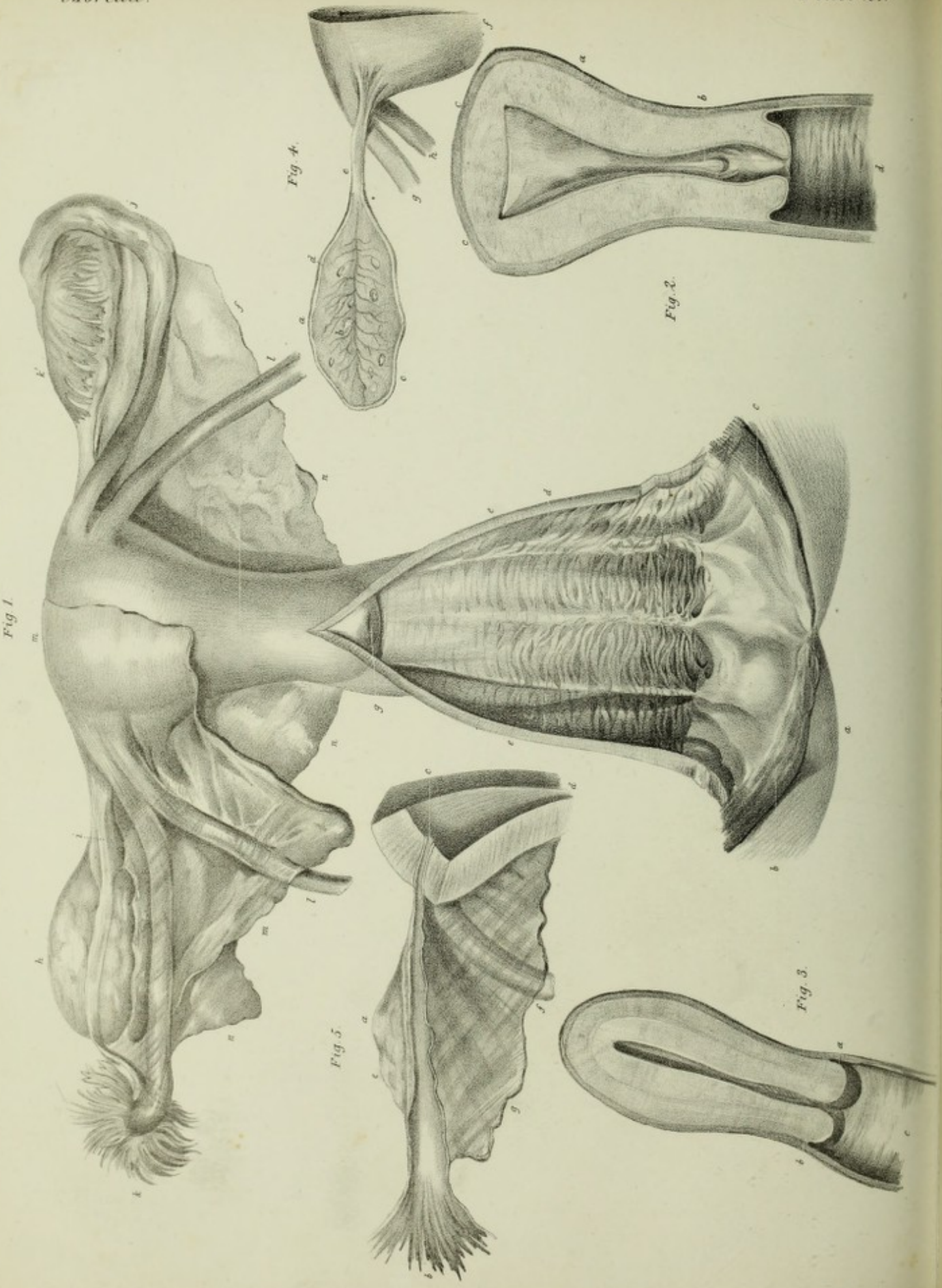

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PLATE XXI.

GENITAL ORGANS OF AN ADULT WOMAN, PRESENTING DIFFERENT SECTIONS, EXHIBITING THE EXTERNAL AND INTERNAL ARRANGEMENT.

(Natural Size.)

Fig. 1, Representing the vagina, uterus, and its appendages in a normal condition.
a, Labia pudendi.
b, Nymphæ.
c, Entrance of the vulva.
d, Posterior median raphe of the vagina; transverse folds of this canal.
e, *e*, Section of the vagina throughout its whole extent on the anterior median raphe.
f, Anterior surface of the body of the uterus.
g, Vaginal orifice of the neck of the uterus.
i, Ovarian ligaments.
j, Fallopian tubes.
h, Ovarium.
k, Fimbriated extremity of the right side, displayed.
k^1, Fimbriated extremity of the left side, embracing the ovarium of that side.
l, Round ligaments.
m, *m*, Anterior lamina of the broad ligament.
n, *n*, Posterior lamina of the same ligament.

Fig. 2, Representing the posterior half of the uterus.
a, Cavity of the body of the uterus.
b, Cavity of the neck of the uterus.
d, Portion of the vagina.
c, *c*, Uterine orifices of the fallopian tubes.

Fig. 3, Antero-posterior section of the uterus on the median line.
a, Anterior lip of the os uteri.
b, Posterior lip of the os uteri.
c, Vagina.

Fig. 4, Representing a perpendicular section of the ovarium.
a, Ovarium.
b, Fibrous septum dividing the substance of the organ into cells.
c, Graafian vesicles.
d, General fibrous envelope giving origin to the internal septa.
e, Ligament of the ovarium.
f, Posterior surface of the uterus.
h, Round ligament divided near its origin.
g, Fallopian tube divided near its origin.

Fig. 5, Representing the cavity of the left fallopian tube opened throughout its whole extent.
a, Canal of the tube before its external enlargement.
b, Widened portion formed by the tube and fimbriated extremity.
c, Uterine portion of the same canal, greatly contracted.
d, Posterior left half of the uterus.
e, Ovarium.
f, Round ligament.
g, Origin of the broad ligament.

(Vide page 35 et seq.)

PLATE XXII.

UTERUS OF A WOMAN WHO DIED TWO DAYS AFTER DELIVERY, INTENDED TO EXHIBIT THE FIBRES AND VESSELS ON THE EXTERNAL SURFACE OF THIS ORGAN.

(One-third Size.)

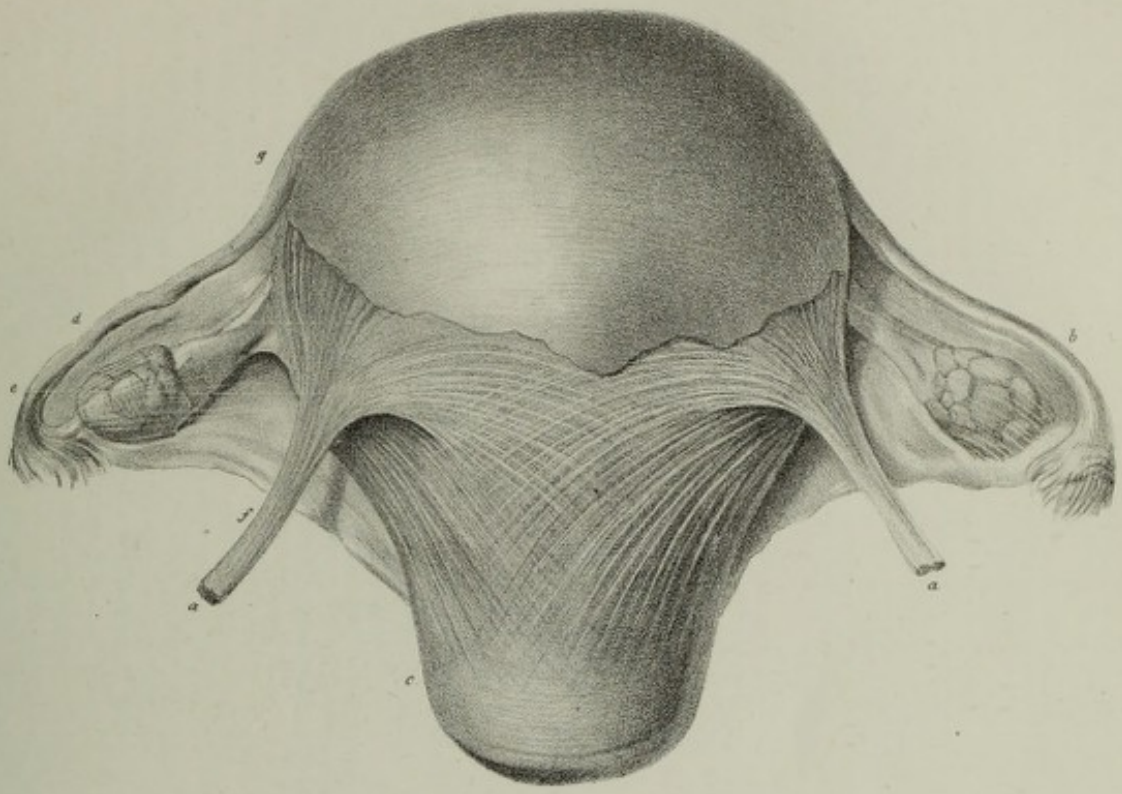
Fig. 1, On this Plate is seen the anterior surface of the uterus. It is impossible to indicate a constant direction for the fibres of the superficial plane alone, as it is not uniform in all cases. We shall point out those fasciculi which present some degree of regularity.

A, Round ligament.
B, Fallopian tube.
C, Circular fibre of the neck intersecting with the oblique fibres.
D, Fasciculus arising from the fundus uteri to assist in the formation of the round ligament.
E, Middle fasciculus performing the same office.
F, Inferior fasciculus ascending to be reflected over the posterior surface of the round ligament.
G, Portion of the peritoneum lining the fundus uteri, and which cannot be separated from it without laceration.

Fig. 2, Vessels of the uterus injected, seen on its anterior surface.
a, Trunk of the uterine artery.
a,[1] *a*,[11] Trunks of the uterine veins.
b, Ovarian artery.
c, Arterial and venous plexus distributed to the fallopian tubes.
d, Artery and veins following the course of the fallopian tubes.
e, Arterial and venous plexus distributed to the ovarium.
f, Artery and veins of the round ligament.
g, Free anastomosis between the veins of the two sides.
h, Other venous anastomoses.
k, Artery on the surface of the uterus.
l, Another artery.

(Vide page 35 et seq.)

Fig 1.



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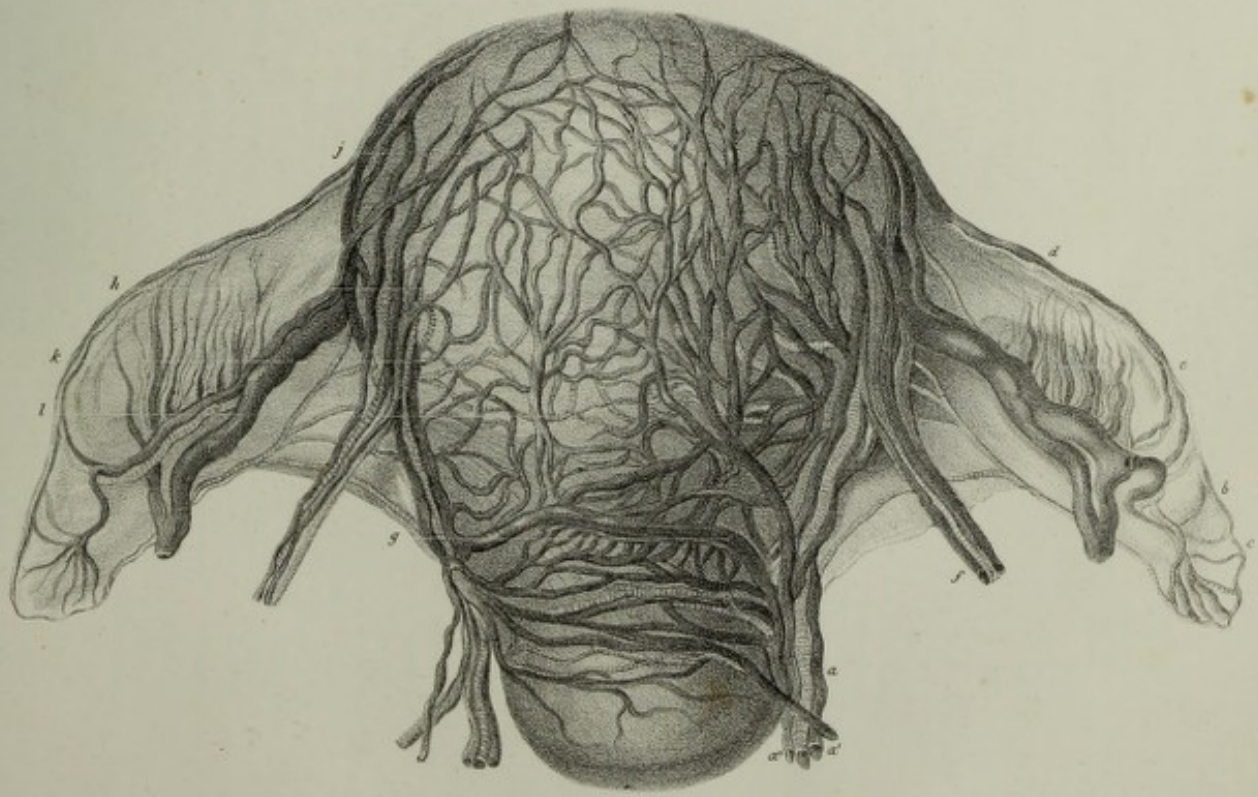
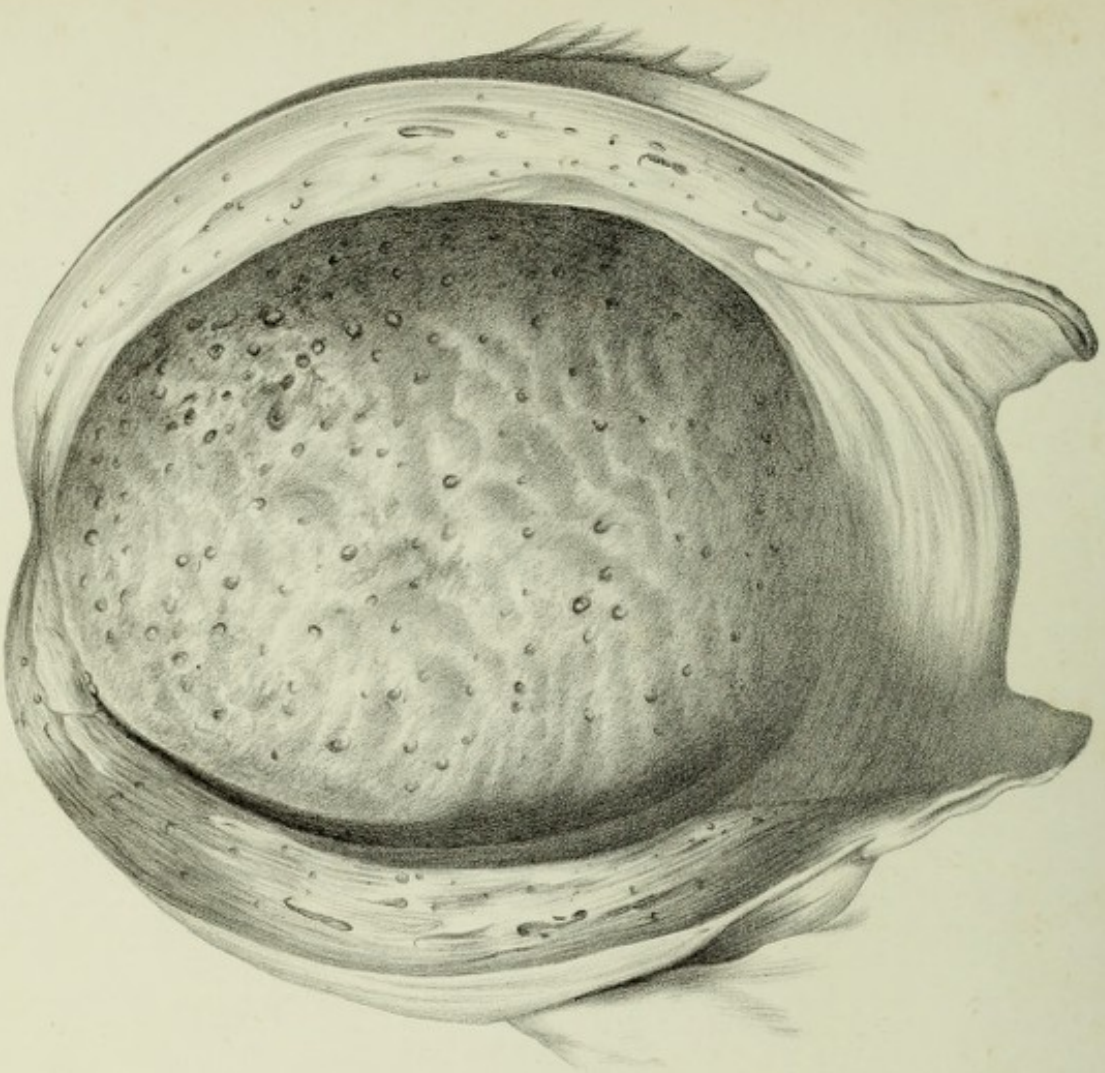


On Stone by P.C. Hollis. Philadelphia. Published by Carey & Hart. P.S. Duval, Lith. Phil.

Fig. 1.



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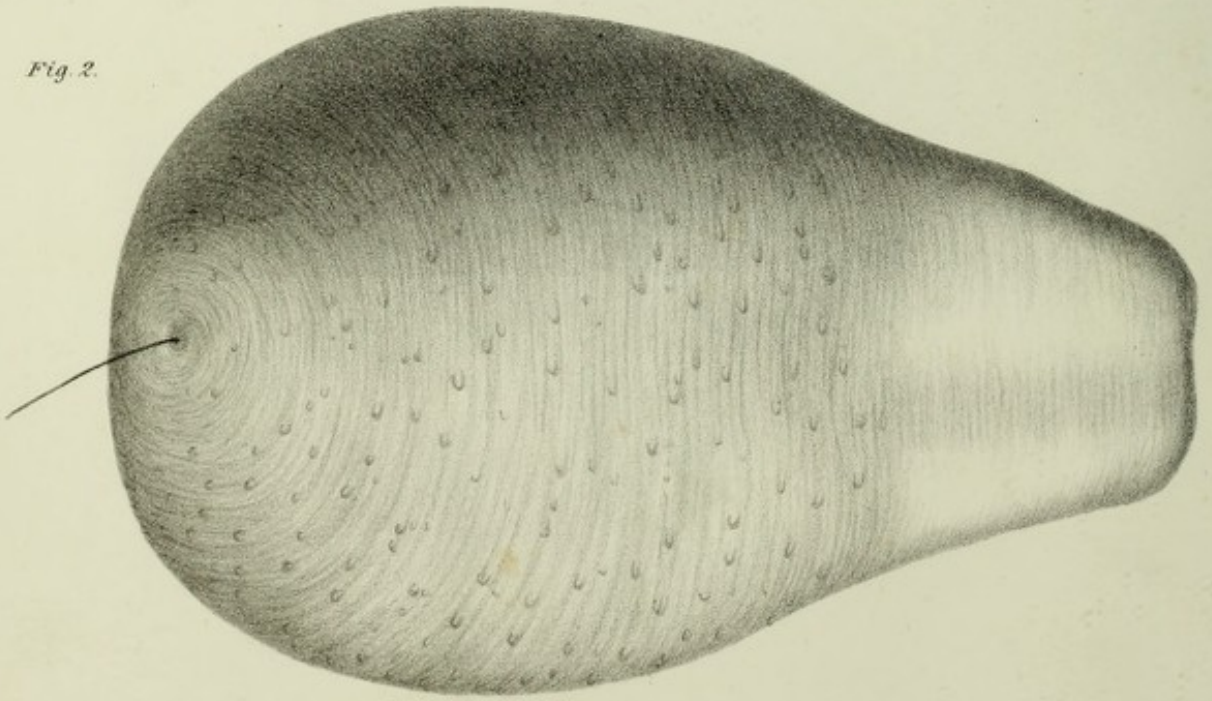

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PLATE XXIII.

UTERUS OF AN ADULT WOMAN WHO DIED FORTY-FOUR HOURS AFTER DELIVERY, INTENDED TO SHOW THE VASCULAR STRUCTURE AND THE PATULOUS ORIFICES OF THE VESSELS ON THE INTERNAL SURFACE OF THIS ORGAN.

(Half Size.)

Fig. 1, Represents a uterus opened by an incision anteriorly on the median line; the edges are widely separated, so that the whole of the internal surface is displayed. The injection has rendered very evident the orifices of the uterine sinuses which are scattered over the internal surface, with the exception of the neck.

Fig. 2, The same uterus seen on its internal surface and lateral portion. It has been endeavoured to represent the direction of the fibres of the internal plane. This direction is evidently circular at the neck and around the internal orifice of the fallopian tube.

(Vide page 35 et seq.)

PLATE XXIV.

LYMPHATIC VESSELS OF THE UTERUS AND ITS APPENDAGES, INJECTED IN A WOMAN WHO DIED SOON AFTER DELIVERY.

(Natural Size.)

In this plate are seen the lymphatic vessels arising from the posterior surface of the uterus, fallopian tubes and ovaria, and their arrangement in the broad ligaments. The pubes are removed, the uterus is inverted and drawn forward, so as to present the whole of its posterior surface. The peritoneum of the posterior surface of the abdominal cavity, is likewise removed.

A, Promontory of the sacrum.
B, Arteria aorta, and its divisions.
C, Vena cava ascendens, and its divisions.
D, Ovarian artery.
E, *E*, *E*, Ovarian veins.
F, Ovarian artery and veins, before reaching the broad ligaments, very tortuous and divided.
G, Superior half of the kidneys.
H, Canal of the ureter.
J, Rectum.
K, Posterior surface of the uterus.
L, Fallopian tube.
M, Ovarium.

1, Trunks of the lymphatic vessels, four in number, arising from the uterine genital organs, before reaching the lymphatic glands, placed on a level with the kidneys, in front and upon the sides of the aorta and vena cava. These vessels follow the course of the ovarium arteries and veins.
2, Divisions of one of these cords before entering a lymphatic ganglion.
3, 3, Anastomoses of the cords in their course.
4, 4, Pelvic lymphatic ganglia, situated on the hypogastric vessels, receiving the lymphatic vessels which arise from the posterior part of the neck of the uterus.
5, Numerous primitive branches on the posterior surface of the uterus, proceeding to the broad ligaments, and from these forming trunks which are distributed to the renal ganglia.
6, Branches arising from the fundus uteri, and distributed like the preceding.
7, Trunks of the lymphatics which arise on the anterior surface of the uterus.
8, Lymphatics arising from the fallopian tubes.

(Vide page 35 et seq.)

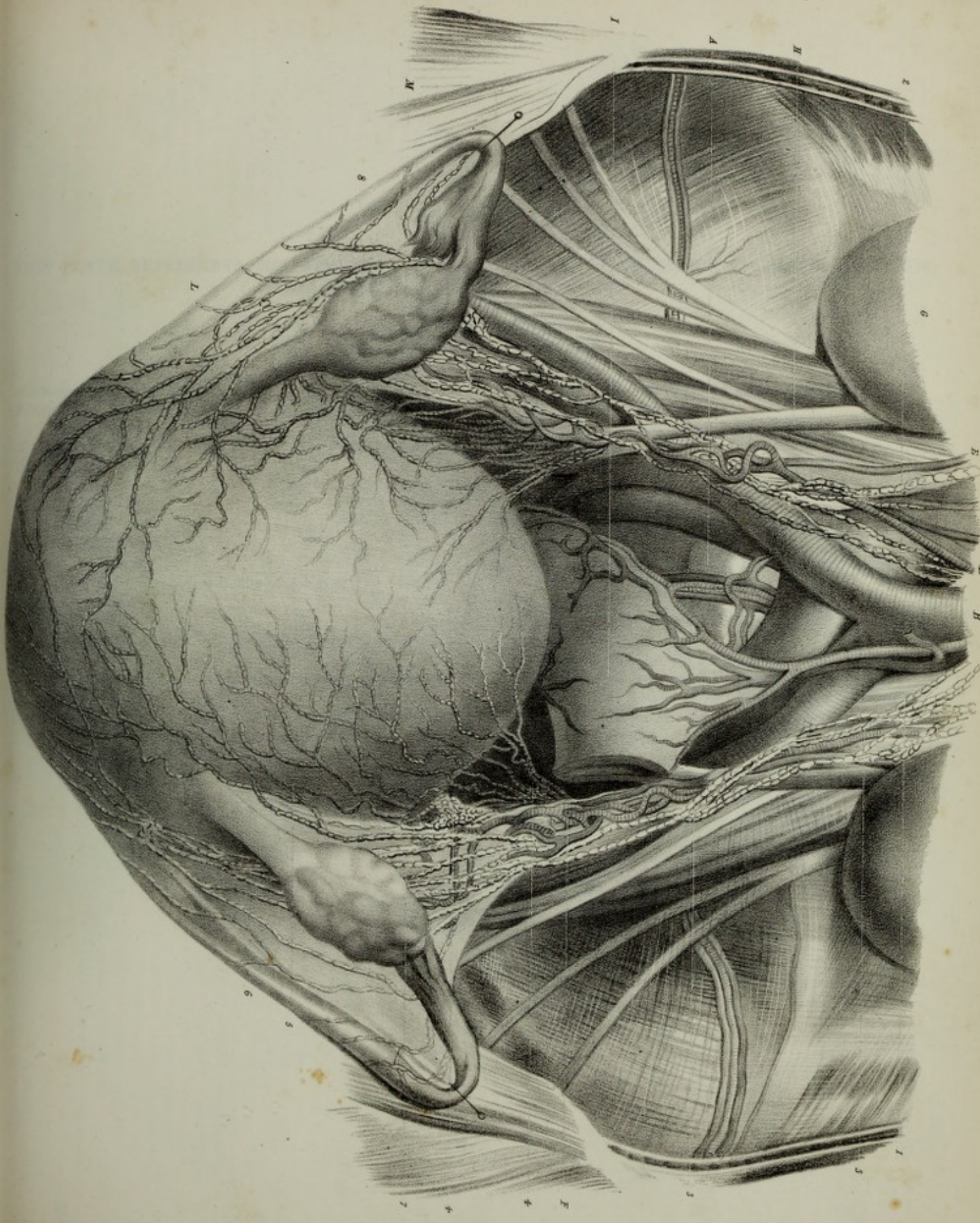

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PLATE XXV.

THIS PLATE REPRESENTS THE NERVES OF THE UTERUS AND OTHER PELVIC VISCERA OF A WOMAN WHO DIED FOUR DAYS AFTER DELIVERY.

(Natural Size.)

A, Promontory of the sacrum.
B, Section of the horizontal ramus of the pubes outside of the symphysis.
C, Sacro-iliac symphysis.
D, The vagina.
E, The uterus.
F, The bladder.
G, The rectum.
I, Left ovarian artery.
J, Left ovarian vein.
H, Ovarium and fimbriated extremity of the tube.
K, Aorta, vena cava.

a, *a*, Right and left lumbar splanchnic nerves passing inside and in front of the aorta.
b, Plexus resulting from the anastomosis of the two preceding trunks.
c, Ovarian plexus arising from the usual plexus distributed to the ovarium and uterus, and establishing a direct relation between the latter and the loins. This nervous communication explains most satisfactorily the pains in the loins observed in some cases of parturition.
d, Communicating branch of the lumbar and sacral ganglia.
e, *e*, *e*, Sacral ganglia.
f, *f*, *f*, Origins of the sciatic nerve.
g, Fourth sacral branch giving off anastomotic branches to the hypogastric plexus and pelvic viscera.
i, Vesico-uterine branch arising from the sacral plexus.
j, Vesico-vaginal branch arising from the sacral plexus.
h, Another branch having the same origin as the preceding, and distributed to the bladder, vagina, and uterus.
k, Vaginal branch.
l, Anastomoses of the sacral branches with the hypogastric plexus.
m, Plexiform trunk of the great sympathetic which descends into the pelvis, and receives, in its passage, filaments sent to it by the sacral ganglia to form the hypogastric plexus, of which the ramifications are seen, are the sides of the uterus, vagina, and rectum.
n, Hypogastric plexus.
o, Ascending uterine nerves, furnished by the hypogastric plexus.

(Vide page 35 et seq.)

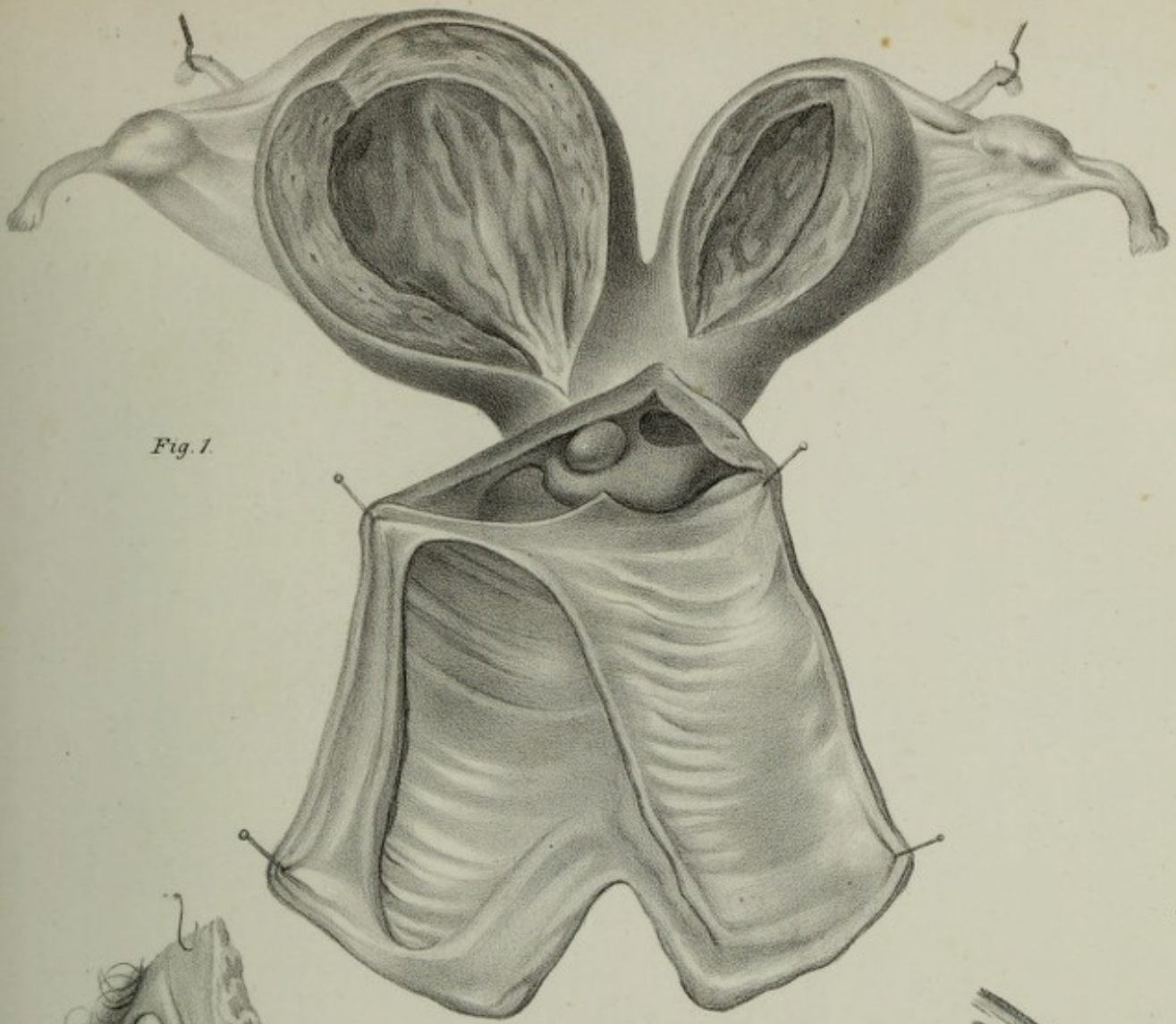
PLATE XXVI.

MALFORMATION OF THE UTERUS AND VAGINA.

Fig. 1, Bifid or bilobed uterus, the vagina of which was originally divided throughout its whole length by a median septum, but of which there remain at the upper part of this canal merely a narrow band and a double cicatrix resulting from delivery. The woman, from whom this drawing was taken, had conceived alternately in each half of the uterus, and died after her second delivery, in consequence of a metro-peritonitis then prevailing epidemically in the Lying-in Hospital of Paris. (For the case, see page 47.)

Fig. 2, (Natural size.) Uterus single, vagina double throughout a great portion of its extent.

A, Incomplete septum of the vagina, presenting at the superior part a smooth enlargement at the distance of half an inch from the os uteri; on each side, the septum exhibits evidently the characters of a mucous membrane. This specimen was presented to me by M. A. Bérard. (See text, page 48.)



