the blood-glands was traced to William Hewson (1739-1774), who was the first to show that the so-called blood-glands were concerned in one function, namely, in the elaboration, or, as he called it, the "secretion" of blood. For many years Hewson's work had no attention paid to it, but its excellence was brought to light in consequence chiefly of the discovery, by Virchow and Hughes Bennett, of leucocythæmia, in 1845.

ABSTRACT OF LECTURES

ON THE

METAMORPHOSIS OF SUCTORIAL FISHES AND BATRACHIA.

Delivered at the Royal College of Surgeons of England.

By W. K. PARKER, F.R.S.,

Hunterian Professor of Anatomy in the College.

LECTURE IV.—DEVELOPMENT OF THE LAMPREY. (*Continued.*)

ON the ventral aspect of the head, immediately in front of the mouth, is the olfactory pit. It is from its beginning unpaired, and in the larva just hatched forms a shallow groove of thickened epiblast at the base of the fore-brain. Its ventral part is gradually prolonged into a pit, which extends backwards beneath the brain, nearly up to the infundibulum.

On the side of the head, nearly on a level with the front side of the notochord, is the eye. It consists of a very shallow optic cup with a thick outer or retinal layer, and a thin inner or choroid layer. In contact with the retinal layer is placed the lens, which is formed by an invagination of the skin, to which it is still attached at the time when the larva is hatched. The eye only differs at this stage from that of other vertebrates in its extraordinary small size, and the rudimentary character of its constituent parts. The auditory sac is a large vessel placed at the side of the brain, opposite the first persistent branchial pouch. The brain is formed of the usual vertebrate parts, but it is characterised by the very slight cranial flexure. The fore-brain consists of a thalamencephalon and an undivided cerebral rudiment. To the roof of the thalamencephalon is attached a flattened sac, which is probably the pineal gland. The floor is prolonged into an infundibulum, which contains a prolongation of the third ventricle. The lateral walls of the cerebral rudiment are much thickened. Behind the thalamencephalon follows the mid-brain, the sides of which form the optic lobes, and behind this again is the hind brain. The notochord is continued forward in the head to the hinder border of the infundibulum, and is slightly flexed anteriorly.

From the hinder border of the auditory region to the end of the branchial region the mesoblast is dorsally divided into myotomes, which nearly correspond in number to the branchial pouches. The head of the larva differs strikingly in general appearance from that of other vertebrates. This is due to the want of a pronounced cranial flexion in the former, a want probably caused by the small development of the fore-brain. The stomodæum of *Petromyzon* is very large. In the region of the trunk there is an uninterrupted dorsal fin, continuous with a ventral fin round the end of the tail. There is a well-defined body-cavity which is especially dilated in front, in the part which afterwards becomes the pericardium. In this region is placed the nearly straight heart, divided into an auricle and ventricle, the latter continued forward into a bulbus arteriosus. The myotomes are very numerous, are separated by septa, and have a wavy outline. The notochord is provided with a distinct sheath, and below it is a subnotochordal rod. The alimentary canal consists of a narrow anterior section free from yolk, and a posterior region, the walls of which are largely swollen with yolk. The anterior section corresponds to the region of the oesophagus and stomach, but exhibits no distinct parts. Behind this, the alimentary canal dilates considerably, and on the ventral side is placed the opening of a single large sac, which forms the commencement of the liver. The posterior part of the tract constitutes a kind of yolk-sac, the vertical walls being thick, and formed of several layers of yolk-cells. The excretory system consists of two segmental ducts, each connected in front with a well-developed pronephros, and with about five ciliated funnels opening into the pericardial region of the body-cavity. The mouth undergoes considerable change during the course of development. The upper lip becomes much more prominent, forming, of itself, the anterior end of the body. The opening of the nasal pit is, in this way, relatively thrown back, and is at the

same time caused to assume a dorsal position. On the inner side of the oral cavity a ring of papillæ is formed. Dorsally, these papillæ are continued forward as a linear streak on the under side of the upper lip.

The gill-pouches become gradually enlarged, but it is some time before their small external openings are established. Their walls, which are entirely lined by hypoblast, become raised in folds forming the branchial lamellæ. The walls of the head-cavity between them become resolved into contractors and dilators of the branchial sacs. The extrabranchial basketwork becomes established very early. On the dorsal walls of the branchial region, a ciliated ridge is formed. The primitive hepatic diverticulum grows rapidly outwards, and forms a tubular gland. The opening of the duodenum changes from a ventral to a lateral or even dorsal position. The ducts lead into a gall-bladder imbedded in the substance of the liver. Ventrally the liver is united with the abdominal wall, but laterally passages are left by which the pericardial and body-cavities continue to communicate. The yolk-cells doubtless supply nourishment for the growth of the embryo; and although in the anterior part of the intestine they become, to some extent, enclosed in the alimentary tract and break up, yet, in the posterior part, they become wholly transformed into the regular epithelium of the intestine, a condition which does not obtain in other vertebrates. The opening of the olfactory sac becomes narrowed and ciliated; it is carried on to the dorsal surface of the head. The lumen of the sac is well developed. No maxillary arch proper is developed. The larval stage of the lamprey seems to correspond to the adult stage of the development of the hag-fish; while, as will afterwards be seen, the adult lamprey reaches only to the state of development in which we find the larval frog.

