

**On the construction of the placenta, and the mode of communication
between the mother and the foetus in utero / by Francis Adams.**

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ON THE

CONSTRUCTION OF THE PLACENTA,

AND THE

MODE OF COMMUNICATION

BETWEEN THE

MOTHER AND THE FŒTUS IN UTERO.

Supplement to Papers on this subject concluded in No. 1031 of the
LONDON MEDICAL GAZETTE.

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I FIND myself called upon to resume this subject, in consequence of having been obliged to leave one portion of my argument incomplete at the time I composed my papers on the Construction of the Placenta, which appeared in the MEDICAL GAZETTE during the months of July, August, and September, 1847. At that time, having never had an opportunity of inspecting the anatomical preparations in the Hunterian Museum at Glasgow, I was under the necessity of passing judgment upon those which relate to the structure of the placenta entirely at second hand, and principally upon the report of the authorities quoted by Dr. Lee, in his paper contained in the Philosophical Transactions for the year 1832. I have since had it in my power to inspect them carefully for myself, and consequently it becomes my duty to state publicly the results of my examination, as far as they bear upon the opinions advanced by me in my former communications. I think the present, moreover, a most fitting occasion to redirect the attention of the profession to this question, as I find that a zealous advocate of the Hunterian hypothesis, in a late number of the MEDICAL GAZETTE, rests his defence of it almost entirely on the appearances presented by these preparations: his words are—"Many years ago the Hunters demonstrated that vessels passed (pass?) from the uterus into the placenta, and the beautiful injections left behind them still remain to certify to this fact. Since then several attempts have been made to repeat these injections, *but without success*, and thus incontrovertible evidence seemed to be afforded in favour of the opinion that the placenta was (is?) entirely foetal. The injections, and the doctrine founded upon them, were considered to be equally fallacious, &c." It thus appears that the evidence in support of the Hunterian hypothesis is now made to rest entirely upon the anatomical preparations contained in the Hunterian Museum. Whether or not the gentleman whose words I have just quoted ever actually inspected

these preparations, I have no means of knowing; but if he has, I must say that either he or I have been looking at the same objects through a coloured medium, and have drawn very different conclusions from the same data. Indeed, I may mention, that when I entered the Hunterian Museum, for the purpose I have stated,—although I must admit that I did so under the impression that the Hunterian hypothesis is at variance with a general law of the animal economy,—I did expect to meet with appearances by which I should be staggered, and fancied to myself that my mind for a time would be in such a state of suspense, as the Roman poet professes to have been, when called upon to pronounce judgment on the justice of a cause, when the Gods were on the one side, and Cato on the other!

"Victrix causa Diis placuit sed victa Catoni."

I was not a little surprised then,—I may almost say disappointed,—to find that, notwithstanding the imposing titles which certain of the preparations on the gravid uterus bear in the catalogue, there is not a single one of them which, when impartially examined, would warrant the inference drawn from them by the Hunters—namely, that arteries "of the size of crow-quills, and veins of a considerable size," pass between the uterus and the placenta.

I now proceed to give literally the remarks which I wrote on these preparations at the time I made my examination of them. It would serve no good purpose, however, to detail my observations on all the preparations of the gravid uterus which I examined, as a very large proportion of them do not at all bear upon the question at issue; and therefore I shall be content with relating what I consider to be a sufficient number for forming a general judgment on the whole:—

No. 31, s.—A portion of the uterus at the place where the placenta adhered; the orifices of the torn veins full of plugs of coagulated blood: very remarkable. [*Very unsatisfactory: no certainty that what are here represented as vessels are vessels. The*

substance on the inner surface of the uterus. evidently a portion of the maternal cotyledon much torn.]

33, s.—A portion of the uterus in which the arteries had been injected red, the veins yellow: shows inside surface and the torn orifices of the veins filled with the yellow injection. [*Pieces of red wax, certainly having some resemblance to vessels, are to be seen, but they prove nothing as to the construction of the placenta.*]

34.—Ditto, shows ditto. [*Nothing certain can be made of this preparation: very unsatisfactory.*]

96, s.—A portion of the placenta and its membranes: on the surface which adhered to the uterus may be seen some very small curling arteries injected red, and veins injected black, which are going to the cells of the placenta. [*I cannot make anything of this preparation. Substance of the placenta a mass of red wax.*]

100, s.—A small section of placenta with part of the membranes: the cells of the placenta have been filled from the veins of the uterus, and vice versa; the cells are not very bare; on the side which adhered to the uterus the veins may be seen very distinctly. [*Difficult to say what is meant here by the cells of the placenta. Quite an indistinct preparation.*]

106.—A section of uterus with membranes turned partly down, and showing a double layer of decidua. [*A beautiful preparation. What is called decidua, a mere film, seemingly devoid of regular structure.*]

