BIOLOGY

Red Corpuscles of the Blood

"A Classic of Science"

Leeuwenhoek in Holland Studied the Microscopic World And Wrote of His Discoveries to Friends in England

MICROSCOPICAL OBSERVATIONS FROM M. LEEUWENHOEK. In Philosophical Transactions of the Royal Society: giving some Accompt of the Present Undertakings, Studies and Labours of the Ingenious in many Considerable Parts of the World. Vol. IX. London: MDCLXXIV (1674). [*Englished by the Secretary of the Royal Society*]. *This is an exact reprint of extracts from the original publication.*

I HAVE divers times endeavoured to see and to know, what parts of the *Blood* consists of; and at length I have observ'd, taking some Blood out of my own hand, that it consists of small round globuls driven thorough a Crystalline humidity or water: Yet, whether all Blood be such, I doubt. And exhibiting my Blood to my self in very small parcels, the globuls yielded very little colour. . . .

The small Red Globuls in the Blood, formerly spoken of, are heavier than the Crystalline liquor in which they are carried, because soon after that the Blood is let out of the Veins, those Globuls by little and little subside towards the bottom; and being made up of soft fluid Corpuscles, and many lying upon one another, they do unite themselves close together, and by this close conjunction the Blood that is under the surface alters its colour, and becomes dark-red or blackish; as I have observed several times: of which I take the reason to be, (with submission to better Judgments) that the Air cannot move every way round about the Globuls, and hits as twere against a close darkish body. Touching the *Florid* red colour of the surface of the Blood exposed to the Air, that comes, in my opinion, from hence, that the *uppermost* Globuls are not press'd, and therefore retain their nature, and the Globuls *subjacent* to the uppermost lye close together, by reason of which close conjunction the Air or Light cannot penetrate through them, but is reflected, and so gives a greater light to, and about, the uppermost Globuls, than they had before the union of the inferiour Globuls; and this it is that makes them appear more florid.

I shall herewith communicate the Manner *how* I have observ'd, among other things, *Blood* and *Milk*. I did my self prepare divers sorts of very slender hollow Glass-pipes, of which some were not thicker than a mans-hair; and the slenderer they are, the clearer will they make the red Globuls of the Blood appear. But, for seeing the Crystalline water in which those Globuls move, and for observing also how they subside, these Pipes may be made somewhat thicker. Having then made ready such a small Pipe, I tye about the uppermost joynt of (e.g.) my thumb a string, as is usual in opening a Vein of an Arm, and then I prick that part of my thumb with a pin, to make it bleed; this blood I wipe off, if I intend to keep any for the Air. And then I look well to the place prick't, putting upon that point my Glass-pipe, and withal squeesing my thumb to press out more blood; which being thus press'd out, will in part run up into the said pipe: This pipe with the blood in it, I lay upon a piece of white paper, and with my nail break a little piece from it, and set it to the pin of my Microscope, having first a little wetted the pin with my spittle, or a little turpentine, to make the pipe stick to it; or else I take the whole Glass-pipe, and with my hand hold it before the Microscope. Now in such a Glass-pipe, the blood on the surface, and that which is under it, is almost of the same colour, although it stand a pretty while in it, because the Globuls in the Glass-pipe are but few, nor lye they so close together. The slenderer the pipe is, the higher will the blood rise into it. And that the Curious in your parts might themselves see this, I have used the freedom of sending you some of the said hollow Pipes, by the means of which I hope my above-mention'd speculations will be verified.

The red Globuls of the Blood I reckon to be 25000 times smaller than a grain of sand; which perhaps will to many seem incredible: But the matter being about figured Bodies, 'tis known, that, two Globes being given, the Axis of one whereof is 1, and that of the other, 20, the proportion between their magnitudes is as 1 to 8000; Spheres being in a triplicat proportion to their Diameters. The same red Globuls, when they are single, and stick within to the sides of the Glass-pipes, will appear white and colourless.

Further, if your Curiosity shall lead you to observe the motion of those red Globuls thorow the Crystallin liquor, be pleased to take one of the thicker sort of these pipes, filling it partly with blood, and so putting the lower end a little into the flame of a Candle, and closing it hermetically. Which done, set the pipe upright, with the other end upwards, that so the red Globuls may sink. And desiring to see the motion of those Globuls, apply a little warmth to the pipe, making use only of a warm hand; by which warmth the Air must expand it self into a greater space, and the blood in the pipe will be driven up higher; by which means the red Globuls will in part come to move above in the Crystallin humidity; yet if those Globuls come to joyn themselves too close together, this Observation will fail.

Science News Letter, November 19, 1932

Anton A. Leeuwenhoek, born in 1632, in Holland and Robert Hooke, his contemporary, in England, were two pioneers in making and using microscopes. Hooke's instrument was very similar to the compound microscopes in use today, while the Dutch scientist preferred a single lens of very short focal length for most of his observations. Leeuwenhoek's discovery of microbes (1676) was published in the SNL Oct. 18, 1930. Hooke's discovery of cell structure was the first "Classic of Science" published, SNL Sept. 17, 1927.