ART. VII.—*Note on Apnœa and Heat Dyspnœa.* By R. JOHN ANDERSON, Demonstrator of Anatomy, Queen's College, Belfast.

DURING the Winter Session, 1879–80, a paper was read by me at the Ulster Medical Society, entitled “Respiratory Excitation and Depression.”^a Some points of importance bearing on the history, nature, and cause of apnœa and heat dyspnœa have since come to my knowledge, and I shall here briefly state them.

APNŒA.

As far back as 1858 Professor Brown-Séquard showed that pressure on the head of an animal affected the character of the respirations. The respirations are slowed by pressure upon the head. Subsequently the same physiologist found that injection of carbonic acid, nitrogen, and other gases with force into the laryngeal side of a tracheal opening produced apnœa; the same phenomenon appeared, but in a less degree, when the injection was made into the pulmonary side. The result of the experiments was doubted by Filehne, but his mistake arose from the fact that he did not carry out the details of the experiments.

Some experiments that have a very important bearing upon the cause of apnœa were made by Professor Brown-Séquard a considerable time ago; and during last winter and the present summer not only have the results been confirmed, but many important facts have been added thereto. The experiments were made principally on dogs and rabbits.

If a dog be fixed in the usual position on Bernard's dog-board, the trachea opened, and a canula introduced for the purposes of artificial respiration if necessary, but more especially with the object of obtaining the respiratory tracings on a rotating cylinder, and the head be pressed upon, the respirations immediately change in character—in fact, they become slower. If, however, the head be bent strongly forwards, complete cessation of the respirations as a rule results—in other cases, when a prolongation of the pause is observed, in a greater or less degree. The season of the year seems to have some influence on the result; for with rabbits, in the winter apnœa was much more prolonged than in the summer months. Division of the pneumogastric nerves does not affect the comparative results. When, however, the cerebrum is removed,

^a See Transactions of the Ulster Medical Society in this number of the Journal, page 269.

no apnœa is produced by flexion of the head. When the lateral half of the medulla is divided the apnœa is less marked than when that structure is entire. It thus follows that the tension of the medulla oblongata produced by the forcible flexion of the head is the cause of the apnœa.

It has been stated by some that the veins contain red blood in apnœa, but the colour of the blood varies according to the conditions under which apnœa is produced. In the experiments performed in the College of France the blood of the veins was distinctly redder, approaching the colour of arterial blood. Another fact of interest is that the temperature of the rectum is lowered by depression of the head.

In experiments of this kind it is of the utmost importance that the trachea tube should be quite free, that no structures be injured which will produce convulsions or affect the character of the respirations unless in such a way as may be desired. The asphyxia superinduced by accidents of this kind will necessarily affect the result, but this occurs so rarely with care that it is sufficient to mention it.^a

HEAT DYSPNŒA.

A paper appeared in the September (1879) number of the *Journal of Physiology* which contains some important facts with reference to heat dyspnœa. It is there shown that the experiments of Goldstein and Ackermann, though accurate, are susceptible of an explanation very different from that given by these observers. Dr. Sihler points out that the method of warming the blood adopted by Goldstein and Ackermann is imperfect, that the bath introduced into the wound increases the number of the respirations when the carotid is tied, and that hot water brought into contact with wounds in the thighs increases the frequency of the respirations. The same observer has found that section of the spinal cord at the lower part of the neck diminishes the power of heat in producing an increase in the number of the respirations, and enables artificial respiration to produce apnœa when the blood is heated. He concludes that warmed blood and skin stimulation are factors, the latter the more important, in the production of heat dyspnœa. The same observer regards the venosity of the blood as the sole or principal cause of the action of the nerve centres.

^a Paper read before the Société de Biologie, July 3, 1880. Archives of Scientific and Practical Medicine, p. 87. Prolongation extraordinaire des principaux actes de la vie après la cessation de la respiration. Archives de Physiologie. 1878.