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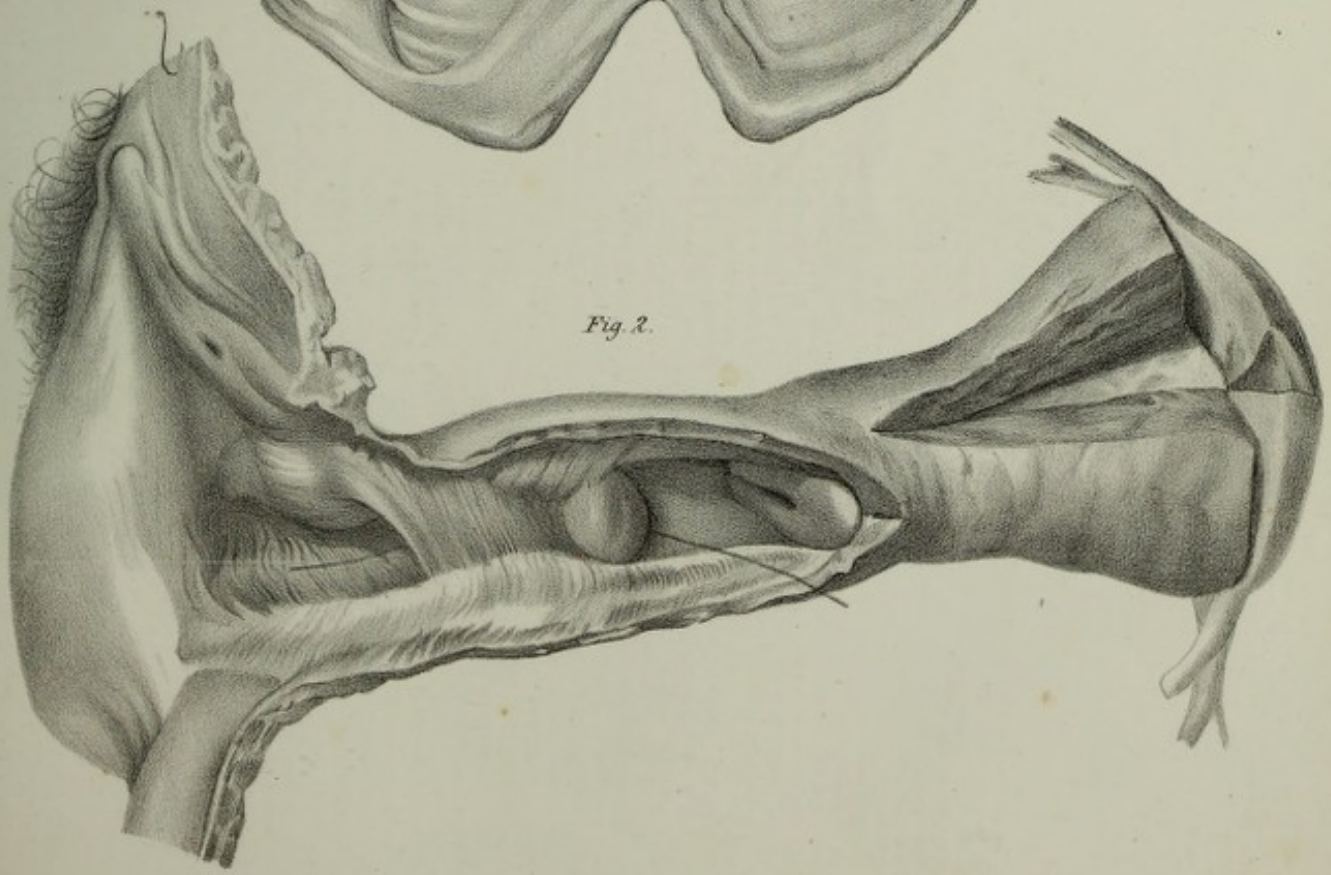

Fig. 2.

A

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Fig. 1.

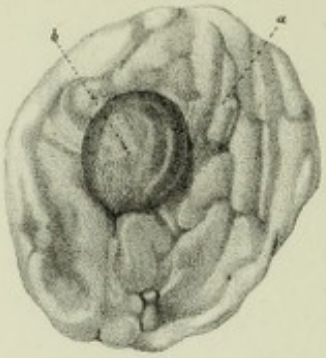

Fig. 8.

Fig. 2.

Fig. 3.

Fig. 4.

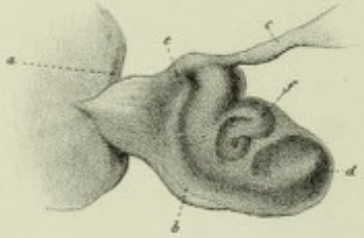

Fig. 5.

Fig. 6.

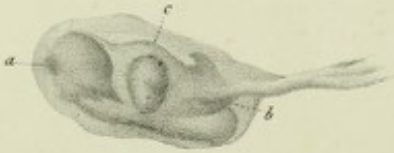

Fig. 7.

Fig. 9.

Fig. 11.

Fig. 10.

Fig. 12.

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PLATE XXVII.

THIS PLATE REPRESENTS TWO HUMAN OVA, EXPELLED IN THE EARLY STAGES OF CONCEPTION.

(Natural Size.)

Fig. 1, An entire ovum, surrounded by the uterine caduca, and expelled about the fourth week of conception. The woman menstruated on the 19th of December, 1835; the catamenia continued until the 25th of the same month: she might have conceived on the 26th. The ovum was expelled on the 5th of February, 1836.
a, Uterine membrana caduca displayed, seen from its internal surface.
b, Ovum.

Fig. 2, The same ovum, separated from the uterine caduca, and still covered by the caduca reflexa, through the membranes of which are already perceived the rudiments of the embryo.

Fig. 3, The same ovum, seen through the microscope, separated from the caduca reflexa and envelope of the chorion, of which the villosities have been removed. The embryo can be seen through the chorion, curved on itself, and enveloped in the amniotic sac.

Fig. 4, The same ovum, magnified seven times its own diameter, from which the chorion has been separated, and of which the embryo is still contained in the amnion.
a, Chorion, divided and inverted.
b, Sac of the amnios, or amniotic membrane.
c, Membranous portion, which appears to be the remains of the umbilical vesicle.
d, Cephalic extremity of the embryo.
e, Pelvic extremity, to which repair the vessels forming the umbilical cord.
f, Intestinal mass, projecting on the anterior surface of the abdomen.

Fig. 5, The same ovum, magnified to the same size, seen from the dorsal surface.
a, Cephalic extremity.
b, Pelvic extremity.
c, Vertebral column.

Fig. 6, Anterior surface of the same embryo, seen through the microscope.
a, Cephalic extremity.
b, Pelvic extremity, to which repair the rudiments of the umbilical cord.
c, Intestinal mass.

Fig. 7, Left side of the same embryo, removed from the amniotic sac, and seen through the microscope.
a, Cephalic extremity.
b, Pelvic extremity, to which repair the rudiments of the umbilical cord.
c, Intestinal mass.
d, Species of tail, which appears formed for the development of the intestinal canal.

Fig. 8, The same embryo, of natural size, seen by the naked eye.

Fig. 9, Another ovum, expelled about four weeks after conception, represented as it then appeared.

Fig. 10, The same ovum, the membrana caduca of which has been divided, so as to expose the cavity of this membrane.
a, *a*, Portion of the uterine caduca.
b, Caduca reflexa.
c, Anormal prolongation, extending into the os uteri.

Fig. 11, The same ovum, completely separated from the caduca, and exhibiting the villosities of the chorion.

Fig. 12, The same ovum, divided in its length, presenting a smooth cavity filled with a limpid serum, and exhibiting no traces of an embryo.
a, Membrana chorion.
b, Villosities of the chorion.
c, Membrana amnion.

PLATE XXVIII.

THIS PLATE REPRESENTS THREE ABORTIVE OVA, EXPELLED BEFORE THE THIRD MONTH OF CONCEPTION.

(Natural Size.)

Fig. 1, External view of an abortive ovum of about nine weeks. The membrana caduca is lacerated and slightly inverted, so as to exhibit the caduca reflexa, thin and opaque.

a, a, External and rugose surface of the caduca, separated from the uterus.

b, A small portion of the placenta, of which the external surface is seen, the rest being concealed.

c, c, c, c, c, Internal surface of the caduca which, in the early months of pregnancy, does not adhere to itself.

d, d, Lacerated edge of the caduca which, when uninjured, adhered to the edge *e, e,* of the same membrane.

f, Caduca reflexa, extended over the external surface of the chorion.

g, g, Angle of the reflected portion, on the edge of the placenta, where the internal lamina of the caduca is reflected over the chorion, nearly in the same manner as the internal lamina of the pericardium, in order to cover the external surface of the heart.

h, Inferior portion of the caduca which was in contact with the os uteri.

Fig. 2, Vertical section of the same ovum.

a, Section of the placenta which, on its external surface, is supposed to have adhered to the superior and posterior part of the uterus.

b, b, Section of the anterior part of the caduca, or *caduca uterina.*

c, c, Section of the posterior part of the caduca.

d, Inferior part of the caduca which was in contact with the os uteri.

e, e, Cavity of the amnion, in which the fœtus is suspended from the internal surface of the placenta, by means of a very delicate umbilical cord.

f, Section of the three membranes; viz: the amnion, chorion, and caduca reflexa, which are not only contiguous, but adhere to each other.

g, g, Angle formed by the edge of the placenta, where the internal lamina of the caduca is reflected over the external surface of the chorion.

h, Here, these three membranes nearly touch each other, and their respective situations, as regards the placenta, are rendered evident.

[Note.—These plates and their explanation, are faithfully copied from the 33d plate of the magnificent work of William Hunter, entitled "*Anatomia Uteri Humani Gravidi Tabulis Illustrata. Londini,* 1774." 1 vol. in fol.]

Fig. 3, Abortive ovum of about five weeks, opened so as to display the cavity of the membrana caduca, the super-position of the membrane of the ovum, the cavity of the amnion, and the fœtus therein contained.

a, a, a, a, External surface of the membrana caduca uterina.

b, b, b, Edge of the membrana caduca which, when uninjured, adhered to the section *e, e, e.*

c, c, c, Internal surface of the membrana caduca.

d, Portion of the membrana caduca which corresponded to the os uteri.

f, f, f, f, Flaps furnished by the various membranes of the ovum, and resulting from a crucial incision, made in order to display the embryo.

g, Smooth or internal surface of the caduca reflexa.

h, Adherent or external surface of the caduca reflexa, separated from the chorion.

i, Membrana chorion.

k, k, k, Amniotic membrane.

l, Interval between the chorion and amnion, filled with fluid.

m, Cavity of the amnion.

n, Embryo.

o, Intestinal hernia at the base of the umbilical cord.

Fig. 4, Abortive ovum of about six weeks, completely separated from the membrana caduca uterina.

a, Caduca reflexa.

b, b, b, Inequalities resulting from the laceration in separating the uterine caduca at the points where it was reflected over the ovum.

c, c, External surface of a small portion of the placenta.

Fig. 5, The same ovum, in which the caduca reflexa has been divided by a crucial incision.

a, a, a, a, Flaps formed by the caduca reflexa, dissected and separated from the chorion.

b, Chorion and amnion, through which the embryo can with difficulty be seen.

Fig. 6, The same ovum, completely opened.

a, a, a, a, Flaps formed by the caduca reflexa.

b, b, b, b, Flaps formed by the chorion.

c, c, Amnion.

d, Embryo.

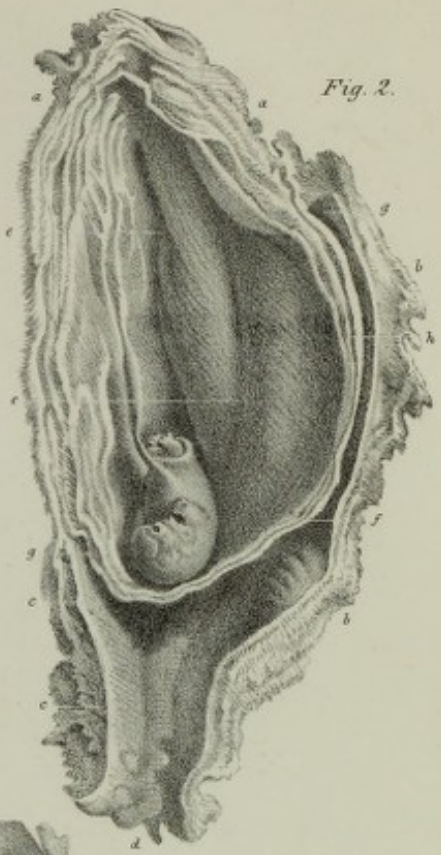
e, e, Umbilical vesicle and its prolongation, placed between the amnion and chorion.

f, Fold of the amnion enveloping the umbilical vessels.

g, Hernial tumefaction at the base of the umbilical cord.

Fig. 1.

Fig. 2.



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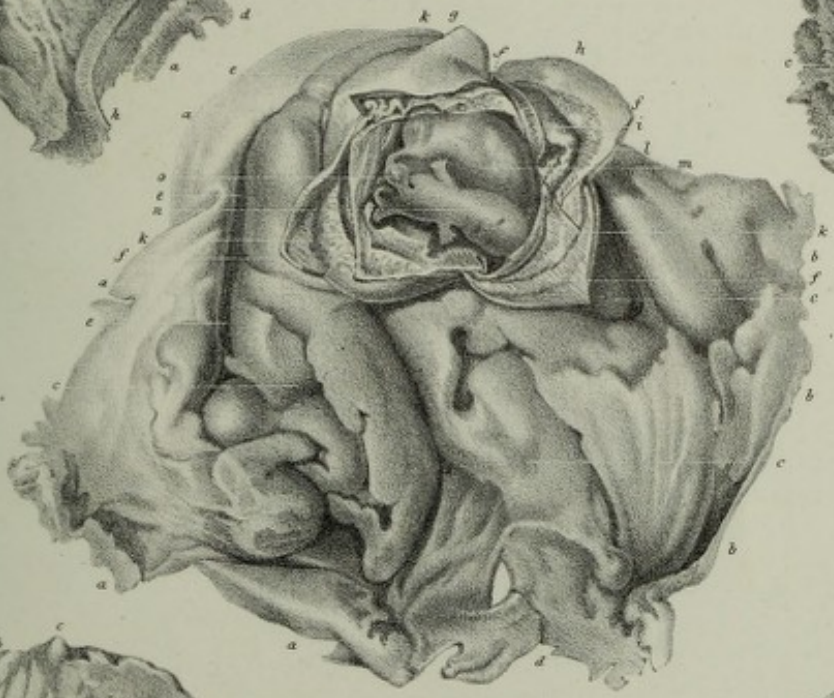
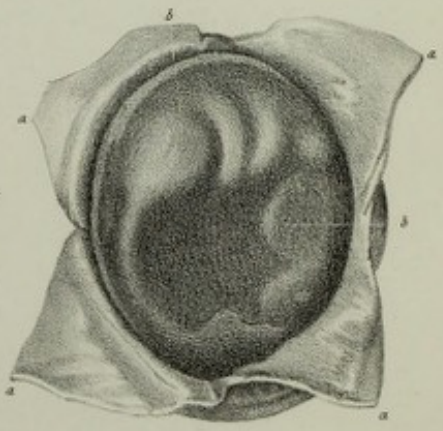


Fig. 4.

Fig. 5.



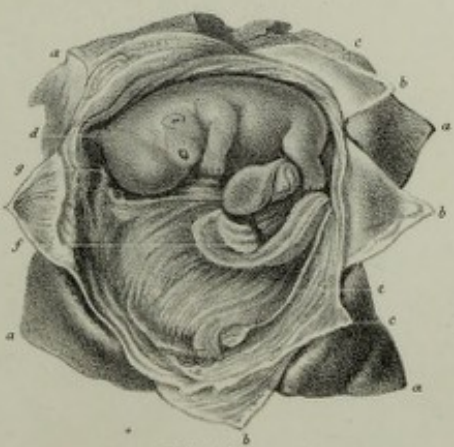


Fig. 6.

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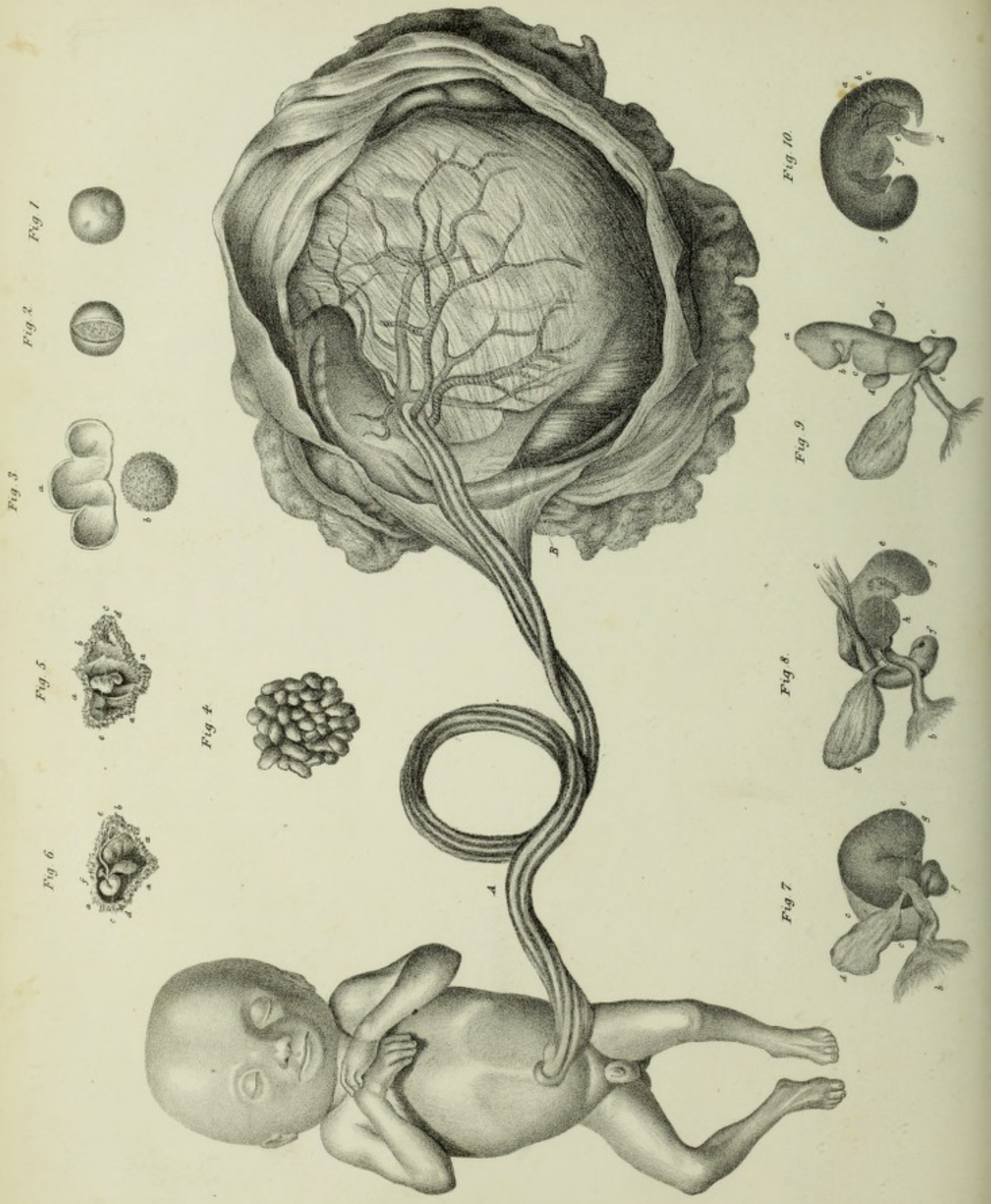

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PLATE XXIX.

THIS PLATE REPRESENTS:—1. AN OVUM MUCH MORE COMPLETE THAN THAT FIGURED IN PLATE XXVII. 2. A FŒTUS OF ABOUT THREE MONTHS, WITH ITS APPENDAGES.

The woman from whom the fœtus, represented in the first ten figures, was obtained, menstruated on the 17th of March, 1838. The catamenia continued until the 24th. She might have conceived from the 27th to the 28th of March. On the 27th of April, 1838, she was greatly fatigued by a long walk. On the 30th of April she was again fatigued: on the 1st of May a slight bloody discharge took place from the vulva, which, notwithstanding absolute rest, was followed, on the 4th of May, by the expulsion of the ovum.

Fig. 1, Ovum, of the natural size, represented as it was expelled.

Fig. 2, The same ovum, in which the external membrane of the ovum, divided by a longitudinal section, exhibits the villosities of the chorion.

Fig. 3, The same ovum, separated from the external membrane.

a, External membrane of the ovum, extended.

b, Ovum, separated from the external membrane by a sort of enucleation, and seen on the external surface of the chorion, and covered with villosities.

Fig. 4, Villosities of the chorion, seen through a microscope, and presenting a hydatiform aspect.

Fig. 5, The same ovum, opened by a section made on the edge of the placenta. The contained fluid has escaped from the extended chorion. The embryo may be perceived enveloped by the amniotic sac, and at its middle, near the pelvic extremity, the umbilical vesicle appears under the form of a bubble. The sac, containing the embryo, as well as the umbilical vesicle, adheres to the chorion by filaments imperceptible to the naked eye, but yet sufficiently strong to require some effort for their separation.

a, External and villous surface of the chorion.

b, Internal and smooth surface of the chorion.

c, Amniotic sac, containing the embryo.

d, Umbilical vesicle.

e, Point of adhesion of the amniotic sac with the chorion, which exhibits the rudiments of the umbilical cord.

Fig. 6, Another view of the same ovum. The sac containing the embryo has been removed, and its adhesions with the chorion have been broken. The rudiments of the cord may be distinctly seen, uniting with the contracted portion of the umbilical vesicle, in order to penetrate into the amniotic sac, and into the embryo itself.

a, External and villous surface of the chorion.

b, Internal and smooth surface of the chorion, seen at the point over which the vessels of the umbilical cord ramify.

c, Amniotic sac, enclosing the embryo.

d, Umbilical vesicle.

e, Umbilical vessels.

f, Pelvic extremity of the embryo, of a triangular form.

Fig. 7, Microscopic view of the same ovum, enlarged to seven diameters.

b, Internal surface of a portion of the inverted chorion.

c, Amniotic sac, enclosing the embryo.

d, Umbilical vesicle.

e, Point of termination of the umbilical vessels and the umbilical vesicle.

f, Pelvic extremity of the embryo.

g, Cephalic extremity.

Fig. 8, Microscopic view of the same embryo, escaped from the amniotic sac, and lying on the left side.

b, Remains of the chorion.

c, Amniotic sac, which, after having been divided on the anterior surface of the embryo, has been brought on the dorsal surface.

d, Umbilical vesicle.

e, Point of termination of the umbilical vessels, umbilical vesicle, and amniotic sac.

f, Hook of the pelvic extremity, formed by the sacrum and coccyx.

g, Cephalic extremity of the embryo.

h, Visceral mass.

Fig. 9, Microscopic view of the same embryo, lying on its back.

a, Cephalic extremity.

b, Confused visceral mass, situated below the head, and which we suspect would form the thoracic viscera.

c, Another visceral mass.

d, *d*, Two distinct lateral appendages, adherent to the middle of the body of the embryo. These lateral appendages, the nature of which we cannot determine, and which we have never before so distinctly observed, might be the rudiments of the thoracic extremities. Removed, and examined by the microscope, they appeared to be formed of molecules, closely resembling globules of blood.

e, Coxal enlargements of the pelvic extremity.

Fig. 10, Microscopic view of the same embryo, lying on the right side. The transparency of the tissues shows the following objects:—

a, Transverse striæ, indicating the rudiments of the vertebræ.

b, Aorta, filled with blood.

c, Another large vessel, which we take to be the vena cava ascendens, or the vena portæ. In the pelvic portion, this vessel is parallel to the aorta, soon separates from it, and appears to be lost in the liver or with the umbilical vessels.

d, Rudiments of the umbilical cord.

e, Intestinal mass.

f, Visceral mass, formed apparently by the liver.

g, Another visceral mass, which we suppose was the heart and thoracic viscera.

Fig. 11, Fœtus, of about three months of the natural size.

A, Umbilical cord, along which the vessels are as yet parallel.

B, Fœtal surface of the placenta.

PLATE XXX.

THIS PLATE REPRESENTS A UTERUS WITH THE APPENDAGES OF THE FŒTUS WHICH ADHERE TO IT.

(Half Size.)

This anatomical specimen was obtained, in the Lying-in-Hospital of Paris, from a woman who died of convulsions in the latter period of pregnancy. It was prepared by M. Blandin, Chief Prosector of the Parisian Medical Faculty, and carefully examined in the presence of several physicians and pupils. A red injection was thrown into the arteries, and a blue one into the veins of the mother. The injecting matter having reached the placenta, but not the vessels of the umbilical cord, the latter were filled directly: the vein with a white, and the arteries with a yellow substance.

The placenta, partly separated at one of its edges, and inverted on itself, exhibits the numerous utero-placental vessels.

A, A, Section of the parietes of the body of the uterus.

A^1, *A*^{1}, Section of the parietes of the neck of the uterus.

B, Surface of the uterus corresponding to the portion of separated placenta.

C, Uterine surface of the placenta separated and inverted.

D, Umbilical cord.

E, Knot in the umbilical cord.

F, F, Chorion still increased by the caduca reflexa.

G, Section of the amnion or the fœtal surface of the placenta.

H, Portion of the uterine caduca isolated and inverted.

H^1, Uterine caduca adhering to the uterus.

H^2, Very long and apparent vessels developed in the caduca uterina. By means of slight pressure, we were able to cause the blood contained in these vessels to circulate, and, by opening them, to perceive their internal cavity.

I, I, Species of coronary sinus filled with the blue injection which had been thrown into the mother's veins. This sinus existed regularly only for about one-third of the circumference of the placenta. The injection not having penetrated further, we have inferred the *unknown from the known*, and represented it uniformly over the whole surface of the placenta. We should, however, state, that this probable supposition is not strictly proven.

I^1, *I*^{1}, A portion of the same sinus opened.

I^2, *I*^{2}, Corresponding part of the same sinus, seen from the edge of the placenta.

J, J, Another sinus anastomosing with the coronary sinus, after a passage of more than an inch under the caduca, and in the substance of the parietes of the uterus.

K, K, K, K, Utero-placental arteries distended by the injection thrown into the arteries of the mother: they are remarkable for their size, number and tortuous disposition. Leaving the uterus, after having ramified over the internal surface of this viscus for about an inch between the uterus and placenta, they are directed toward the uterine surface of the latter, penetrate for a line or two in the thickness of its lobes, and suddenly terminate without sensibly diminishing in size or being further subdivided.

L, L, Venous sinus, situated behind the placenta, passing for several lines between the uterus and placenta, and having no other parietes than that furnished by the temporary tissue between these two organs.

L^1, *L*^{1}, Prolongations of the preceding sinuses toward the internal surface of the placenta, completing the parietes of these singular venous vessels.

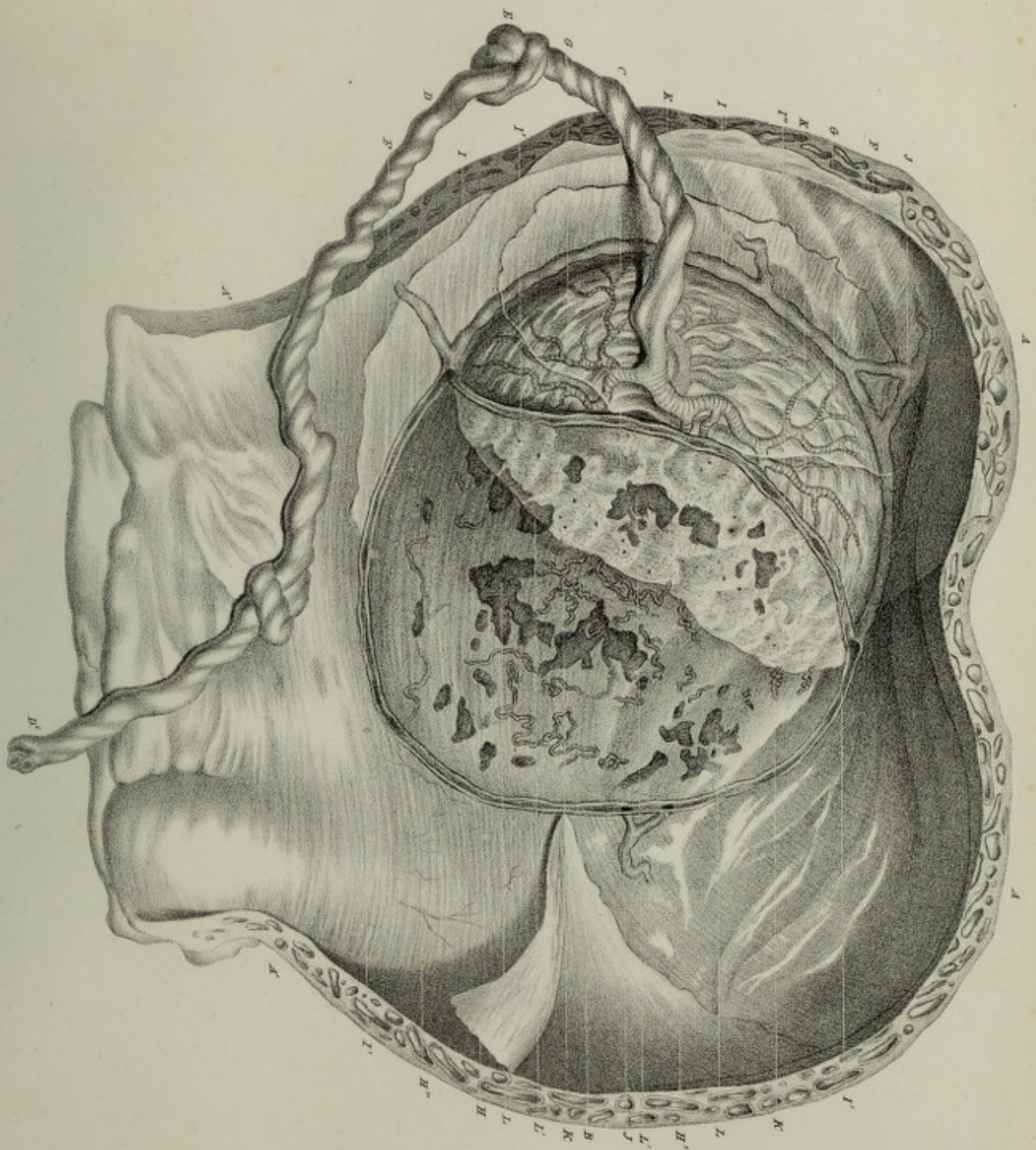

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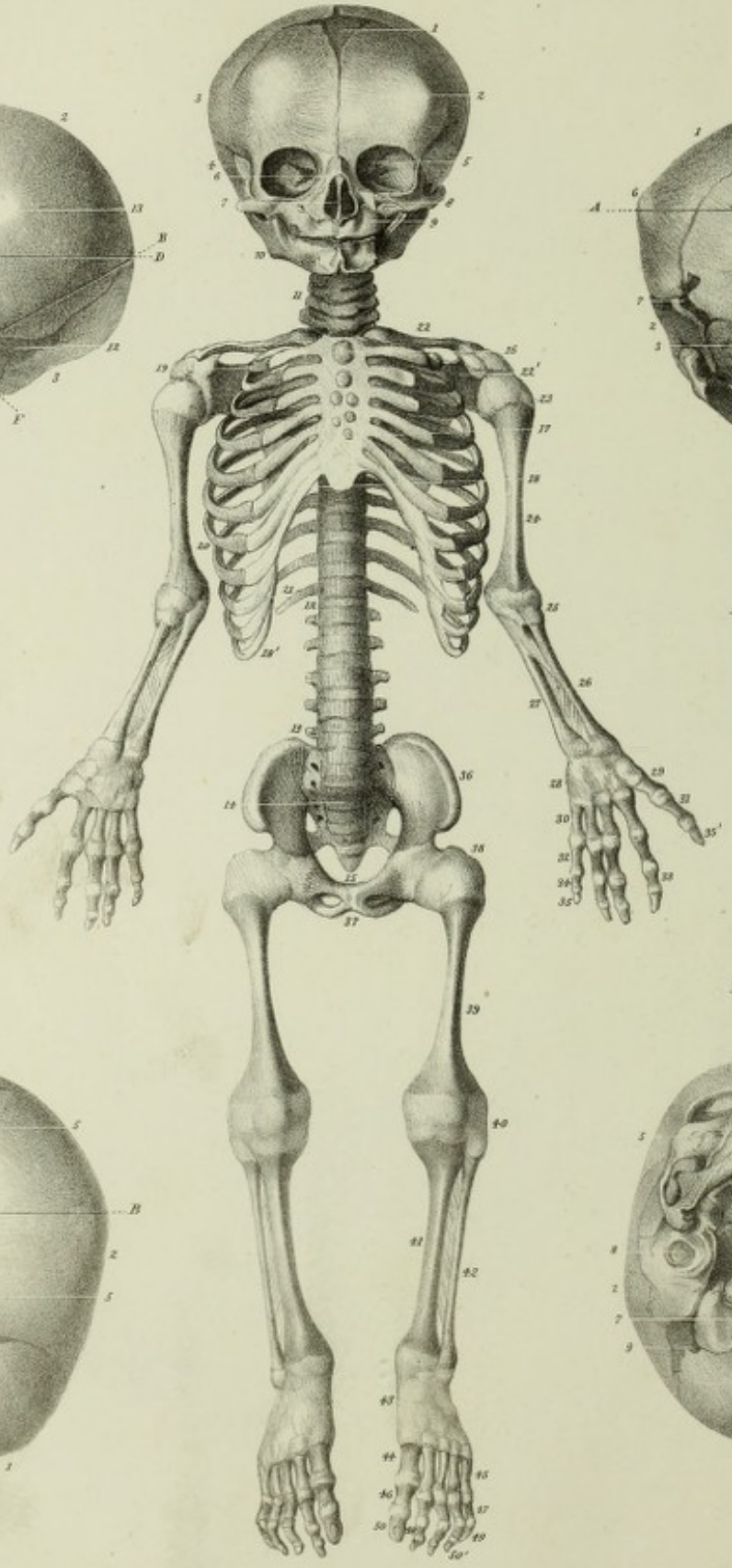
Fig. 1.



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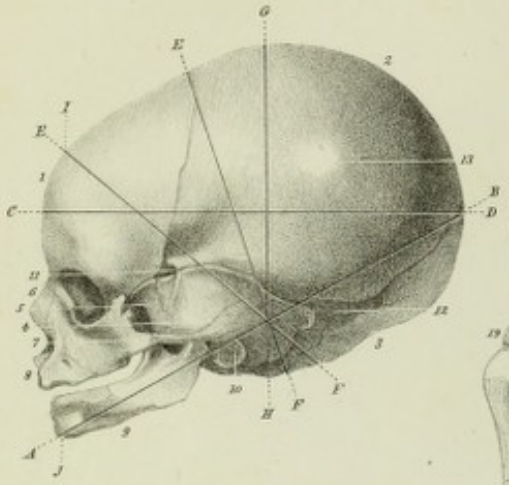

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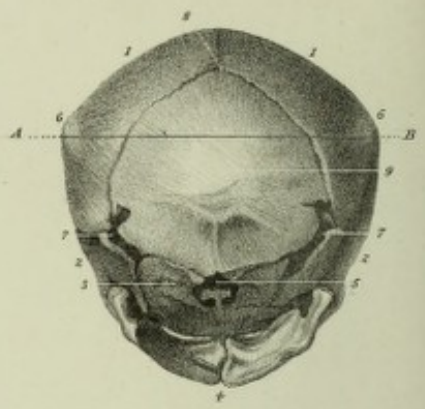

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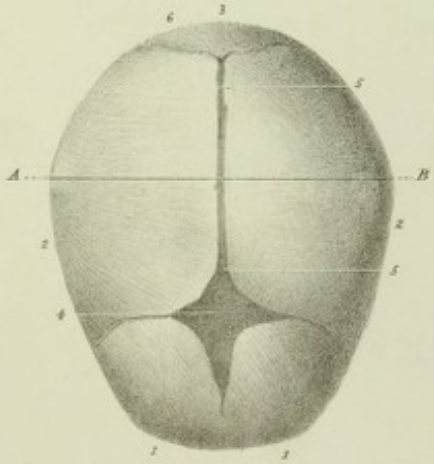

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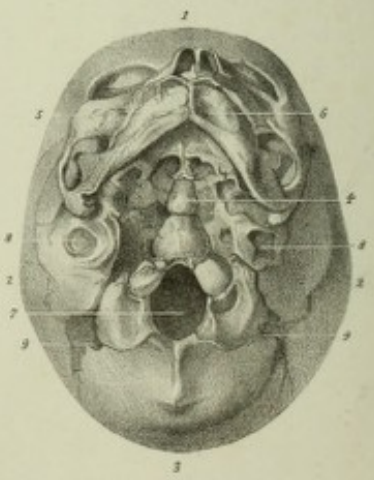

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PLATE XXXI.

