

*A Preliminary Note upon the Question of the Nutrition of the Early Embryo, with Special Reference to the Guinea-pig and Man.*

By E. EMRYS-ROBERTS, M.B. (Liverpool), Ethel Boyce Research Fellow in Gynæcological Pathology in The University of Liverpool.

(Communicated by Professor C. S. Sherrington, F.R.S. Received February 20,—  
Read March 16, 1905.)

During the progress of a research into the earliest implantation of the embryo of the guinea-pig, I have been particularly struck with the way in which the nutrition of the embryo is anticipated and provided for during the time it remains free in the uterine horn. The so-called yolk-granules of the ovum are obviously insufficient to provide for the growth of the embryo to the stage prior to differentiation of the inner cell-mass, to which it attains during the five or six days which elapse before it comes into contact with the maternal tissues.\* It is clear that it must derive nourishment from the medium in which it lies—the product of the secretion of the uterine or other glands, which, during the period of pro-œstrum, exhibit such marked activity. I suggest that this secretion, which consists of mucus and probably albumin, is assimilated by the embryo after having undergone a process of digestion, the result of a secretory activity on the part of the outermost cells of the embryo—the cells of the Trophoblast. This suggestion I base on my observations in the guinea-pig, where I am able to demonstrate a breaking-down of maternal cells before the Trophoblastic cells are in actual contact; likewise in human placentation where a more or less dense layer of fibrin and broken-down leucocytes and decidua cells, the result of Trophoblastic activity, affords a barrier interposed between the invading Trophoblastic cells and the Decidua. This layer I purpose naming the “Protective Layer.”

Looked at from a comparative point of view, there is in all probability a close analogy between the uterine secretion of mammals, and the secretion of the oviducts of the lower vertebrata. In the case of birds the analogy is very striking, on account of the direct and important share in the nutrition of the embryo afforded by this secretion, commonly known as the white of the egg. In the case of the frog the ovum receives in its passage down the oviduct, corresponding to the uterine horn of the guinea-pig, a coating of mucus and

\* This insufficiency is even more pronounced in the mole, where the uterine cavity is actually distended by the growing embryo before implantation takes place.

probably albumin, comparable to the uterine secretion referred to above; when it reaches the water and becomes fertilised, this swells up by absorption, forming a gelatinous covering. The embryo for nutriment depends upon the yolk contained in the ovum before fertilisation, upon the covering of mucus and probably albumin, and lastly upon the water in which it lies. In certain mammals, as, for example, the rabbit and the mole, a distinct gelatinous envelope is described as surrounding the embryo before implantation occurs; this envelope is, I suggest, possibly due to some digestive action of the cells of the Trophoblast upon the adjacent medium, producing a form of coagulation.

In a number of mammals during the period of pro-œstrum the secretion of uterine glands is supplemented by a pouring-forth of blood, from the simple oozing of congested vessels, to that associated with actual exfoliation of uterine epithelium. Although there is reason to suppose that the flow of blood has practically ceased before the embryo reaches the uterine cavity, there is, in all probability, a considerable quantity of blood-serum present, in addition to the secretion of the uterine glands. I think it is conceivable, if not highly probable, that this process is, in part at least, a preparation on the part of the mother for providing a rich pabulum to nourish the embryo until such time as it attaches itself to the uterine wall; while, when implantation is effected, there is in readiness for the embryo an abundant supply of richest nutriment.

---