

The theory of menstruation in early pregnancy, superfoetation and the site of insertion of the ovum / by J. Matthews Duncan.

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THE
THEORY OF MENSTRUATION
IN
EARLY PREGNANCY, SUPERFŒTATION,
AND THE
SITE OF INSERTION OF THE OVUM.

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ABERDEEN.

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SINCE the time of the Hunters, physiologists have taught that one of the earliest results of successful impregnation, is the formation or deposition of a new membrane in the cavity of the uterus. This membrane, the *caduca* of Harvey, and to which William Hunter gave the name of *decidua*, consists of two chief parts, entitled respectively *decidua vera* and *decidua reflexa*; the former lining the cavity of the uterus internally, and at the edge of the placenta uniting with the latter, which covers the chorion externally. The *reflexa* has generally been described as produced by the intrusion of the ovum from the fallopian tube upon the *vera*, which had previously been deposited over the whole inner surface of the uterus, closing up the tubes.

Such were the generally received opinions for a long time after the Hunters. But the numerous varieties of statement and hypothesis on the part of authors, might have been sufficient to show that they were not well-founded, for scarcely a single point can be discovered in the history of these parts upon which authors are agreed. For instance, this membrane has been successively described as being vascular and not vascular; as having no openings, or three openings, or only one corresponding to the cervix; as being simple or composed of two, three, or more layers; as being an empty sac or containing a fluid, called by Breschet, *hydroperione*.

John Hunter described this membrane as resembling a layer of coagulable lymph, and originated several other like fanciful and erroneous notions in regard to it. These have frequently been attributed also to his brother William, and this error has been confirmed by the comments of the nephew of the latter, Matthew Baillie, who undertook the office of his posthumous editor. On examining the writings, etc., of William Hunter in regard to the *decidua*, it becomes evident that he had difficulties in regard to it which he did not neglect to state. But all that he does say is correct in every particular, although far from being so explicit or full as might have

been, or as he himself evidently desiderated. The remarks of Dr Rigby¹ on this subject I have been able to confirm by the perusal of a volume of MS. notes of W. Hunter's lectures preserved in the library of the Royal College of Physicians ; and the examination of plate 34th in his great work,² affords the amplest evidence to the same effect.

We find him always describing the decidua as the inner layer of the uterus, as having three openings, corresponding to the tubes and os uteri, which are still pervious after the descent of the ovum (*vide* fig. 7, tab. xxxiv. of his plates) as having an abundant vascularity, and its inner surface perforated like Brussels lace. In accordance also with the plate referred to, he describes the ovum as being "not in the cavity of the uterus, but only between the membranes."³ Unfortunately these correct descriptions of W. Hunter were neglected, and supplanted by the fanciful doctrines that have been everywhere received. And when we consider the names which have lent authority to these views, as well as the rarity of opportunities of examining the parts in question *in situ* in healthy subjects ; and, further, that most observations of the kind have been made on abortions, or, in other words, on abnormal productions, we shall not be astonished at their long maintaining a position in science.

Seiler, C. Weber, and other continental physiologists, were the first to lead the way to more correct views of the nature of the decidua. They opposed the opinion of John Hunter and his numerous followers, that it resembled coagulable lymph in its formation, and described it as a peculiar development of the internal membrane of the uterus. Subsequently, E. Weber, Sharpey, Reid, Goodsir, and others, demonstrated the glandular structure of the decidua, and Dr Sharpey, in particular, threw much light on the whole subject by his investigations into the anatomy of the corresponding parts in the bitch. It is from 1842, however, when M. Coste communicated to the Academy of Sciences the results of his investigations, that we date the complete remodelling of our views on this subject. In 1846 I had an opportunity of examining M. Coste's preparations, and since then have made several observations in regard to this subject.