SKELETON OF A FŒTUS AT TERM: THE HEAD FIGURED IN VARIOUS POSITIONS, SO AS TO EXHIBIT THE FONTANELLES, SUTURES AND REGIONS OF THE CEPHALIC EXTREMITY OF THE FŒTUS.

Fig. 1, Skeleton of a fœtus at term.
1, Anterior fontanelle.
2, Frontal protuberances.
3, Parietal.
4, Great wing of the sphenoid.
5, Cavities of the orbits.
6, Bones of the nose.
7, Septum narium.
8, Malar bone.
9, Superior maxillary bone.
10, Inferior maxillary bone.
11, Cervical vertebræ.
12, Twelfth dorsal vertebræ.
From 12 to 13, the five lumbar vertebræ.
14, Sacral vertebræ.
15, Coccyx.
16, Various points of ossification of the sternum.
17, Cartilaginous portion of the sternum.
18, Cartilages of the true or sternal ribs.
18¹, Cartilages of the false or asternal ribs.
From 19 to 20, The seven sternal ribs.
From 20 to 21, The five asternal ribs.
21, Last false or floating rib.
22, Clavicles.
22¹, Sub-scapular surface of the shoulder-blade.
23, Scapulo-humeral articulation.
24, Osseous state of the shaft of the humerus.
25, Humero-cubital articulation.
26, Osseous state of the radius.
27, Osseous state of the ulna, the extremities being cartilaginous.
28, Double row of the carpal bones, in the cartilaginous state.
29, 30, Metacarpal bones.
31, 32, First phalanges.
33, 34, Second phalanges.
35, 35¹, Third phalanges.
36, Iliac bones.
37, Pubes, in the cartilaginous state.
38, Ilio-femoral articulation.
39, Shaft of the os femoris, terminated by its cartilaginous epiphyses.
40, Femoro-tibial articulation.
41, Body of the tibia, the extremities being cartilaginous.
42, Fibula, extremities cartilaginous.
43, Tarsal bones, still cartilaginous.
44, 45, Middle portion of the five metatarsal bones, in the osseous state.
46, 47, Bodies of the first phalanges, in the osseous state.
48, 49, Bodies of the second phalanges.
50, 50¹, Third phalanges.

Fig. 2, Lateral view of a fœtal head at term, stripped of its soft parts.
1, Left half of the frontal bone.
2, Left parietal.
3, Left half of the occipital bone.
4, Left temporal.
5, Great wing of the sphenoid.
6, Ossa nasi.
7, Left malar bone.
8, Superior maxillary bone.
9, Inferior maxillary bone.
10, Meatus auditorius externus.
11, Left lateral and anterior fontanelle.
12, Left lateral and posterior fontanelle.
13, Left parietal protuberance.

a, *b*, Occipito-mental diameter, five inches.
c, *d*, Occipito-frontal diameter, four inches three lines.

E, *F*, Cervico-bregmatic diameter, three inches six lines.
G, *H*, Vertical diameter, three inches four lines.
I, *J*, Fronto-mental diameter, three inches six lines.

Fig. 3. Posterior region of the same head.
1, 1, The two parietal bones.
2, 2, Posterior part of the temporal bones.
3, Condyles of the occiput.
4, Inferior maxillary bone.
5, Foramen magnum occipitis.
6, 6, Parietal protuberances.
7, 7, Posterior lateral fontanelles.
8, Lambdoidal suture.

A, *B*, Bi-parietal diameter, three inches four lines.

Fig. 4, Vertical view of the same head.
1, 1, Double portion of the frontal bone.
2, 2, Parietal bones.
3, Superior angle of the occipital bone.
4, Anterior fontanelle.
5, 5, Sagittal suture.
6, Posterior fontanelle.

A, *B*, Bi-parietal diameter.

Fig. 5, View of the base of the same cranium.
1, Frontal bone.
2, 2, Parietal bones.
3, Occipital.
4, Sphenoidal bone.
5, Malar bone.
6, Inferior maxillary bone.
7, Foramen magnum occipitis.
8, 8, Meatus auditorii externi.
9, 9, Posterior and inferior lateral fontanelles.

PLATE XXXII.

FŒTAL CIRCULATION.

Fig. 1, Distribution of the sanguineous vascular system in the thoracic and abdominal viscera, with the exception of the thymus gland and alimentary canal, which have been removed. (Half size.)

A, Anterior surface of the heart.
B, Left lung.
C, Thyroid body.
D, Inferior surface of the liver, elevated and turned outward.
E, The gall-bladder.
F, The spleen.
G, *G*, The kidneys.
H, The rectum.
J, The uterus.
K, The bladder.
L. The diaphragm.
M, The ureter.

1, Origin of the aorta.
2, Pulmonary artery.
3, Vena cava descendens.
4, Arteria innominata.
5, Left subclavian vein.
6, Right primitive carotid artery.
7, Left internal jugular vein.
8, Abdominal aorta.
9, Opening of the vena cava descendens into the right auricle of the heart.
10, Vena cava ascendens, near its bifurcation into primitive iliac.
11, Cœliac axis.
12, Umbilical cord.
13, Ovarian artery and vein.
14, Right primitive iliac artery.
15, Left primitive iliac vein.
16, The umbilical arteries, separated by the urachus.
17, Mesenteric veins.
17¹, Splenic vein forming, with the preceding, the trunk of the vena portæ.
18, Renal artery and veins.
19, Umbilical vein.
20, Ductus venosus.

Fig. 2, Origin of the vessels at the base of the heart; ductus arteriosus. (Natural size.)

A, Right ventricle of the heart.
*A*¹, Left ventricle of the heart.
B, Right auricle.
C, Left auricle.
D, Aorta.
E, Pulmonary artery.
F, Ductus arteriosus.
G, Left pulmonary artery.
H, Vena cava descendens.
J, Arteria innominata.
K, Right primitive carotid artery.
L, Right subclavian artery.
M, Left primitive carotid artery.
O, Left subclavian artery.
P, Termination of the arch of the aorta.
Q, *Q*, *Q*, *Q*, Lungs.

Fig. 3, Cavities of the right auricle and ventricle; foramen of Botal. (Natural size.)

A, Inter-auricular septum.
B, *B*, Section of the parietes of the right auricle.
C, Cavity of the right ventricle.
D, *D*, *D*, Section of the parietes of the right ventricle.
E, Inter-auricular communication, or foramen of Botal.
F, Vena cava ascendens.
G, Vena cava descendens.

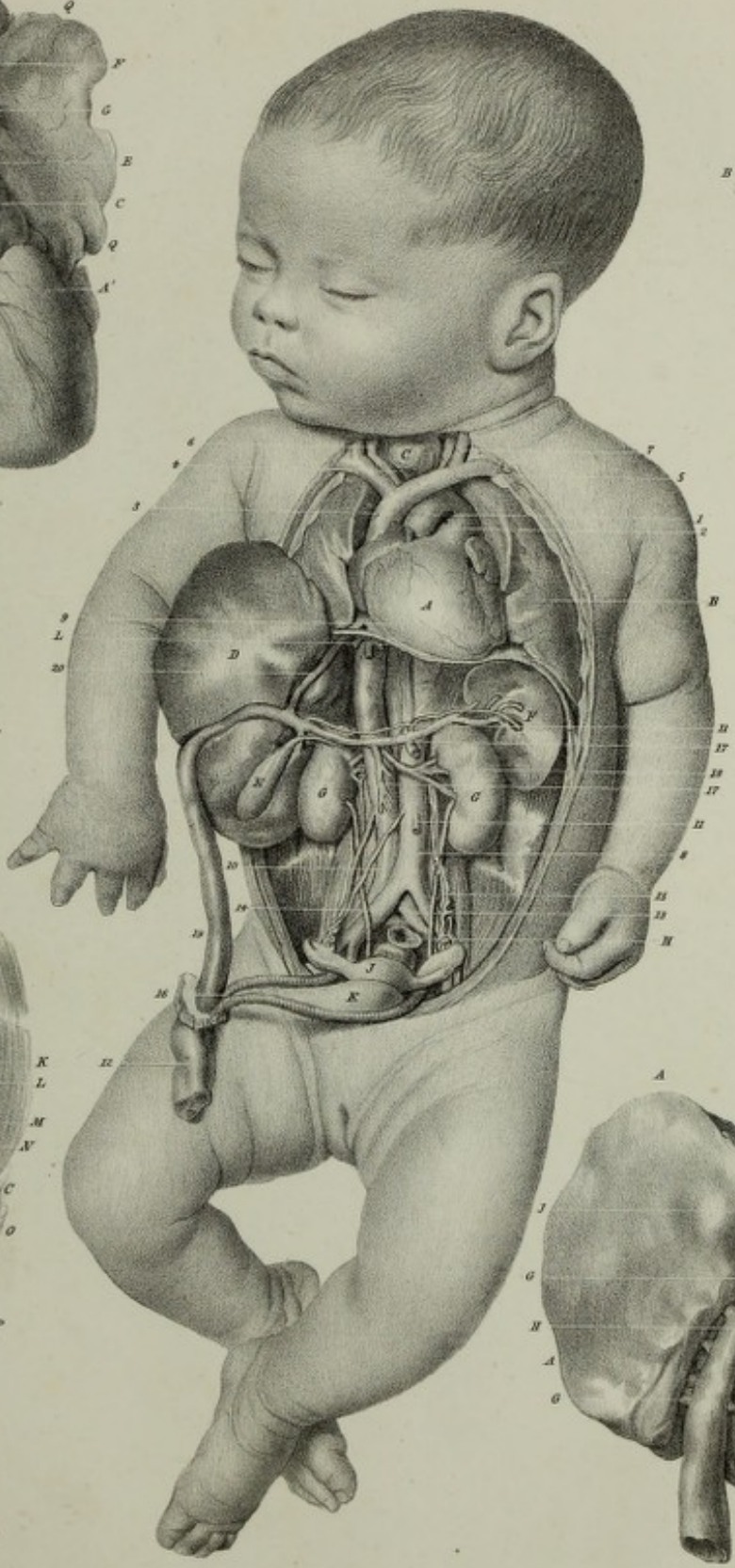
Fig. 4, Inferior surface of the liver. (Natural size.)

A, *A*, *A*, *A*, Circumference of the liver.
B, Lobulus Spigelii.
C, Gall bladder.
D, Opening of the vena cava ascendens into the heart.
E, Hepatic veins at their opening into the vena cava.
F, Vena cava below the liver.
G, *G*, Branches which furnish the umbilical vein in the substance of the liver, previously to meeting with the vena portæ.
H, Trunk of the umbilical vein near the groove of the same name.
K, Trunk of the vena portæ.

Fig. 5, Lumbar and pelvic vessels; origin of the umbilical arteries.

A, Promontory of the sacrum.
B, *B*, Psoas muscles.
C, *C*, Section of the anterior paries of the abdomen.
D, Rectum.
E, Bladder.
F, Umbilicus.
G, Umbilical cord.
H, Aorta.
J, Vena cava ascendens.
K, Primitive iliac artery.
L, Left primitive iliac vein.
M, Internal iliac artery.
N, External iliac artery.
O, Umbilical arteries.
P, Umbilical vein.
Q, Urachus.

Fig. 1.



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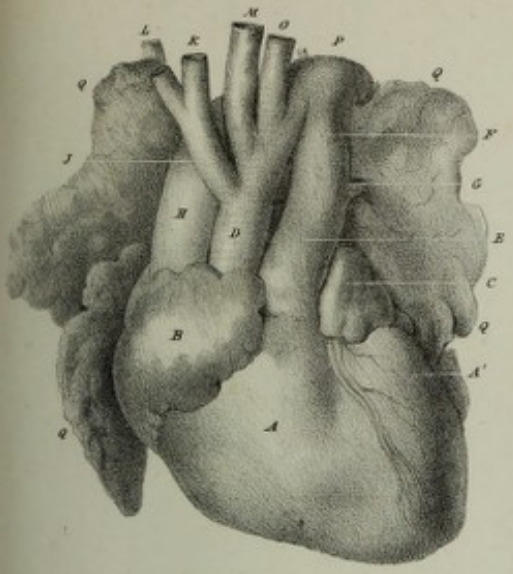

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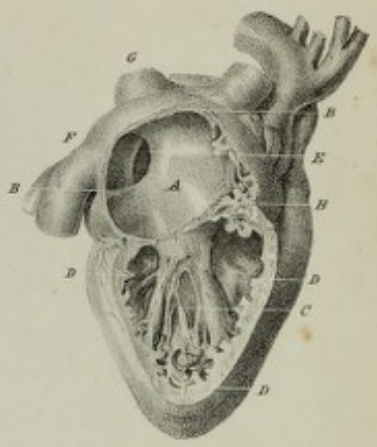

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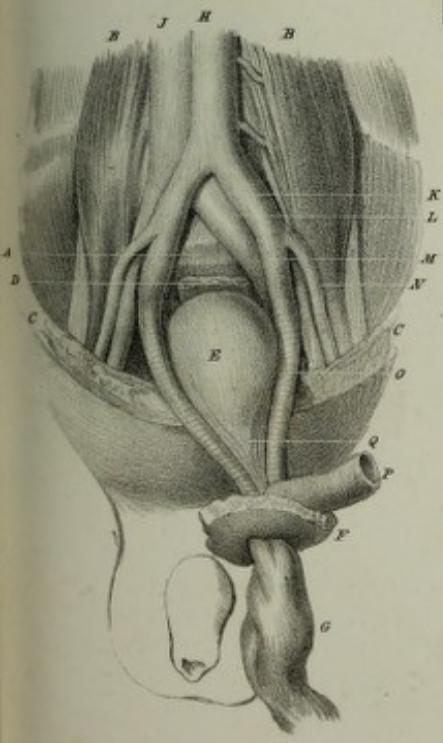

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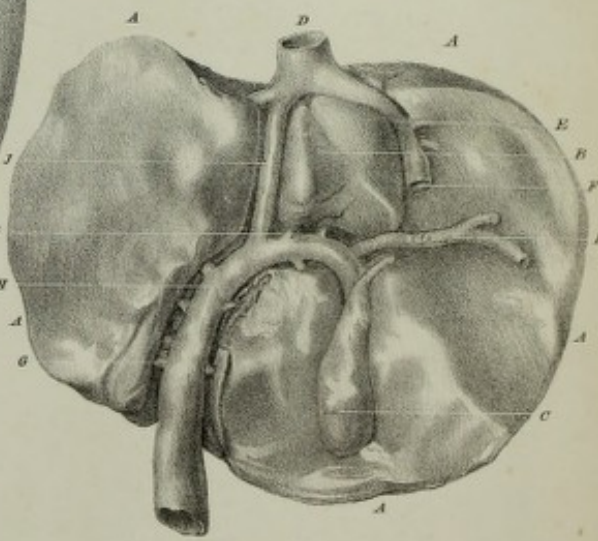

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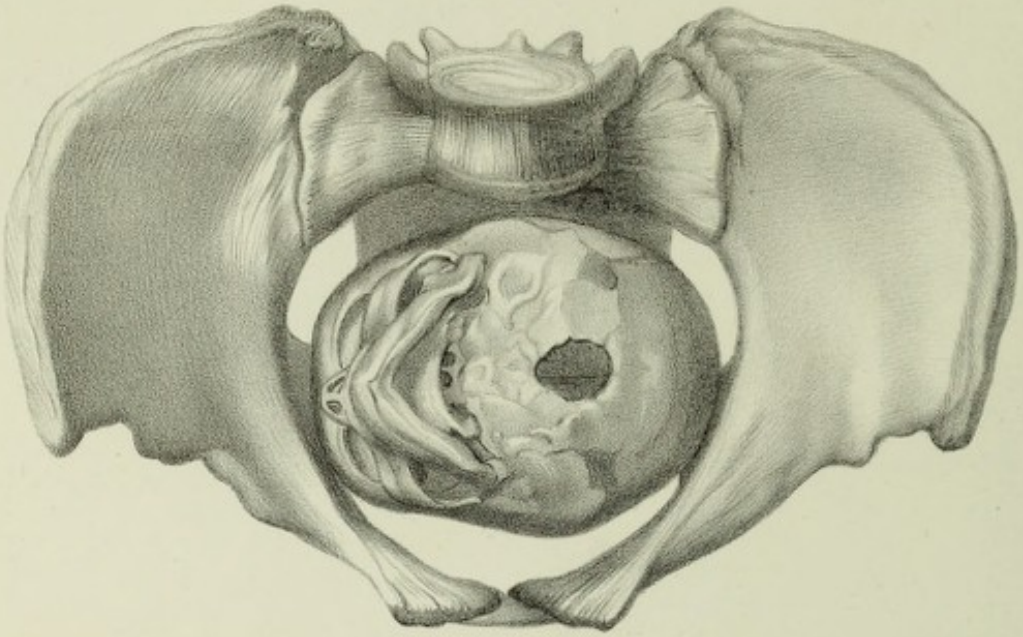
Fig. 1.



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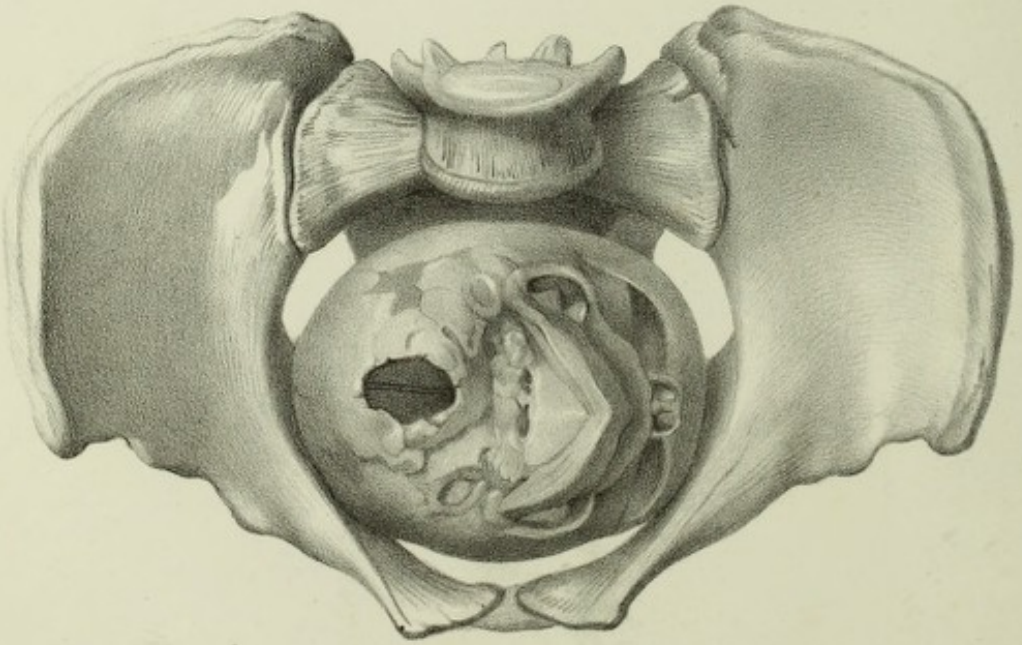

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PLATE XXXIII.

RELATIONS OF THE FŒTAL HEAD WITH THE SUPERIOR STRAIT IN TWO OF THE DIRECT POSITIONS.

(Half Size.)

Fig. 1, First direct position, or left occipito-iliac.

Fig. 2, Second direct position, or right occipito-iliac.

(Vide page 147.)

PLATE XXXIV.

RELATIONS OF THE FŒTAL HEAD WITH THE SUPERIOR STRAIT IN TWO OF THE DIRECT POSITIONS.

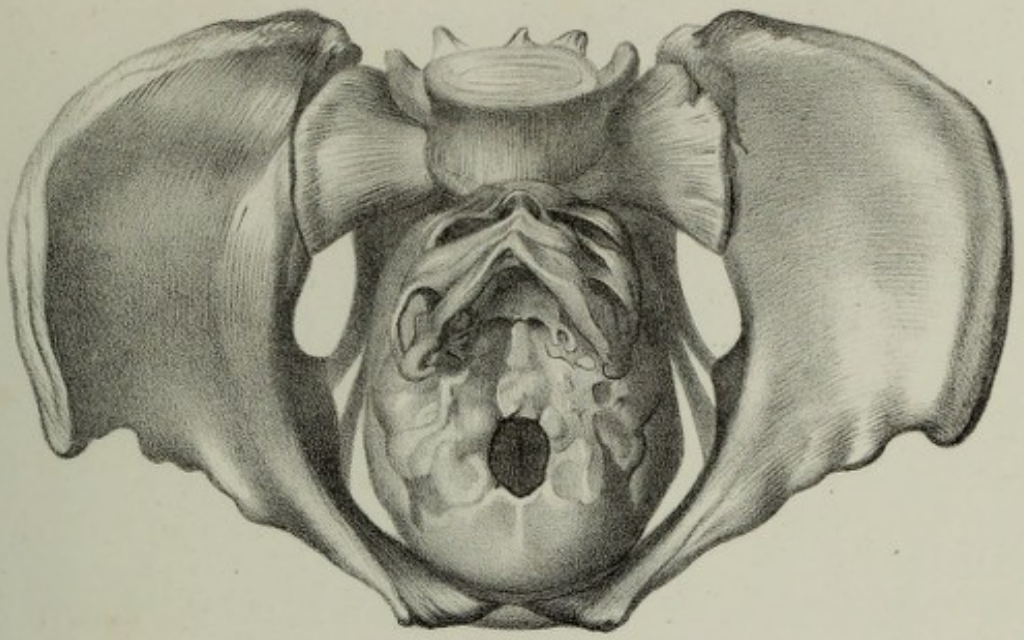
(Half Size.)

Fig. 1, Third direct position, or occipito-pubal.

Fig. 2, Fourth direct position, or occipito-sacral.

(Vide page 147.)

Fig. 1.



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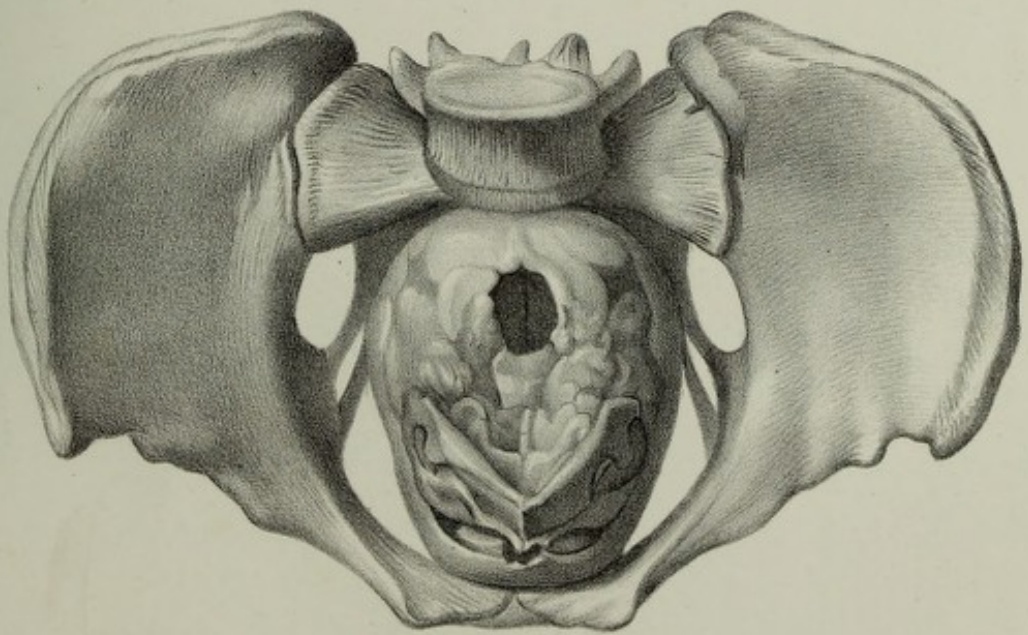

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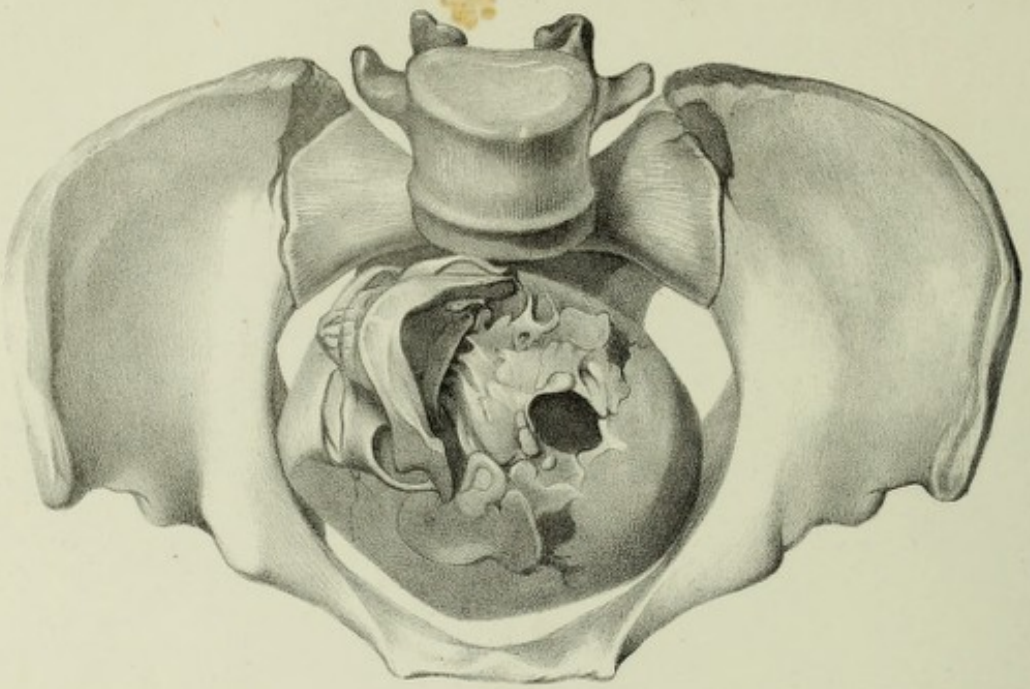
Fig. 1.



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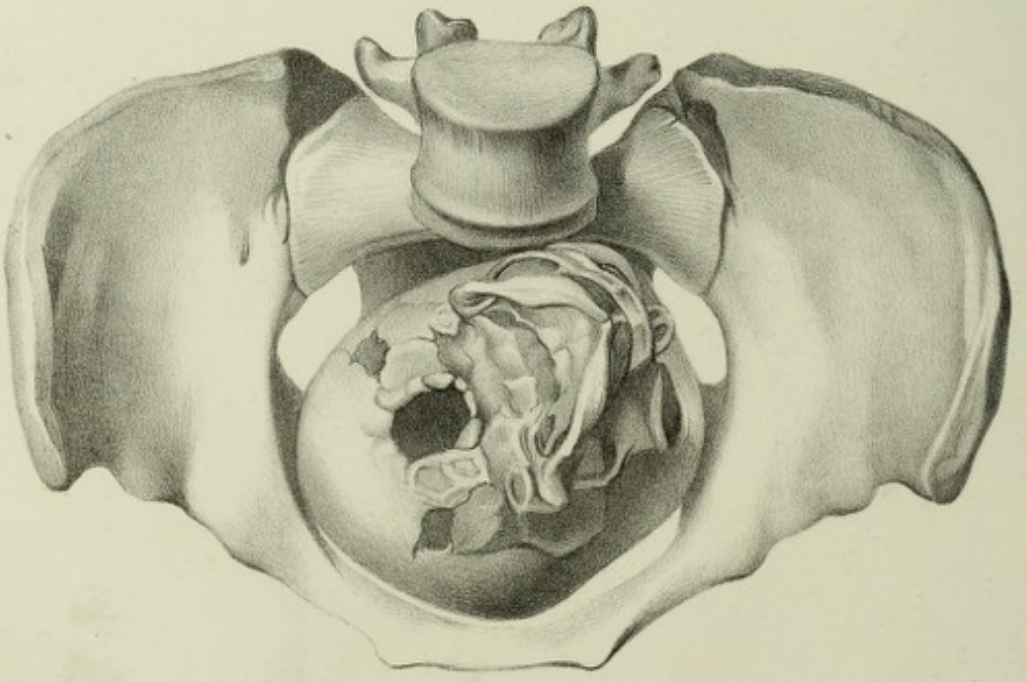

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PLATE XXXV.

RELATIONS OF THE FŒTAL HEAD WITH THE SUPERIOR STRAIT IN TWO OF THE OBLIQUE POSITIONS.

(Half Size.)

Fig. 1, First oblique position, or left occipito-acetabular. | Fig. 2, Second oblique position, or right occipito-acetabular.

(Vide page 147.)

PLATE XXXVI.

RELATIONS OF THE FŒTAL HEAD WITH THE SUPERIOR STRAIT IN TWO OF THE OBLIQUE POSITIONS.

(Half Size.)

Fig. 1, Third oblique position, or right occipito-posterior or left fronto-acetabular.

Fig. 2, Fourth oblique position, or left occipito-posterior or right fronto-acetabular.

(Vide page 147 et seq.)

Fig. 1.

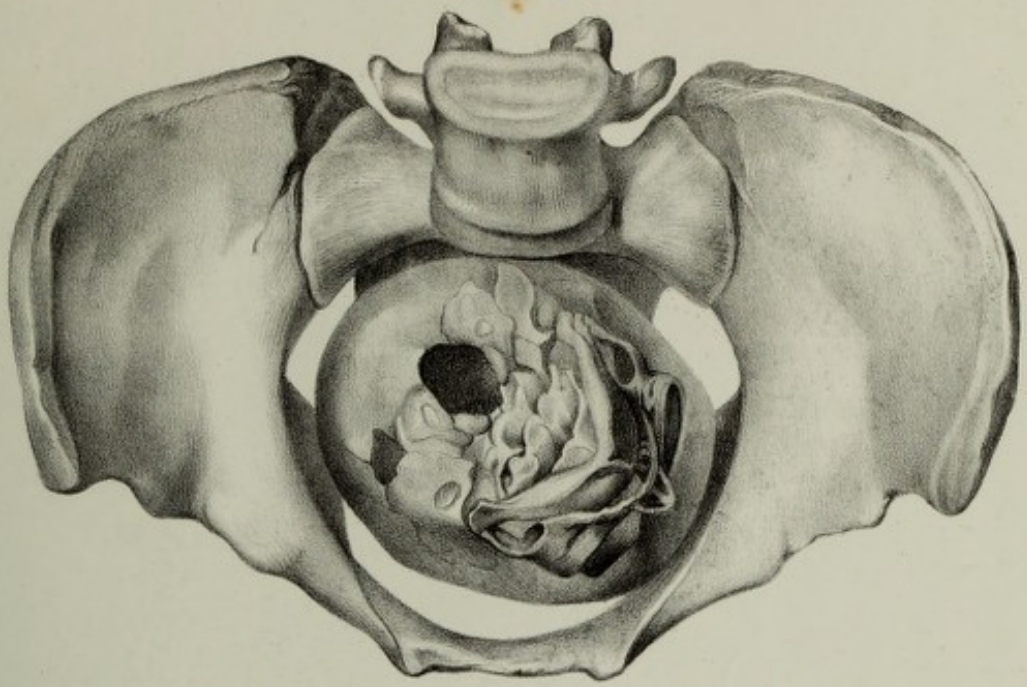
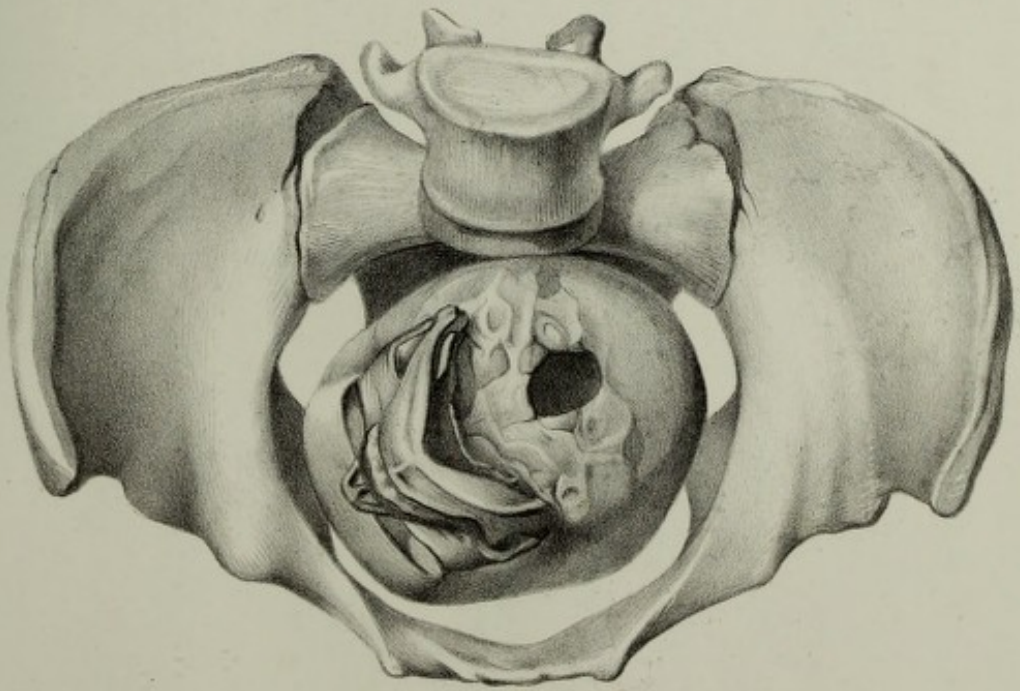


Fig. 2.



