

Leucocytes in Ovarian Corpus Luteum During its Lifespan

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The appearance of different leucocytes and macrophages in the guinea pig corpus luteum of pregnancy and of the oestrous cycle was investigated electronmicroscopically. During the neovascularization in the early corpus luteum, eosinophils, neutrophils and lymphocytes were seen between the luteinizing cells, while during the corpus luteum involution autophagocytosis and heterophagocytosis (with participation of macrophages) were available. The role of the leucocytes (granulocytes, lymphocytes) and the macrophages for the development and function of the corpus luteum was discussed.

Key words: ovary, corpus luteum, leucocytes (granulocytes, lymphocytes), macrophages, ultrastructure.

Recently appeared some studies on the presence of different blood cells (eosinophils, neutrophils, lymphocytes, macrophages) in the ovary during the preovulatory period and the formation, functioning and regression of the corpus luteum [2, 11]. It is well known that the processes of the luteinization of the ovulated follicle is accompanied by the neovascularization, but the understanding of its cellular and molecular mechanisms is still incomplete [12]. There is some evidence that eosinophils play a role in the degradation of the follicle wall at the time of ovulation and exert a major influence on the neovascularization of the corpus luteum [10]. On the other hand, recent evidence indicates that the cells of the immune system (T- and B-lymphocytes, macrophages, granulocytes) and their large network of secretory products or cytokines, play an active role in the ovary throughout the oestrous cycle [9].

The aim of this study is to describe the appearance of the leucocytes and macrophages during the formation and involution of the guinea pig cyclic corpus luteum and the corpus luteum of pregnancy.

Material and Methods

Guinea pigs corpora lutea of pregnancy (at the 9th, 15th, 35th, 45th, 63th day and two days after parturation) as well as during the oestrous cycle (3, 9, 14 and 20 days after ovulation) were prepared for electronmicroscopical study (fixation in 6% glutaral-

dehyde in phosphate buffer, postfixation in 1% osmium acid with 3,4% saccharose, dehydration and embedding in Epon) .The semithin sections were stained with Toluidin blue-pironine. The thin sections were stained with Uranyl acetat and Lead citrat.

Results and discussion

At early pregnancy of guinea pig (9th and 15th day) and on third and 9th days after ovulation, various leucocytes subsets (lymphocytes, eosinophils, neutrophils)

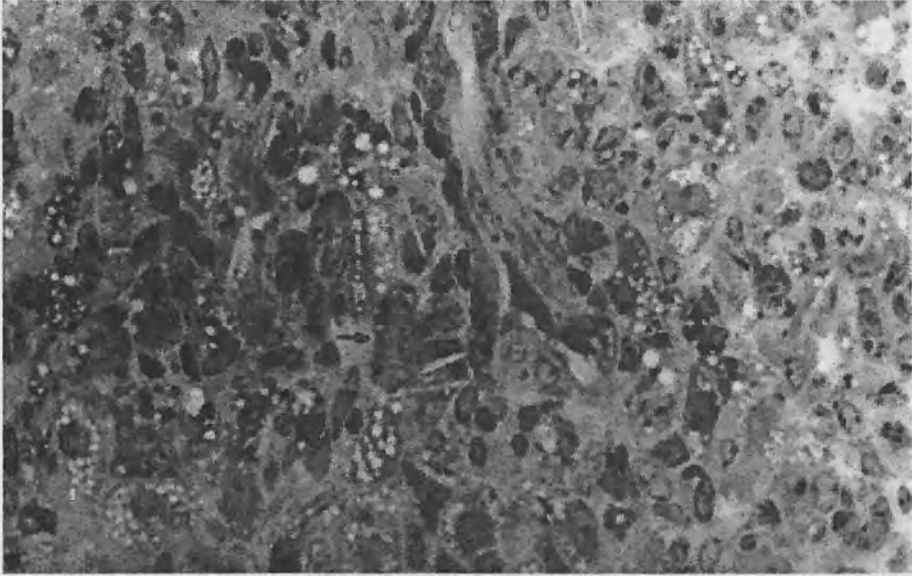


Fig. 1. Corpus luteum at early pregnancy (9th day) — around the capillaries many leucocytes are seen (arrow) (× 100)