118, s.—A section of uterus with placenta partly adhering and partly detached: showing in the angle the mode of adhesion. [*Very interesting, but no appearance of vessels at the angle. Quite at variance with the Hunterian hypothesis, as not exhibiting the utero-placental vessels.*]

124, s.—A small portion of the placenta and uterus, where the cells of the placenta have been injected from the veins of the uterus; the veins are seen, very large, entering into the substance of the uterus: injection green. [*The green pieces of wax here taken for veins passing between the placenta and uterus, are as large as the femoral vein of an adult. Quite out of the question that this can be a correct preparation: evidently the result of laceration.*]

145, s.—A portion of the uterus with placenta adhering; injected red: the cells of the placenta injected from the uterus. [*Difficult to make out what is meant by the cells: altogether the placenta is a confused mass.*]

147, s.—A portion of placenta with the cells apparently filled with fine injection of a red colour; less distinct than when coarse injection is employed; the vessels of

the navel-string are quite empty, although the vessels of the cells had been very minute, proving no communication. [*The entire mass of the placenta is here seen injected, except the cord; consequently the injection must have burst the vessels, even according to the Hunterian hypothesis.*]

149, t.—A portion of uterus and placenta; the arteries injected of a dark colour, and veins green: both vessels are seen entering into the substance of the placenta. [*Pieces of wax to be seen on the uterine surface of the placenta, but no reason to suppose that they are vessels.*]

158, t.—A portion of uterus and placenta; the placenta being partly detached, shewing veins injected green from the uterus, going into the posterior surface of placenta; the placenta itself injected with a different injection. [*Certainly no inference as to the construction of the placenta can be drawn from this preparation. The green substances are taken for vessels, but in all probability they are lacerations; the wax has burst the vessels.*]

160, s.—A placenta injected from the navel-string red, to great minuteness, most entirely unravelled, showing a most beautiful shag of vessels: it has been hardened by spirits of wine probably, and put into oil of turpentine. [*A curious preparation, but shows nothing in regard to the construction of placenta. Indeed, it seems at variance with the Hunterian hypothesis, for the whole mass of the placenta is injected from the umbilical cord.*]

(?) s. t.—A portion of uterus with placenta adhering; the vessels of the uterus injected red and black: the cells of the placenta are filled with a different injection, and therefore not from the vessels of the uterus, but must have been previously filled from the spongy surface of the placenta itself. [*What is here said about the cells is quite imaginary: here the mass of the placenta would seem to be injected from the uterine vessels. Preparation quite unsatisfactory.*]

176, s.—Section of uterus with placenta adhering: the cells of the placenta are injected from the vessels of the uterus. [*The centre is filled with a red injection from the uterus, but no appearance of vessels passing between the uterus and placenta.*]

178, s.—A small section of the uterus, with the veins injected green, and broken off where they are entering the placenta. [*Green pieces of wax are to be seen on the surface of the uterus, but no reason to suppose them truncated vessels.*]

From what I have now stated, it will be readily understood that, in my opinion, the preparations in the Hun-

terian Museum at Glasgow do not at all warrant the inference that there is any connection by arteries and veins between the uterus and placenta, and that the appearances of connection which they exhibit may all be reasonably supposed to be the result of laceration. At all events, as the collection exhibits the most contradictory appearances, it is perfectly indisputable that one is not warranted in founding any theory upon them. For example, No. 147 exhibits a placenta wholly injected from the uterus, while No. 160 is a placenta entirely injected from the umbilical vessels. Now most assuredly it will be admitted that one or other of these preparations must be incorrect, seeing they lead to incompatible and contradictory inferences. Then, again, who for a moment can believe that vessels of the size of the femoral vein pass between the uterus and the placenta, as exhibited in No. 124? And, to give another example, when masses held to be vessels are exhibited in No. 124, how does it happen that the said vessels do not appear in No. 118, which exhibits an uterus with a piece of placenta partially detached from it?

I repeat, then, after a careful, and, I conscientiously believe, an impartial inspection of the preparations of the gravid uterus contained in the Hunterian Museum, I do not fear to declare it as my decided opinion, that they do not at all warrant the inferences which the Hunters drew from them of a vascular connection between the uterus and placenta.