THE CAUSE OF THE WAVY OR INTERRUPTED BREATH-SOUND OF INCIPIENT PHTHISIS.*

By D. C. McVAIL, M.D.,

Lecturer on Medicine in the Western Medical School, Glasgow.

BRIEFLY stated, my view of the causation of the wavy or interrupted breath-sound of incipient phthisis is, that it is due, not to any inequality of the breath-sound itself, but to the breath-sound having here and there superadded to it less or more of the cardiac sound, which, by the partial pulmonary consolidation, is conducted with abnormal force.

When the pulmonary tissue is quite normal, and when the heart is beating with usual force, the cardiac sounds are not heard at all over the apices of the lung during inspiration. When there is considerable pulmonary consolidation, or when the heart is beating very forcibly, or when there is simultaneously pulmonary consolidation and cardiac overaction, then the heart-sounds may be quite distinctly heard through the inspiratory breath-murmur. But intermediate between these two conditions is a third, in which occurs the so-called wavy or interrupted breath-sound. Here the consolidation of the lung-tissue is but very slight; and, while conducting the cardiac sounds with more than usual ease, so that in the inspiratory pause they are quite distinctly heard at the apex of the lung, still the inspiratory sound is in loudness so much more distinct to the ear, that it masks the cardiac sounds; so that, during the continuance of the inspiratory sound, they are not distinctly heard *as such*, but to the ear it only appears as if the inspiratory sound were at these points of time abnormally loud; it

Fig. 1.

thus seems wavy or jerky. If, for example, under such circumstances of slight increased conductivity of the lungs, a cardiac systole occurred in the middle of each inspiration, then the inspiratory murmur would be augmented in the manner shown in Fig. 1.

* Read in the Section of Medicine at the Annual Meeting of the British Medical Association in Worcester, August 1892.

Let *a b d c* be four heart-beats occurring during a complete respiration, consisting of inspiration, expiration, and pause. Then, on listening over the pulmonary apex, where slight consolidation is present, at beats *a d* and *c*, the heart-sounds will be heard distinctly as such, but at *b*, which is in the centre of the inspiratory-murmur, the cardiac-sound will be so masked by the breath-sound, that it will not be distinctly heard as such, but the breath-sound will, at that instant appear only as if it itself were abnormally loud; it will seem wavy or jerky.

If now, in the course of weeks or months, the consolidation becomes considerably greater, the pulmonary conductivity will, in proportion, become greater, and the heart-sound may be so well conveyed, that it will speak out quite distinctly through even the harshest inspiratory-sound, and so the breath-sound will no longer be described as being wavy, but it would be entered in a clinical record that the heart-sounds were abnormally well conducted.

If, during an inspiration, there were two cardiac contractions, then the breath-sounds would mean two augmentations (Fig. 2) at *b* and *c*; and thus the inspiratory sound, instead of appearing to be divided into three parts, as in Fig. 1, would appear as broken up into five parts (1, 2, 3, 4, 5 in Fig. 2), and this could not be better described than by the term cog-wheel respiration.

Fig. 2.

Thus the wavy inspiratory sound, due to the breath-sound being supplemented by the cardiac sounds, may be of a very varying character. As one effect of partial consolidation of the pulmonary tissue is to augment greatly the expiratory sound, we have it also, in like manner, liable to become wavy.

Whether or not wavy respiration is ever due to other causes than that I have advocated, I do not at present give a positive opinion; but certainly, in the great majority of cases, the mode of its production is that which I have just explained.

Dr. THEODORE WILLIAMS (London) said he quite agreed with what Dr. McVail had said; but if Dr. McVail would refer to a work on consumption by his (Dr. Williams's) father and himself, now out of print, in which almost exactly the same view was advanced, and he might have mentioned that the original idea of it was suggested by Dr. Theophilus Thompson.

ON THE USE OF ANÆSTHETICS DURING LABOUR.*

By THOMAS D. SAVILL, M.D.Lond.

