

AN  
INAUGURAL DISSERTATION  
ON

*The Circulation of the Blood*

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# Circulation of the Blood

1st

We should peruse with pleasure the medical history of the past, deeply deploring its condition and viewing with regret the numerous disadvantages under which those who had embarked in our glorious profession of medicine underwent in attempting to elevate its standard.

Although their knowledge was quite limited with reference to the whole subject, we find them upon no one point so ignorant as that of the anatomy and Physiology of the circulation of the blood.

Upon examination we will see that no one attempted to investigate this subject until 460. B.C.) when Hippocrates who is very deservedly termed the father of medicine possessing a mind vast and progressive devoted a lifetime of indefatigable study to those branches relating to a small degree the mystic veil

2<sup>ed</sup>  
11

which had from no those beauties that oblivion  
had claimed as her own inheritance, succeeding  
only in tracing the various ramifications  
of the blood vessels, allotting to neither their  
normal function. The accomplishment of even  
these facts lay foundation upon which some one  
might stand for the further prosecution of this  
matter. consequently after a lapse of more than  
six centuries - Galen, who, possessed a mind  
hardly inferior to that of his noble predecessor  
very clearly proved that these vessels contained  
blood thereby completely eradicating the false  
belief of the ancients that their functions were  
those of distributing air throughout the  
system. The subject made no further advances  
for a period of 1200 years when Torretus  
and his contemporary Vesalivus threw considera-  
ble light upon the subject, very clearly  
proving the hepatic and Pulmonic circulation

Again we find in 300 years the public mind content with discovery is that point. When the illustrious Harvey seized the subject with a lions grasp and gigantic mind brought forth as the offering of his labour, correct conclusions respecting the whole subject to whom we are indebted and to whom is attributed the honors accruing from this great discovery.

Having given a brief historical sketch of medical progress from the time of Hippocrates to Harvey. We will enter first upon the anatomy (general) of the circulatory apparatus and then enquire into the Physiology of its actions.

We believe the heart to be the source and cause of the passage of the blood throughout the system. A hollow muscular organ situated in the thorax resting upon the cartilaginous tendon of the diaphragm enveloped in a membranous sac termed the pericardium and occupying a position

4<sup>th</sup>

between the two Pleura, consisting of two Auricles and two ventricles so arranged as to communicate with each other by means of valves which are closed and opened at the respective actions of each, to prevent regurgitation and allow the escape of blood from one to the other Beginning at the right Auricle the blood passes into the right ventricle from thence expelled through the Pulmonary artery to the lungs, there to be fitted by coming in contact with the oxygen of the atmosphere to afford nutrition to the various tissues of the body, at the same time riding itself of Carbonic acid gas which it has collected from decay of tissues in its travel from the extremities to the heart. It is then returned through the pulmonary artery to the left Auricle passes then into the left ventricle and by its great contractile power distributed through the aorta and its numerous

branches throughout the whole system. The former being termed the Pulmonic the latter the Systemic circulation. There exists a difference in thickness between the walls of the right and left ventricles, the former only requiring sufficient strength to send the blood to the lungs while the latter has to possess power to give sufficient impetus to the blood <sup>so</sup> as to force it through out the whole system making the pulse at the extremities almost synchronous with the hearts beat.

We are now lead to enquire into the exciting causes of these alternate contractions and dilatations with reference to which there exists much discrepancy of opinion among the most celebrated writers of our day. Some have supposed that the arterial blood coming in contact with its walls act as sufficient stimulus to affect this end; but Kirke & Paget

deny that arterial blood possesses any such power and clearly proves the fallacy of this proposition by excising the heart of a fish and by repeated ablations entirely cleansing it of arterial blood and the same movement will ensue.

Then the advocates of the supposed truth of this proposition seeing that its presence is not necessary to excite movement as a subterfuge attribute its action to the almost then claiming that it possesses peculiar properties calculated to bring about this movement, but this again is disproved by placing it under an exhaustor when it is utterly impossible for any supposed exciting agent to come in contact with it and we see that its motion is not retarded.

These results then demolish completely all such hypotheses depriving the "Quisotic Genus" of all farther argument to prove

~~in~~ substantiate things so preposterous, compelling  
 them to desert the field which afforded such  
 unlimited scope to their wild imaginations  
 underriding their minds reluctantly content with  
 the ungarmented fact that nature's God has  
 endowed it with that peculiar power thereby  
 doing away with everything that suggest  
 physiological retrospection or conjecture.

