and arterioles, because if this were wanting, as at present constituted we should either have to go about on all-fours or constantly run the risk of fatal syncope. Moreover, the blood would gravitate into the most dependent parts, the cooling surface would be enormous, the capillary velocity would be diminished, the blood would become surcharged with CO , and we would become cold-blooded animals. When the vasomotor nerves of a rabbit are paralyzed it appears all right until you suspend it by the ears, and then it immediately dies. The arteriolar resistance saves us from such risks.

In the second line of resistance there is a greater transformation of energy. If there be very little resistance in the veins a large proportion of the kinetic energy is carried right through to them, but as far as the resistance to the outflow has to be overcome the velocity is converted into pressure. There is considerable waste or rather transformation of energy in overcoming resistance and in producing filtration pressure. In these small tubes there is an enormous amount of surface friction. The resistance is directly as the length of the tube and inversely as the square of the sectional area; directly as the square of the velocity and inversely as the fourth power of the diameter. It also varies directly as the viscosity. The extravascular pressure is about one-fourth of the capillary pressure from which it is derived, and is an important force in carrying on the lymph circulation.

The Interchange of Material Through the Capillary Walls.

There are some physiologists who would raise the endothelial cells of the capillary walls to the high level of secreting structures, not that they have any evidence, either from analogy or otherwise, in support of such a contention, but simply because they think that the physical properties of diffusion, osmosis and filtration cannot account for the phenomena. They hold that the capillary pressure is low, and is more than counterbalanced by the endosmotic equivalent of the albumen and salts in the blood. When they recognize the enormous variation which takes place in the pressure and velocity of the blood in the capillaries, they will have less difficulty in admitting the problem of filtration as applicable to the capillary circulation. Moreover, the capillary walls do not form a semi-permeable membrane, but are just as easily permeated, caeteris paribus, in one direction as in the other. In a network of capillaries the pressure must necessarily be higher in the efferent or distributing vessels connected with arterioles than it is in the afferent or collecting tubules which unite to form the venules. You can thus have filtration and absorption going on side by side, just as in a hole in the wall