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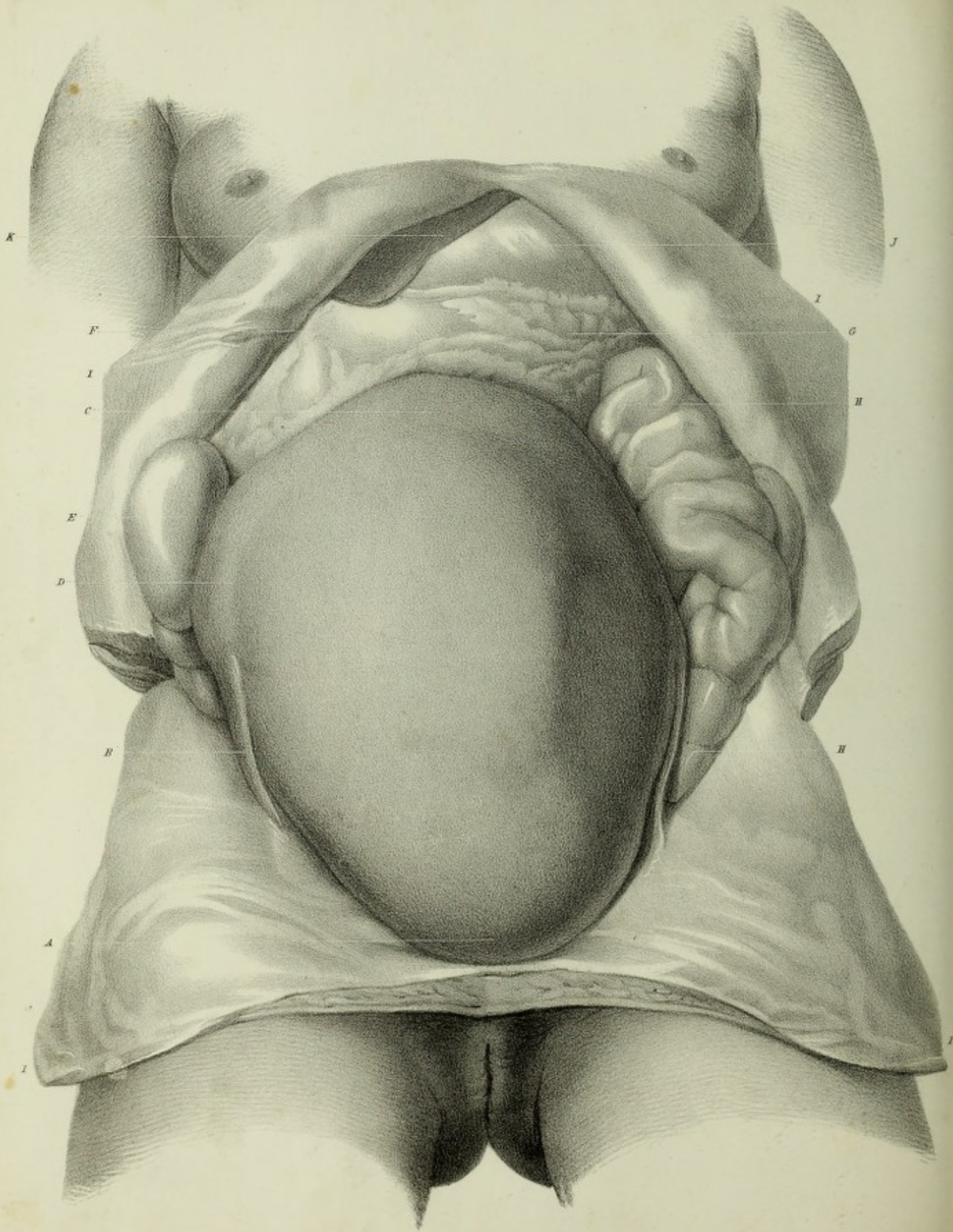

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PLATE XXXVII.

THIS PLATE EXHIBITS THE FORM, SIZE, AND SITUATION OF THE UTERUS COMPLETELY DEVELOPED BY THE PRODUCT OF CONCEPTION, AND THE RELATIONS IT BEARS TO THE DIFFERENT ORGANS CONTAINED IN THE ABDOMINAL CAVITY.

(Half Size.)

1, 1, 1, 1, Parietes of the abdomen crucially divided and turned backward.

A, Inferior portion, or small extremity of the uterine globe engaging in the superior strait.

B, Round or supra-pubic ligament of the right side.

C, Superior portion, fundus, or large extremity of the uterus inclined to the right.

D, Expansion of the fibres of the round ligament of the right side.

E, Portion of the ascending colon.

F, Right angle of the transverse colon.

G, Transverse colon covered by the omentum majus.

H, *H*, Convolutions of the small intestine.

J, The stomach.

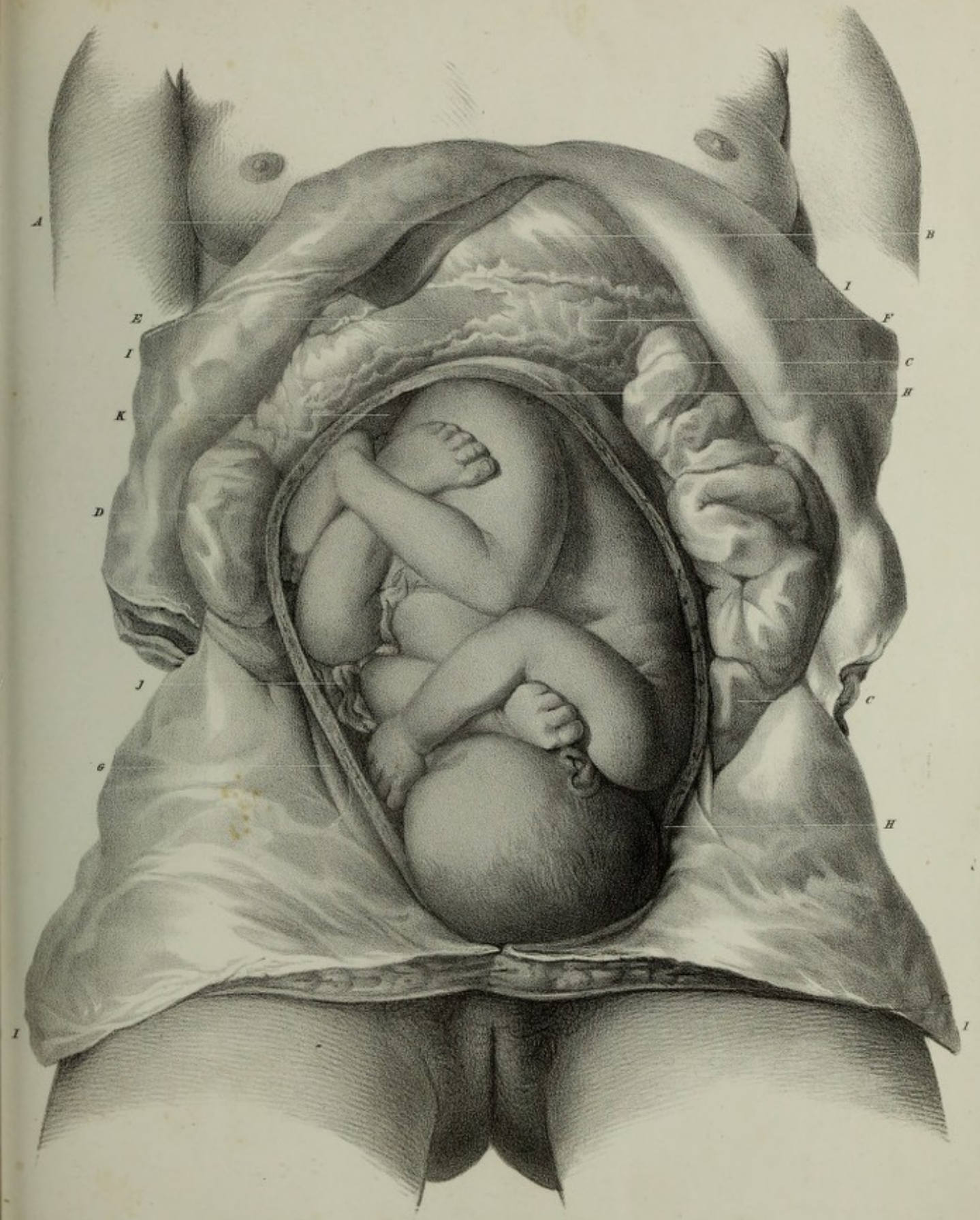
K, The liver.

PLATE XXXVIII.

SAME GENERAL RELATIONS AS IN THE PRECEDING PLATE:—THE ANTERIOR HALF OF THE UTERUS HAS BEEN REMOVED, IN ORDER TO DISPLAY ONE OF THE POSITIONS OF THE FŒTUS AT TERM:—THE CEPHALIC EXTREMITY IS TURNED DOWNWARD; THE POSTERIOR PLANE OF THE FŒTUS IS DIRECTED TO THE LEFT AND BACKWARD. (FOURTH OBLIQUE POSITION, OR RIGHT FRONTO-ACETABULAR.)

(Half Size.)

A, Liver.
B, Stomach.
C, *C*, Convolutions of the small intestine.
D, Ascending colon.
E, Transverse colon: the omentum majus has been removed in order to expose the intestine.
F, Omentum majus.
H, *H*, Section of the parietes of the uterus.
I, Round ligament of the right side.
J, Umbilical cord.
K, Portion of the placenta adhering to the fundus of the uterus.



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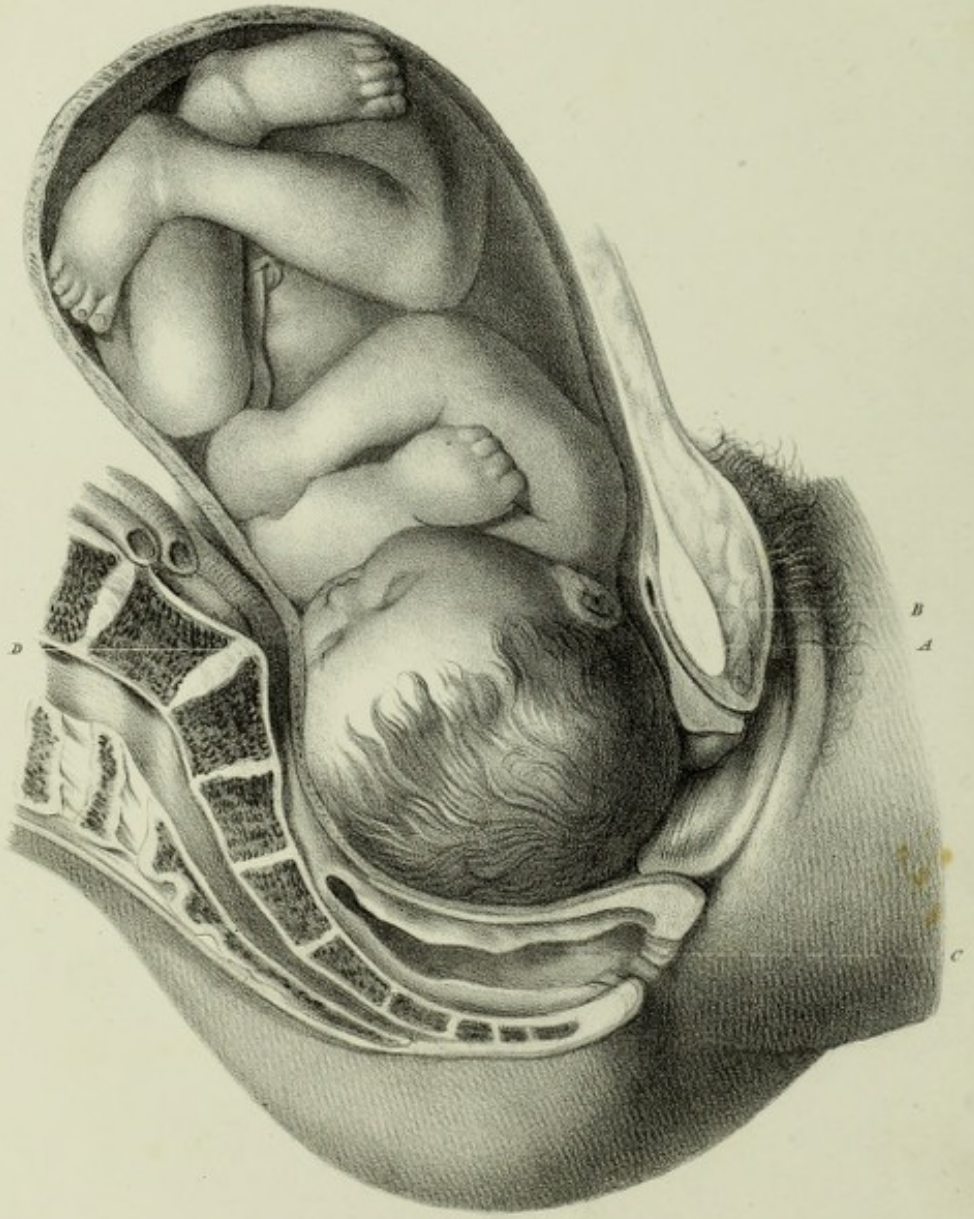

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PLATE XXXIX.

MECHANISM OF NATURAL LABOUR, IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ACETABULAR.)

(Half Size.)

Termination of the first period. The fœtus has undergone a motion of flexion; it has descended to the bottom of the pelvic excavation, preserving the general relations it had on entering the superior strait.

A, Symphysis pubis.
B, Bladder.
C, Anal aperture.
D, Promontory of the sacrum.

PLATE XL.

MECHANISM OF A NATURAL LABOUR IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ACETABULAR.)

(Half Size.)

Second period. The head of the fœtus has abandoned the diagonal position; it has executed a motion of rotation from left to right; the occiput is brought behind and beneath the symphysis pubis; the forehead and face have departed from the right sacro-iliac symphysis, and are lodged in the cavity of the sacrum. The general relations of the head are changed; the bi-parietal diameter is parallel to the bis-iliac diameter of the excavation. The occipito-mental diameter is nearly in the direction of the axis of the inferior strait. The relative position of the body of the fœtus has not changed; it is the same as in the preceding Plate, thus indicating that the motion of rotation of the head has been effected by the simple torsion of the neck.

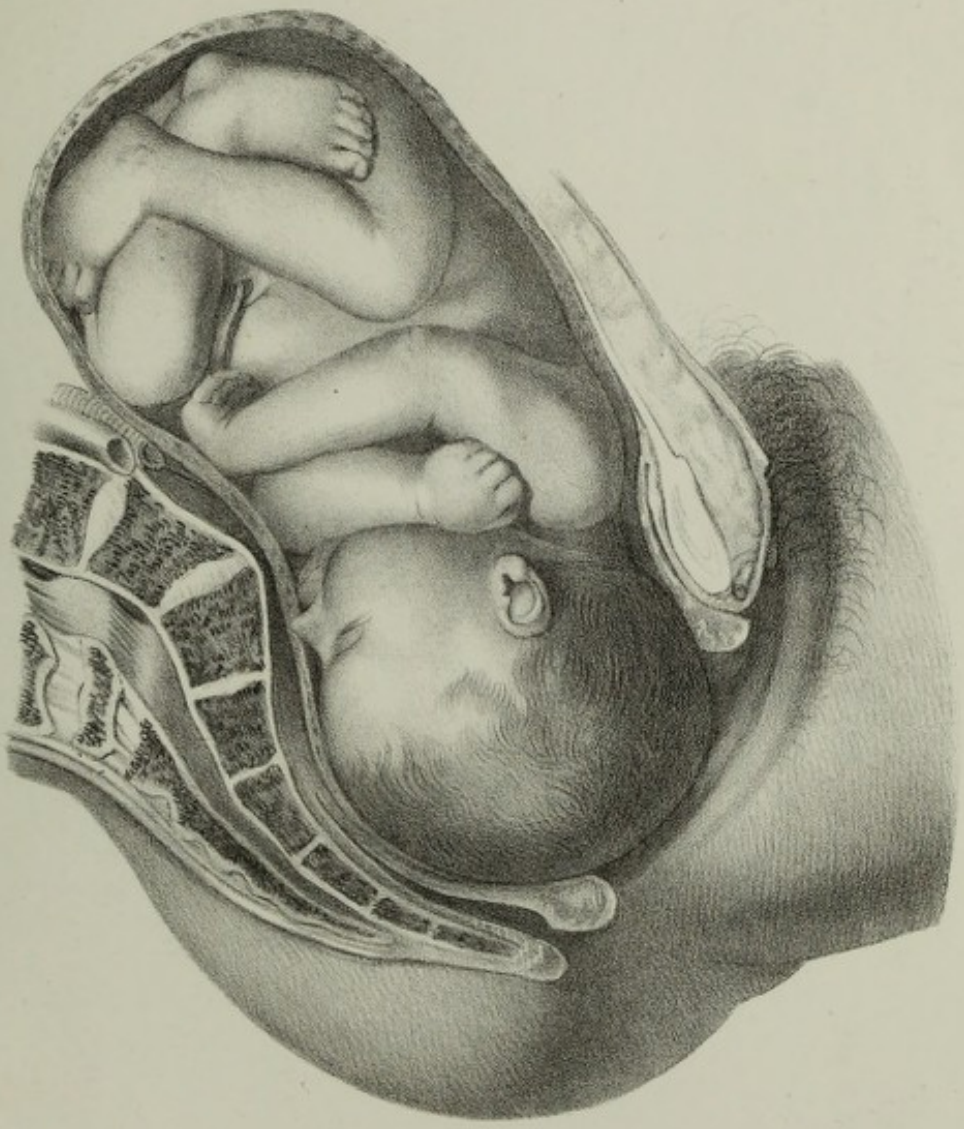

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PLATE XLI.

MECHANISM OF NATURAL LABOUR, IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ACETABULAR.

(Half Size.)

Third period. The head of the fœtus performs a motion of extension, during which the occiput glides beneath and in front of the symphysis pubis, whilst the forehead and face traverse the inclined plane presented by the curvatures of the sacrum, coccyx, and perineum. The shoulders of the fœtus engage in the direction of the oblique diameter of the superior strait, which has given passage to the bi-parietal diameter of the head.

PLATE XLII.

MECHANISM OF NATURAL LABOUR, IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ACETABULAR.)

(Half Size.)

Fourth period. The head of the fœtus, having escaped through the inferior strait and vulva, being no longer retained, has just performed a motion of restitution, which brings it into a position analogous to that which it had before entering the superior strait. The occiput is directed toward the left groin of the mother, whilst the forehead and face look toward the internal and posterior part of the mother's right thigh. The shoulders of the fœtus, plunged in the pelvic excavation, have performed a motion of rotation which has placed the right shoulder behind the symphysis pubis, and the left shoulder in the cavity of the sacrum.

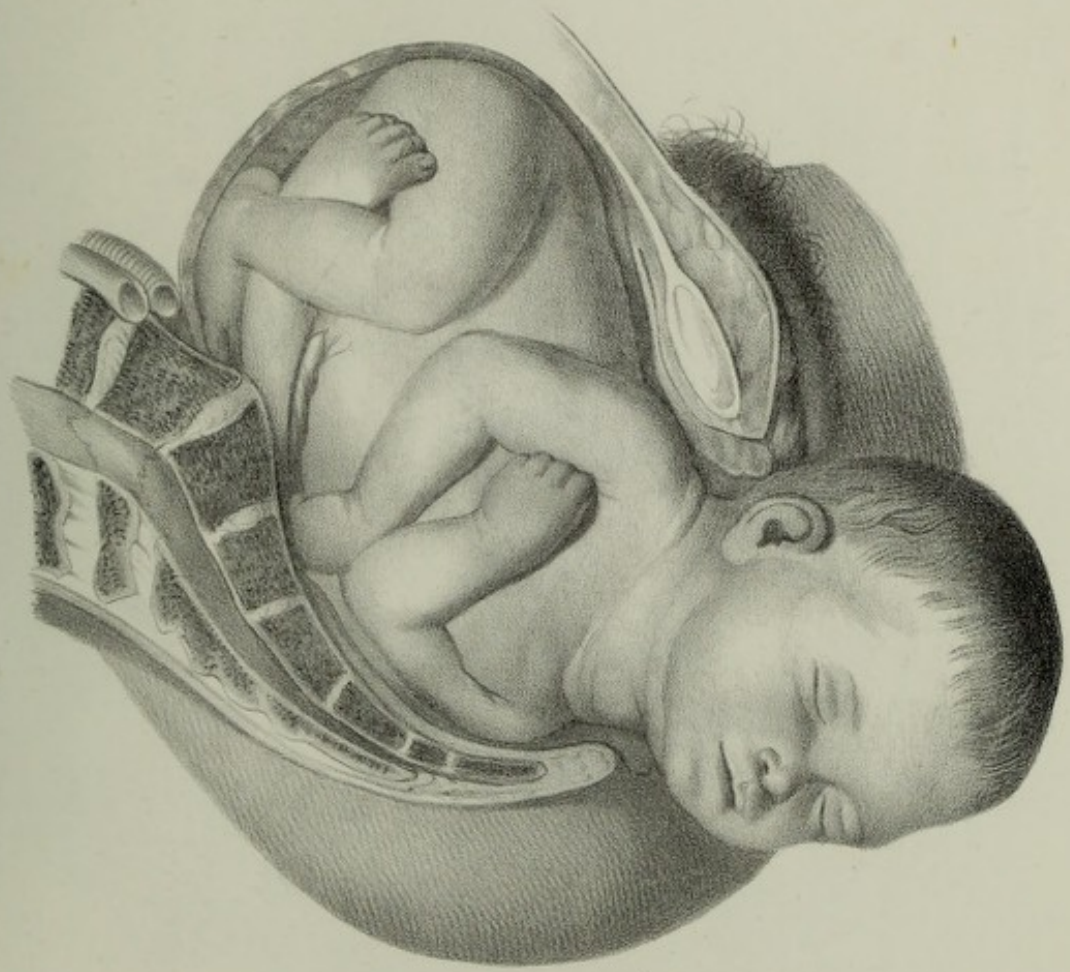

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PLATE XLIII.

MECHANISM OF NATURAL LABOUR, IN THE FOURTH DIRECT POSITION OF THE VERTEX, (OCCIPITO-SACRAL,) AND IN THE THIRD AND FOURTH OBLIQUE POSITIONS, WHERE THE OCCIPUT COULD NOT BE BROUGHT BEHIND THE SYMPHYSIS PUBIS.

(Half Size.)

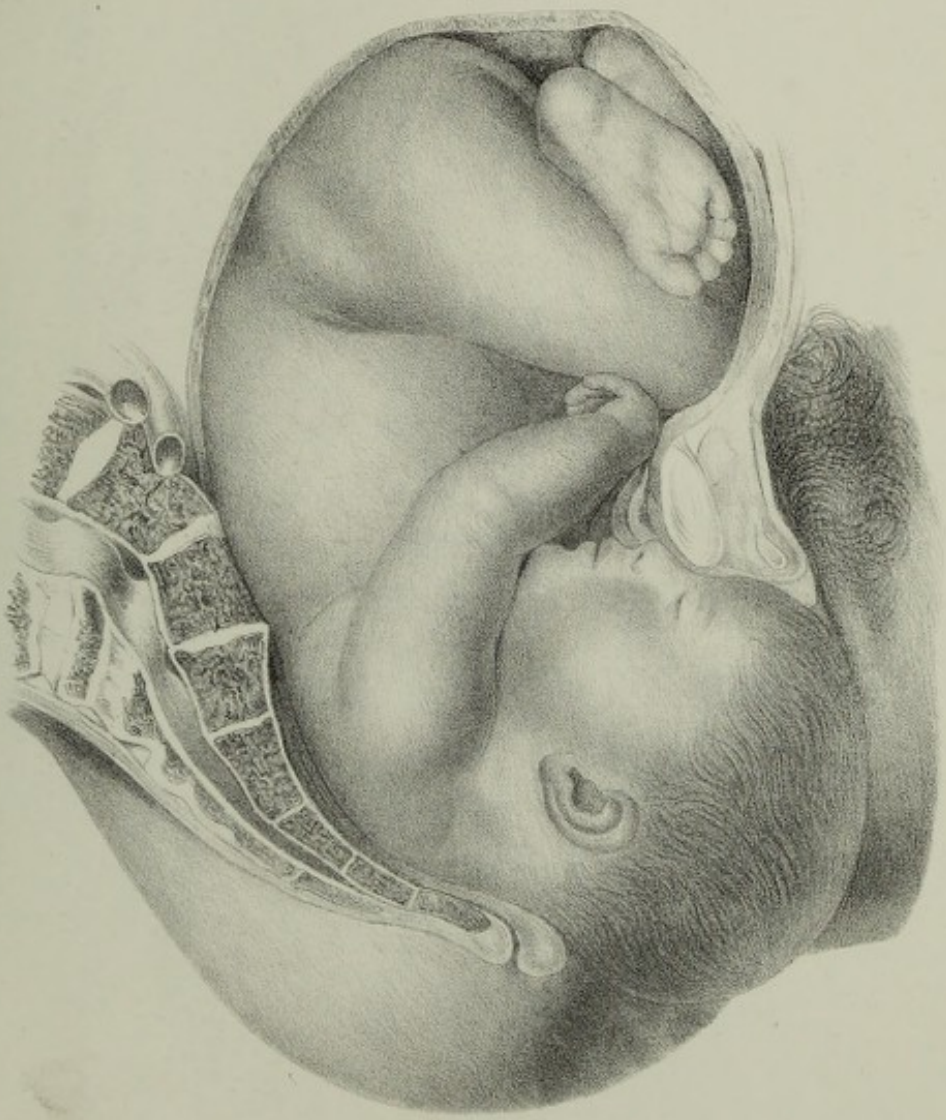
Second period. The head of the fœtus has descended into the pelvic excavation. The occiput occupies the cavity of the sacrum. The forehead, placed behind the symphysis pubis, has begun to ascend during the motion of forced flexion performed by the head, in order to escape from the inferior strait and vulva.

PLATE XLIV.

MECHANISM OF NATURAL LABOUR, IN THE FOURTH DIRECT POSITION OF THE VERTEX, (OCCIPITO-SACRAL,) AND IN THE THIRD AND FOURTH OBLIQUE POSITIONS, WHERE THE OCCIPUT COULD NOT BE BROUGHT BEHIND THE SYMPHYSIS PUBIS.

(Half Size.)

Third period. The head of the fœtus, having overcome the resistance presented by the perineum and vulva, has commenced a motion of extension. The perineum is placed behind the occiput; the forehead passes beneath the symphysis pubis, and appears at the anterior commissure of the vulva, where it will be soon followed by the nose, mouth and chin, which will disengage in front, in proportion to the direction backward, of the occiput rolling against the anterior edge of the perineum.



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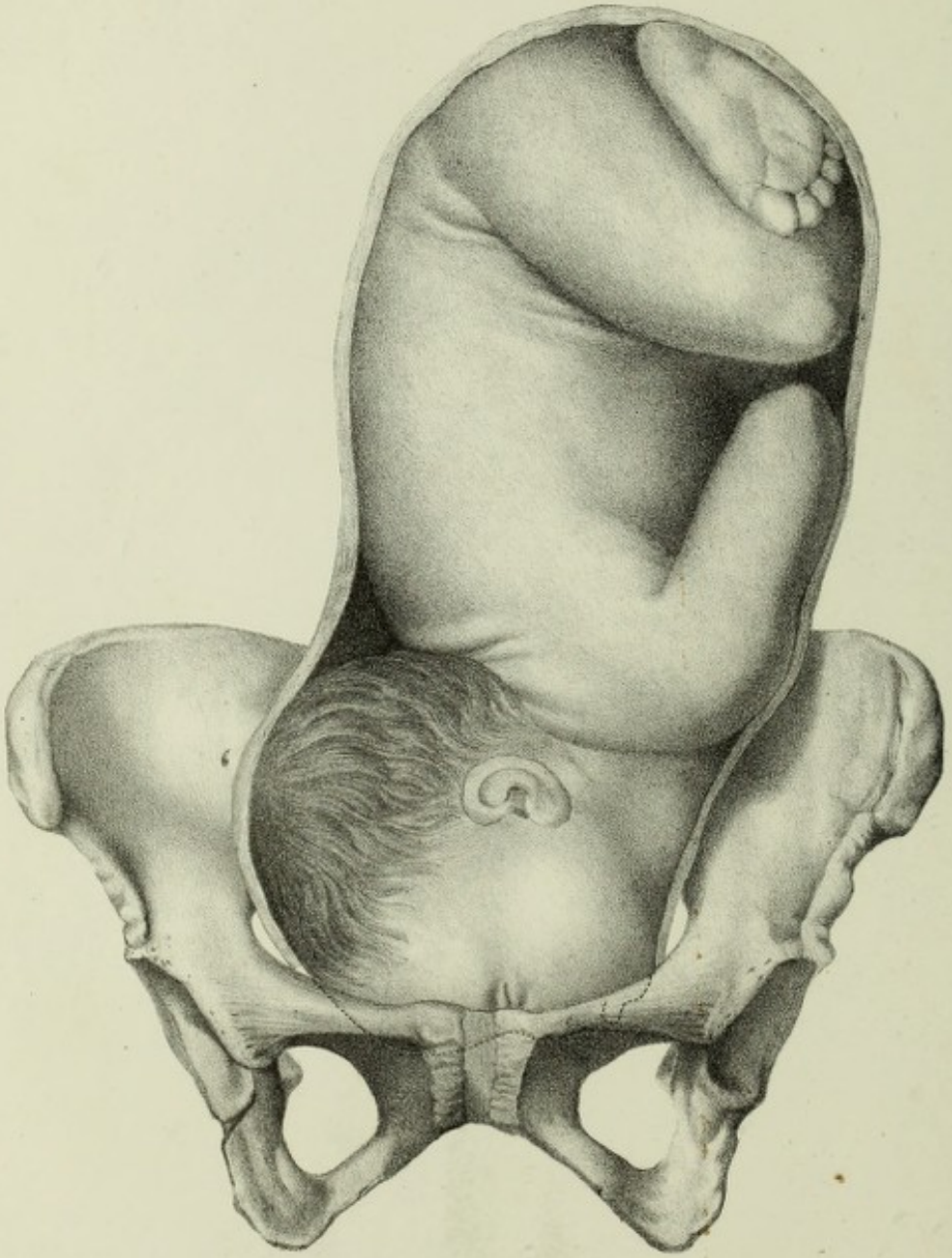

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PLATE XLV.

MECHANISM OF NATURAL LABOUR, IN THE SECOND POSITION OF THE FACE. (LEFT MENTO-ILIAC.)

(Half Size.)

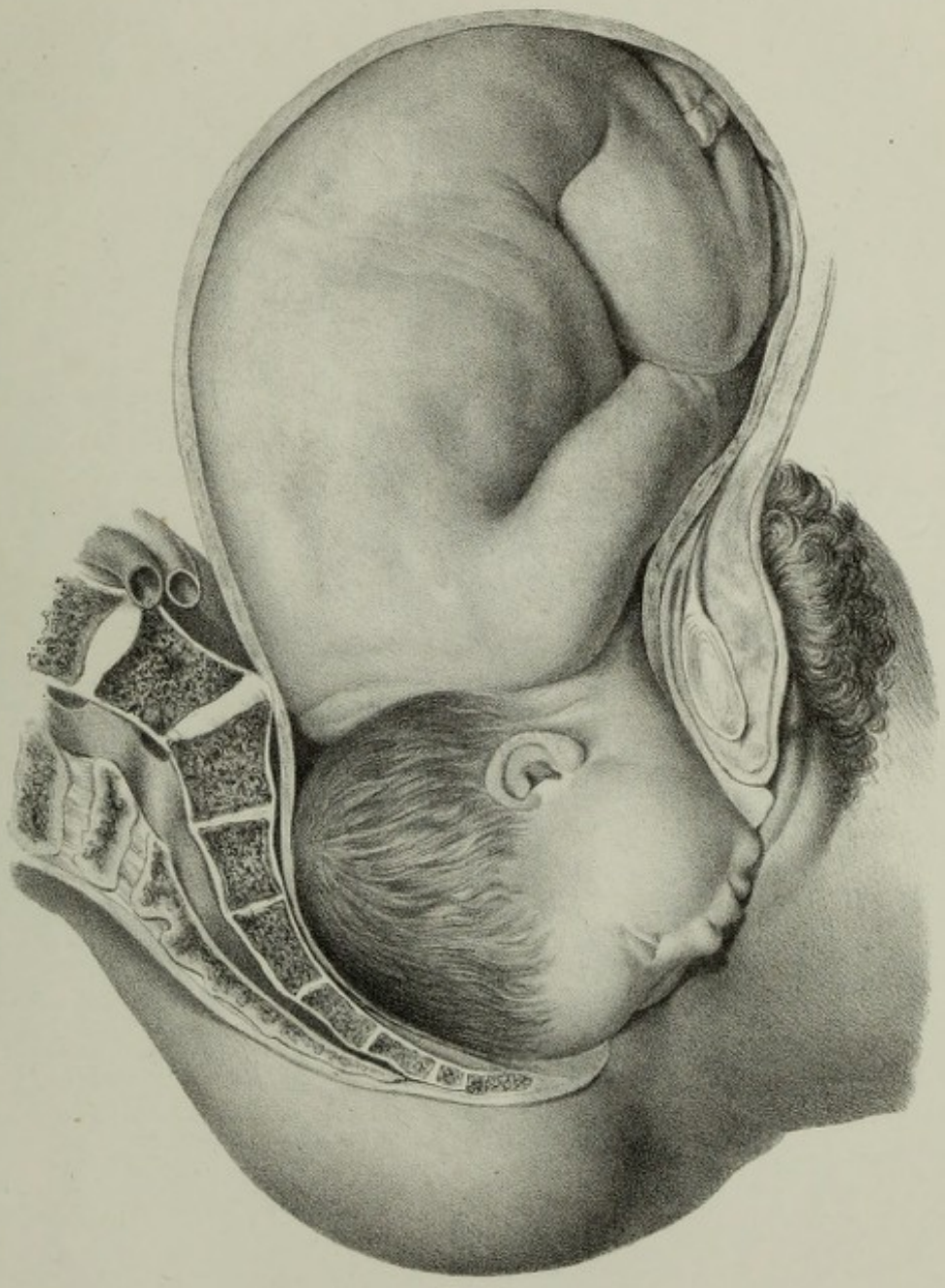
First period. The fronto-mental diameter of the face of the fœtus is parallel to the bis-iliac of the superior strait. The chin corresponds to the left ilium, whilst the vertex is directed toward the right ilium. The face begins to engage in the pelvic excavation, and will preserve the same position until it has completely descended.

