

Citation:

A.A.W. Hubrecht, Haematopoiesis in the placenta of Tarsius and other mammals, in:
KNAW, Proceedings, 1, 1898-1899, Amsterdam, 1899, pp. 167-170

KONINKLIJKE AKADEMIE VAN WETENSCHAPPEN
TE AMSTERDAM.

PROCEEDINGS OF THE MEETING

of Saturday November 26th 1898.

(Translated from: Verslag van de gewone vergadering der Wis- en Natuurkundige
Afdeling van Zaterdag 26 November 1898 Dl. VII).

CONTENTS: „Haematopoiesis in the placenta of Tarsius and other mammals”. By Prof. A. A. W. HUBRECHT, p. 167. — „On a Contagium vivum fluidum causing the Spot-disease of the Tobacco-leaves”. By Prof. M. W. BEIJERINCK, p. 170. — „On congealing- and melting-phenomena in substances showing tautomerism”. By Prof. H. W. BAKHUIS ROOZEBOOM, p. 176. — „Variation of volume and of pressure in mixing”. By Prof. J. D. VAN DER WAALS, p. 179. — „Equilibriums in systems of three components. Change of the mixing-temperature of binary mixtures by the addition of a third component”. By Mr. F. A. H. SCHREINEMAKERS (Communicated by Prof. J. M. VAN BEMMELEN), p. 191. — „On the accurate determination of the molecular weight of gases from their density”. By Prof. J. D. VAN DER WAALS, p. 193. — „Some remarks upon the 14-monthly motion of the Pole of the Earth and upon the length of its period”. By Dr. E. F. VAN DE SANDE BAKHUYZEN (Communicated by Prof. H. G. VAN DE SANDE BAKHUYZEN) p. 201. — „A standard open manometer of reduced height with transference of pressure by means of compressed gas”. By Prof. H. KAMBERLINGH ONNES, p. 213. (With one plate.)

The following papers were read:

Zoology. — „*Haematopoiesis in the placenta of Tarsius and other mammals.*” By Prof. A. A. W. HUBRECHT.

The various authors who have investigated in the course of the last thirty years the first origin of the mammalian red blood-corpuscles have come to conclusions that are far from unanimous. This can in part be ascribed to the wish to look upon the red blood-corpuscles without nucleus of the full-grown mammalia as morphological elements, that are equivalent with the nucleated red corpuscles of the lower vertebrates and of mammalian embryos.

Against this view SCHÄFER, SEDGWICK-MINOT and RANVIER (whose experimental proof has however a year ago been disposed of by VOSMAER) protested. The two first-named look upon the non-nucleated mammalian blood-corpuscles as plastids, that are formed in cells in an analogous way as are the chlorophyll-granules in vegetable cells. The majority of the remaining investigators consider the non-nucleated mammalian blood-corpuscles as cells from which the nucleus has either been extruded (RINDFLEISCH, VAN DER STRICHT, BIZZOZERO, SAXER, KOSTANECKI, HOWELL, MONDINO), or in which the nucleus gradually disappears within the bloodcell (KÖLLIKER, NEUMANN, SANFELICE, SPULER, LÖWIT, ELIASBERG, FREIBERG, GRUNBERG, ISRAEL, PAPPENHEIM). DISSE, summarizing the results obtained up to 1895 writes as follows: „Eine sichere Entscheidung der Frage nach dem Modus der Entkernung der rothen Blutzellen erscheint einstweilen unmöglich, da die directe Beobachtung des Vorganges der Entkernung im strömenden Blut unthunlich ist.”

On comparing the maternal and the embryonic blood-corpuscles as they circulate in each other's immediate vicinity in any section of the preserved placenta of various mammals in various stages of development we are struck by two facts. Firstly the nuclei of the embryonic blood-corpuscles differ in many respects from the nuclei of the very earliest bloodcells that arise in the area vasculosa. Secondly it is the first-named „nuclei” and it is not the corpuscle that encloses them, which resemble both in size and very often in staining properties the non-nucleated corpuscles of the mother, so that the question imposes itself whether, if indeed the nucleated embryonic mammalian blood-corpuscles change into non-nucleated corpuscles by extrusion of the nucleus, it might not much rather be this so-called nucleus (which differs notably from a normal nucleus) which will correspond to the definite non-nucleated corpuscle, than the vesicle from which it has been expelled.

