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The fate of embryonic tissue implanted in the mother.

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The following experiments were done primarily to ascertain whether there exists, specific to the pregnant animal, a substance favoring the growth of embryonic tissue.

Many pregnant white mice were hysterectomized (leaving the ovaries *in situ*), and a measured portion of the hashed embryo implanted through a needle subcutaneously. The animals showed themselves only slightly susceptible to infection at operation, and in the great majority the laparotomy wound healed promptly and the general health remained good. It was found that the embryonic tissue grows profusely when implanted in the mother, yet not better than in certain unoperated, alien hosts. No evidence of a favoring substance specific to the pregnant animal was obtained.

In a number of experiments two mice were hysterectomized, and separate grafts of the hashed embryo from each were made in both, using the subcutaneous tissue of the flanks as the site of implantation. In general the embryonic material grew better in the animal that had furnished it,—a new demonstration of the importance of blood-relationship in transplantation.

It proved feasible to snare off from the forked uterus of the mouse one or more embryos, without damage to the others, which go on to term. The implanted material fails to grow in these mothers that still carry young. The contrast to what occurs in the completely hysterectomized mother, or in a favorable alien host, or, for that matter, in an unfavorable alien host is very striking.

As I have shown elsewhere,[1] individual mice differ much as hosts for the same hash of mouse-embryo. In some it is promptly vascularized and grows well, whereas in others no vascularization occurs and the fragments die within a few days. Histological examination shows that embryo implanted into the mother is

[1] *Jour. of Exper. Med.*, 1910, XII, No. 3.

vascularized; yet if she still carries young, it does not grow. On the other hand, it does not die, as it would in an unfavorable alien host. The fragments remain in good health for a considerable period. At the end of seven days the thin strand of grafted tissue consists of minute bits of cartilage, nests of epithelium, and a connective-tissue of embryonic type, all with little sign of degeneration; whereas in the hysterectomized mother the nodule that has already developed is made up of relatively large masses of cartilage, epithelial cysts distended with secretion or cast-off cells, and a connective tissue approaching the adult in type. Many signs of beginning degeneration are seen, in the cartilage especially.

These facts have a considerable bearing on tumor problems, especially on Ehrlich's hypothesis of immunity by atrepsia — immunity by the lack of a specific food substance. Ehrlich holds that a specific "X substance" is necessary to tumor growth because (1) mouse tumor when introduced into rats grows for a short period only and then retrogresses, — presumably for lack of the "X substance," and (2) because the presence of a large, rapidly growing tumor in a mouse prevents (by its utilization of "X substance") the development of other grafts in the same animal. But in view of the experiments just detailed, it must be granted that, if tumor requires an "X substance," so developing embryo requires a "Y substance." For (1) mouse embryo when implanted in rats grows for a brief period and then retrogresses,[2] and (2) the presence of a developing litter *in utero* prevents the growth of embryo grafts.

But the question may well be asked whether one need suppose for the growth of tumor or embryo the presence of special substances other than the circulating food required by mouse-tissue in general. A lack of this might well explain the ultimate failure of grafts in the rat, and its total utilization this failure when the host-mouse already carries a rapidly growing tumor or a litter of developing embryos. It should also be recalled that numerous observers have found pregnancy of the host to interfere with the growth of implanted tumors.

[2] *Loc. cit.*