

**Note on the intracellular development of blood-corpuscles in mammalia /  
by Edward Albert Schäfer.**

**Contributors**

Sharpey-Schäfer, E. A. Sir, 1850-1935.  
Hogg, Jabez, 1817-1899  
Royal College of Surgeons of England

**Publication/Creation**

[London] : [Royal Society of London], 1874.

**Persistent URL**

<https://wellcomecollection.org/works/h67anhb8>

**Provider**

Royal College of Surgeons

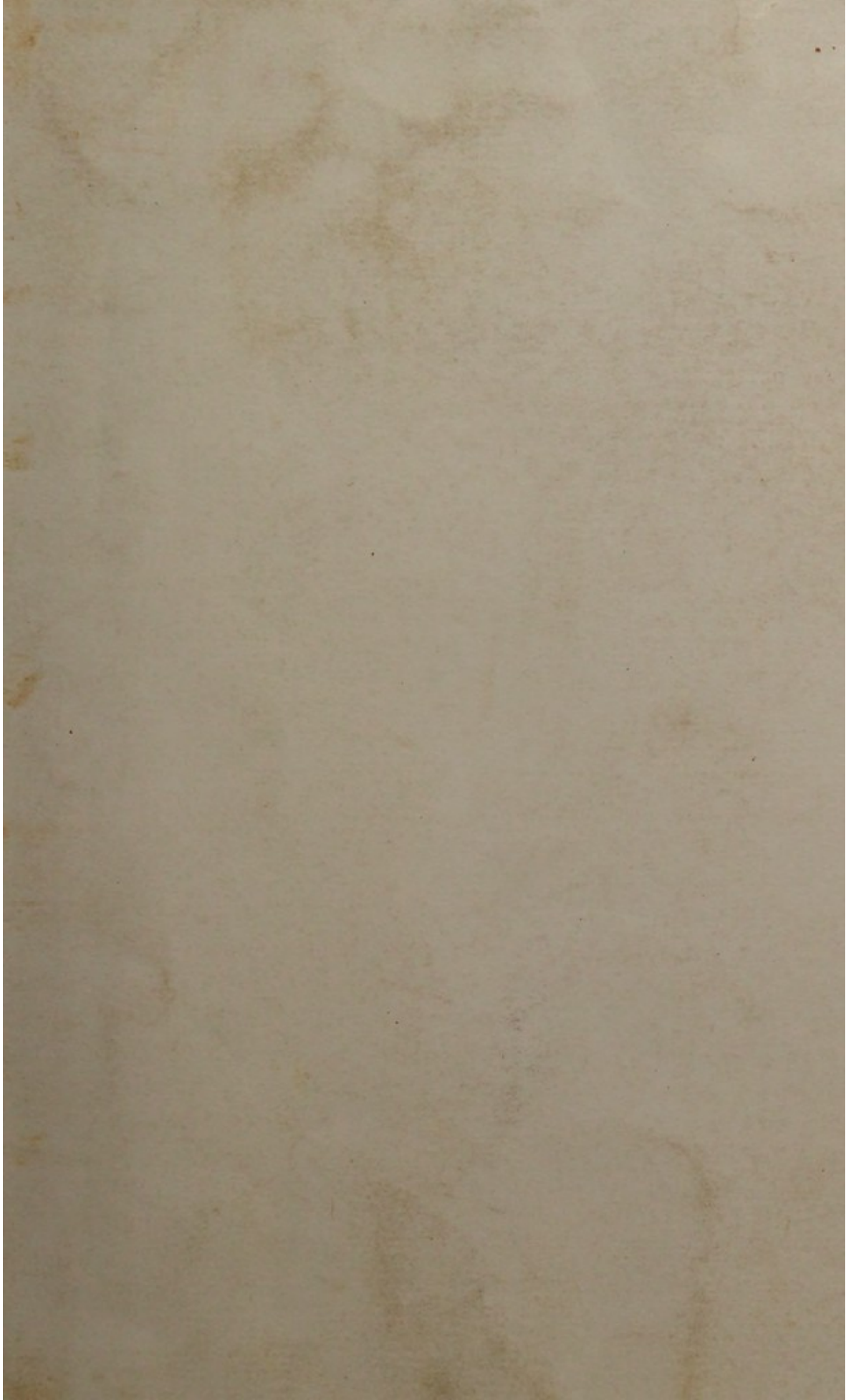
**License and attribution**

This material has been provided by This material has been provided by The Royal College of Surgeons of England. The original may be consulted at The Royal College of Surgeons of England. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection  
183 Euston Road  
London NW1 2BE UK  
T +44 (0)20 7611 8722  
E [library@wellcomecollection.org](mailto:library@wellcomecollection.org)  
<https://wellcomecollection.org>