PLATE XLVI.

MECHANISM OF NATURAL LABOUR IN THE SECOND POSITION OF THE FACE. (LEFT MENTO-ILIAC.)

(Half Size.)

Second period. The head of the fœtus having reached the bottom of the pelvic excavation, has performed a motion of rotation, which has brought the chin from left to right, below and behind the symphysis pubis, whilst the vertex has passed from right to left in the cavity of the sacrum, where it is at this moment lodged. In order to be disengaged, the head must undergo a motion of flexion, during which will be seen to appear, successively, at the vulva, the chin, mouth, nose, eyes, forehead, vertex, and lastly, the occiput.



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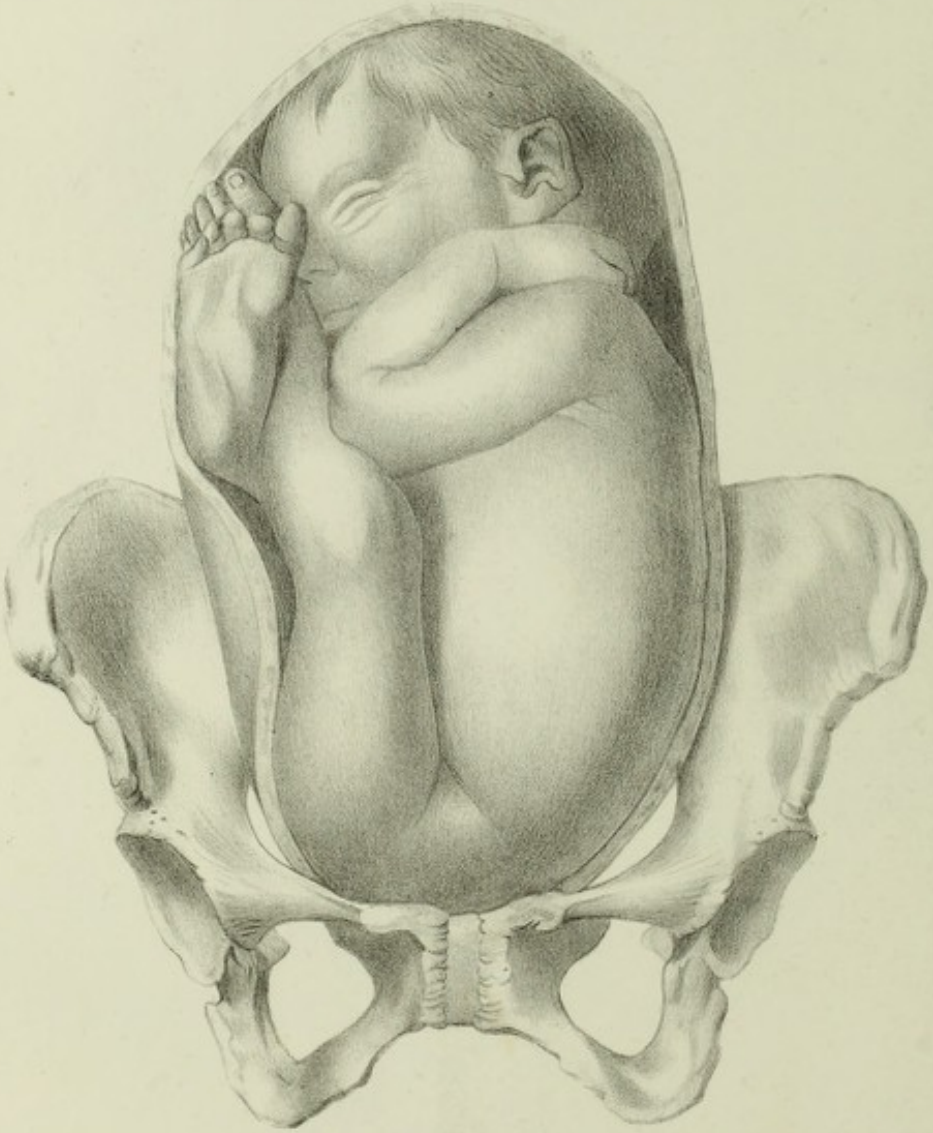

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PLATE XLVII.

MECHANISM OF NATURAL LABOUR, IN THE VARIOUS PRESENTATIONS OF THE PELVIC EXTREMITY.—FIRST POSITION OF THE BREECH. (LEFT SACRO-ILIAC.)

(Half Size.)

In order not to needlessly multiply Plates, we have given merely one figure of the four positions, which each presentation of the pelvic extremity may assume at the entrance of the pelvis. These four positions being known, it is very easy to apply them.

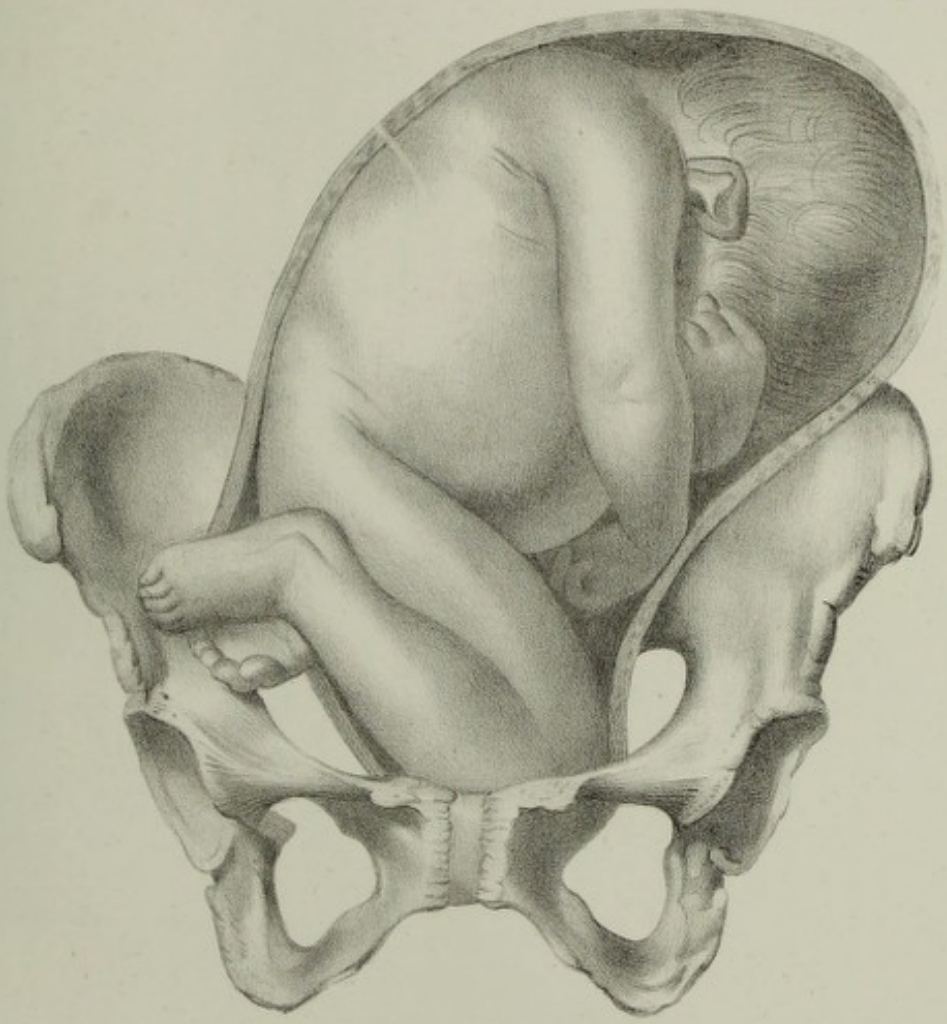
First position of the breech.—First period. In this position, the hips of the fœtus are parallel to the sacro-pubal diameter of the superior strait; the left hip towards the pubes of the mother; the right hip toward the sacrum. The back of the fœtus looks toward the left lateral part of the uterus. The legs and thighs, extended on the anterior part of the fœtus, correspond to the right lateral part of the uterus. The head corresponds to the fundus uteri.

PLATE XLVIII.

MECHANISM OF NATURAL LABOUR, IN THE VARIOUS POSITIONS OF THE PELVIC EXTREMITY.—SECOND POSITION OF THE KNEES. (RIGHT TIBIO-ILIAC.)

(Half Size.)

Second position of the knees.—First period. In this position, the transverse diameter of the knees is parallel to the sacro-pubal diameter of the superior strait; the right knee toward the pubes of the mother; the left knee toward the sacrum. The anterior part of the legs looks toward the right ilium. The feet crossed, and resting against the breech of the fœtus, correspond to the right iliac fossa. The back of the fœtus corresponds to the right lateral part of the uterus. The front of the thighs, the abdomen and whole anterior surface of the fœtus look toward the left lateral part of the uterus. The head flexed, and strongly inclined to the left, corresponds to the fundus uteri, which is in a state of left lateral obliquity.



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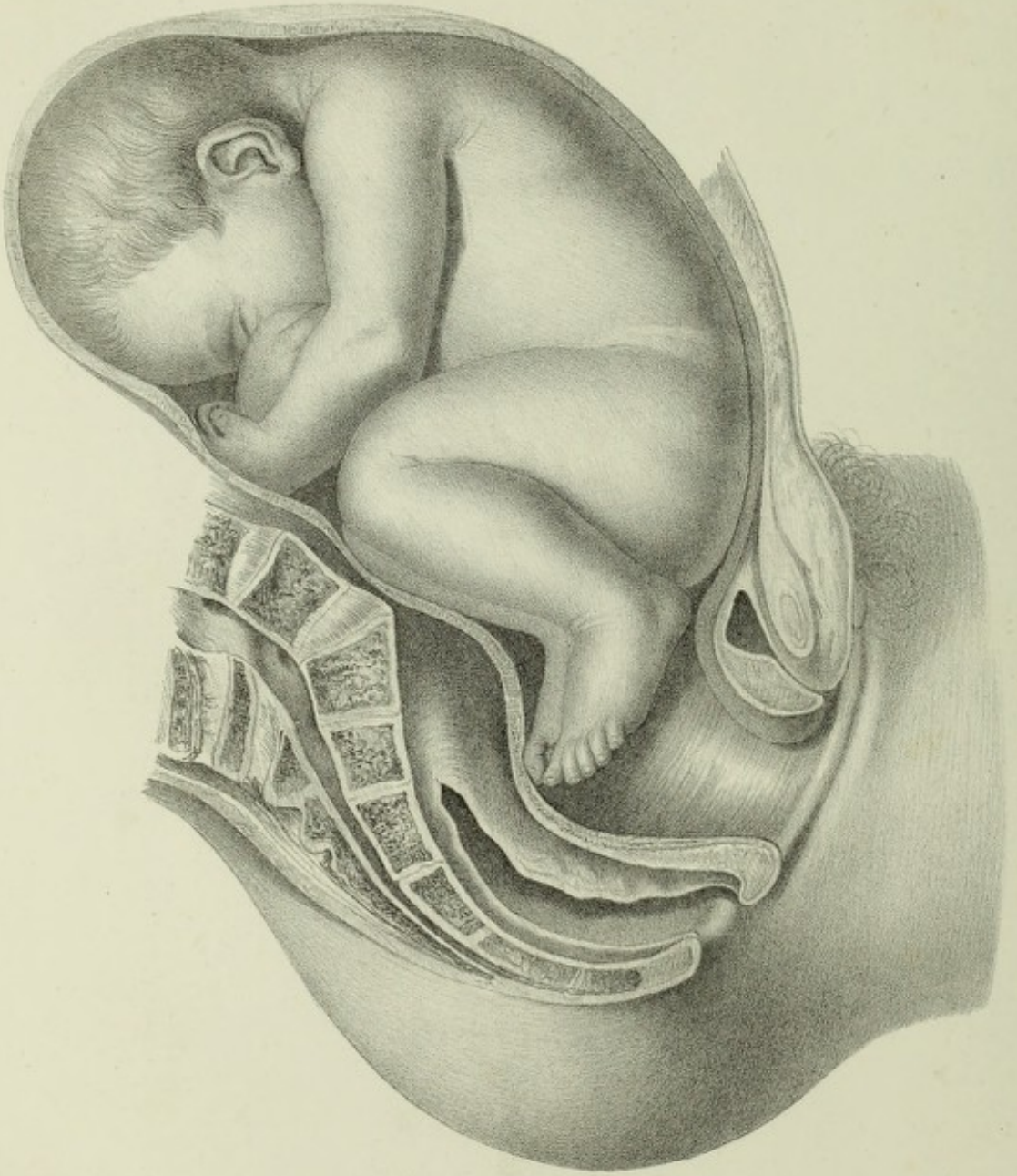

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PLATE XLIX.

MECHANISM OF NATURAL LABOUR IN THE VARIOUS POSITIONS OF THE PELVIC EXTREMITY.—THIRD POSITION OF THE FEET. (CALCANEO-PUBAL.)

(Half Size.)

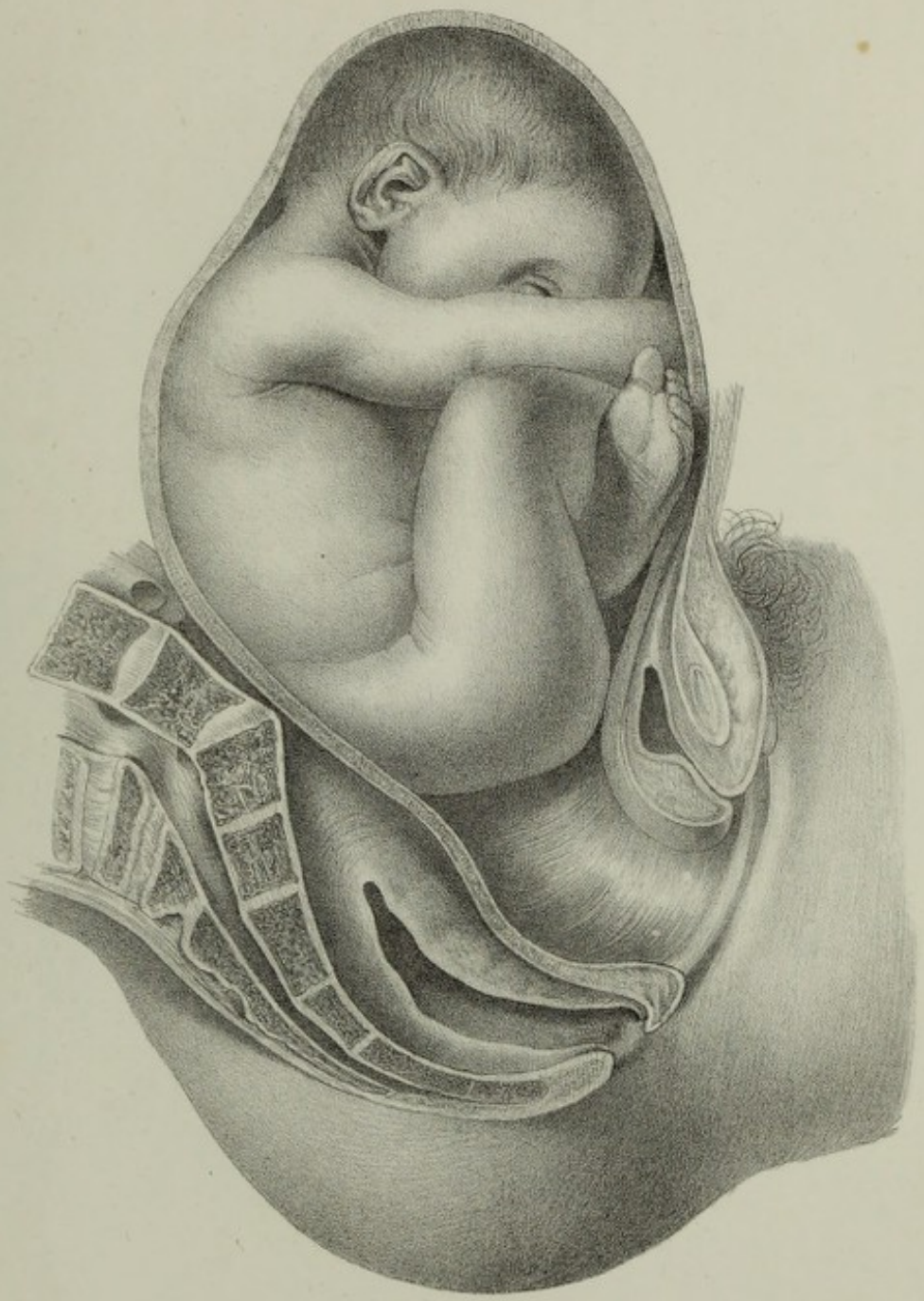
Third position of the feet.—First period. In this position the heels of the fœtus correspond to the pubes of the mother. The toes look toward the sacrum. The back of the fœtus corresponds to the anterior surface of the uterus. The front of the legs, knees, arms, and the whole anterior region of the fœtus look toward the posterior paries of the uterus. The left side of the fœtus is directed toward the right side of the mother, and *vice versa*. The head is covered by the fundus uteri.

PLATE L.

MECHANISM OF NATURAL LABOUR IN THE VARIOUS POSITIONS OF THE PELVIC EXTREMITY. FOURTH POSITION OF THE BREECH. (SACRO-SACRAL.)

(Half Size.)

Fourth position of the breech.—First period. In this position, the hips of the fœtus are parallel to the bis-iliac diameter of the pelvis. The right hip and right side of the fœtus correspond to the right side of the mother: and *vice versa*. The posterior part of the thighs and legs, and the whole anterior region of the fœtus look toward the anterior paries of the uterus. The sacrum and back of the fœtus correspond to the posterior part of the uterus. The head flexed and inclined forward is covered by the fundus uteri, which is in a state of anterior obliquity.



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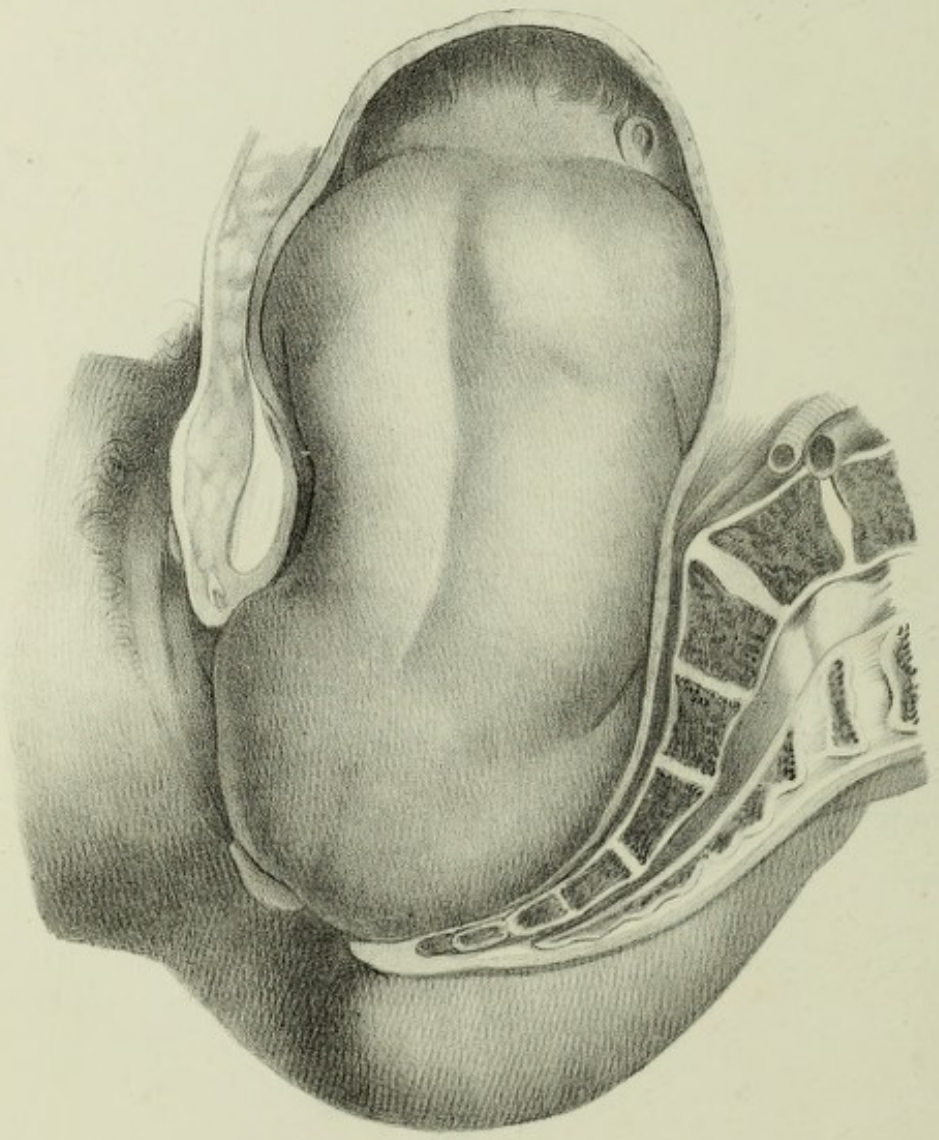

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PLATE LI.

MECHANISM OF NATURAL LABOUR, IN THE FIRST POSITION OF THE BREECH. (LEFT SACRO-ILIAC.)

(Half Size.)

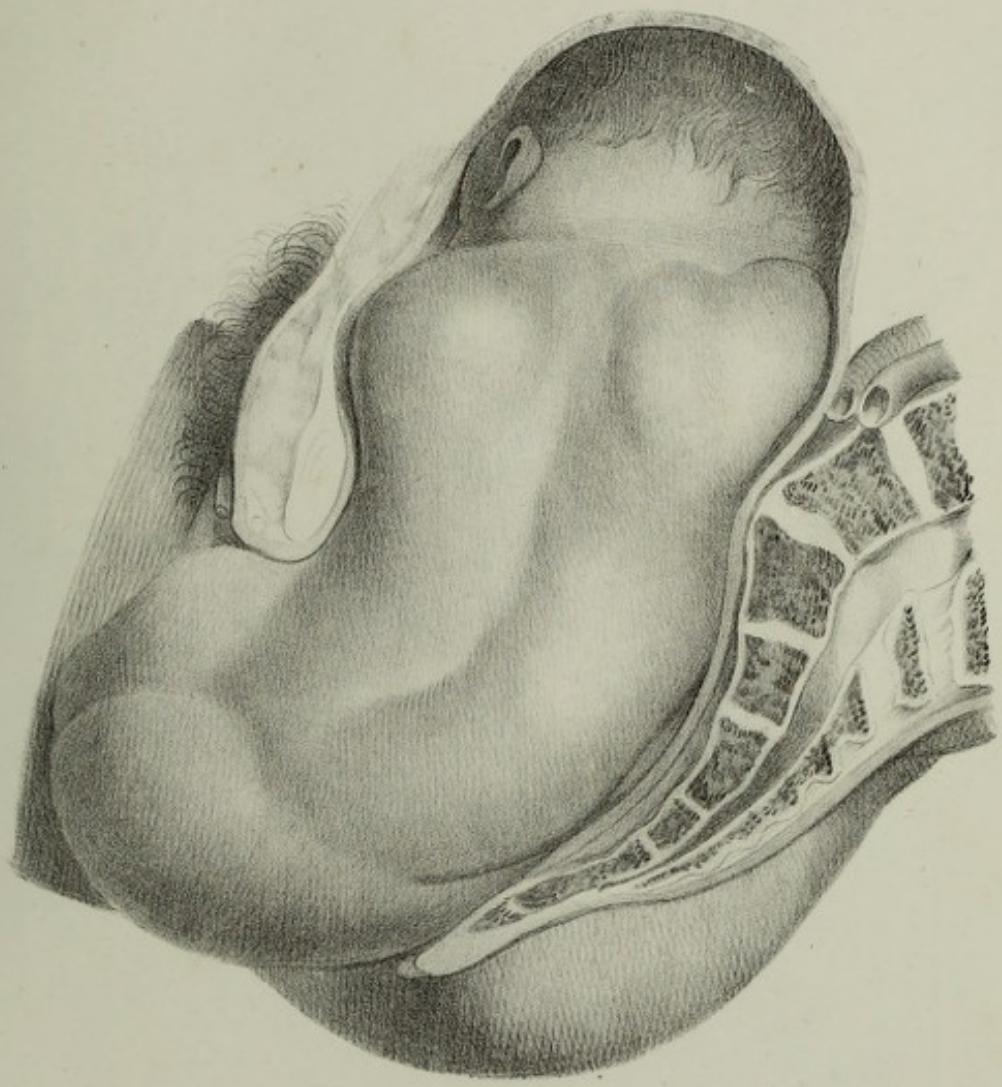
Second period. The breech, impelled by the contractions of the uterus, has passed through the superior strait and descended into the cavity of the pelvis. The left hip, having arrived below the symphysis pubis, engages in the inferior strait and appears at the vulva. The right hip, placed in the cavity of the sacrum, is yet upon the same horizontal line as the left hip. In order to assist the passage of the hips, the trunk of the fœtus will undergo an inflection, of which the cavity corresponding to the pubes of the mother will correspond to the left side, and the convexity to the right. The general relations of the fœtus have not changed, and are still those which we indicated in the first period of this first position of the breech. (Plate 47.)

PLATE LII.

MECHANISM OF NATURAL LABOUR IN THE FIRST POSITION OF THE BREECH. (LEFT SACRO-ILIAC.)

(Half Size.)

Third period. The breech has passed through the inferior strait and escaped from the vulva. The left hip of the fœtus appeared first at the vulva, beneath the arch of the pubes, whilst the right hip, in order to reach the exterior, must have traversed the inclined plane formed by the curves of the sacrum, coccyx, and perineum. The trunk has undergone a very decided motion of inflexion on the left side.



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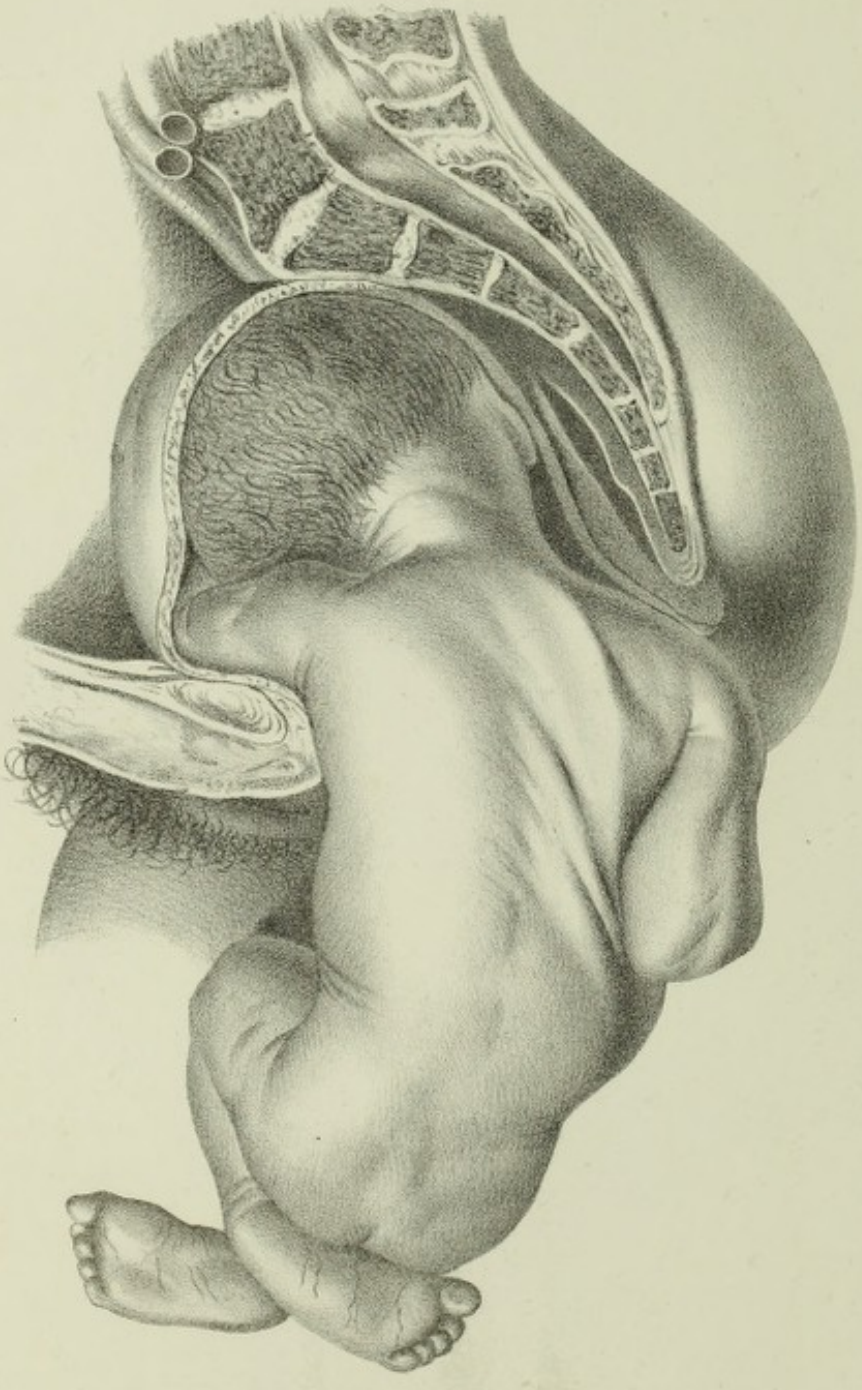

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PLATE LIII.

MECHANISM OF NATURAL LABOUR IN THE FIRST POSITION OF THE BREECH. (LEFT SACRO-ILIAC.)

(Half Size.)

Fourth period. The motion of lateral inflexion has continued during the whole time of the disengagement of the trunk. The shoulders, having reached the superior strait, have engaged in the direction of one of the oblique diameters. The right shoulder is in front of the left sacro-iliac symphysis, and the left shoulder behind the right acetabulum. The right shoulder, after having traversed the whole posterior paries of the pelvis, disengages, in front of the perineum, whilst the left shoulder remains above and behind the right acetabulum. The head begins to descend into the pelvic excavation, and, at the moment of the disengagement of the left shoulder, will undergo a motion of rotation, which will bring the occiput behind the pubes, and the face in the cavity of the sacrum.

PLATE LIV.

MECHANISM OF NATURAL LABOUR IN THE FIRST POSITION OF THE BREECH. (LEFT SACRO-ILIAC.)

(Half Size.)

Fifth period. The trunk and shoulders of the fœtus are completely disengaged; the head alone remains in the pelvis; it has performed its motion of rotation. The face and vertex are disengaged in front of the perineum, and the occiput will escape last by rolling against and below the symphysis pubis.

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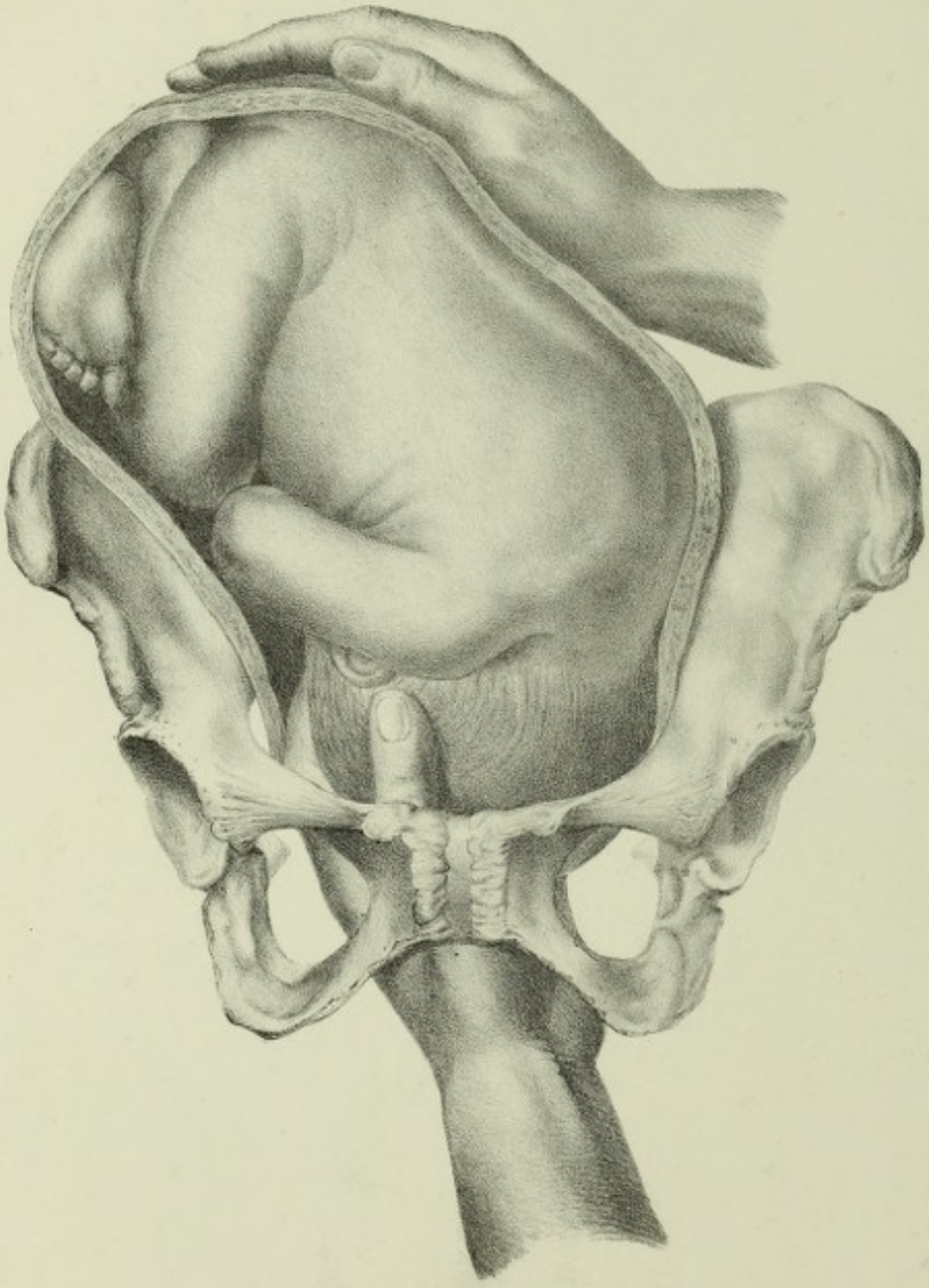

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PLATE LV.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Whenever version becomes necessary, after having placed the woman in a proper position, the uterus should be kept fixed by one hand applied to the abdomen of the woman and on the fundus of the organ.

