

The blood for a certain time, in embryonic life, is found to contain only the red cells, most of which are nucleated, the leucocytes appear later. In adult life nucleated red cells are normally found only in the blood-forming organs, mainly the bone marrow.

All authors are by no means agreed upon the mode of origin of the non-nucleated red cells in mammals. Schaeffer traces them to differentiation of the protoplasm of the vaso-formative cells. This view correlates the animal blood globules with the plastids of the botanists. Against this view is the contention of Kölliker, that the red globules are derived from nucleated corpuscles which have lost their nuclei. Sanfelice regards the red cells as being derivatives of leucocytes. The white cells are supposed to shrink, lose their nuclei and become charged with hæmoglobin. Still another view is brought forward that the bone marrow produces non-nucleated red corpuscles from certain of its cells.

There seems little doubt that some of the first non-nucleated red cells arise in the vasoformative cells in different parts of the embryo. These cells acquire a reddish tinge, and after a time the substance becomes condensed in the form of globules within the cells and gradually assumes the size and shape of a red blood corpuscle. Some areas of embryonic connective tissue show such cells studded with these globules and forming nests of blood corpuscles or blood islands. The development of the non-nucleated red cells in this manner simulates very much the origin of the nucleated red corpuscles in the early embryo. There is only this difference, that in the intracellular origin of the red cells the nucleus of the mother cells seems to play no part, at least not through mitosis. It may be the nucleus does play a part in contributing hæmoglobin to the developing daughter-cells (Hayem). The intracellular development of red blood corpuscles ceases before birth, although in some animals it may be continued for a few days after birth. Subsequently, therefore, it becomes necessary to seek for some other source of origin of the red blood discs during the remainder of life. As soon as the vessels are definitely found in the embryo, and the vasoformative cells are no longer so active, new sites of blood forming organs develop.

Others have asserted that the lymph glands, and more particularly the thymus give rise to red corpuscles by a metamorphosis of their lymphocytic cells, (Malassez).

Very early in embryonic life the liver, as was pointed out by Kölliker, Neumann and others, becomes a principal seat of blood formation. It has been noted that certain cells, presumably of endothelial origin, about the capillaries of the liver, give off nucleated red cells by a