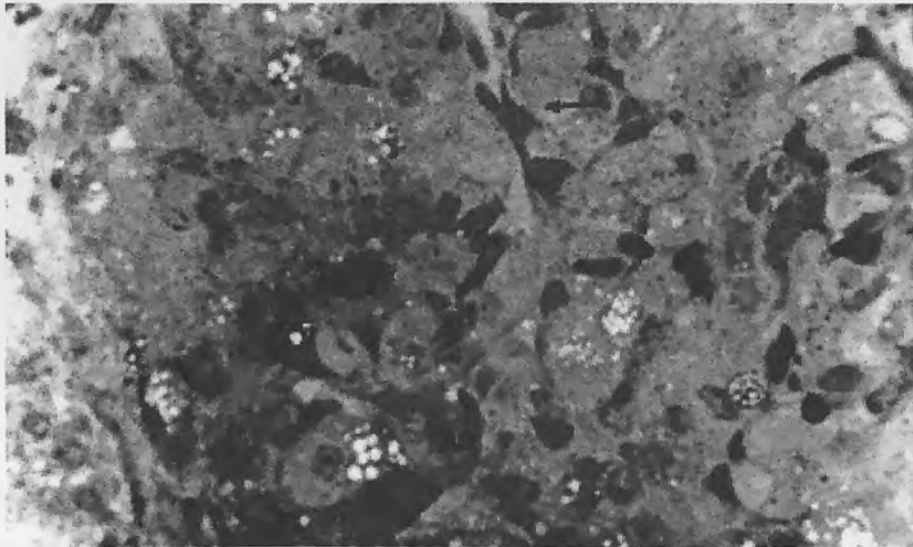


Fig. 2. Corpus luteum at midpregnancy (35th day) — around the capillaries single leucocytes are seen (arrow) (× 100)