First period. In this position, the left hand must be introduced on the right side of the pelvis, in a state between pronation and supination, and made to follow the direction of the right sacro-iliac symphysis, so that the palm of the hand may be applied to the vertex of the fœtal cranium, in order to raise up the head, remove it from the superior strait, and carry it as far as possible toward the left iliac fossa.

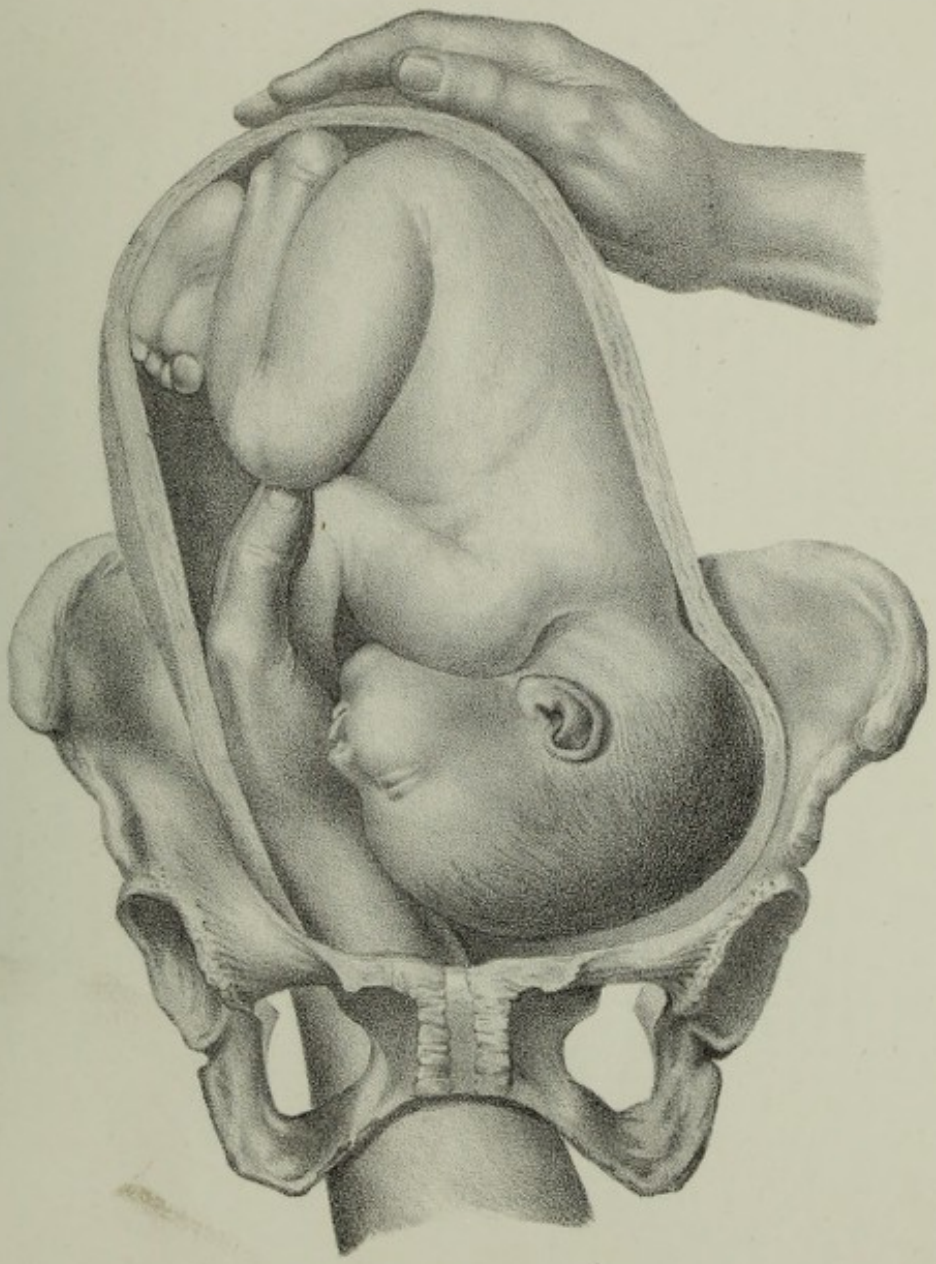
PLATE LVI.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Second period. After having raised the head, the hand must be introduced between the left side of the cranium and the posterior part of the uterus, and made to follow the whole of the left side of the fœtus, taking care to distinguish successively each of the parts constituting it, until the hand reaches the feet.

During the whole of this period, the right hand, which is external, should incline the fundus uteri to the right, and bring the feet as near as possible toward the hand which is to grasp them.



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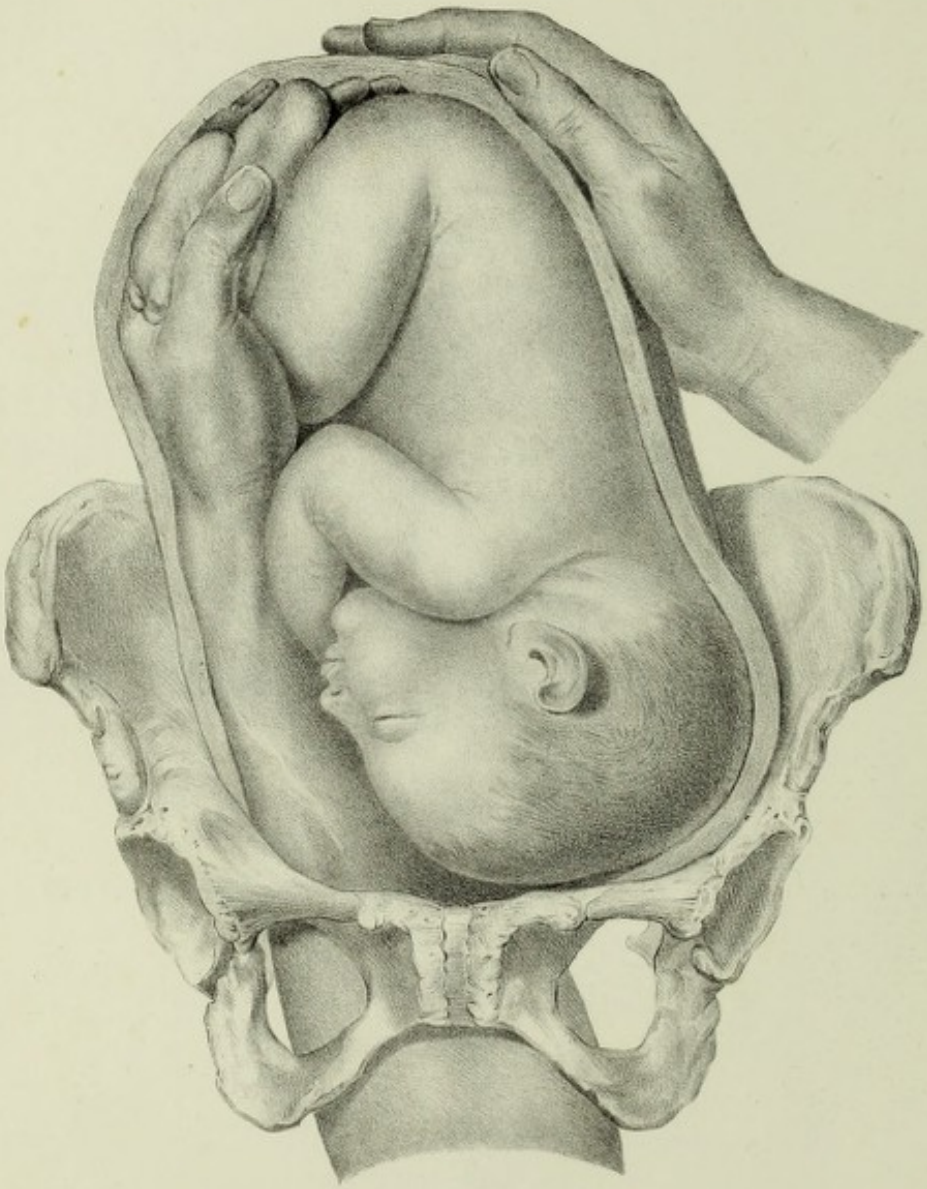

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PLATE LVII.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

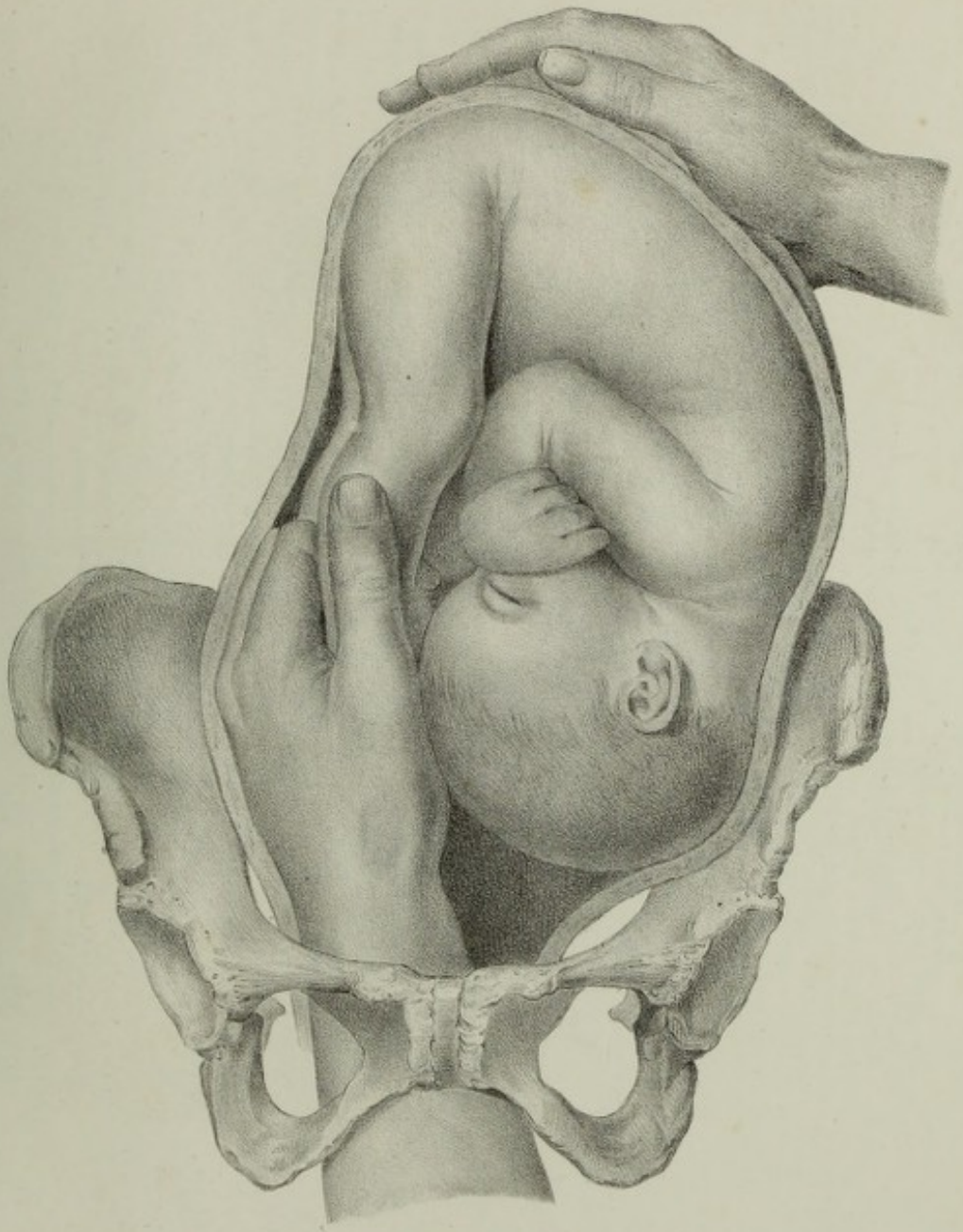
Third period. In this position, the left hand seizes the two feet, and extends the legs upon the thighs in order to commence the motion of version.

PLATE LVIII.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Fourth period. The two legs are extended, the feet grasped so that the thumb rests above the external right malleolus, the middle finger on the external left malleolus, and the index between the legs, above the internal malleoli. The operator takes advantage of the interval between the contractions of the uterus to draw on the feet and execute the motion of version.



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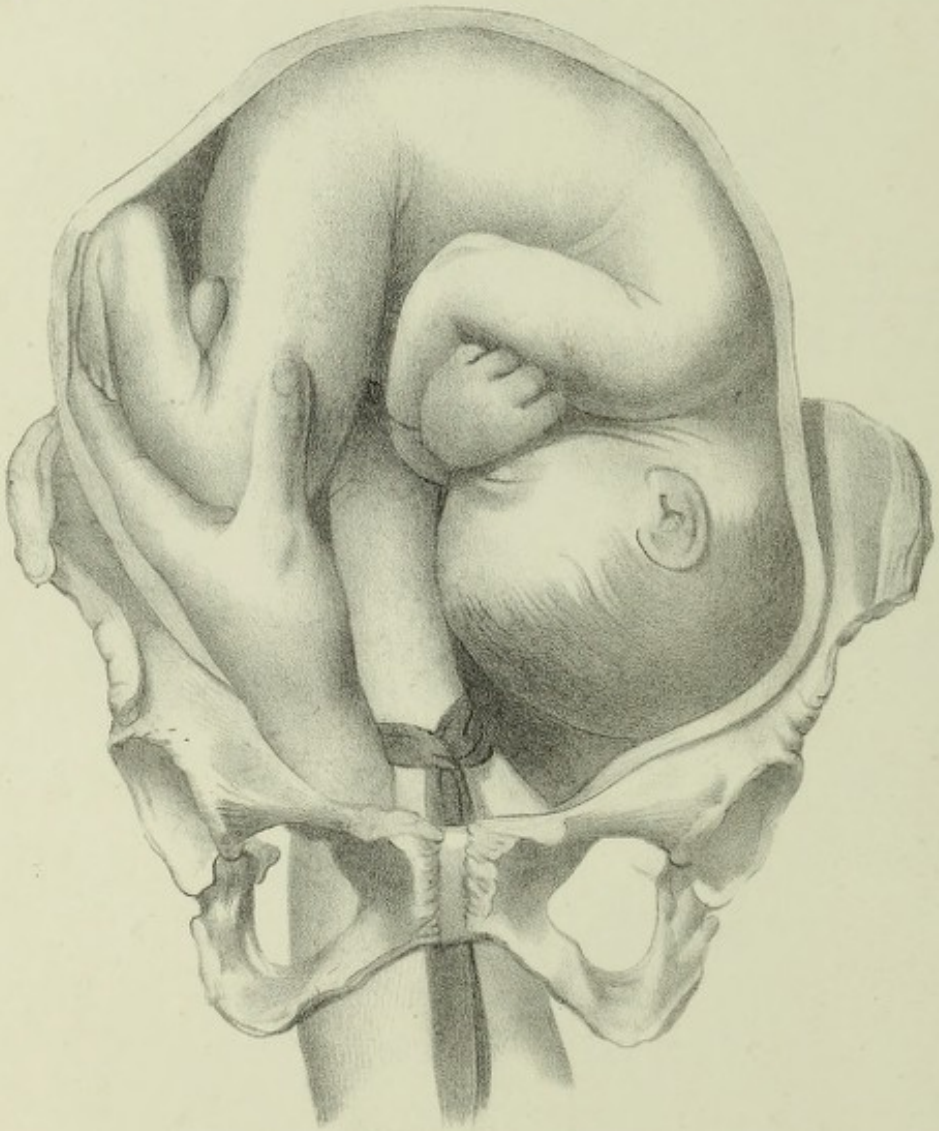

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PLATE LIX.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

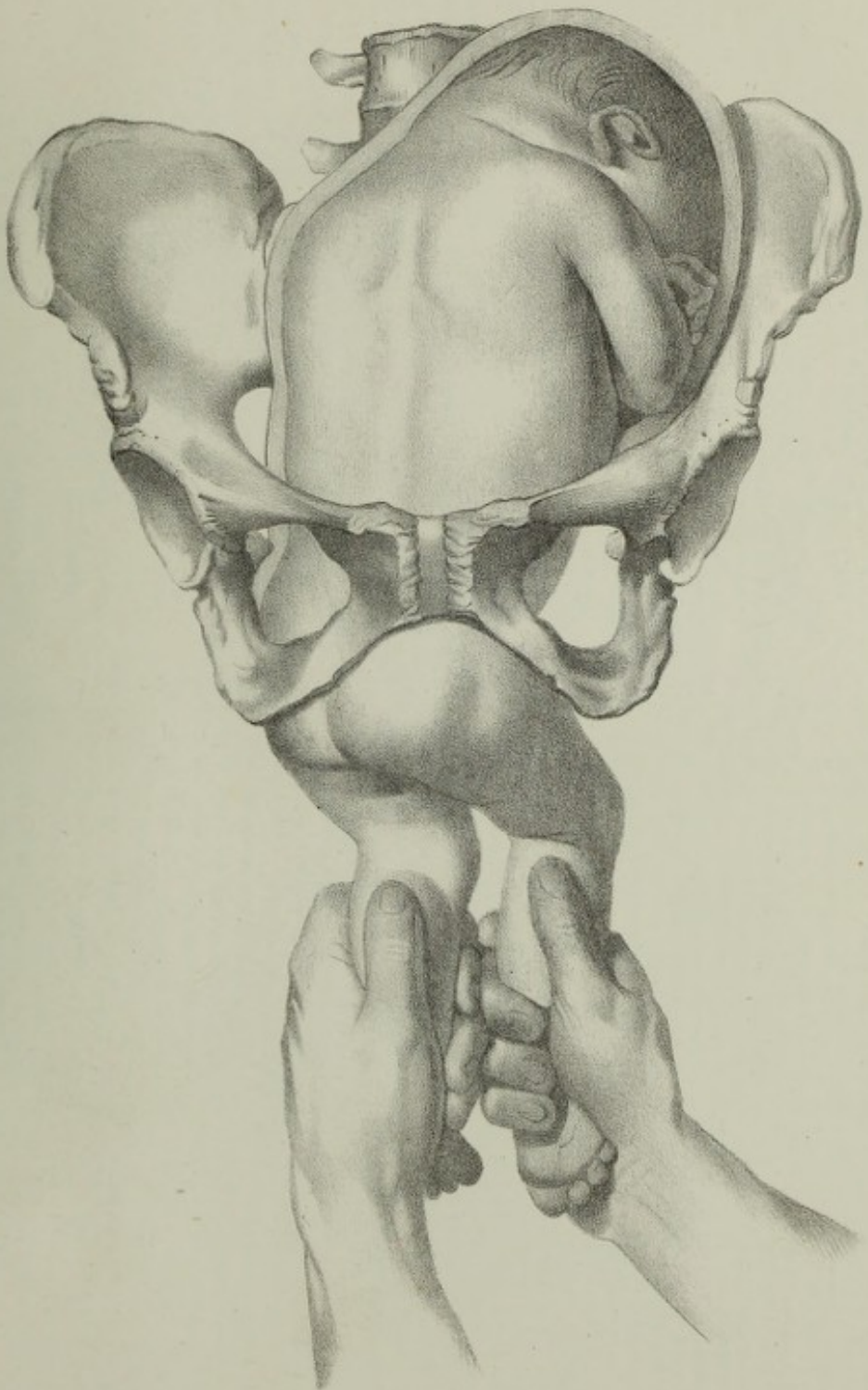
Third period, (*bis.*) When in the third period, the hand has been able to grasp and bring to the orifice of the uterus only one foot, in order to bring down the other, the first must be secured by the fillet, and the left hand again introduced along the internal part of the disengaged limb.

PLATE LX.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Fifth period. The feet and legs have escaped from the vulva; the right hand has grasped the right leg, given it a motion from before backward, and from right to left, and brought the right hip of the fœtus behind the anterior left inclined plane of the pelvis, whilst the left hand, which has grasped the left leg, has given to this limb an opposite motion; that is, it has directed it from behind forward, and from left to right, in order to place the left hip in front of the right sacro-iliac symphysis; and, in this position, to assist the disengagement and passage of the hips through the pelvis.



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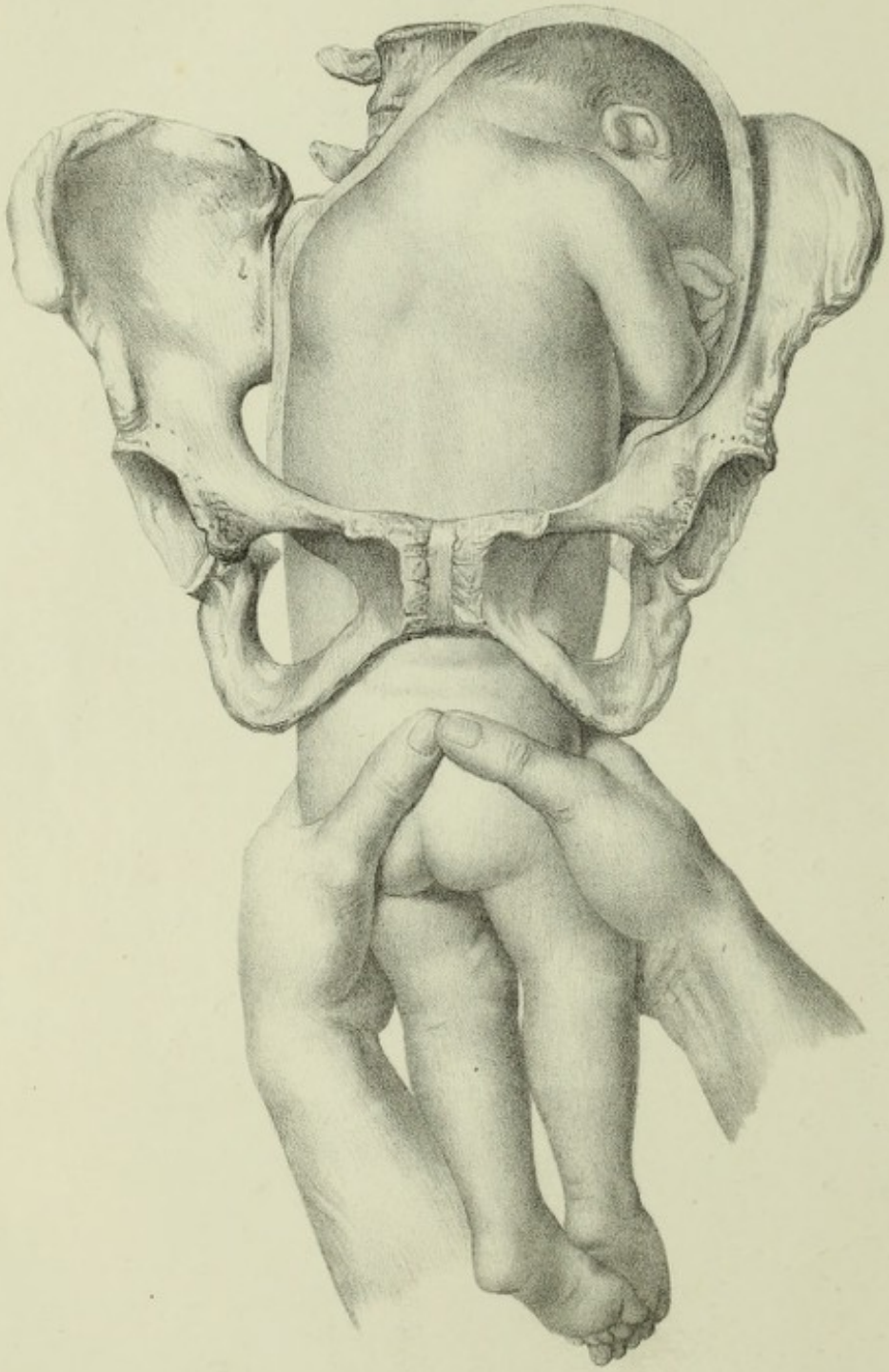

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PLATE LXI.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Sixth period. The hips have escaped from the vulva, the hands have grasped them; the thumbs are applied to the sacrum of the fœtus; the fingers are extended along the anterior part of the thighs, so that the radial edge of the index finger is parallel to the horizontal ramus of the pubes, and rests upon it, in order not to compress the abdominal viscera of the fœtus.

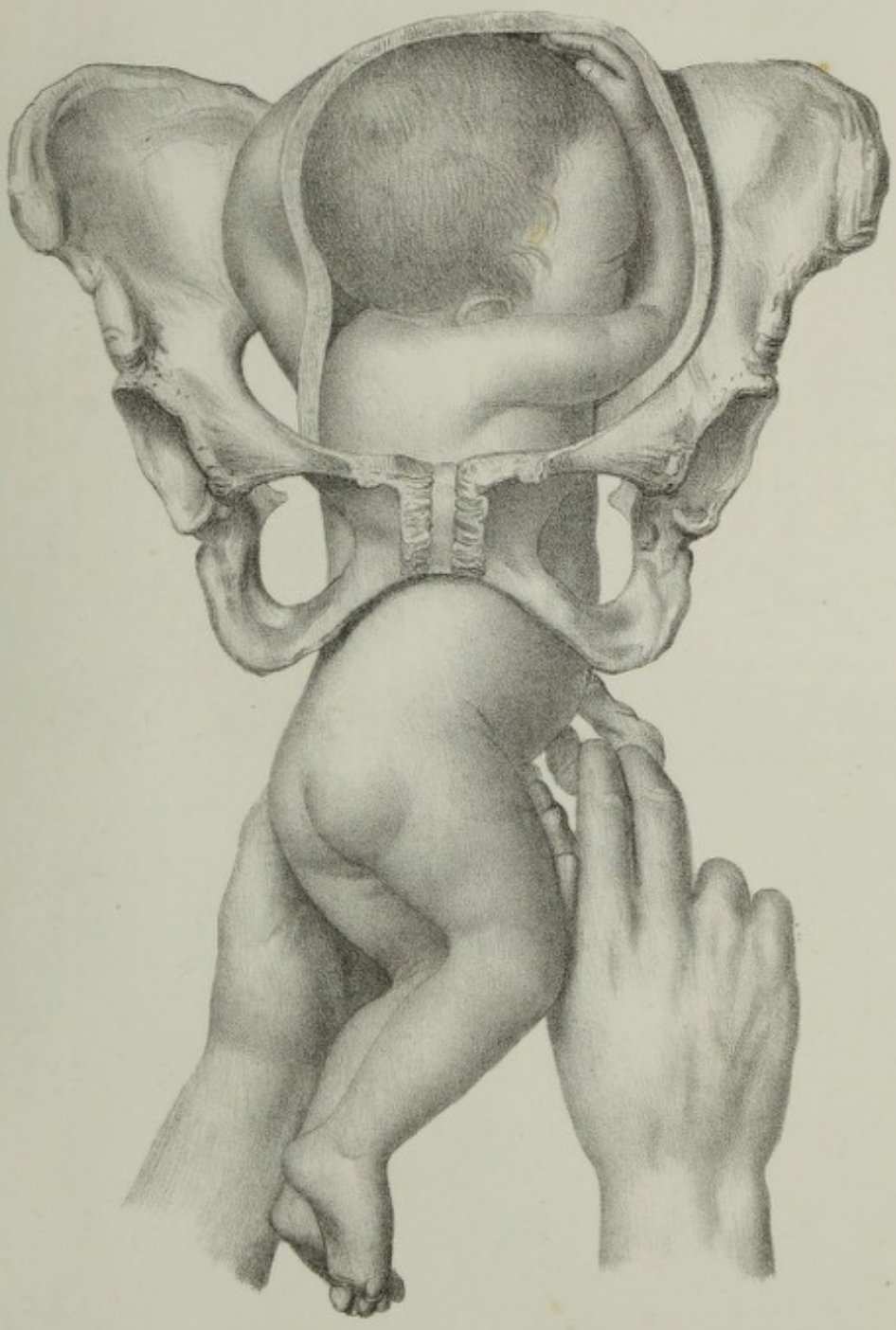
The hips being thus grasped, gentle tractions should be exerted on the trunk of the fœtus, by directing successively and alternately, by a motion of elevation and depression, the right hip of the fœtus toward the left groin of the mother, and the left hip toward the posterior part of the mother's right thigh.

PLATE LXII.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Seventh period. The umbilicus of the fœtus has passed through the vulva. The left hand, resting on the left side of the fœtus, supports and elevates the trunk; the index and middle finger of the right hand seize the cord near its insertion at the umbilicus, draw it externally, and form a loop sufficiently large to prevent its being torn during the disengagement of the rest of the trunk.



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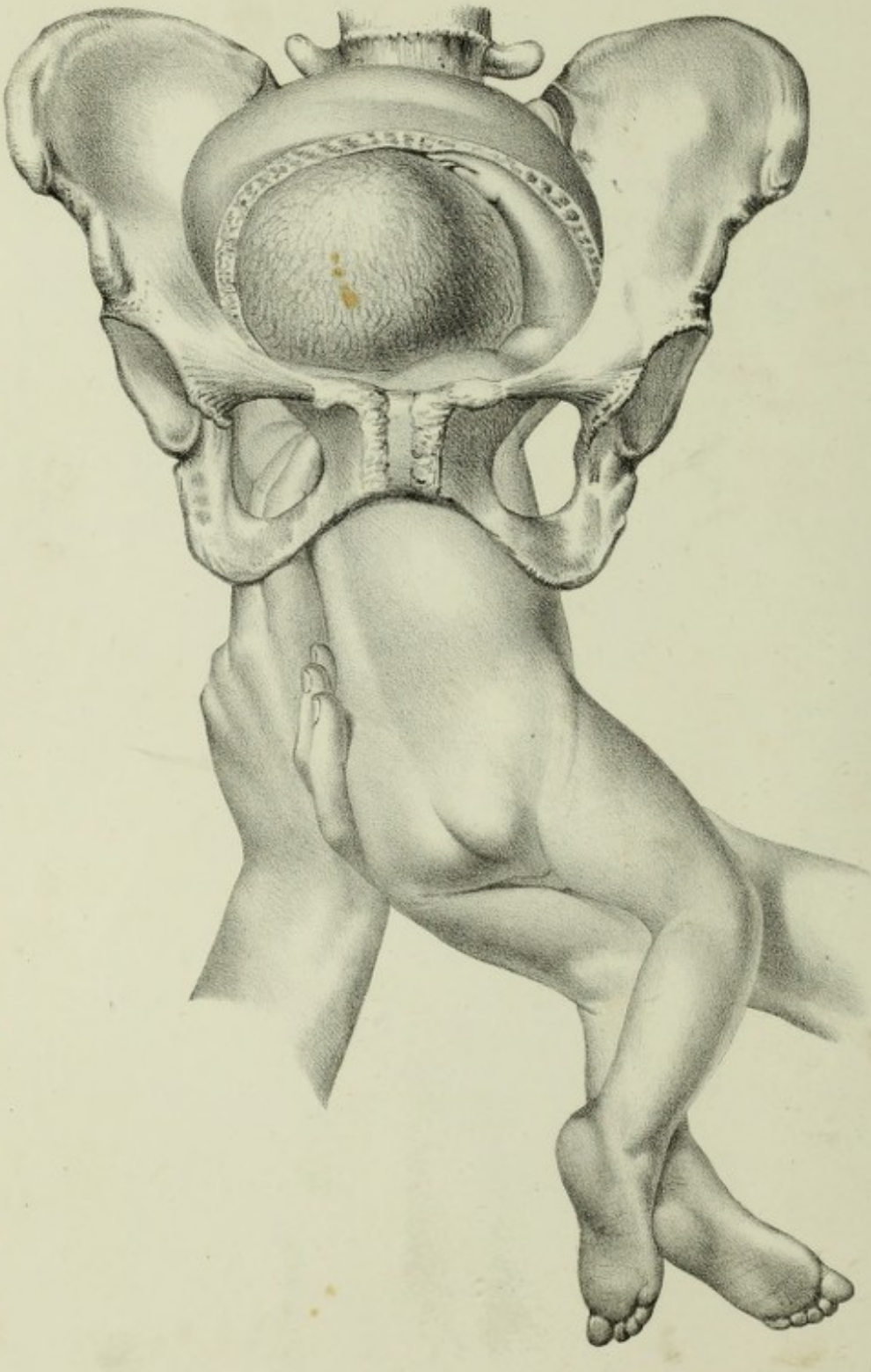

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PLATE LXIII.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

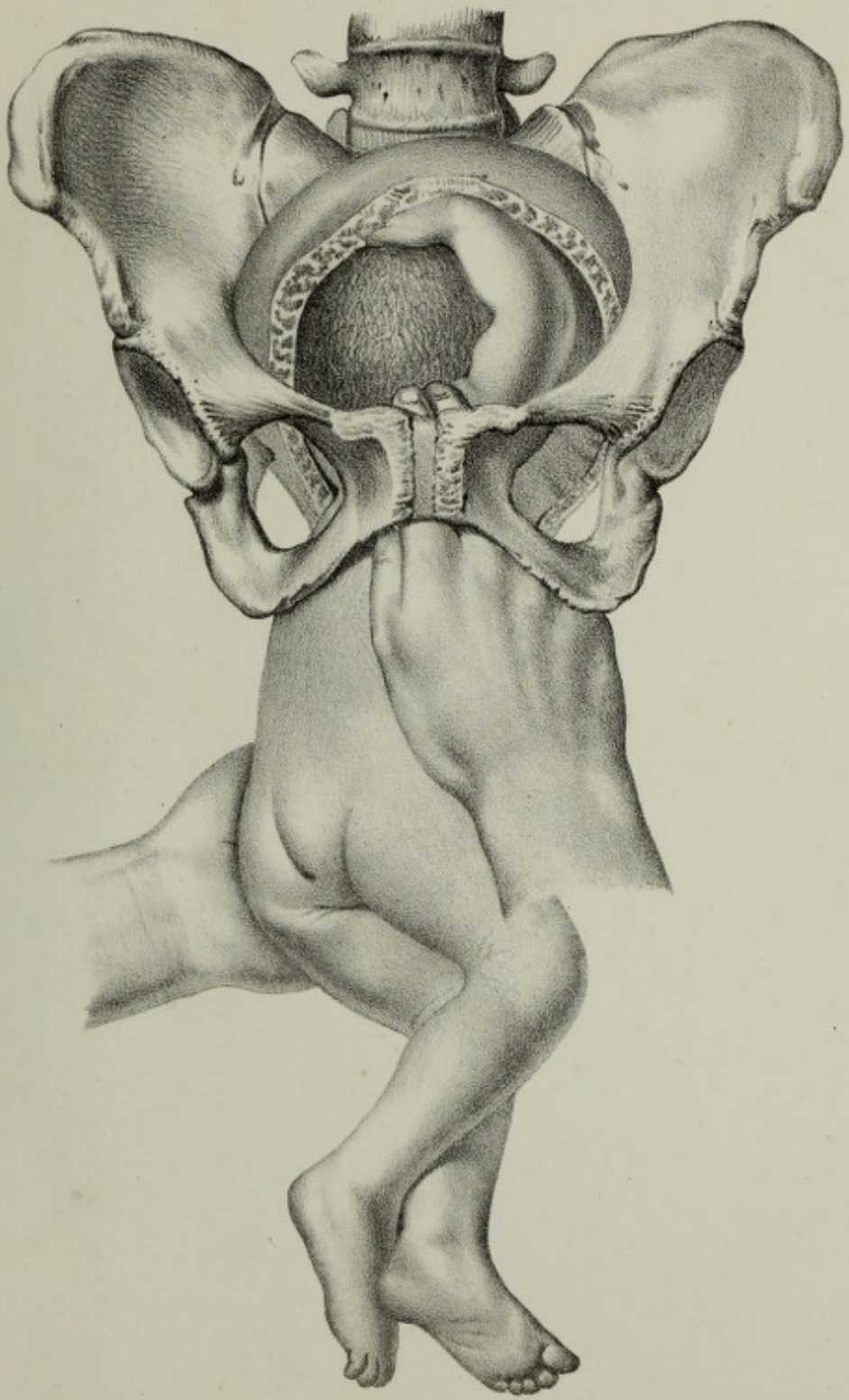
Eighth period. The trunk of the fœtus is entirely expelled from the pelvis, with the exception of the shoulders and arms, which are still retained in it. In order to disengage the latter, the right hand, applied to the left side of the fœtus, raises the trunk and carries it to the arch of the pubes, by inclining it, as much as possible, toward the belly and left side of the mother. The index and middle fingers of the left hand are placed along the posterior and left lateral part of the thorax of the fœtus, depress the shoulder and disengage the left arm, which is applied to the left side of the head.

