cattle entirely free from tuberculous taint and yet endowed with all the most valuable strain characteristics possessed by this breed of stock.

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The function of the otic labyrinth in turtles.

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The peculiar method of progression in serpents[1] and the widely different modes of progression in lizards, snakes and turtles[2] have attracted attention to the relation of the semi-circular canals to the processes of progression and maintenance of equilibrium in these forms.

The general results of labyrinthine extirpation in all these forms are similar to the results observed in other vertebrate types. There is, in the turtle, torsion of the head to the injured side, permanent deviation of the eyes and a tendency to crawl or swim toward the injured side, when the lesion is unilateral. The body on the uninjured side may be raised higher than on the injured side.

After bilateral operation, there are coarse wide tremors of the head which seriously interfere with grasping food. The gait on land is not markedly affected permanently, and there is no permanent torsion of the head to either side. The head may, however, be displaced directly upward and backwards in the first few days following extirpation. Swimming is a matter of great difficulty. When the turtle moves slowly, progress is fairly good, but agitation or hurry upset coördination and extreme disorientation results. The animal's reactions are not biologically adequate (Edinger).

It may be shown in turtles and snakes particularly that the otic labyrinth is a great proprioceptive organ for the head segment (Sherrington). The rôle of the labyrinth in the maintenance of equilibrium rests primarily upon its relation to the head, and only

[1] Henri, *Comptes rendus de la Soc. de Biol.*, Paris, 1899, I, IIe serie, 94–5.

[2] Trendelenburg and Kühn, *Archiv für Physiologie*, 1908, pp. 160.

secondarily upon its relation to the body. It may be shown that under certain conditions, the head is the only part affected.

31 (848)

The respiratory and cardiac variations of intrathoracic pressure and their significance in cardiac contraction.

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When intrathoracic pressure is recorded by a trocar connecting with a calibrated Frank's segment capsule it is found that the intrathoracic pressure does not change smoothly with inspiration and expiration, but each respiratory variation consists of a series of negative and positive cardiac changes. The ratio between the cardiac and the respiratory variations range from 1 : 3 to 1 : 6. Thus, in an animal whose entire intrathoracic variation was 36 mm. of water, the cardiopneumatic changes were equal to 11 mm. during an apnea period, increased to 15 mm. in inspiration and fell to 9 mm. during expiration. A comparison with simultaneous intraventricular pressure curves shows that the negative pressure decreases slightly during the period of rising intraventricular tension; then, as the ejection period begins, gives a sharp vibration and then drops sharply until it reaches a turning point, after which the curve follows the reverse of the contour of the intraventricular pressure curve.

Are these variations in whole or in part responsible for the inspiratory fall of arterial and intraventricular pressures that occur when cardiac rhythm is regular? It is conceivable that the more negative pressure during inspiration might do this either by directly counteracting the cardiac systole or by diminishing its vigor through a decrease in the initial intraventricular tension at the beginning of systole. In either case the steepness of the isometric rise of the curve should show a decrease. That this is so is shown in experiments where considerable negative pressure is applied to the heart by a cardiometer over the top of which the pericardium was tied.