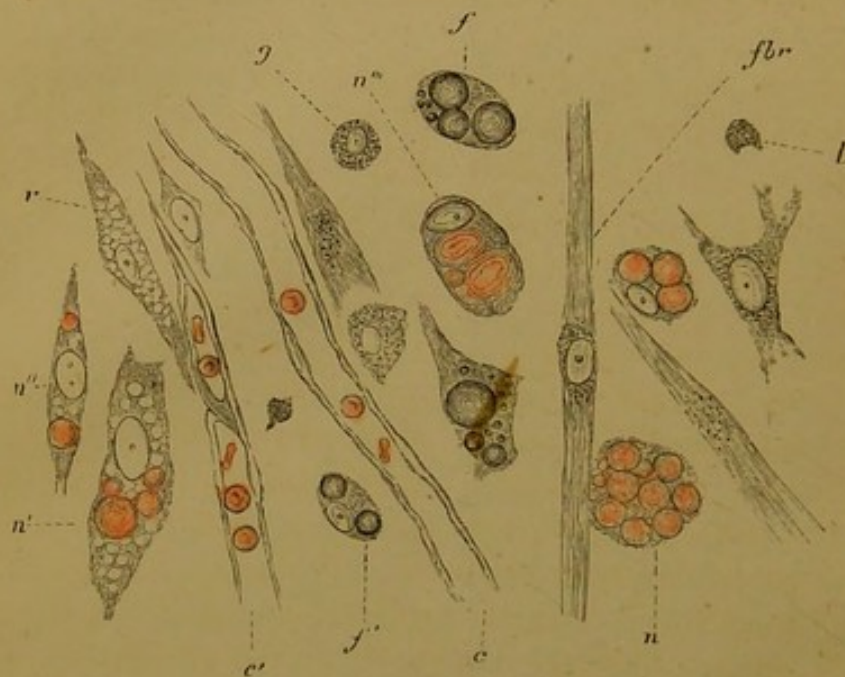


FIGURE SHOWING THE DEVELOPMENT OF BLOOD-CORPUSCLES WITHIN CELLS OF THE CONNECTIVE TISSUE. THE FIBRES ARE OMITTED FOR THE SAKE OF CLEARNESS. FROM THE SUBCUTANEOUS TISSUE OF THE NEW-BORN RAT, EXAMINED IN SALT-SOLUTION ( $\frac{1}{2}$  PER CENT.), AND MAGNIFIED ABOUT 350 DIAMETERS.

*n*, *n'*, *n''*, *n'''*, cells containing blood-corpuses in various stages of development; in *n'''* the reddish matter is mainly in two large roundish ill-defined patches; in *n* the hæmoglobin globules are of nearly equal size, and fill the cell; a little above this cell another is seen with three such globules; the nucleus is also apparent; *n'*, and *n''* exhibit in addition a number of vacuoles; *r*, vacuolated cell without blood-corpuses, applied to another cell the vacuoles of which have united to form a cavity in which two fully developed corpuses are observed; this cell is joined to the end of the developing capillary vessel *c'*; *c*, portion of a fully developed capillary; *f*, *f'*, cells in which fat is being deposited; another is seen to the right of the capillary, between it and *fbr*, fibrillated cell of the connective tissue; two other fibrillated cells are seen, in which no nucleus is visible; *g*, granular connective tissue corpuscle; *l*, migratory cell, or leucocyte; another between the two blood-vessels.

(To illustrate Mr. Schäfer's paper "on the intracellular development of blood-corpuses in Mammalia.")



Note on the Intracellular Development of Blood-corpuses in  
Mammalia. By EDWARD ALBERT SCHÄFER.