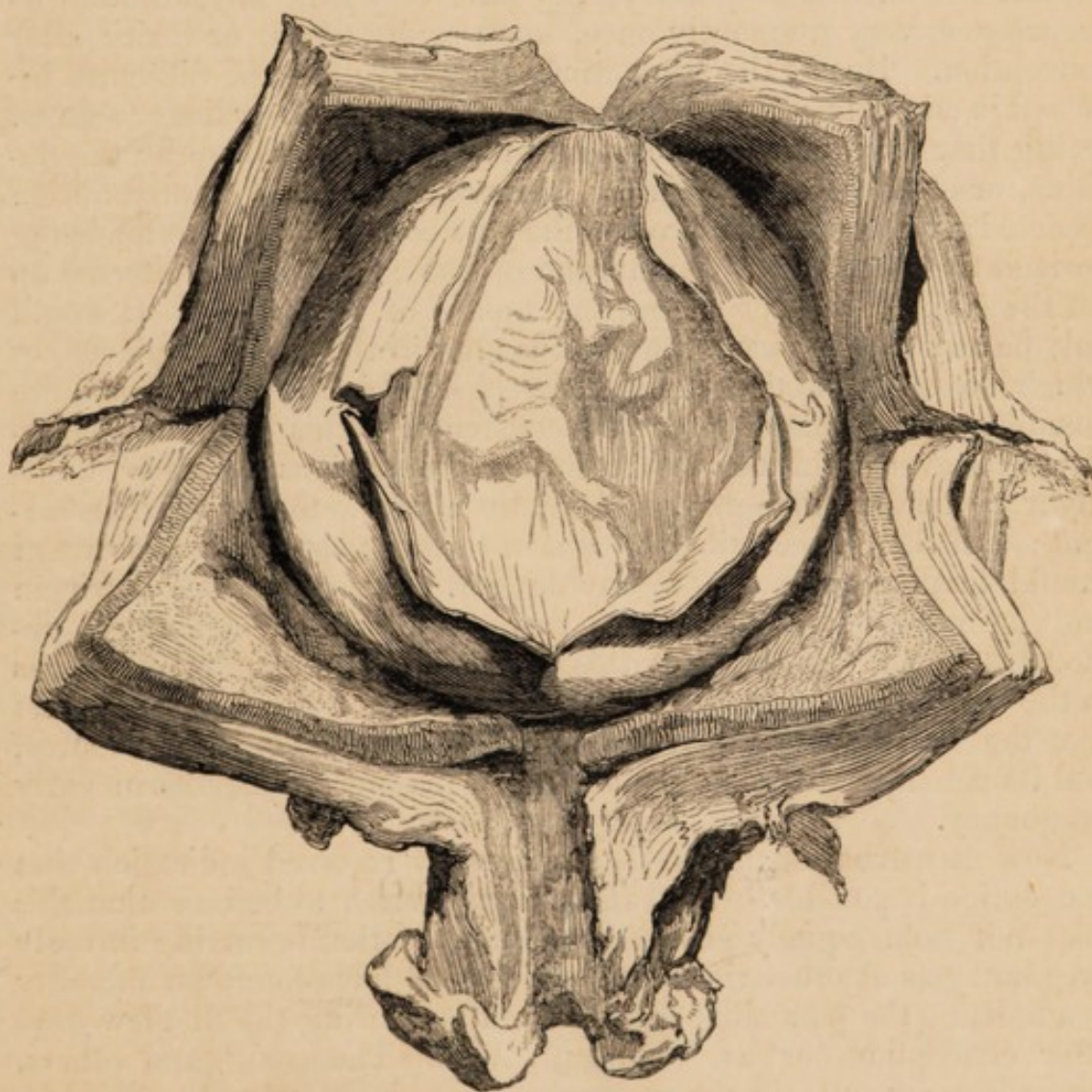
The preparation (figured in the woodcut) beautifully illustrates several points in regard to the decidua. After describing it briefly, I shall, founding on this and similar observations, proceed to some deductions in regard to points in obstetrics which have not been explained hitherto.

¹ See Dr Rigby's edition of "An Anatomical Description of the Human Gravid Uterus," etc., by W. Hunter, M.D., etc., p. 48.

² Plates of the Anatomy of the Human Gravid Uterus.

³ M.S. Notes of Lectures, in the Library of the Royal College of Physicians. The cavity of the uterus is external to the decidua reflexa,—between it and the decidua vera.

The woman from whom this preparation was taken, died from causes quite unconnected with the uterus or its functions. Judging from the development of the fœtus, she had arrived at least at the eighth week of pregnancy. The mucous membrane lining the uterus or the decidua vera is seen to be of great thickness, that lining the cervix is unchanged. The openings of the cervix uteri, and of the fallopian tube of the left side are easily seen, that of the right tube has been destroyed in dissection. The decidua reflexa completely covers the ovum, being a thin layer without glands springing from the decidua vera. The cavity of the uterus is still not closed, there being ample space all around the ovum between the two parts of the decidua, from the os uteri to the tubes.