However observing the effects of Anesthetic agents  
 upon the circulation - the lessening dependent  
 upon de-oxygenation we are compelled to  
 believe in fact we know that oxygen sustains  
 the normal action of the heart, but we are  
 not warranted to conclude that its action  
 is attributable to the presence of oxygen  
 but to a combination of circumstances which  
 we know are requisite to the functional performance  
 of any part of our organism. .E.g. We consider  
 light indispensable to our very existence, throwing

That when we deprive animals or plants of its rays  
 They undergo rapid changes - we are though  
 to conclude that because it is necessary to our  
 existence - that that existence has been brought  
 about by its agency? No! We are equally justify-  
 able in concluding in the other instance  
 that because oxygen is necessary to the  
 continued motion of the heart, that it  
 has acted as an exciting cause, either of  
 which would be absurd - But let us enquire  
 into the cause of the expulsion and return  
 of the blood - As to the first we are all  
 pretty well agreed believing it dependant  
 upon the contraction of the left ventricle  
 and partially to the construction of the  
 aortis. But in relation to its return there  
 seems to be a variety of opinions, one of  
 which I mention as it possesses an  
 indefeasible claim to position pre-eminent.

in the category of absurdities. viz- That it is brought back by a very mysterious power which the heart possesses termed suction. I will first attempt to prove that this can be attributed to the existence of no such power. and then that this organ possesses nothing that approximates that power. For I contend

that the pressure of blood in the extremities there being no other means of escape is forced to take the channels of the veins back to the heart- which I think is proven by the application of a bandage to the arm in preparation for venesection; it being applied sufficiently tight to check venous but not arterial circulation an incision being made we perceive a gradual flow from the orifice from which fact we are led to suppose that it must return in precisely the same manner to the

Heart 2<sup>ed</sup> Were this immigration dependent  
 upon the existence of such power there would  
 be no necessity for such bandage, for as  
 soon as its connexion is severed the blood  
 must unhesitatingly cease to flow. 3<sup>rd</sup>  
 That this organ possesses no such power  
 If the blood be cut off you thereby deprive  
 the heart of its supposed normal function  
 the result of which would certainly be a derangement  
 of the whole circulatory apparatus  
 Again. To possess suction a vacuum would  
 be created. The presence of air and its  
 exhaustion is necessary to the production  
 of that vacuum. Converting its right  
 Auricle into a bell glass and the right  
 ventricle into an air pump - which would bring  
 us to consider the absurd theory of the  
 Ancients - that these vessels were intended  
 for the circulation of air throughout the system

Again allowing the dilatory power to be equal to  
 the contractile The same impulse would be given  
 to the vein as to the artery, which we know  
 not to exist. It is true that frequently pulsations  
 are sometimes to be seen in the veins of the  
 neck, of Amateurs persons which Dr. Kease  
 attributes to respiration and which he proves  
 by inserting a tube into the Jugular vein of an  
 animal and submerging the other end under  
 water and at inspiration the water will  
 ascend the tube and form itself in the vein  
 Consequently I am brought back to my original  
 affirmation that its return is attributable  
 only to a pressure of blood in the extremities

As to the anatomical structure of the vein  
 and artery there is but little difference  
 the vein being deficient in Muscular fibre  
 which the Artery possesses indeed we find  
 no muscular fibre in the veins anywhere but

near the heart which resemble closely that of the covering of the Arteries consequently we can very readily distinguish the difference between the Artery and vein in the dead subject. The one retaining its original cylindrical form while the other is in a collapsed state and being knobby in their appearance caused by the numerous valves placed along the course of the vein to prevent regurgitation. McBernard allots to the muscular fibre upon the Venae Cavae and Hepatic veins the function of assisting in the Hepatico-Renal circulation and with these exceptions he denies the existence of muscular fibre in the veins. The muscular fibre in the artery we know to be necessary in its accomodating itself to the volume of blood sent through it - at each ventricular contraction and by means of this contractile and dilatory power a steady stream together with this

propagation of ventricular contractions is kept up  
 the latter of which produces what is termed the  
 pulse. Next and lastly we will briefly consider  
 the structure and physiology of the capillaries  
 and their circulation. They are a microscopic  
 network of blood vessels whose junctions serve  
 to convey arterial blood to every and most  
 minute structure of the animal economy  
 hence considered by Physiologists to be by far  
 the most important of the three. We here  
 give two sets, the 1<sup>st</sup> consisting of gradually  
 diminishing terminations of arteries and ~~veins~~  
 those comprising the intermediate network  
 or "rete" of uniform size of so small calibre  
 as to admit only a single row of blood  
 corpuscles. Its circulation is partly dependent  
 upon the action of the heart and also by  
 a principle which is termed endosmosis  
 and exosmosis. The arterial blood possessing

a stronger affinity for those tissues carrying  
 their nutrients essential to their very existence  
 forces itself in at the displacement of the  
 venous blood which it rejects as useless until  
 it has returned to the heart and lungs  
 there to be refitted to subserve the same great  
 purpose. This we prove by two liquids being  
 made to communicate with each other through  
 a capillary tube for which they have an  
 unequal affinity a movement will occur  
 the one possessing the stronger affinity will  
 insinuate itself at the expense or displace-  
 ment of the other. Thus having given a  
 brief consequently an imperfect description  
 both Anatomically & Physiologically I submit  
 most respectfully the above

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