PLATE LXIV.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Ninth period. The shoulder and left arm are disengaged; the latter is placed parallel to the left side of the fœtus; the trunk has been depressed and carried downward and backward toward the right thigh of the mother; it is kept in this position by the left hand. The index and middle fingers of the right hand are introduced behind the horizontal ramus of the left pubes; and, curved in the shape of a hook, they successively depress and disengage the shoulder and right arm.



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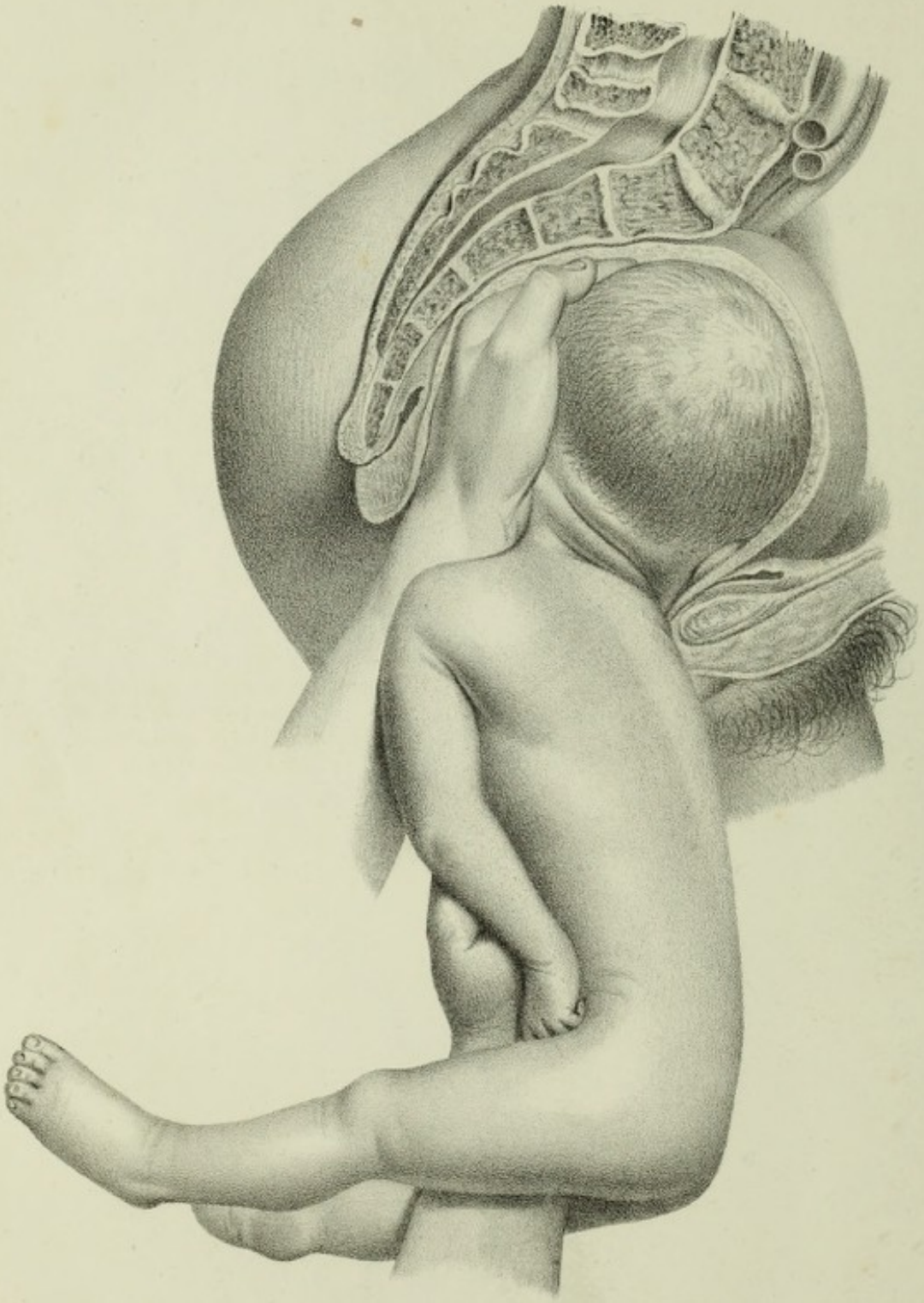

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PLATE LXV.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Tenth period. The arms being disengaged, the right hand and forearm of the operator passed between the legs of the fœtus, support the trunk and incline it toward the belly of the mother; whilst the left hand, introduced into the cavity of the pelvis, grasps the face of the child, which is directed toward the left side of the pelvis, in order to bring it in the cavity of the sacrum.

PLATE LXVI.

ARTIFICIAL LABOUR.—VERSION IN THE FIRST OBLIQUE POSITION OF THE VERTEX. (LEFT OCCIPITO-ILIAC.)

(Half Size.)

Eleventh period. In order to disengage the head, the anterior part of the thorax of the fœtus rests on the palmar surface of the left hand, and the index finger of the latter is placed in the mouth of the fœtus in order to maintain the head in a state of flexion. The index and ring fingers of the right hand, placed on the back of the fœtus, are flexed on the shoulders in the shape of hooks, whilst the extended middle finger rests on the inferior part of the occiput, in order to prevent the too early departure of the chin from the breast; then the trunk of the child will be brought from below upward, from behind forward, and strongly inserted on the belly of the mother; whilst the face, forehead, and all the parts constituting the vertex will traverse successively the curve formed by the sacrum, coccyx, and perineum, and escape from the vulva.

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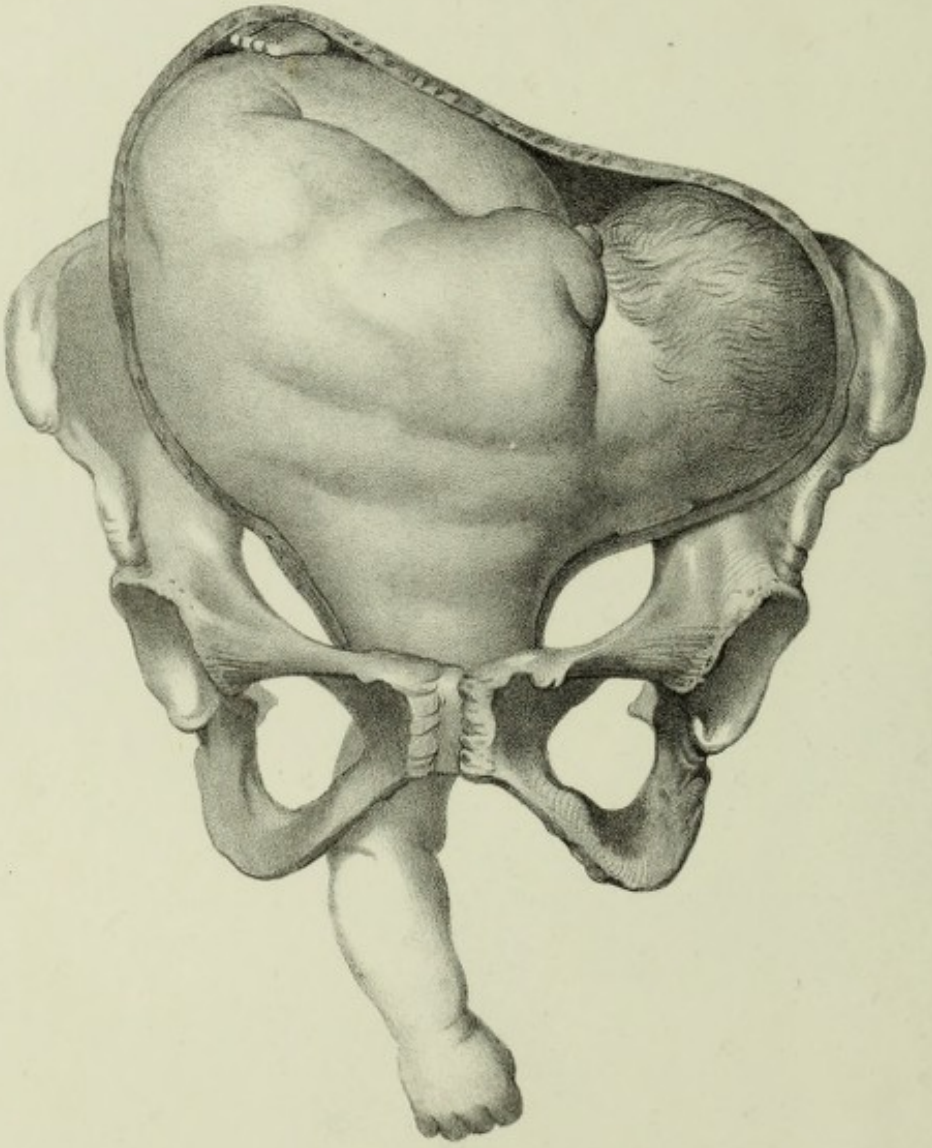

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PLATE LXVII.

ARTIFICIAL LABOUR.—PRESENTATIONS OF THE SHOULDERS AND ARMS.

(Half Size.)

First position of the right shoulder (left acromio-iliac) and of the right arm.

PLATE LXVIII.

ARTIFICIAL LABOUR.—PRESENTATIONS OF THE SHOULDERS AND ARMS.

(Half Size.)

Second position of the right shoulder (right acromio-iliac) and of the right arm.

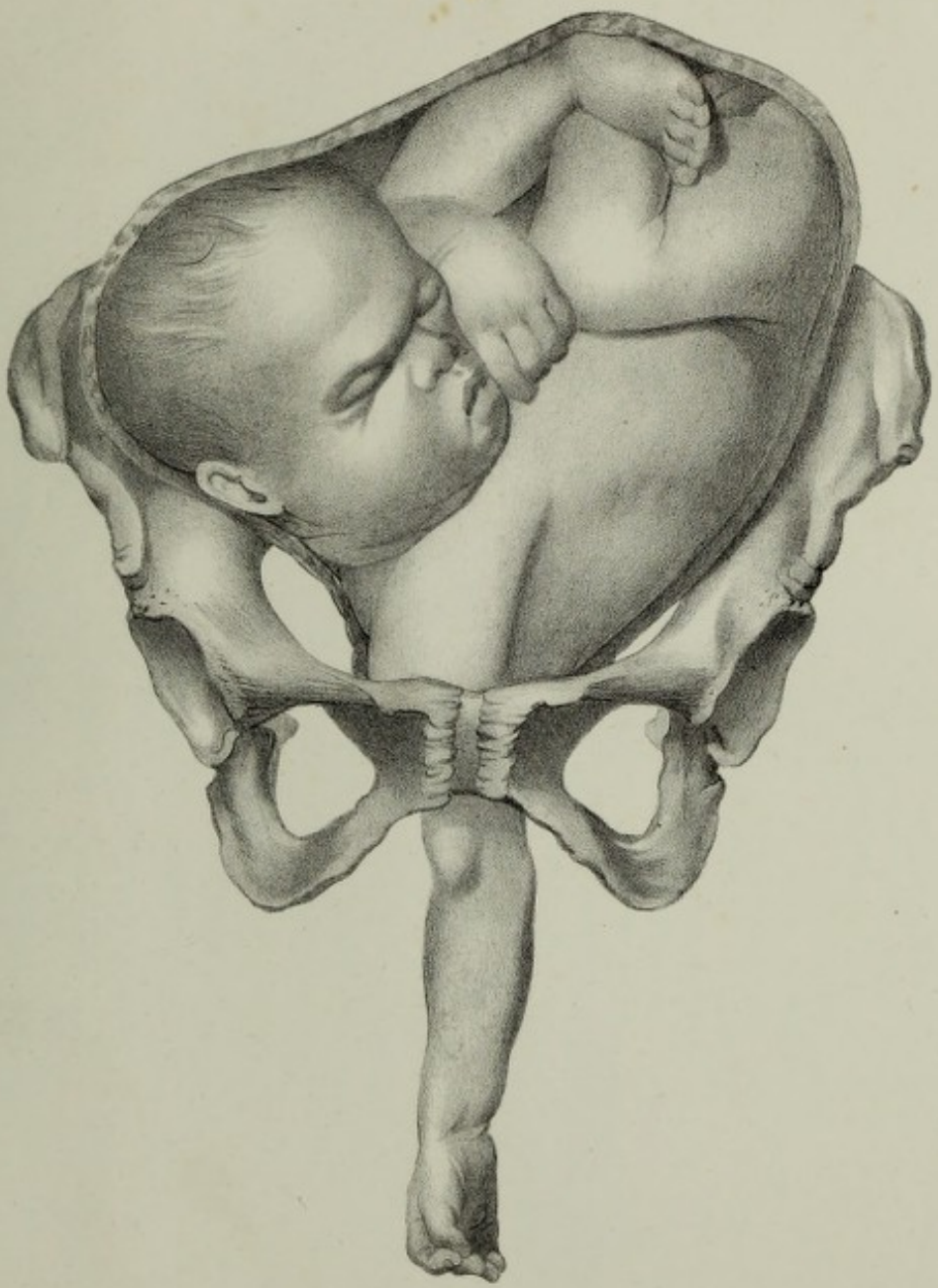

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PLATE LXIX.

ARTIFICIAL LABOUR.—PRESENTATIONS OF THE SHOULDERS AND ARMS.

(Half Size.)

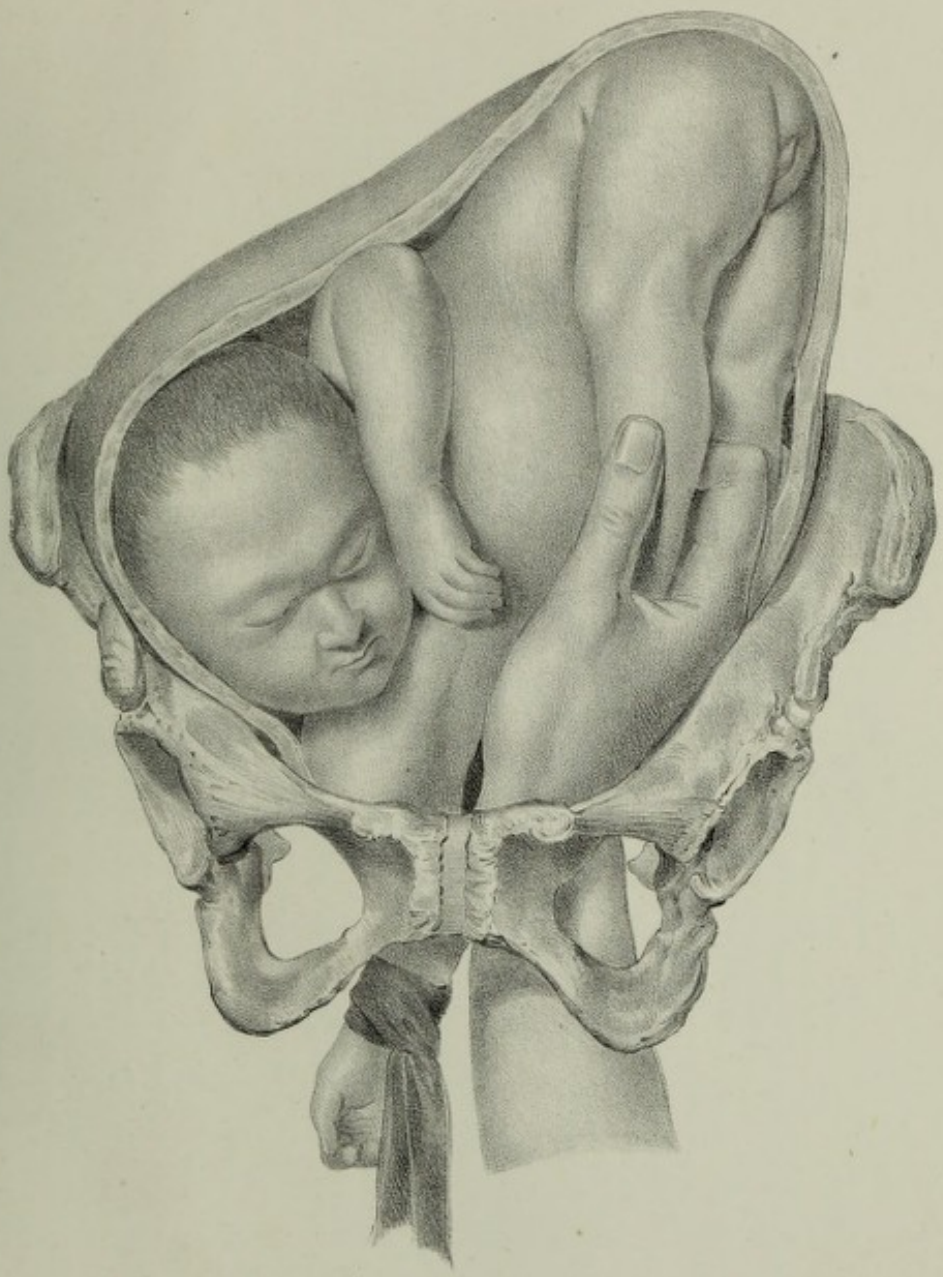
First position of the right shoulder and right arm.—First period. A fillet is fastened to the arm in order that it may be brought on the side of the trunk, when the feet are disengaged and the version accomplished. The right hand, introduced on the left side of the pelvis, grasps the right side of the thorax of the fœtus, raises and removes it from the superior strait, in order to be able to pass between the internal surface of the uterus and the right side of the fœtus, in order to reach successively the breech and feet, whilst the left hand, applied externally, prevents the ascent of the uterus, and tends to depress and bring near to the right hand the feet which are to be grasped by the latter.

PLATE LXX.

ARTIFICIAL LABOUR.—PRESENTATIONS OF THE SHOULDERS AND ARMS.

(Half Size.)

Second position of the right shoulder and arm.—Third period. The right hand has grasped the feet of the fœtus and is about to bring them to the vulva, whilst the left hand, placed externally, depresses the breech of the fœtus in order to assist the incipient motion of version. At the same time, the forearm and hand of the fœtus, which had escaped from the vulva, ascend slightly, and have a tendency to re-enter the mother's organs.



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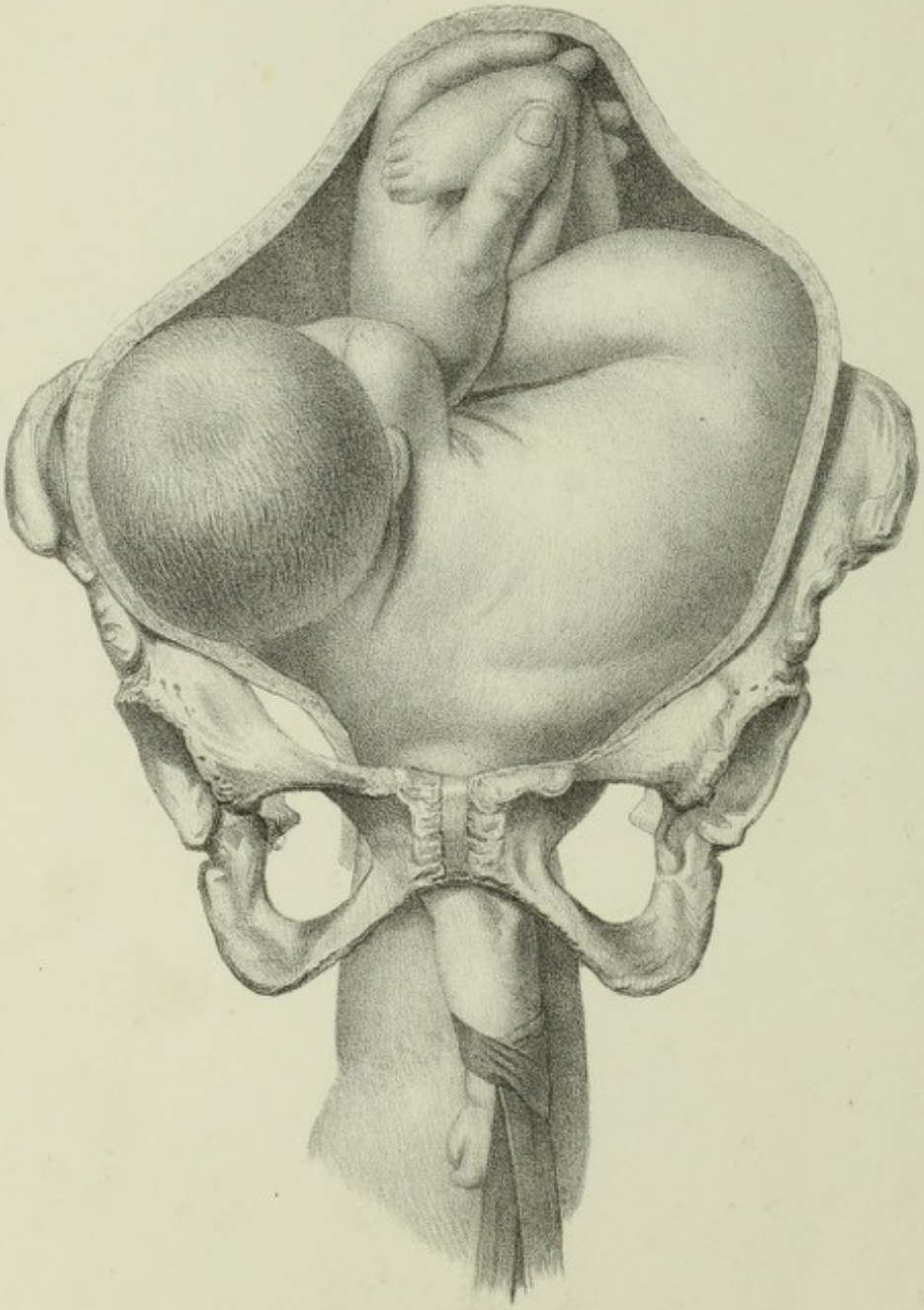

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PLATE LXXI.

ARTIFICIAL LABOUR.—PRESENTATIONS OF THE SHOULDERS AND ARMS.

(Half Size.)

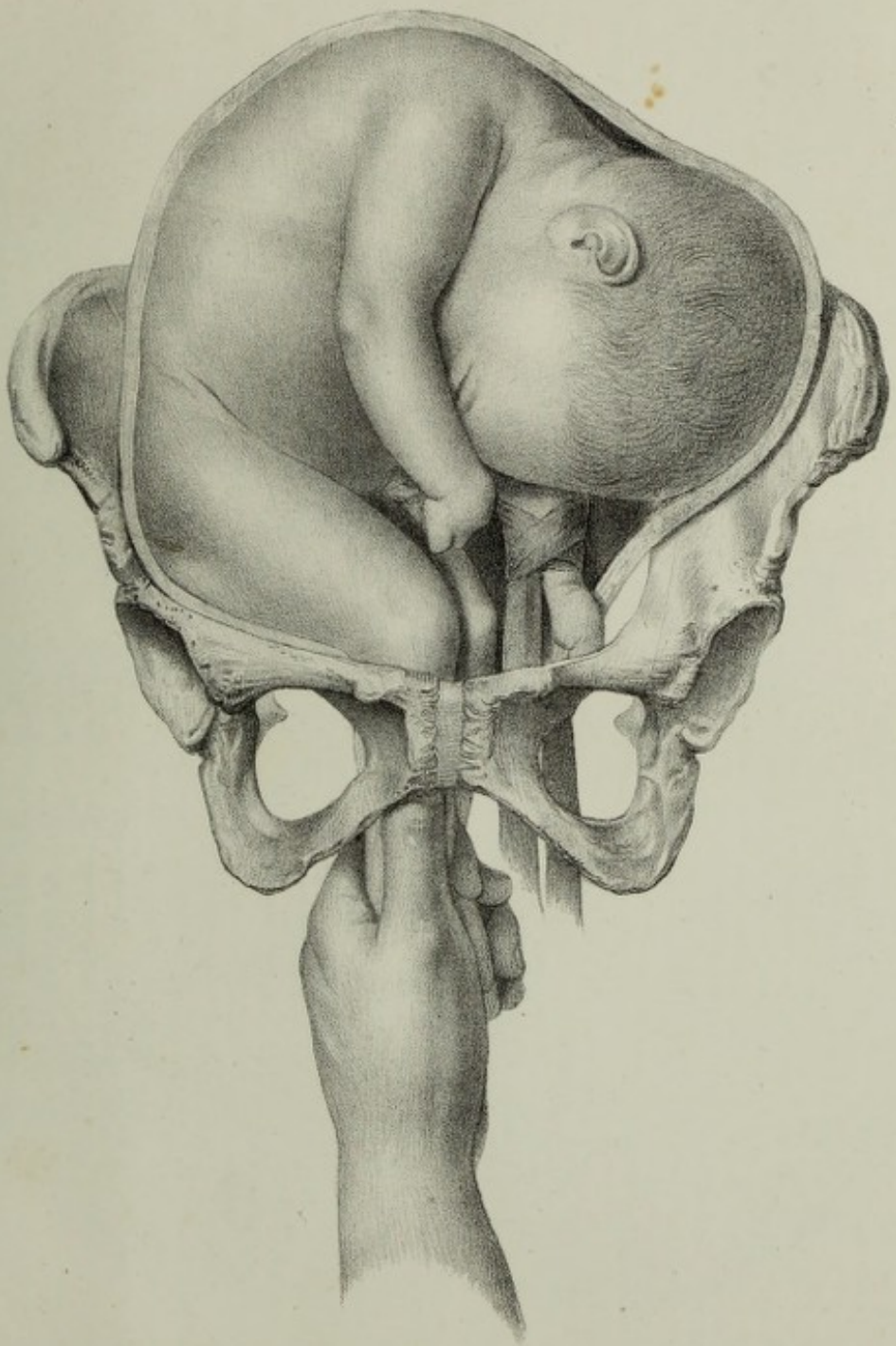
Second position of the left shoulder and arm.—Second period. The left hand, after having traversed the whole of the left side of the fœtus, has reached the feet, which it is about to grasp, whilst the right hand, applied externally, depresses the fundus uteri, and pushes the breech of the fœtus from left to right, to assist the motion of version.

PLATE LXXII.

ARTIFICIAL LABOUR.—PRESENTATIONS OF THE SHOULDERS AND ARMS.

(Half Size.)

Second position of the left shoulder and arm.—Fourth period. The left hand has grasped the feet and brought them to the vulva; the motion of version is terminated; the right hand draws gently on the fillet in order to apply the left arm against the corresponding side of the fœtus.



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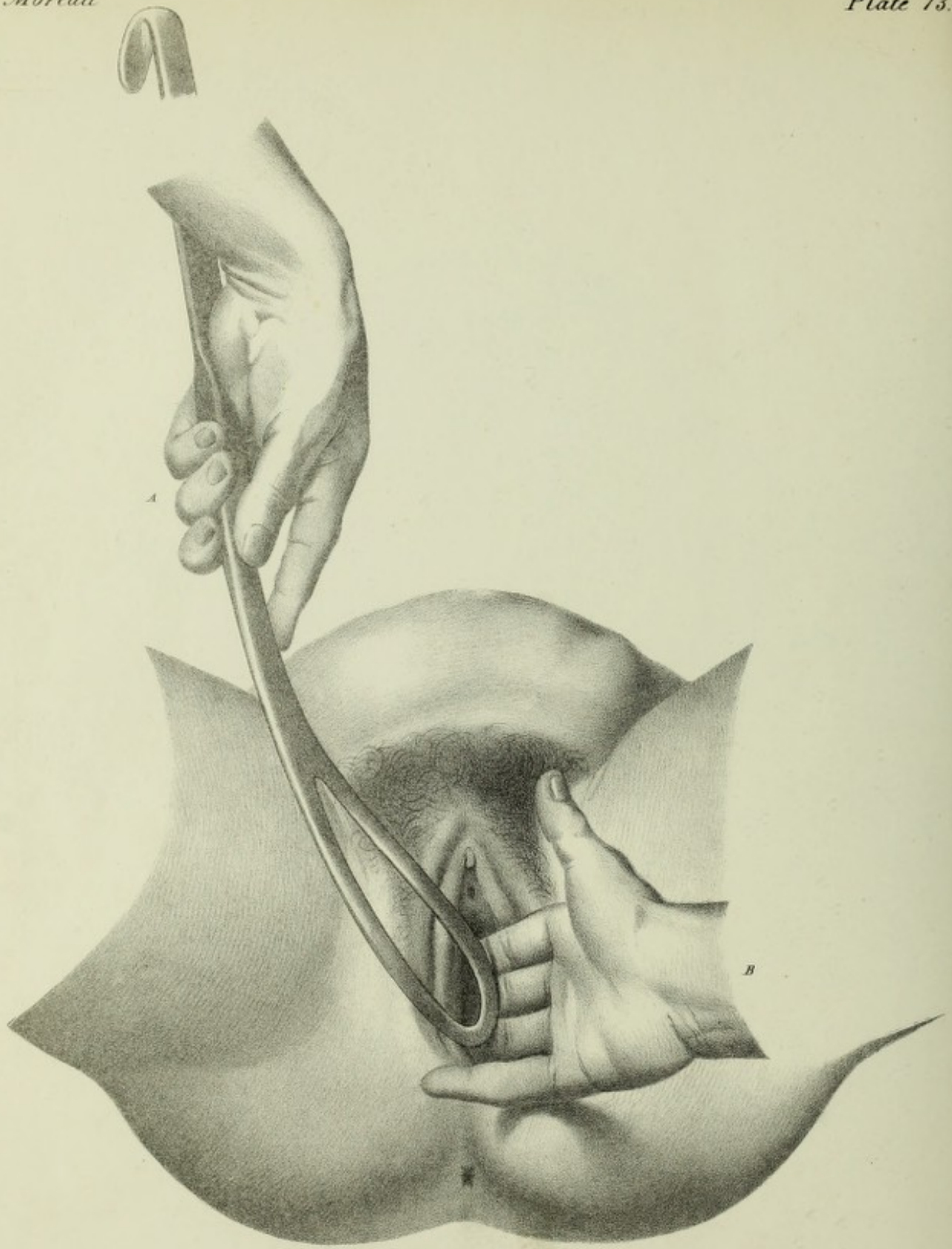

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PLATE LXXIII.

ARTIFICIAL LABOUR.—APPLICATION OF THE FORCEPS.

(Half Size.)

Application of the forceps in the particular cases in which the head has escaped through the os uteri, descended into the cavity of the pelvis, and the occiput is behind the symphysis pubis and the forehead, in the cavity of the sacrum, or reciprocally.

A, The left hand having seized the male blade of the forceps, presents the extremity of the claw to the vulva, and is about to introduce it into the sexual organs.

B, Three fingers of the right hand placed between the left side of the vulva and the head of the fœtus, in order to serve as a guide for the male blade.

PLATE LXXIV.