If the subcutaneous connective tissue of the new-born rat\* is examined under the microscope in an indifferent fluid, it is found to consist chiefly of an almost homogeneous hyaline ground-substance, which is traversed by a few wavy fibres, and has a considerable number of exceedingly delicate, more or less flattened cells scattered throughout the tissue. The cells here spoken of are of course the connective-tissue corpuscles. They are not much branched as a rule (at any rate their branches do not extend far from the body of the corpuscle), and they are mainly distinguished by the extraordinary amount of vacuolation which they exhibit—by which is meant the formation within the protoplasm of minute clear spherules, less refractive than that substance, and probably, therefore, spaces in it containing a watery fluid. The nuclei, of which there is generally not more than one in each cell, are frequently obscured by the vacuoles, but, when visible, are seen to be round or oval in shape and beautifully clear and homogeneous; they commonly contain either one or two nucleoli. It is from these cells that the blood-vessels of the tissue are formed, and within them, red, and perhaps also, white blood-corpuses become developed.

Of the vacuolated cells above described some possess a distinct reddish tinge, either pretty evenly diffused over the whole corpuscle, or in one or more patches, not distinctly circumscribed, but fading off into the surrounding protoplasm. Others contain either one, two, or a greater number of reddish globules, consisting apparently of hæmoglobin. These vary in size, from minute specks to spherules as large as, or even larger than, the red corpuscles of the adult: in cells which are apparently least developed it is common to find them of various sizes in the same cell; whereas cells which are further advanced in development are not uncommonly crowded with hæmoglobin-globules, tolerably equal in point of size, and differing from the adult corpuscle only in shape. It is important to remark that there is, at no time, an indication of any structure within the globules resembling a nucleus: the nucleus of the cell also appears, up to this point at least, to undergo no change. In fact the formation of the hæmoglobin-globules reminds one rather of a deposit within the cell-substance such as occurs in developing fat-cells, the difference being that in the latter case the deposited globules eventually run together into one

\* The animal employed was the white rat.



drop, whereas in the former they remain distinct as they increase in size and eventually take on the flattened form.

Before, however, this change occurs in the hæmoglobin-globules, the cells containing them become lengthened, and are soon found each to contain a cavity, within which the globules now lie. This cavity is probably formed by a coalescence of the vacuoles of the cell, or, what amounts to the same thing, by the enlargement of one vacuole and the absorption of the rest into it. The cell now comes to resemble a segment of a capillary, but with pointed and closed extremities; it is of an elongated fusiform shape, and consists of a hyaline protoplasmic wall (in which the nucleus is imbedded) enclosing blood-corpuscles in a fluid—blood, in fact.

Two or more such cells may become united at their ends, a communication being established between their cavities; indeed, by aid of branches sent out from the sides a number of cells may unite to form a complete plexus of capillary vessels containing blood, and situate at a considerable distance in the tissue from any vessels in which blood is circulating. Eventually, however, these last become united with the newly developed capillaries, and the blood contained in the latter thus gets into the general circulation.

With regard to the mode of junction of the capillary-forming cells with one another, and with processes from preexisting capillaries, it has seemed to me to occur most commonly, not by a growing together of their extreme points, as commonly described, but rather by an overlapping and coaptation of their fusiform ends, which, at first solid, become subsequently hollowed by an extension into them of the cavity of the cell or capillary, the partition between the two being finally absorbed.

The best preparations for demonstrating the facts above described are obtained from the subcutaneous tissue of the upper part of the fore limb, and from that under the skin of the back—regions in which, in the adult rat, this tissue becomes almost entirely converted into fat. Even in the new-born animal some portions have already undergone this change; and it is principally in the neighbourhood of such patches that the hæmopoietic cells are met with. It is only when the young rats are not more than a few days old that the formation of blood-vessels is preceded by a development of blood-corpuscles within the same cells as form the vessels: in such other animals as I have hitherto examined this phenomenon seems to occur only whilst still in the foetal state. The immature condition in which the young of the rat are brought forth is sufficient to account for this difference.

The observations here recorded as to the intracellular development of blood-corpuscles are in many respects in accordance with what has already been described by others as occurring in the *area vasculosa* and other parts of the embryo chick. It has not, however, appeared desirable to enter into the literature of the subject in this brief notice.