NOTE.—In order to have the whole drawing included in the page, the size is considerably reduced from that of the original. The decidua reflexa has been opened by a crucial incision, and the four flaps turned aside. The fœtus is seen through the membranes; its superior and inferior extremities are well developed. The cavity of the cervix is filled up with the mucous plug.

On examining the uterus of a woman dying during or soon after menstruation, we find the mucous membrane of its cavity vascular, much injected, red in colour, soft and permeated by its numerous tubular follicles, having the appearance of white lines in a cross section. It is, in fact, not capable of being distinguished, except by the minor degree of its evolution from the decidua of pregnancy. We have thus, at every menstrual period, a nidus prepared for the ovum about to be expelled, and to be made available as a nidus, should the ovum become impregnated. The human female, thus, at every menstrual period, passes through the first or initial processes of pregnancy.

Now, whilst most obstetric authors of repute have with great reason doubted or denied the occasional presence of real menstruation during the latter months of pregnancy, they have very generally admitted its occurrence, very frequently once, more rarely twice, or thrice after conception. But at the same time they have felt the difficulty involved in admitting its derivation in any case from its ordinary source, seeing that they believed the uterus to become sealed up by the decidua, or otherwise, immediately after conception. The preparation depicted gives anatomical proof of the possibility of this secretion being derived from the lining membrane of the cavity of the uterus, up till the end, at least, of the second month of pregnancy. It would only be necessary to have the mucous plug in the cervix displaced, of which so much notice is made by obstetricians. Now it is quite possible, nay, probable, that the persistence of this plug may sometimes be even injurious, by retaining the sanious or other fluids (hydroperione) which may accumulate above it to an injurious extent; and there is certainly no reason to think that its displacement should involve the ovum in any danger. My dissections of virgin and unimpregnated uteri have frequently, indeed generally, demonstrated the existence of this firm and adherent plug of mucus in the non-menstrual state. From these considerations, it is manifest that the secretion of the menstrual fluid from its ordinary source, and its subsequent discharge, are in no manner impossible in early pregnancy.

Now menstruation proper is a generally received indication that conception is possible. And there is no reason to believe that this does not hold equally good of the menstruation occurring in early pregnancy as at other times. Physiologists have found no difficulty in admitting the possibility of superfoetation during the first few days after conception, or as Velpeau,¹ Allen Thomson,² and others, specially point out, till the uterus becomes closed up by the decidua. Of this, the authentic instances of twin-births, where one child has been born black and the other white, in accordance with successive impregnations by black and white males, form incontrovertible

¹ *Traité Complet des Accouch.* Bruxelles, 1835. P. 194.

² *Cyclop. of Anatomy and Physiology.* Vol. ii., p. 469.

illustrations. But the dissection above described shows that the uterus is not closed up till sometime about the third month, and there is no reason to think superfoetation impossible till this takes place.¹ The uterus does not become closed, and repeated impregnation is not impossible, till the ovum is so large as to force the decidua reflexa into close and firm opposition to the decidua vera. Up till this time (in the third month) there is a sufficiently free communication between the ovary and the vagina, or between the ova and the semen. In the uterus described, there is at least as much free space for this communication, as exists in the long and very contracted cervical passage of the virgin uterus. Numerous physiologists adduce the plug of viscid cervical mucus as an impediment to impregnation during pregnancy; but frequent examinations have convinced me that this plug is dense and well developed, and apparently impassable in the non-menstruating unimpregnated uterus, and as it does not prevent conception then, so there is no reason to ascribe to it this function in early pregnancy.

Without taking up space in going over the numerous cases of superfoetation which are everywhere recorded, it may be stated that this explanation will account for all the authentic cases. For if we suppose in an instance of this kind, that the first child is born prematurely, but within the limits of viability, we thus gain two months; and if impregnation may take place between two and three months after conception, we have thus four or five months of interval accounted for between the births of successive viable infants.