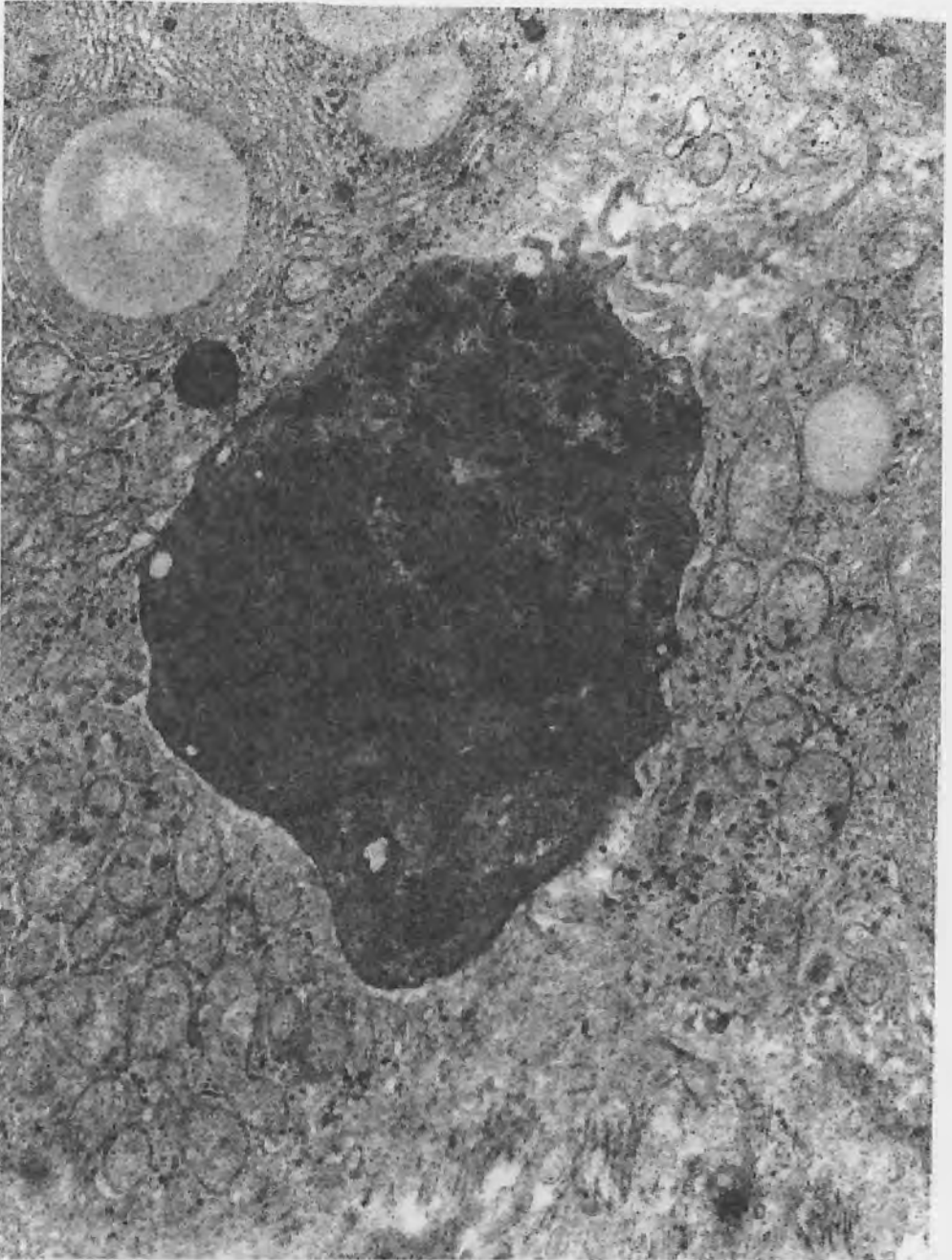


Fig. 3. Corpus luteum at early pregnancy (9th day) eosinophil (Eo) between the luteal cells (L) ($\times 16\ 000$) were seen in the vessels and around its when the neovascularization was available (Fig.1, 3, 4).

The luteal cells possess the well developed agranular endoplasmic reticulum (whorls), mitochondria with tubular cristae and lipid droplets, which are the ultra-