IN opening this discussion, I will ask your kind attention to three questions:—

1. What are the advantages and disadvantages of the use of anæsthetics during normal labour?

2. What are their advantages and disadvantages during abnormal labour?

3. What is the best kind of anæsthetic to use, and the best mode of administration?

1. In normal labour. Many years ago this subject had a moral aspect, and I am told that the question still exists in the minds of the laity, but we need scarcely stop to discuss it now. The pains of even healthy labour are in some cases very severe, producing at times what almost amounts to delirium. Are we not then justified in giving some form of anodyne, just as we would for a neuralgia? Provided we avoid certain risks, why should we not assuage the pain in the one as well as in the other? In these days of scientific medicine, when we are so far in possession of the knowledge of the conditions and sources of danger, we can with greater boldness employ agents for the relief of suffering which, in darker times, we rightly hesitated to use even for the neces-

sary treatment of disease. Moreover, pain is a depressing agent in itself, and lowers the vitality of the sufferer; and we ought, on this account, to relieve it where possible. Of course, it behoves us first to become acquainted with the risks we run, and to see that they are reduced to a minimum. But the relief of pain is not the only advantage which anæsthetics have in normal labour, for they also obviate a tendency to certain complications. Rigidity of the cervix, and other irregular uterine contractions, depending on functional causes, are less likely to occur when chloroform has been given, even to a slight extent; and the indirect good thus done is equivalent to all the advantages of a speedy over a tardy labour. Again, in some women there is an inherent predisposition to puerperal convulsions, so justly dreaded by the obstetrician; and this tendency anæsthetics will counteract by quieting the nervous system, and abolishing the pain which acts as an exciting cause.

It is right, however, that we should bear in mind the objections that there are. The first, and indeed the only formidable one, is the tendency to produce *post partum* hæmorrhage. It is now well established that both ether and chloroform, when given to the full extent, produce great relaxation of the muscular tissues throughout the body—voluntary and involuntary. About the voluntary, anyone can assure himself; and that the organic muscles also share in the general relaxation, is evidenced by the diminished vermicular movements of the intestines of an animal after death; by the dilatation of the pupil which occurs after the initial stage of administration; and by the diminution, and sometimes abolition, of the uterine contractions, which occur when the full effect of either of these drugs is induced. It is in this way that they hinder nature's method of closing the uterine sinuses after the separation of the placenta, and then flooding occurs. How to obviate this untoward result should be one of our chief aims, when an anæsthetic has been used.

By interfering with the uterine contractions* before expulsion of the foetus, labour becomes somewhat prolonged. And, further, all anæsthetics (but especially ether) are apt to be attended with troublesome vomiting, and followed by headache and depression.

You will notice that all these evils arise from complete anæsthesia. Partial anæsthesia is not attended by them, if other conditions be favourable; and I believe it is this fact which will explain the discrepancy between some of the statements as to the effect of anæsthetics on the uterine contractions.

2. Let us turn now to the case of abnormal labour. By that, I mean labour that is complicated in some way, or necessitating some form of operative interference.

Here, besides relieving pain, an anæsthetic greatly facilitates manipulations of all sorts. That very relaxation which is otherwise an evil is here of great use; especially is it so in the operation of turning. Of all operations, perhaps, it is more advantageous in cases of version than in any other; but at all times, whether for craniotomy, cephalotripsy, high forceps operation, or the introduction of the hand into the uterus, fully induced anæsthesia gives great assistance to the operator, and much ease to the patient, enabling her to undergo the operation without movement or shock. Again, besides obviating a tendency to the two complications—spasm of the cervix and puerperal convulsions—chloroform constitutes the best and speediest mode of treatment for both of these conditions when they arise; the first by relaxing tissue, and the second by abolishing the reflex excitability of the nervous system.

The disadvantages are—1st. The great tendency to the production of *post partum* hæmorrhage, as already mentioned; and 2ndly. A fresh one—in the way it muffles and obscures the pains, so that we cannot tell the precise moment to aid nature with our efforts. This applies mainly to the group of forceps operations.

3. We now come to the question: What is the best anæsthetic to use and the method of its administration? The division of cases into normal and abnormal has a practical application; for in normal cases it is given solely with the object of relieving pain, and it is quite unnecessary to push the anæsthetic to loss of consciousness; but in abnormal cases, besides relieving pain, it is given as part of the treatment, and complete anæsthesia must be induced.

The best kind of anæsthetic to use has hitherto been pretty well agreed upon; for, although many drugs have been suggested, chloroform has justly carried off the palm. Of the two commoner anæsthetics, chloroform and ether, we know that, whereas chloroform tends to produce death suddenly by cardiac paralysis or syncope, ether, in most cases, tends to death by choking

* Churchill (*Theory and Practice of Mid.*, fifth edition, p. 236), and Leishman (*System of Midwifery*, second edition, p. 822) deny this; others agree in the above statement. I offer an explanation for the discrepancy in the next paragraph.

* Read before the East Surrey District of the South-Eastern Branch.