In the same way it is easy to explain the difference in apparent age and development often observed in twin-births; which may thus be instances not unfrequently of superfoetation with this peculiarity, that both children, though conceived at different times, are born at or near the same time.²

The dissection above described, and numerous others, have demonstrated that the decidua is formed by the development of the normal mucous membrane of the uterus, without closing the tubes or cervix uteri. The only new production is the comparatively thin uniform membrane of the decidua reflexa, which springs

¹ It is now established, chiefly by the researches of Pouchet, Raciborski, and Bischoff, that a mature ovum is ordinarily expelled after every menstrual period. On the occurrence of pregnancy, the maturation of ova in the Graafian vesicles, and their expulsion, are generally arrested till the end of the period of suckling. But this is not invariably the case. In the human female the sign of ovulation being about to take place is the occurrence of menstruation. The discharge of the menstrual fluid necessarily displaces the mucous plug in the cervix of the pregnant as of the unimpregnated uterus, and thus clears a passage for the conjunction of the ovum of the female with the spermatozoon of the male.

² I may state that all such cases cannot be explained by the supposition of superfoetation. Most conclusive evidence to this effect is afforded by a preparation in my collection of a double monster (anterior duplicity), in which the foetuses differ considerably in size; and it is difficult to conceive that superfoetation has anything to do with the anomaly of double monstrosity.

from the mucous membrane and envelopes the ovum. Burns,¹ Velpeau,² Campbell,³ and others, with their erroneous notions of the origin of the decidua reflexa, have ascribed to it the function of limiting the motion of the ovum on its arrival in the uterus; and in the same way have attempted to account for the various positions of the placental insertion. But such opinions are now untenable.

The mucous membrane of the cavity of the uterus during and for some time after menstruation, or, in other words, the menstrual membrane, may be described as cramming the organ, so much so as frequently to be projected into folds. Now the ovum, propelled by the vermicular action of the tube, advances into the open cavity of the uterus with its so hypertrophied lining. On its arrival there, it is probably about the size of a pea, and is consequently very soon arrested in its motion, and takes root, as it were, somewhere in the vicinity of its point of ingress.

The ovum, on its arrival in the uterus, will therefore move in the direction of least resistance till it become fixed. Obstetricians have hitherto often been puzzled to explain the insertion of the ovum over the os uteri, or on the side of the uterus opposite to that indicated by the corpus luteum as the side by which it entered, and have suggested to themselves wonderful processes by which the ovum might burrow beneath the decidua to arrive at the distant site, or be otherwise conveyed thither. But our improved knowledge of the decidua dispels these difficulties. It may thus be easily conceived that if on the arrival of the impregnated ovum in the uterus the peculiar hypertrophy of its lining membrane exist only in a small degree, the ovum may enjoy some freedom of motion in the enlarged cavity. Such a state of matters might, *à priori*, be looked for in women having the peculiar erethism of menstruation in a low degree, or in such as have borne families, or in whom, from any cause, the cavity of the womb is slightly enlarged.

At an advanced stage of pregnancy our only guide as to the original site of the ovum is the insertion of the placenta. This is found in every part of the uterine cavity; but its rarest and undoubtedly its most dangerous position, is when it is implanted over the cervix.

Now it is curiously in accordance with the details just given that we find the ovum descending to this position much more frequently in cases of repeated than of first pregnancies. Dr Simpson has pointed out this fact, and suggests that it might afford some clue to the discovery of the cause or causes of placenta prævia. He has shown that, in the Dublin Hospital, while Dr Collins was master, first labours formed thirty per cent. of all the deliveries; and that notwithstanding this large proportion, not one of eleven cases of

¹ Anatomy of the Gravid Uterus, p. 201.

² Traité Complet des Accouch., p. 158, etc. ³ System of Midwifery, p. 85.

placenta prævia occurring in that time was a first pregnancy. Of 136 cases of placenta prævia tabulated by Dr Simpson, only eleven were first labours. In fact, a very great majority of the women had had several children previously; and it is to be observed that these figures give far too low an estimate of the relative rarity of placenta prævia in first labours, on account of the great numerical excess of first over second or third labours, and so on.

It may happen, in some cases, that from similar causes an impregnated ovum may not find an appropriate nidus for its development, either from the comparatively atrophied state of the decidual membrane, or from the patency of the uterine cavity admitting of its escape into the cervix below the seat of the proper decidual structure.

[The preceding communication is a condensed statement of part of a tentative lecture delivered before a committee of the Royal College of Physicians, previous to their granting the author their certificate of qualification to teach midwifery, etc. It also formed the subject of a demonstration to the Physiological Society on the 5th of March.]

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