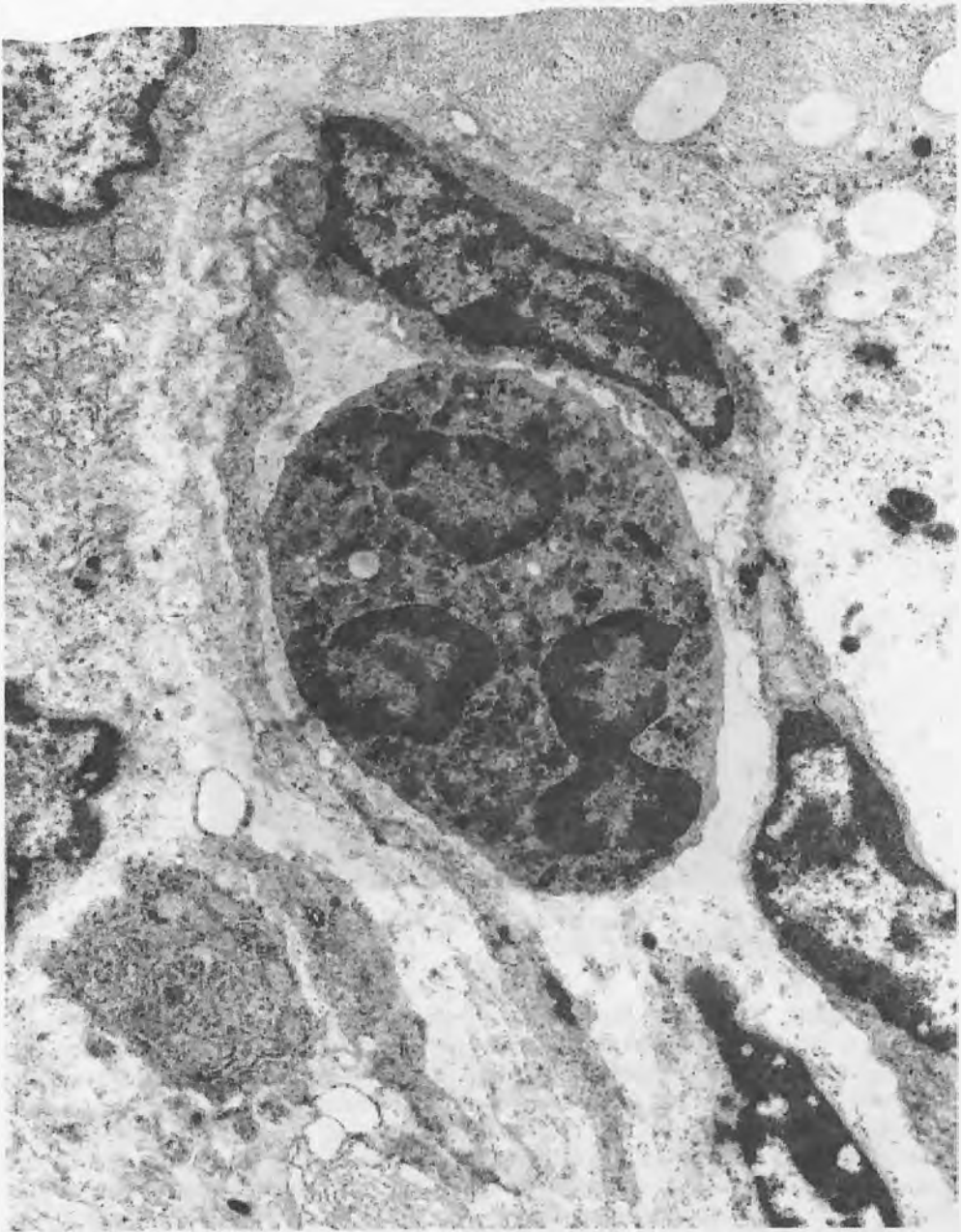


Fig. 4. Corpus luteum at early pregnancy (9th day) — polymorphonuclear leucocyte (PMN) in the capillary ($\times 14\ 000$)

structural features of steroid producing cells (Fig. 3, 4).

Corpus luteum is a model of transient physiological formation of the new blood vessels in the adult [12, 5]. In this early stage of guinea pigs corpus luteum formation eosinophils and polymorphonuclear leucocytes could be seen (Fig.3, 4).

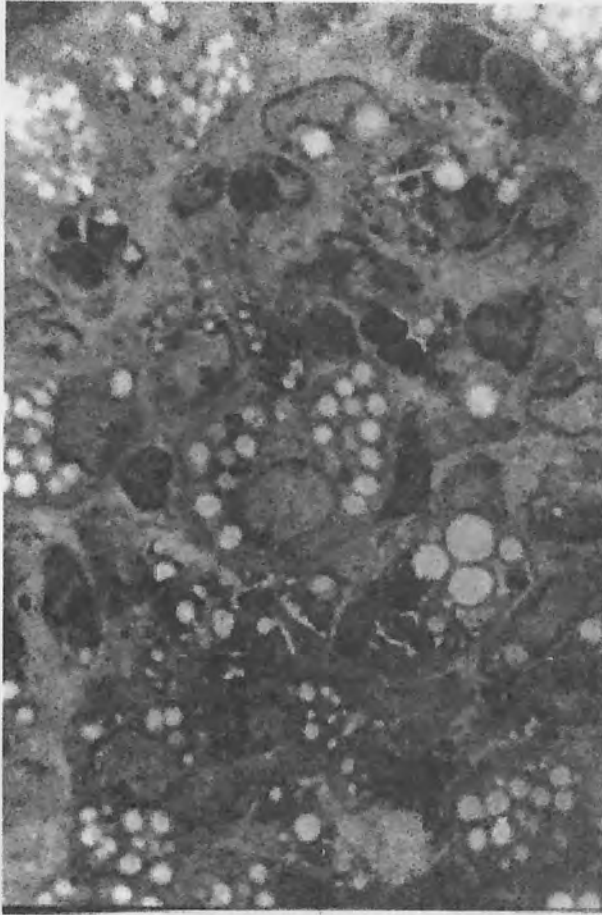


Fig. 5. Corpus luteum 20th day after the ovulation — many macrophages are seen ($\times 100$)

Different trafficking mechanisms involved in the appearance of these leucocytes during the luteinization have been suggested in the literature. V i g a n o et al. [13] pointed out the cyclic expression of adhesion molecules in the mammalian ovary. After R o h m et al. [11] the selective migration of various leucocytes subpopulations into ovary during the preovulatory period and follicular regression is accompanied by changes of the distribution pattern of adhesion molecules on the leucocytes and endothelial cells. On the other hand, the morphological signs of diapedesis and emperipolesis can be asked. The emperipolesis /term given by H u m b l e et al. [7] for engulfment of viable cells within other viable cells without reciprocal damage/, has never been reported for internalization of leucocytes by arterial muscular cells [6]. In our electronograms we have also not seen the emperipolesis of leucocytes in corpus luteum endothelial cells. After R o h m et al. [11] eosinophil accumulation at the time of ovulation and early corpus luteum development is due to their diapedesis from the circulation.