How the Hunters came to entertain such erroneous notions regarding the placenta I have partly explained in the former part of my communication; namely, that it was owing to their minds having been occupied by strong prepossessions in favour of the termination of the absorbent vessels in patulous mouths, and their prejudices against the doctrine of imbibition through membranes. It is a melancholy instance how a superior mind may be blinded by prejudices, that Dr. W. Hunter professed to have actually seen distinctly the terminations of the lacteals in an intestinal villus, and that the Museum of the Hunters contained preparations which were held to show decidedly the patulous orifices

of these vessels.* With such unfounded prejudices and mistaken views, it was morally impossible that the Hunters could have solved the problem as to the mode of communication between the mother and foetus in utero, unless it shall be maintained that it is possible to draw correct inferences from erroneous premises. How the opinions of the Hunters on this subject should still command authority in this country, can also admit of a ready explanation, when we advert to the extraordinary veneration in which their names have been held for the last 60 or 70 years: this is so much the case, that Mr. Samuel Lane, in his excellent paper on the Lymphatic and Lacteal System, in the *Cyclopædia of Anatomy*, complains that he found the minds of professional men had not yet freed themselves from the influence of the Hunterian views with respect to the parts performed by the lymphatic vessels, and that we are still allowing ourselves to be misled by these impressions. It is now at least thirty years since our Gallic brethren overturned the doctrines of the Hunters regarding absorption, and yet we stuck to them down almost to the present date. We were long behind our neighbours, also, in admitting the possibility of absorption by veins and through membranes; but, now, all must allow that on these points the Hunters were greatly in error. To allow, then, that they had also deceived us on the subject of the placenta appears altogether monstrous in the eyes of those ardent worshippers who are not yet prepared to cast off the Hunters as their professional Indigetes. What adds much to the tenacity with which their hypothesis on the placenta is still defended, is the circumstance that it is intimately connected with the art of midwifery, and that many of our standard authorities in this line are already strongly committed on the subject, and naturally feel reluctant to believe and to confess that they have long been propagating erroneous doctrines on points of the most vital importance, as regards the lives of their fellow creatures.

*Vel quia nil rectum, nisi quid placuit sibi, ducunt
Vel quia turpe putant parere minoribus, et quæ
Imberbes didicere, senes perdenda fateri.*

* See Mr. Lane's paper on the Lymphatic and Lacteal System, in the *Cyclopædia of Anatomy*, and Goodsir's *Anatomical Essays*.

This feeling, then, so well expressed by the poet in the verses just quoted, has operated powerfully in all ages, and for the reason which I stated it weighs very strongly with the obstetrical authorities at the present time. Hence some of them obstinately cling to the Hunterian hypothesis, while at the same time they admit facts bearing upon the question, which, to any unprejudiced mind, must appear quite decisive against their own opinions on the question as to the supposed vascular connection between the uterus and placenta. For example, one of them lately made the following candid statement of facts: "The uterine surface of the placenta is covered by a delicate membrane, and seems to be so applied to the walls of the uterus as to close the venous openings on its surface without any direct connection with them. *The placenta may be peeled from the uterus more easily than the rind from an orange: no vessels seem to be broken.* The natural inference from these facts would be, that the placenta belongs altogether to the foetus; that no maternal blood passes into it; and that any interchange between the blood of the child and the mother takes place only at the surface of the uterus, to which the placenta is applied like a cake of unbaked dough."—MED. GAZ., No. 1,094, p. 826. On this remarkable passage I shall only remark, that the two facts here distinctly admitted appear to me quite decisive of the question at issue; for if the placenta can be peeled from the surface of the uterus more easily than the rind from the orange, without any vessels being seen to be broken, and if no vessels can be detected on the membrane which lines the uterine surface of a separated placenta, we may rest assured that the so-called utero-placental vessels are altogether ideal.

In the course of my examination of the preparations in the Hunterian Museum, I was much struck with one of them, and with the title it bears in the catalogue:—"No. 320, s.—A portion of gravid uterus from the cow, showing the oval fungus of the maternal part of the placenta, resembling in its surface pretty much a cauliflower. This and the foregoing preparation show that in many quadrupeds the

maternal and foetal parts of the placenta are quite distinct in structure from each other, and may throw light on the human placenta, where there is a more intimate connection between the foetal and maternal portions."

Here then it would appear that W. Hunter had before his eyes a specimen of a placenta constructed upon a totally different type from what he conceived the human placenta to be—namely, with a complete separation between the maternal and placental portions, and where of course nutrition must take place by absorption through ~~the~~ membrane. Strange that it should not have occurred to his acute mind, that if absorption through ~~the~~ membrane can take place in one of the mammalia, there is every reason from analogy to suppose that the same vital process must operate in its congeners, and more especially in the highest genus of the class; and that if the secundines be entirely separated from the uterus in one of the genera, that there is every reason from analogy to infer the same of the others. (†) But whatever their blind worshippers may say to the contrary, the minds of the Hunters, and especially of John Hunter, were not of a logical cast, nor capable of entertaining any very enlarged views on professional or scientific subjects. Had they been well trained in tracing the structural analogies in the animal kingdom, and in drawing proper inferences from them, they could not have failed to arrive at the conclusion, that as every other organ in the bodies of man and the ox are constructed on similar types—as, for example, the lungs, the heart, the liver, the kidneys, the bladder, the womb; nay, if even with regard to the contents of the cranium itself, which is as it were "the dome of thought and palace of the soul," every particular structure in the brains of the two animals is formed on the same fundamental type;* it is contrary to all analogy to suppose that the secundines should be constructed on entirely different types, and that their functional office should be decidedly and totally different.

