

system, and thereby as completely discharged from the systemic circulation as if a great internal hemorrhage had taken place." (Handbook p. 260). In other words, the arteries are empty and the veins are full. Just think of it! On the theory of the text books, the arterioles here *ought* to be "paralyzed and dilated." They are empty and contracted.

Let me remind the reader that the law of uniformity of cause and effect, demands that what is true of the relative state of the arteries and veins, after section of the splanchnics must be true also, after section of the cervical sympathetic, and since the arteries are thus shown on high physiological authority to be empty, and the veins full in the former case, the same condition must be held to prevail also in the latter.

The arterioles are always empty and their muscles contracted when their nerves are cut or paralyzed, and such is also invariably their condition *in death*, when nerve force is extinct.

This is true even after the operation of "pithing," in which the medulla and spinal cord are destroyed, as anyone can satisfy himself, as I have done, by actual experiment. This is inadvertently proved to be the case by Dr. Burdon Sanderson, in his experiment designed to prove the contrary, as the reader will see by carefully studying the details he gives, in which it is shown, that of two frogs experimented on, the heart in both being exposed and the ventricle cut open, the one whose nerve centres were uninjured bled most from the aorta. "In the frog deprived of its central nervous system only a few drops of blood escape,—the quantity that is to say previously contained in the heart, and in the beginning of the arterial system. In the other, the bleeding is not only more abundant but continues for several minutes after the section." (Handbook, etc. 296).

The reader who candidly studies this experiment, as given in the Handbook, pp. 246, 296, cannot fail to see that it is the arteries of the unpithed frog which contain most blood, and that it is the arteries of the pithed frog which are empty, and that here "the whole mass of blood has come to rest out of reach of the influence of the heart," (p. 246)—that is the nervous system; an effect brought about by contraction of the arterial muscles, which "in dying drive their contents into the veins." (Kuss. Phys. p. 181).

This is their condition in asphyxia also, in which case the great veins if cut into will spirt like arteries (Handbook p. 332), and this is what occurs as part of the phenomena of the Cheyne-Stokes respiration, to which we now come after this long but unavoidable prelude.

Let the reader bear in mind that bad blood, arterial contraction, and venous engorgement go together, and that so far from this being a state of nervous "stimulation," it is precisely what occurs in the dying, and finds its completion in death!

A NEW THEORY SUGGESTED.

The salient points of the Cheyne-Stokes respiration are, "alternating periods of arrest and of excitement of respiration." The periods of suspension of respiration "usually last from a quarter of a minute to half a minute, while the periods of rise and fall of respiration are about the same or rather longer duration." "In the former period, the thorax is absolutely motionless and the patient appears almost as if dead. Then a faint wave of inspiration is noticed, followed by other respiratory efforts shallow and slow. The succeeding respirations become gradually deeper and quicker, until the chest is agitated with severe dyspnoea; then, arrived at its maximum the paroxysm abates, the retrocession being as gradual as the onset, and at the end there is a period during which the breathing is in complete arrest." That at this stage "the arteries are strongly contracted," is proved not only by the increased tension of these tubes, but by the arrest of the process at the outset by the inhalation of nitrite of amyl, which dilates these vessels. (Sanson Phys. Diag. Dis. of Heart pp. 35-37).

Let us assume with Dr. Sanson and others, that there is here a condition of partial paralysis of the respiratory centre; that the blood is imperfectly arterialized, is loaded with carbonic acid and deficient in oxygen. Such a condition of things will naturally produce, not stimulation, but failure of function in the nervous centres. We have seen above, that nerve failure means contraction of the arterioles, systemic emptiness and venous engorgement. This condition gradually takes place, the great mass of the blood being transferred to the venous reservoirs "out of reach of the influence of the heart," as in Dr. B. Sanderson's pithed frog.

But as the heart continues to beat, it is fair to assume that a small quantity of blood still finds