

blood-vessels the inlet of supply to which is somewhat larger than the outlet.

The efferent vessel again breaks up into a capillary plexus which surrounds the proximate portion of the convoluted tube. By this arrangement of the tubules and blood-vessels, with the epithelial cells which line the one and are applied to the tufts of the other, we have a system perfect for the separation of the urinary ingredients in solution.

The composition of the urine is exceedingly complex, and the various excrementitious substances discharged through this channel bear a striking analogy to, and is indeed intimately connected with, the processes of nutrition and disassimilation, and any marked modification of the latter produces a no less marked modification of the functions of the kidney.

One is interested, in connection with the subject of nutrition, to notice how the highly organizable nitrogenous compounds circulating in the blood are appropriated and transformed into the tissues, and how by a reverse action, by a physiological decay of the molecules of the tissues, they are again taken back into the blood—a much lower grade of matter—and finally eliminated by the emunctories. General disassimilation, therefore, keeps the kidneys and other emunctories constantly at work. And in addition one frequently finds that during digestion more substances enter the blood than are absolutely requisite for the demands of the system, and this excess entails an increased amount of work upon the emunctories; and in all cases of renal inadequacy this is by no means an unimportant point for us to remember in connection with the treatment, if it be not in a few cases the cause of renal disease.

Time would fail me to enter into any details regarding the manner of excretion of the urinary ingredients. The elimination of water, with perhaps some salt, is largely influenced by blood pressure. The drinking of large quantities of water increases the blood-pressure, owing to general increase of the volume of blood due to dialysis; and as a consequence we have an increased amount of pale colored urine. As a rule, therefore, the greater the blood pressure the greater secretion; and with lower blood pressure there is a corresponding diminution in

the secretion of the urine. Blood pressure is also influenced by the vaso-motor system, and in certain nervous affections such as hysteria, where the arterioles are contracted and the blood pressure raised, we have a large quantity of pale colored urine of low specific gravity. So also in certain stages of certain diseases of the kidneys there is a great increase of blood pressure and a free secretion of urine.

The eliminations of solid, however, is not so much influenced by the blood pressure as by the action of the renal epithelium. Why albumen is not found in the urine during a condition of health the present state of our knowledge will not permit us absolutely and unequivocally to state. When the watery portion of the blood passes out through the capillaries in any other portion of the body we find it contains albumen; and here the transudation through the capillaries, in connection with nutrition, is not simply a transudation under pressure, for everywhere there is a sort of selective power exercised. The selective power in the capillaries of the glomerulus may entirely differ from the general selective power, and the fact that the bloodvessels here are covered by a layer of epithelial cells, which follow the loops of the capillaries everywhere, is conclusive that the capillary function is here more or less modified, and indeed that the glomerulus itself is a complex organ.

Two explanations, in connection with the absence of albumen in the urine during health, have been variously supported by physiologists. One, that the epithelial cells lining the glomerulus have a selective power, and thus prevent the albumen from passing through along with the water and salt. The other, that albumen does pass through the capillaries in the glomerulus, but that in its passage through the convoluted tubes part of the water and the whole of the albumen is reabsorbed by the epithelium lining the tubes, and is thus carried into the lymph channels and so into the blood current again.

Bearing in mind that in the ordinary processes of nutrition a large amount of excrementitious waste matter is removed by the kidney, and that an increase of the nutritive processes means a corresponding increase in the nitro-