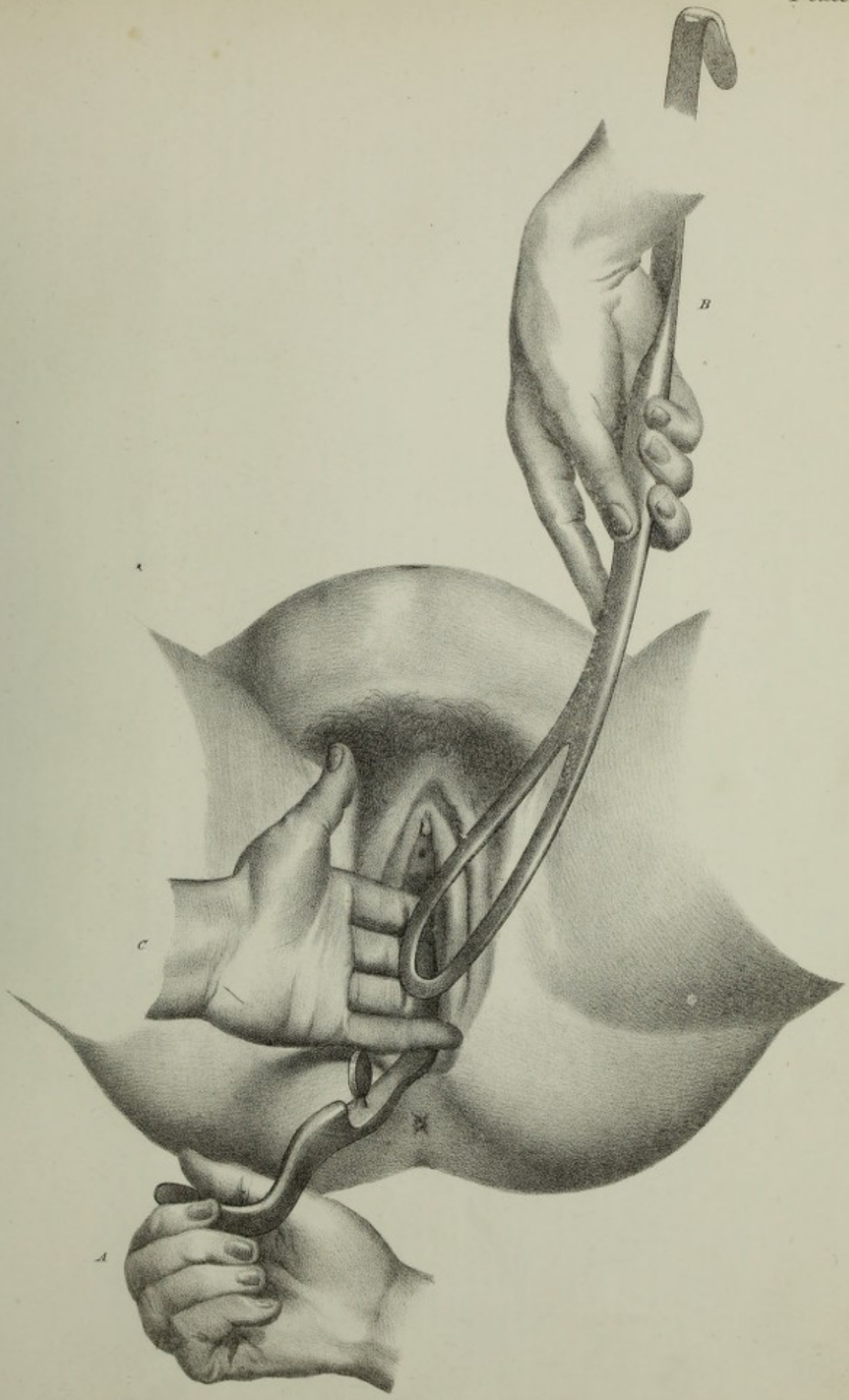
ARTIFICIAL LABOUR.—APPLICATION OF THE FORCEPS.

(Half Size.)

A, The male blade introduced and supported by an assistant.

B, The female blade, grasped by the operator's right hand, is to be introduced on the right side of the pelvis, above the male blade, already applied.

C, Three fingers of the left hand, placed between the right side of the vulva and the head of the fœtus, in order to serve as a guide for the female blade.



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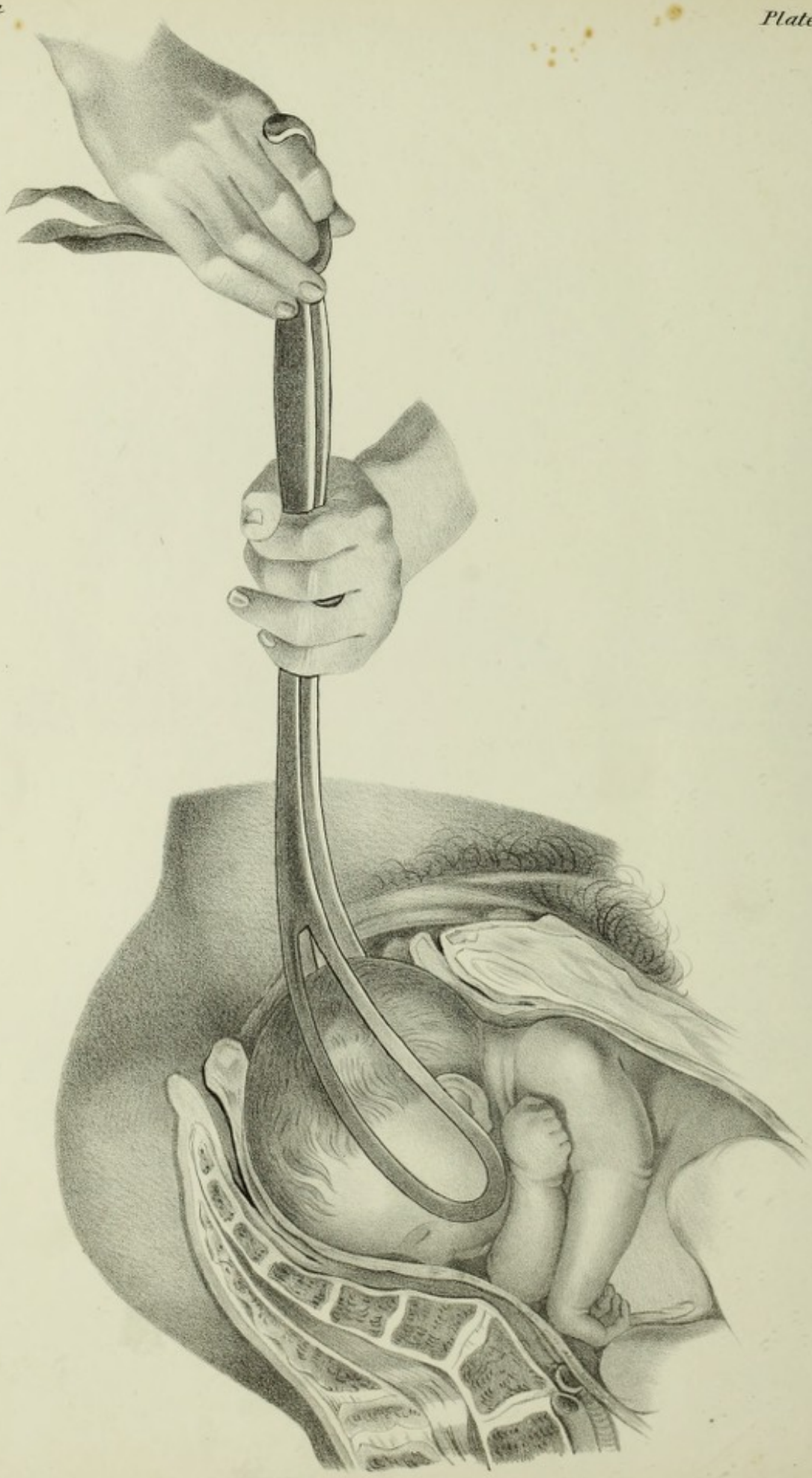

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PLATE LXXV.

ARTIFICIAL LABOUR.—APPLICATION OF THE FORCEPS.

(Half Size.)

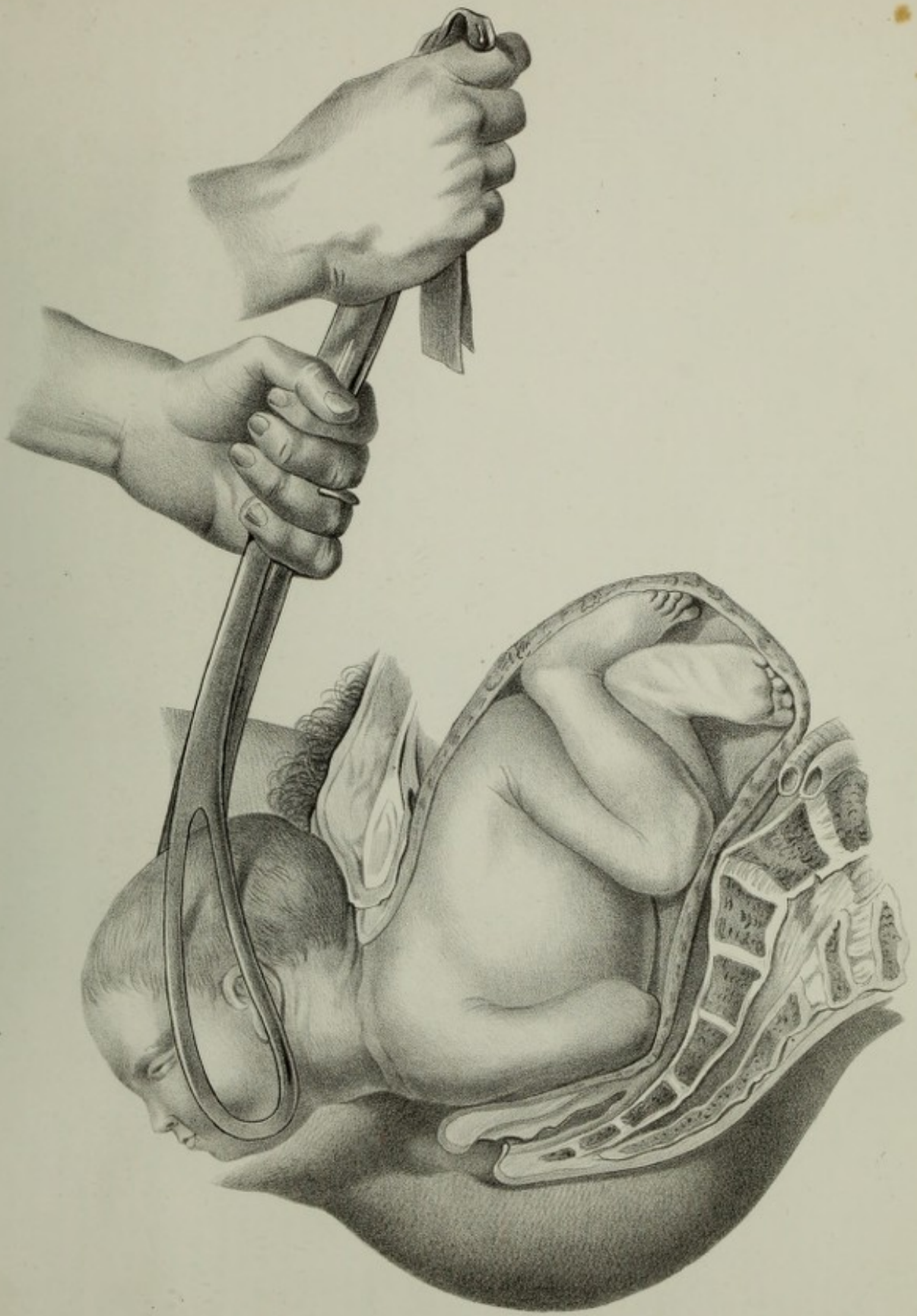
Fig. 1, The forceps are applied; the two blades locked, the head properly grasped, and the degree of pressure regulated by a fillet. The hands have seized the instrument; the left at the junction of the blades, the right at the extremity of the handles and below the hooks, will perform the motions of traction and vascillation, in order to bring the occiput below the symphysis pubis and outside of the vulva.

PLATE LXXVI.

ARTIFICIAL LABOUR.—APPLICATION OF THE FORCEPS.

(Half Size.)

As soon as the occiput has passed beyond the arch of the pubes, the hands, by continuing the motions of traction and vascillation, have slowly elevated the handles of the forceps, so as to bring them toward the mother's belly. During this period, the head has executed a motion of extension, which has caused the occiput to ascend in front of the symphysis pubis, whilst the forehead and face have slipped and been disengaged in front of the posterior commissure of the vulva.



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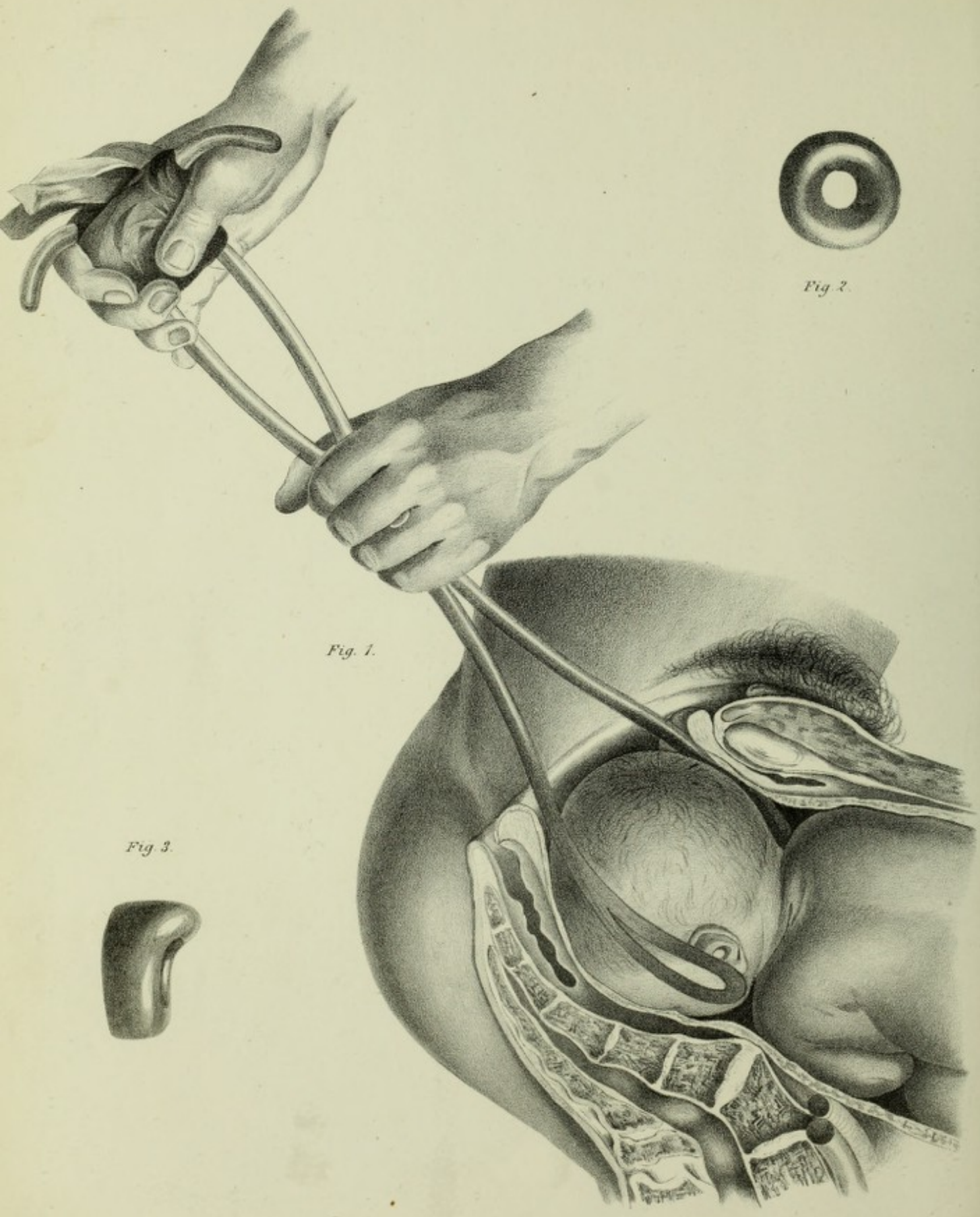

Fig. 1.

Fig. 2.

Fig. 3.

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PLATE LXXVII.

ARTIFICIAL LABOUR.—APPLICATION OF THE FORCEPS.

(Half Size.)

Fig. 1, Application of the forceps in the left occipito-acetabular position. (The head preserving the oblique position.)

The male blade is placed to the left and rear in the direction of the left sacro-iliac symphysis, and rests on the left side of the head of the fœtus. The female branch is placed obliquely in front and to the right of the pelvis on the right side of the head of the fœtus. The blades being locked, the pivot is then in the direction of the fold of the left groin of the woman. The hands, having grasped the instrument, carry the handles of the forceps obliquely from below upward, from the left forward, so as to bring the occiput behind and below the symphysis pubis.

Fig. 2, Circular pessary, called pessary *en gimblette*.

Fig. 3, Pessary with a projecting edge, devised by M. Moreau, and first used in certain cases of anteversion and retroversion of the uterus.

PLATE LXXVIII.

ARTIFICIAL LABOUR.—APPLICATION OF THE FORCEPS.

(Half Size.)

Fig. 1, Application of the forceps above the superior strait.

The head of the fœtus, having the occiput above the symphysis pubis, and the forehead above and in front of the promontory of the sacrum, is grasped by the forceps. The blades are locked, and the degree of pressure determined. The right hand has seized the ends of the handles above the hooks; the index finger of the left hand, below and within the point of junction, is placed in the interval between the claws, and extended so as to touch the vertex of the fœtal head, in order to judge if it obeys the various motions which will be given to it.

Fig. 2, Circular pessary.

Fig. 3, Oval-shaped pessary.

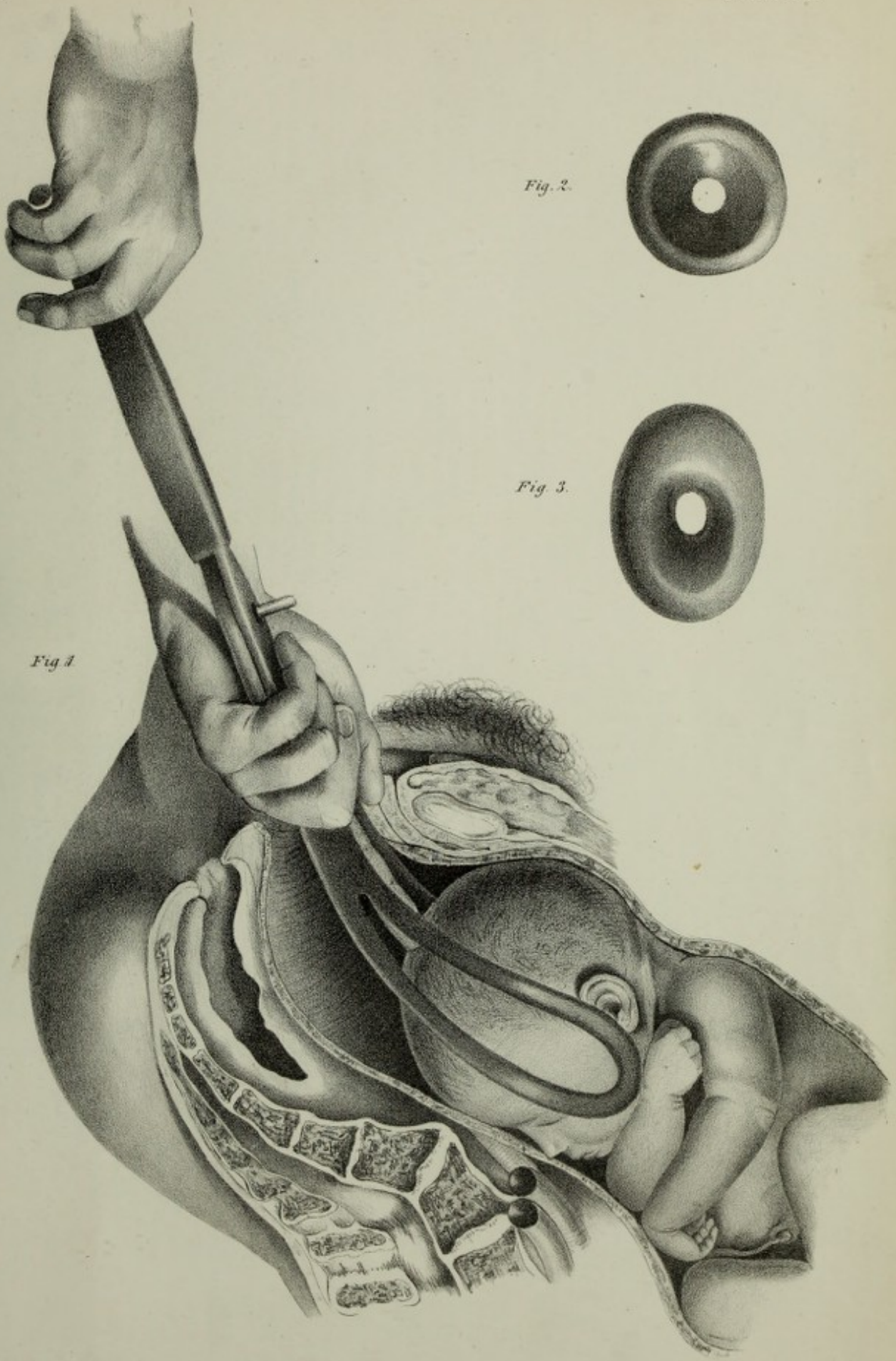

Fig. 2.

Fig. 3.

Fig 4

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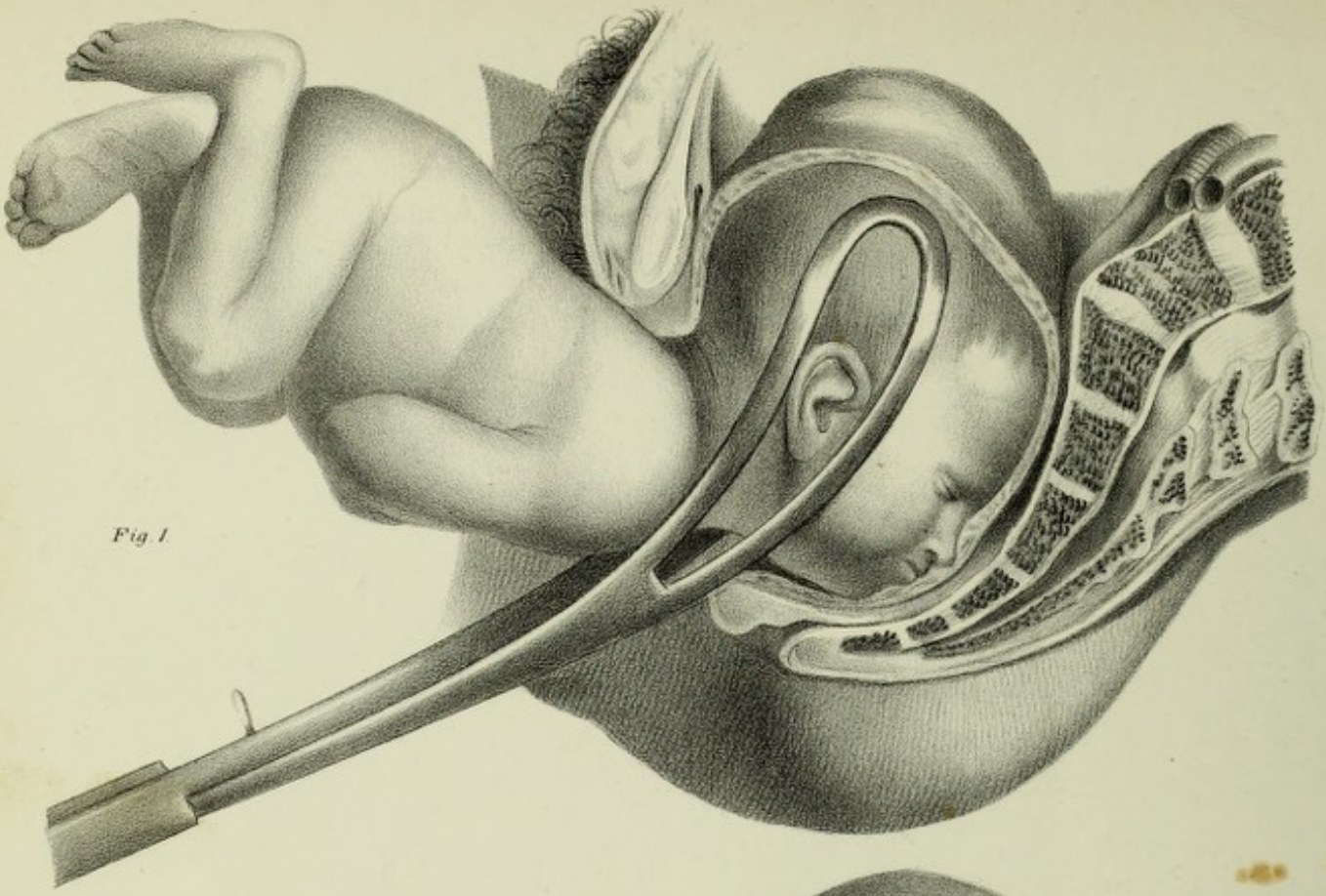

Fig 1

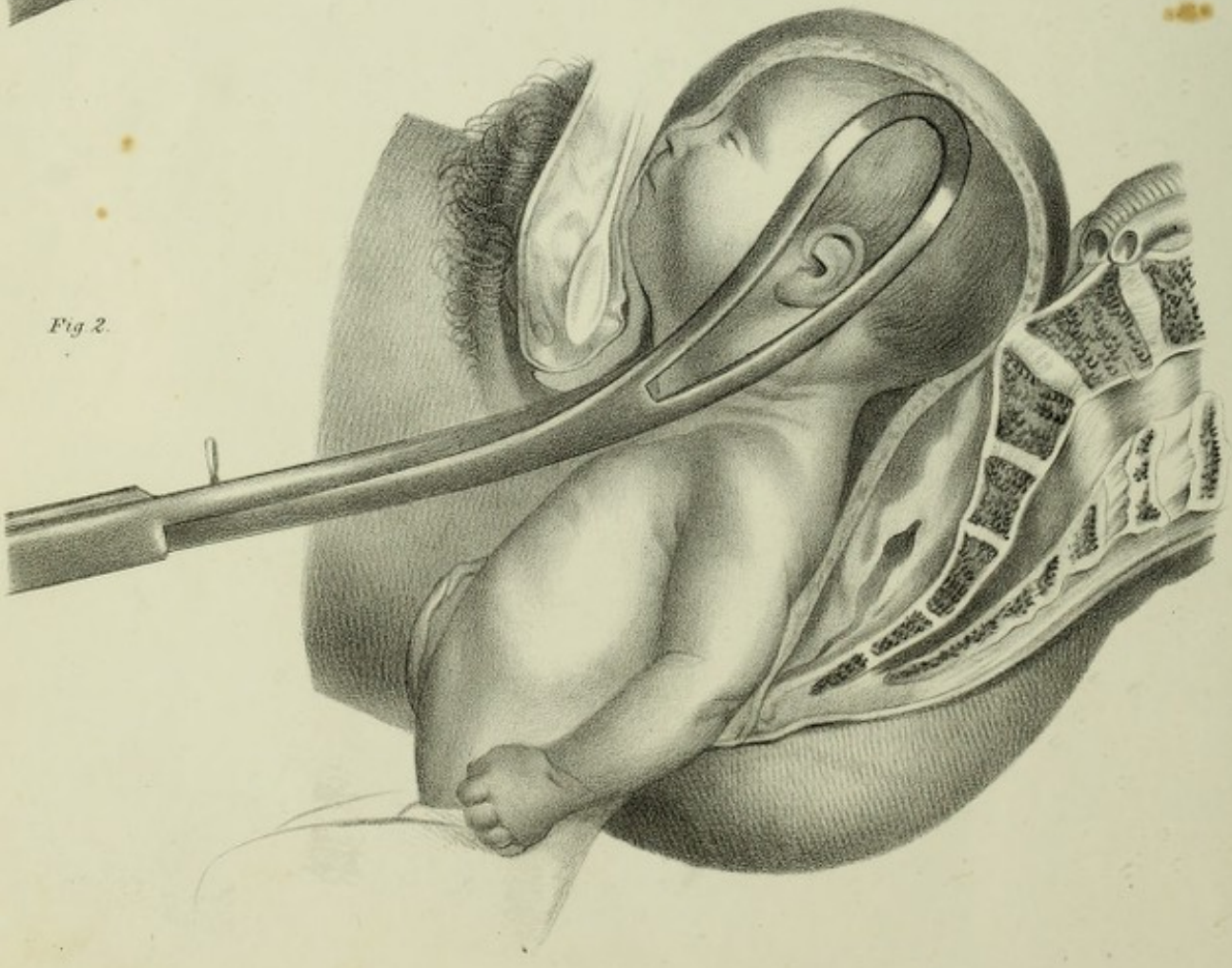

Fig 2.

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PLATE LXXIX.

ARTIFICIAL LABOUR.—APPLICATION OF THE FORCEPS.

(Half Size.)

Fig. 1, Application of the forceps, the body of the fœtus being without the vulva, the head descended in the pelvic excavation, the face lodged in the cavity of the sacrum, and the occiput behind the symphysis pubis.

Fig. 2, Application of the forceps, the body of the fœtus being without the vulva, the head retained at the superior strait, the face directed backward, and above the symphysis pubis, and the occiput in front of the promontory of the sacrum.

PLATE LXXX.

OBSTETRICAL AND OTHER INSTRUMENTS.

(Half Size.)

Fig. 1, Forceps modified and adopted by M. Moreau. Their length is sixteen inches and six lines.

The openings between the blades are nineteen lines above and twenty-one lines at the lower part, and they measure nine inches and three lines from the pivot to the end of the blade.

The thickness of the two branches united near the pivot is seven lines. The handles are oval and measure seven and a half lines by three lines in thickness.

The blades are eighteen lines at their widest part; their fenestra are four inches and nine lines in length, and five lines in width.

In most forceps the curves forming the claws or blades are strongest on the inner or concave margin, whereas, in these, this is the thinnest part, being only one line, whilst the outer or convex edge of the claw is two lines in thickness.

This arrangement allows the parietal protuberances of the child to pass into the fenestra, and thus prevents the claws from occupying much room. As the blades approach the pivot they are brought nearer to each other than in most forceps, which prevents the laceration of the vulva when the head approaches it.

It will be perceived that, by unscrewing the end of the handle of the male blade, we have a sharp crotchet, and by unscrewing that of the female, we have a perforator.

Fig. 2, Side view of the male branch, showing the shape of its fenestrum and the elevation of the pivot.

Fig. 3, Key for turning the pivot and unscrewing the ends of the handles to expose the sharp crotchet and perforator.

Fig. 4, Intro-pelvimeter and calliper of Madame Boivin.

This instrument is made of steel polished, and consists of three pieces. Only two of these pieces, however, come into play at one time. The two long branches form a calliper, and are twelve inches in length. When the movable branch is taken off and the short one substituted, the instrument forms an intro-pelvimeter. This branch is seven inches long including the screw.

The graduations for measuring with the calliper will be found on the arc which is attached to the moving blade and passes through a slot in the fixed one. Those for the internal measurement are cut upon the length of the fixed blade. (See page 28.)

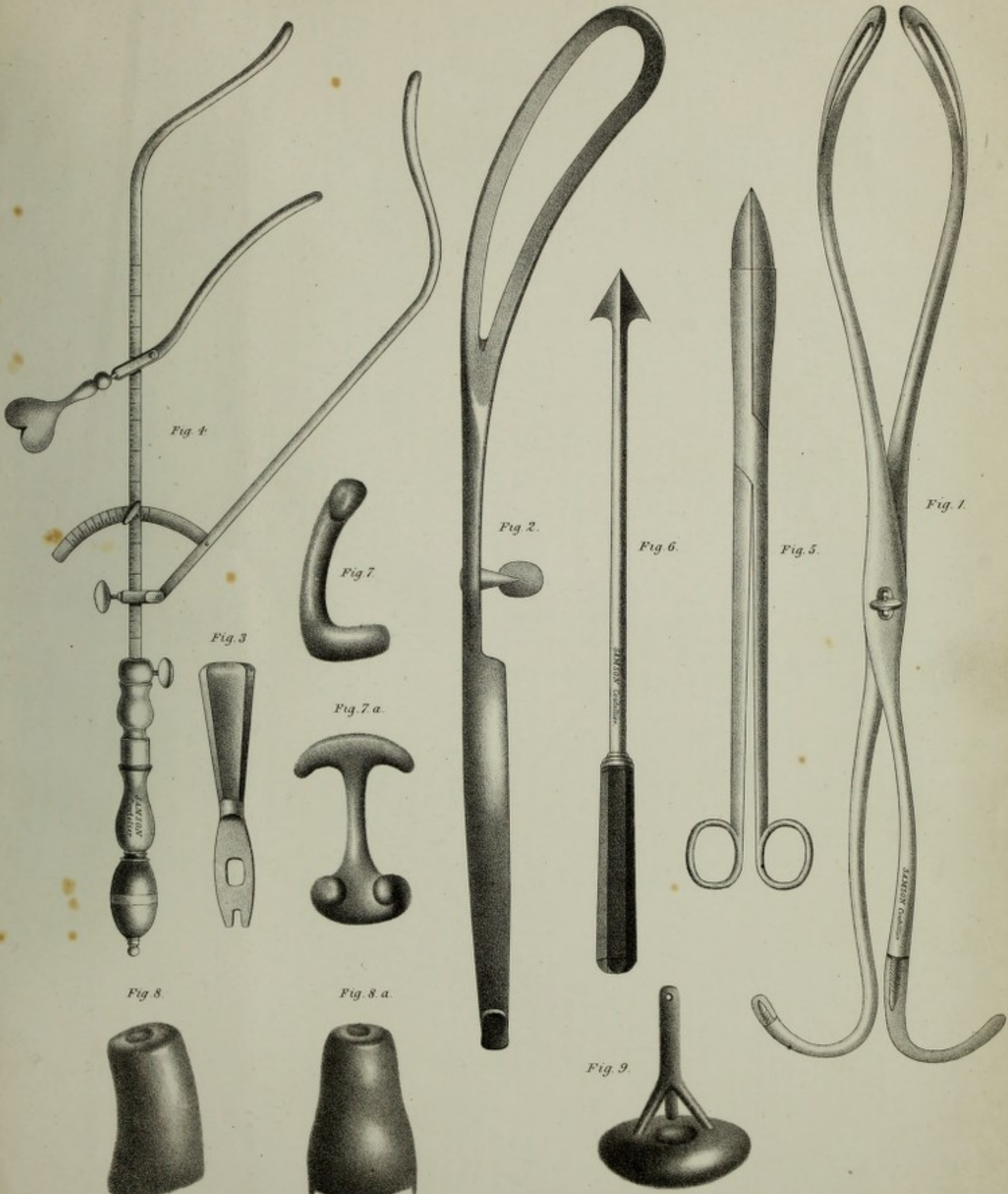
Fig. 5, Smellie's scissors modified.

Fig. 6, Mauriceau's perforator.

Fig. 7 and 7 *a*, Mr. Moreau's pessary for retroversion of the uterus. The upper transverse bar goes behind the os uteri, and the cut ring at mouth of the vagina; the opening in the ring is to accommodate the neck of the bladder.

Fig. 8 and 8 *a*, Two varieties of the cylindrical pessary.

Fig. 9, Ring pessary with a stem to act like a bilboquet pessary.



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