The observation of quite a different series of phenomena in the placenta of *Tarsius spectrum* leads to a confirmation of this hypothesis. They render it probable that during the development of the *Tarsius*-placenta part of the cell-material which is actively concerned in this development, becomes converted into blood-corpuscles that are set free in the circulating maternal blood which bathes it. These bloodcorpuscles, entirely corresponding to those which we encounter everywhere in the maternal bloodvessels, do not take their origin out of the cytoplasm but out of the nucleoplasm and do not consist of chromatin so characteristic for the nucleus, but rather and principally of nucleolar matter which plays a part in many cell-nuclei

by the side of the chromatin. Haematopoiesis occurs in various ways in the Tarsius-placenta. Every now and then we notice a nucleolar body (the nuclear membrane surrounding it becoming partially indistinct and then disappearing) being set free and mixing up with circulating blood-corpuscles from which it cannot possibly be distinguished. Besides this simpler mode of origin we find another in which large-sized, so-called giantcells with lobulated and gemmating nuclei play a part. Numerous nuclear fragments are set free from it, the nucleus itself vanishing in the process. The fragments are of equal size, behave in a corresponding way towards the most different staining reagents and might be designated as „haematogonia”. All the intermediate stages between these haematogonia and normal blood-corpuscles were observed and similarly their development out of the enlarged nucleus and not out of the cellplasm could be demonstrated. It are not only maternal but also embryonic trophoblastcells which partake in this haematopoiesis under similar phenomena of proliferation; the blood-corpuscles thus formed are, also caught up by the maternal blood and circulate with it.

A destructive significance cannot reasonably be given to the giantcells in the Tarsius-placenta: they are decidedly constructive elements, which furnish not only blood-corpuscles, but also the walls of bloodlacunae. This double part is often played by solid strands of cells in lower vertebrates.

It deserves attention that the participation of giantcells with characteristic proliferating nuclei in the formation of blood in the bone-marrow, the liver and the spleen of mammals was expressly recognized by NEUMANN, KÖLLIKER, PEREMESCHKO, KUBORN, SAXER, ELIASBERG, FREIBERG a. o. Many of them look upon the proliferation of the nuclei of these giantcells (which are perfectly distinct from those other giantcells, the osteoclasts which occur in their immediate vicinity in the bone-marrow) as the first step in the formation of blood-corpuscles, although none of them has expressed the opinion that these latter should not be looked upon as cells but as nuclear derivatives. As soon as we do this, on account of what we have observed in Tarsius, light is also thrown on the development of the fullgrown non-nucleated corpuscles out of embryonic nucleated ones, a phenomenon which as above indicated is undoubtedly comparable to it.

Similar haematopoietic processes are noticed in the placenta of Tupaja, which differ in detail but agree in general outlines with what has here been described for Tarsius.

Whether blood is also formed in the placenta of other mammals must be carefully looked into. Corpuscles are figured, mixed up with maternal blood-corpuscles, by NOLF for the bat's placenta, by MAXIMOW for that of the rabbit, by SIEGENBEEK VAN HEUKELOM for that of man, with which I feel inclined to identify my „haematogonia” and of which the first and last-named author decidedly state that they are distinguished by certain characters from polynuclear leucocytes.

Neither of them, however, refers what he has observed to haematopoeisis.

In point of fact MASQUELIN and SWAEN (1880) and FROMMEL (1888) have already stated that blood is formed in the placenta respectively in the rabbit and in the bat. Their observations have up to now convinced but few and do not correspond in their details with my own. What I have myself observed in the rabbit, the hedgehog, the shrew and the mole has never emboldened me to conclude to the existence of haematopoietic processes in the placenta: it was not until I had examined the *Tarsius*-placenta in which the phenomena are so extraordinarily lucid that I was forced to draw the conclusions of which a rapid sketch was given above, but which is in no way meant to be a generalisation. Ungulates and Lemurs, certain Edentates (and probably also the Cetacea) undoubtedly miss a similar haematopoeisis. Its strong development in *Tarsius* is perhaps connected with the unfavourable relation in which the small and delicate mother finds itself placed with respect to the comparatively large foetus, while moreover each parturition is generally immediately followed by a new pregnancy, a circumstance which however exhausting its effect may be upon the mother is decidedly most favourable to the collector of embryological material.

This short account will soon be followed by a full description with plates and figures, which will appear in the Report of the Zoological Congress that was held at Cambridge in 1898.

A discussion followed in which Prof. MAC GILLAVRY and Prof. HUBRECHT took part.

Botany. — „*On a Contagium vivum fluidum causing the Spot-disease of the Tobacco-leaves*”. By Prof. M. W. BEIJERINCK.

The spot-disease of the tobacco plant, also called mosaic-disease, consists in a discoloration of the chlorophyll, spreading in little spots over the leaf and afterwards succeeded by the partly or entirely dying away of the tissue which originally composed the spots. Com-