During the development and the bloom stage of the guinea pig corpus luteum of pregnancy (mid pregnancy) and of the oestrous cycle (on the 15th day of the

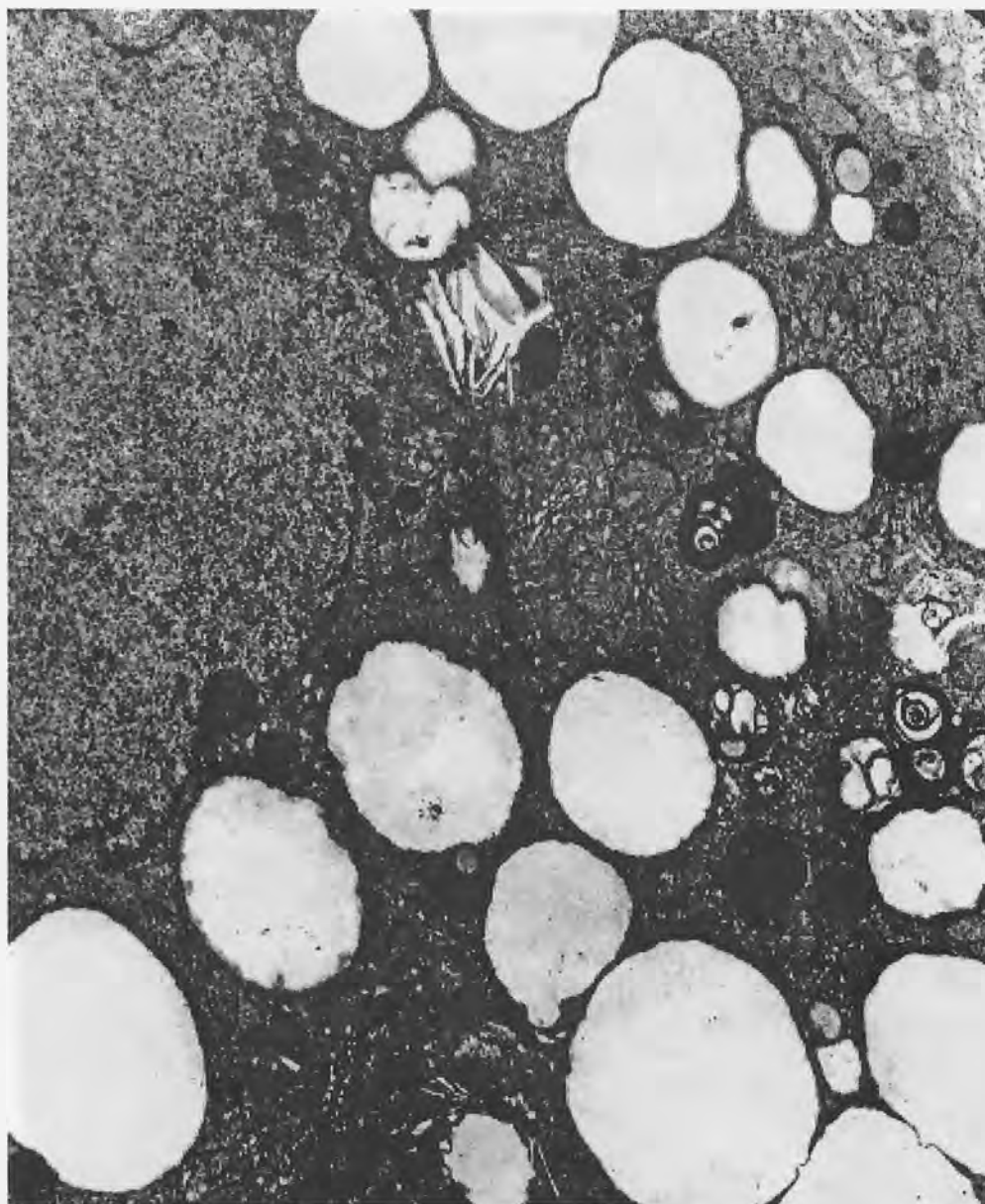


Fig. 6. Luteal cells two days after the parturition — autophagic structures in the cytoplasm ($\times 15\ 000$)

cycle), the eosinophils and neutrophils disappeared (Fig. 2) and appeared cells with phagocytic cell debris.

The results presented in this study show some differences in ultrastructural changes during involution of corpus luteum of pregnancy and corpus luteum cyclicum. At the end of guinea pig pregnancy autophagic processes (degenerative changes in the cytoplasm, enlarged cisternae of agranular endoplasmic reticulum, lipid droplets or the formation of autophagic vacuoles — i.e. secondary lysosomes) predominate in the luteal cells (Fig. 6). During the regression of the corpus luteum

