

MEDICAL CLASSICS

MARCELLO MALPIGHI (1628–1694) was born near Bologna. The achievement for which he is best remembered was his conclusive demonstration that capillary anastomosis exists between arteries and veins. This theory had first been postulated by Erasistratus, who lived 19 centuries before Malpighi, and anyone who had studied the vascular system after that time had been forced to accept it. Had it not been for Malpighi's proof, however, Harvey's belief that such a circumstance occurred in the lungs and elsewhere in the body might not have survived, since theories nearly as good had died for lack of supporting evidence.

Malpighi's discovery was one of the first in which the eye was aided by magnifying lenses. He published his report in the form of two letters to his friend Giovanni Borelli, *De Pulmonibus Epistolae II ad Borellium*, Bologna, 1661. Part of an English translation of these letters* follows:

"For, while the heart is still beating, 2 movements contrary in direction though accomplished with difficulty are observed in the vessels so that the circulation of the blood is clearly laid bare; and indeed the same may be even more happily recognized in the mesentery and in other larger veins contained in the abdomen. And thus by this impulse the blood is showered down in minute streams through the arteries, after the fashion of a flood, into the several cells, one or other conspicuous branch passing right through or leaving off there, and the blood, thus repeatedly divided, loses its red color, and, carried round in a sinuous manner, is poured out on all sides until it approaches the walls, and the angles, and the absorbing branches of the veins.

"The power of the eye could not be carried further in the opened living animals; hence I might have believed that the blood itself escaped into an empty space and was gathered up again by a gaping vessel and by the structure of the walls. But an objection to this view was afforded by the movement of the blood being tortuous and scattered in different directions and by its being united again in a determinate part. My doubt was changed into certainty by the dried lung of the frog which to a very marked extent had preserved the redness of the blood in very minute tracts (which were afterwards found to be vessels) where by the help of our more perfect glass there

* FOSTER, M.: *Lectures on the History of Physiology*. London and New York, Cambridge Univ. Press, The Macmillan Co., 1901, pp. 96-97.

met the eye no longer scattered points resembling the skin which is called *Sagrino*, but vessels joined together in a ring-like fashion. And such is the wandering about of these vessels, as they proceed on this side from the vein and on the other side from the artery that the vessels no longer maintain a straight direction, but there appears a network made up of the continuations of the 2 vessels. This network not only occupies the whole area but extends to the walls, and is attached to the outgoing vessel, as I could more abundantly and yet with greater difficulty see in the oblong lung of the tortoise, which is equally membranous and transparent. Hence it was clear to the senses that the blood flowed away along tortuous vessels and was not poured into spaces, but was always contained within tubules, and that its dispersion is due to the multiple winding of the vessels. Nor is it a new thing in Nature to join to each other the terminal mouths of vessels, since the same obtains in the intestines and other parts; and indeed, what seems more wonderful, she joins together by a conspicuous anastomosis the upper and lower terminations of veins as the most learned Falloppius has very well observed.

"In order, however, that you may more easily grasp what I have just stated, and follow it with your own eyes, ligature with a thread at the spot where it joins the heart, the protruded and turgid lung of a frog whose body has been laid open, doing this while a copious supply of blood is flowing through the whole of it.

"This even when dried will preserve its vessels turgid with blood. And this you will see exceedingly well if you examine it with a microscope of a single lens against the horizontal sun."

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