And here I cannot deny myself the pleasure of introducing a quotation in which this train of thought appears to

* See Tiedemann on the Foetal Brain, *passim*.

me very conclusive on the argument which I am now enforcing. "In all the principles of his internal structure, in the composition and functions of his parts, man is but an animal. The lord of the earth, who contemplates the eternal order of the universe, and aspires to communion with his invisible Maker, is a being composed of the same materials, and framed on the same principles, as the creatures which he has tamed to be the servile instruments of his will, or slays for his daily food. The points of resemblance are innumerable; they extend to the most recondite arrangements of that mechanism which maintains instrumentally the physical life of the body,—which brings forward its early development, and admits, after a given period, its decay,—and by means of which is prepared a succession of similar beings, destined to perpetuate the race."—(Prichard's Natural History of Man, p. 2.)

From what has been now stated, I trust it will be generally admitted that I am warranted in drawing the following inferences:—

1. That a careful inspection of the preparations of the gravid uterus, in the Hunterian Museum at Glasgow, gives no support to the hypothesis advanced by the Hunters and their followers regarding the construction of the placenta, and the mode of communication between the mother and the foetus in utero.

2. That these preparations, by appearing to prove too much in regard to a vascular connection between the mother and foetus, lose all claim to be held as competent evidence on the question at issue: since, for example,

some of them exhibit vessels of the size of the femoral vein, passing between the uterus and placenta; and in others the whole substance of the placenta is injected from the uterus.

3. That considering how close an analogy subsists between the respective organs in the bodies of the ruminants and the human subject, it is highly improbable that their secundines should be composed upon totally different types.

4. That since no one pretends to say that there is an utero-placental circulation in any other animal, it is contrary to all analogy to suppose that such a *whole* process takes place in the human subject.

5. That the human placenta, if constructed in the manner represented by the followers of the Hunters, that is to say, if composed partly of foetal and partly of maternal vessels, all blended together into one compact structure, would be an absolute monstrosity, without a parallel in the whole works of Nature.

5. That it being now universally admitted, that the placenta can be peeled from the surface of the womb more easily than the rind from an orange, without any vessels seeming to be broken, and that there is no appearance of vessels on the uterine surface of an expelled placenta, it is impossible any longer to contend that the so-called utero-placental vessels have any existence.

Lastly. That in the human subject, as in all other animals, the secundines are altogether a foetal structure, and that no maternal vessels can possibly be lacerated at the separation of the placenta in natural labour.

very conclusion on the argument which I am now advancing. "In all the principles of the internal structure, the composition and functions of his system, man is but an animal. The only of the earth, who contemplates the eternal order of the universe, and who is communion with his invisible Father, is a being composed of the same materials, and framed on the same principles, as the creature which he is termed to be the active instrument of his will, or slave for his daily food. The points of resemblance are so numerous; they extend to the most remote arrangements of that machine, and which maintains instrumentally the physical life of the body,—which brings forward the early development, and admits, after a given period, its decay,—and by means of which is prepared a succession of similar beings, destined to perpetuate the race."—(Richard's Natural History of Man, p. 2.)

From what has been now stated, I trust it will be generally admitted that I am warranted in drawing the following inferences:—

1. That a careful inspection of the preparations of the gravid uterus, in the Hunterian Museum at Glasgow, gives no support to the hypothesis advanced by the Hunters and their followers regarding the construction of the placenta, and the mode of communication between the mother and the foetus in utero.

2. That these preparations, by appearing to prove too much in regard to the connection between the mother and foetus, will not only tend to establish, as competent evidence on the question at issue; since, for example,

1. That the human placenta, if compared to any other animal, it is found to be composed of two parts, a fetal and a maternal vessel, all blood, together into one compact structure, would be an absolute monstrosity, without a parallel in the whole works of Nature.

2. That it being now universally admitted, that the placenta can be peeled from the surface of the womb more easily than the mind from an orange, without any vessels seeming to be broken, and that there is no appearance of vessels on the external surface of an expelled placenta, it is impossible any longer to contend that the so-called retro-placental vessels have any existence.

Lastly, That in the human subject, as in all other animals, the red arteries and veins are intermingled, and that the maternal vessels are really be inserted at the separation of the placenta in utero.