BRIEF COMMUNICATION
DEPORTATION OF TROPHOBLAST
IN THE CHINCHILLA

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It is well established that deportation of trophoblast from the placental bed to the maternal system occurs during normal human pregnancy (see review by Bardawil & Toy, 1959). Trophoblastic 'sprouts' break away from the syncytium into the intervillous space and pass directly into the maternal venous system (Hamilton & Boyd, 1966). These cells can be found in the venous drainage of the uterus throughout most of pregnancy (Douglas, Thomas, Carr, Cullen & Morris, 1959) and, although many are subsequently destroyed, probably by some lytic action of the blood, considerable numbers reach the maternal lungs (Attwood & Park, 1961). The functional significance of this phenomenon is obscure, but a number of suggestions have been put forward: that it is merely a physiological desquamation, that the trophoblast cells may have an endocrine function, or an immunological function, or that they may liberate thrombokinase and affect blood coagulation during pregnancy. The allied phenomenon of villous deportation is regarded as essentially accidental and probably of little significance (Hamilton & Boyd, 1966).

One of the main difficulties of regarding trophoblast deportation as a phenomenon of biological importance was that it appeared to be restricted to human pregnancy. There have been a number of such assertions in the literature. In view of this we feel it important to point out that this also occurs during normal pregnancy in the chinchilla (*Chinchilla laniger*). There are a few isolated reports, confined to observations on small numbers of animals (Helmboldt, Jungherr & Caparo, 1958; Hellweg, 1959, cites a personal communication; Burtscher, 1963; Benirschke, 1964, in a discussion following a symposium paper).

Our observations have been made from animals maintained in a breeding colony over the past 2 years (Weir, 1967). Fifteen pregnant chinchillas of known gestational age were killed at intervals up to the end of pregnancy at about 111 days, and a few in the post-partum period. Lung samples were fixed in formol-saline solution, vacuum embedded in paraffin wax and sectioned at 8 μ . Most sections were stained routinely with Haematal '8' and Biebrich scarlet (Baker, 1962), but some were kept for histochemical tests.

Aggregations of trophoblast cells were found in the lungs of all the animals examined. The cells appeared in groups of 1 to 6 cells, distributed irregularly throughout the lungs (Pl. 1, Figs. 1 and 2). Occasionally these groups were so

large that they were visible as nodules protruding from the surface of the lung. The Trophoblastic Index (a measure of the abundance of these cells, see Attwood & Park, 1961) appeared to increase with the number of lung sections examined. Lung samples from five animals killed up to 2 months in the post-partum period also showed trophoblast embolism. The cells were histologically similar to those seen during gestation, and since the trophoblast cells have never been seen in mitosis this suggests a prolonged life-span.

There is also another type of trophoblast excursion in the chinchilla. Examination of the post-partum uterus revealed trophoblast cells in the wall of the uterus (Pl. 1, Fig. 3), and even in the muscle layers (Pl. 1, Figs. 4 and 5). These must derive from cells which migrate from the developing placenta, and persist long after parturition, even into an ensuing pregnancy. Their function is equally unknown.

In an attempt to determine a venous pathway of deportation, as occurs in man, blood samples were taken from the veins draining the uterus during late pregnancy. Examination of stained blood smears has failed so far to demonstrate trophoblast cells. Iklé (1964) estimated that there is a 'deportation rate' of 100,000 cells/day into the human maternal circulation, so that further examination of the chinchilla seems to be warranted.

It has been suggested that deportation of human trophoblast also occurs in the direction of the foetus. Salvaggio, Nigogosyan & Mack (1960) reported syncytiotrophoblast in cord blood obtained at the time of delivery, and also claimed to have found trophoblast cells in the heart and liver of newborn babies. On the other hand, Iklé (1961) was unable to find trophoblastic material in the cord blood of ten newborns. In view of the claim of Salvaggio and his collaborators we have examined the lungs of foetal chinchillas in the late stages of pregnancy, but have not detected any trophoblastic material.

There appears to be only one report of a systematic investigation of embolism of the lungs by trophoblast, other than in man. Maximov (1898) examined the lungs of forty rabbits killed during normal pregnancy but was unable to find any placental tissue. It seems likely that a haemochorial placentation is a necessary prerequisite for trophoblast deportation since it is in this type of placenta that trophoblast is directly bathed by maternal blood. The anthropoid apes have a placenta similar to the human villous type and it may well be that trophoblast deportation also occurs in these species. In the meantime the chinchilla provides an amenable laboratory animal for the study of this phenomenon, and an extension of this work to include other hystricomorph rodents is also in progress.

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PLATE 1

FIG. 1. Lung of pregnant chinchilla showing group of trophoblast cells. $\times 80$.

FIG. 2. Higher magnification of a group of trophoblast giant cells blocking the maternal lung capillaries in late pregnancy. $\times 110$.

FIG. 3. Large mass of trophoblast cells lying just below the uterine epithelium in the endometrium of a chinchilla 2 months *post partum* and 5 days *post coitum* (♀ 169). $\times 40$.

FIG. 4. Trophoblast cells invading deep into the myometrium. (♀ 169) $\times 40$.

FIG. 5. Typical appearance of a single trophoblast cell, in the myometrium. $\times 140$.

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