

but its action ceases in about an hour, if the animal has been killed by suffocation. These facts we consider distinctly prove that the circulation of dark venous blood exerts a most depressing influence on the action of the heart, and gradually arrests its movements.

We need not enquire how far the phenomena of asphyxia may be connected with the retention of carbonic acid in the blood, since it has been proved by direct experiment, that if a frog be compelled to breathe in hydrogen or in nitrogen, carbonic acid is exhaled in no less degree than during respiration in atmospheric air, and yet the animal equally falls into asphyxia, rendering it certain that it is not the retention of carbonic acid in the blood, but the want of oxygen from the blood, as a stimulus to the different parts of the body on which asphyxia depends.*

The short time required to produce asphyxia in a cold-blooded animal during the highest temperature of the season, is in accordance with a general law of the animal economy that when the functions of the body are carried on with the greatest energy, a large amount of oxygen is consumed, and its withdrawal has a more speedy and injurious effect on the system. When the season is more advanced and the temperature lower, the functions become weak and sluggish in these animals, and then the deprivation of oxygen can be sustained for a long time without injurious results.

“Une grenouille, par exemple, que l'on prive d'air périt en moins de deux heures en été, tandis qu'en hiver elle peut continuer à vivre pendant plusieurs jours.”—*M. Milne-Edwards*.

Similar phenomena are witnessed in warm-blooded animals during the period of hybernation.—*Saissy*.

With regard to the extent to which asphyxia may be carried to prevent resuscitation in an animal, I may observe that during the summer months in this climate, when these experiments were instituted, I have not been able by artificial respiration to revive a cold-blooded animal after the pulsations of the heart had fallen below 8 per minute, and the commencement of sensibility is always preceded by natural respiration. Dr. Cartwright states that in an alligator subjected to asphyxia, the organic functions survive the sensational phenomena on the extinction of animal life about an hour, and that half an hour after insensibility or apparent death the animal may be resuscitated by inflating the lungs. I have observed in frogs that after the action of the ventricle has ceased the venæ cavæ and pulmonary veins continue for a time to contract. The veins first pulsate, and endeavour to propel forwards the dark blood which they contain. Then the auricles contract or rather the contraction of the auricles may be considered a continuous movement from the veins; and Muller states that in a warm-blooded animal dying by asphyxia the heart will continue to contract for half an hour after apparent death. But undoubtedly there would be no hope of recovery after that period, though it has been repeatedly stated by physiologists that warm-blooded animals may be recovered from asphyxia, after the heart has ceased to beat.†

* Bayly's Muller, page 338.

† Dr. Watson's Lectures, Vol. I. page 67.