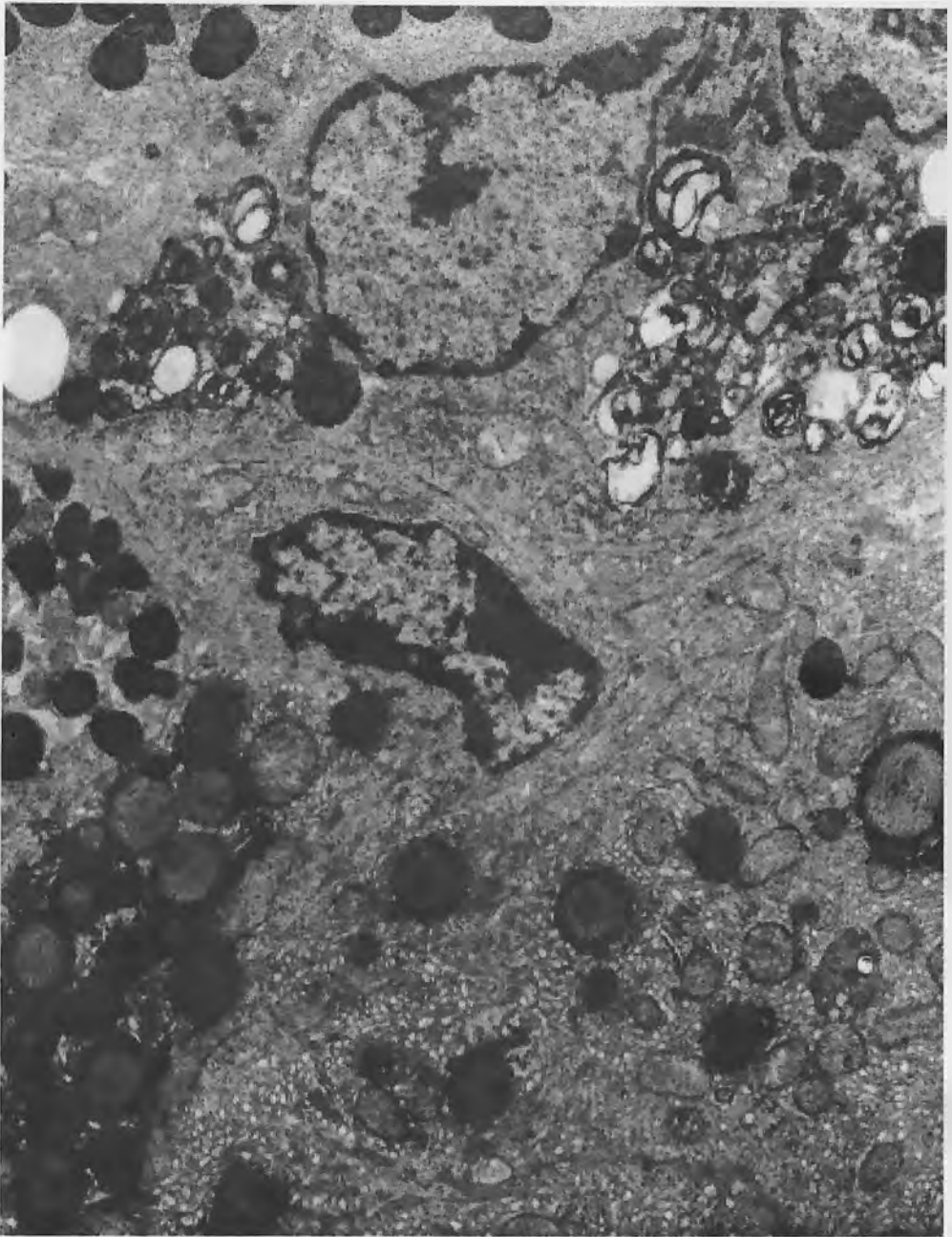


Fig. 7. Macrophages in the cyclic corpus luteum 20 days after ovulation ($\times 10\,000$)

cyclicum the heterophagocytosis is prominent and round large cells are seen among the luteal cells. Its nuclei are excentric situated and in the cytoplasm the large vacuoles and abundant large and small lysosomes could be visualized (Fig. 5, 7). K a s u y a and K a w a b u c h i [8] have been reported for the first time macrophages within the growing follicles of the guinea pig. There are different points of view

about the genesis of macrophages in corpus luteum: from theca interna [1], from capillar litoral cells and pericytes [4], by monocyte migration from the blood vessels [3].

Further investigations on the mechanisms involved in the selective increase of eosinophils, neutrophils and lymphocytes during the neoformation of the corpus luteum and of the increase of macrophages during its involution could be directed to the processes of blood cell migration and its physiological role in the corpus luteum functions.

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