The results agree closely with Bohr's recent calculations of the arterial oxygen pressure which might be expected during rest if diffusion alone were in play.

2. When a much higher percentage of CO is breathed (0.2 per cent. or more) the oxygen pressure in the arterial blood rises to nearly double that of the alveolar air, and considerably above that of the external air. With intermediate percentages of CO there are intermediate rises in the arterial oxygen pressure.

It is thus evident that, although under normal resting conditions absorption of oxygen occurs only by diffusion, want of oxygen in the tissues of the body brings into play a supplementary secretory activity by which oxygen is actively absorbed from the alveolar air into the blood. This process is presumably analogous to that by which oxygen at a partial pressure of sometimes as much as 100 atmospheres above that in the sea water is secreted into the swim-bladder of deep-sea fishes.

It is satisfactory to find that the results by the carbon monoxide method agree closely with those hitherto obtained by the aerotonometer method. The reasons why Fredericq and Krogh have obtained no evidence in favour of the secretion theory are also evident. Still more satisfactory is it to find that the process of absorption of oxygen by the lungs is regulated, just as is the breathing itself, in accordance with the physiological requirements of the organism. But for the secretory process the blood would be very incompletely saturated during muscular work, when five, or even ten, times as much oxygen is absorbed as during rest. During rest, on the other hand, the secretory process is not required, and would be a waste of physiological effort.

REFERENCES.

¹A comprehensive account of this controversy is given by Bohr in Nagel's *Handbuch der Physiologie*, vol. i, p. 142, 1905. ²Skand, *Archiv für Physiologie*, vol. xxiii, pp. 179-278, 1910.

AUSCULTATORY FRICTION:

A LITTLE-USED METHOD OF PHYSICAL EXAMINATION.

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OLD students at University College Hospital will well remember the four methods of physical examination: "First, inspection; secondly, palpation; thirdly, percussion; fourthly, auscultation." To this a fifth should be added, which, for want of a better term, may be called "auscultatory friction" or "auscultatory percussion."

It is a common practice with physicians to make use of a method of auscultatory percussion in mapping out the stomach. By placing the stethoscope over the stomach and tapping lightly with the finger a hollow sound is conducted to the ear as long as the percussing finger and the stethoscope are over the area where the stomach is in contact with the body wall. If the stethoscope is shifted away from this area, the sound becomes notably diminished in intensity, and the same thing occurs if the stethoscope remains in contact with the stomach area and the percussing finger moves off it. In this way it is possible to map out with considerable accuracy the area of a hollow viscus, such as the stomach.

But it is especially in dealing with solid organs that auscultatory friction is so valuable. Information may be obtained in this way which no other method of physical examination can elicit. So far as I know, it is not taught in the medical schools, and is not practised by the generality of practitioners.

By percussion it is only possible to define the outlines of a solid or fluid in contact with a viscus containing air, but by auscultatory friction it is perfectly easy to determine the outline of a solid organ in contact with another solid or with fluid.

For instance, in percussing the heart, the lower margin where it rests over the liver cannot be defined, but auscultatory friction readily shows this. Also to mark out the spleen when there is a pleural effusion on the left side is impossible by percussion alone, and can only be done by the combined method. Again, a pleural effusion of limited extent on the diaphragmatic surface of the right lung is easily overlooked if percussion alone is relied upon; the dullness of the liver is continuous with the dullness of the fluid, and one cannot tell where one begins

and the other ends, but by auscultatory friction a sharp line of demarcation between the liver and the fluid is readily obtained.

It is obvious that it is important to practise a simple and easy method by which such information is available.

Some five or six years ago I found that by placing the chest-piece of a binaural stethoscope or phonendoscope over the liver or the heart, and gently rubbing the skin in the neighbourhood with the tip of the finger, a loud sound was conveyed to the ear as long as the finger was over the solid organ; as soon as it passed off the area which covered the organ the sound became almost inaudible, the solid organ under the abdominal wall acting as a stethoscope in conveying the sound to the ear. If the stethoscope is placed over the liver, and gentle friction made with the tip of the thumb, the upper limit of the organ can be defined with the greatest accuracy, even when a layer of fluid is above it, or another solid organ, such as the heart. If the stethoscope is placed over fluid, such as a pleural effusion, the sound becomes lost when the finger passes over a solid or air-containing organ.

I thought at the time I had made an important discovery, but I have since found that the method had already been described and practised. Sir Lauder Brunton tells me that he has made use of it for at least ten years, but agrees with me that it deserves wider recognition.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

TREATMENT OF TUBERCULOUS MENINGITIS.

IN his most interesting lecture on Meningitis in Children, Dr. Guthrie Rankin, in speaking of the tuberculous form, says, "Cases of recovery are so rare that many observers believe the disease to be invariably fatal."

Many years ago I was asked to see a little boy in the second week of tuberculous meningitis. As he was extremely emaciated and profoundly anaemic, a mixture containing potassium chlorate, tincture of ferric chloride, and glycerine was prescribed. The chlorate was given in the somewhat empirical hope that it might somehow yield oxygen to the tissues. The mixture was steadily continued for three or four weeks. An improvement was almost immediately evident, and the child eventually made a good recovery, although his head remained slightly but distinctly enlarged. I have always felt convinced that the boy owed his recovery to the potassium chlorate. I have never since had an opportunity of trying it in tuberculous meningitis, and I only venture to mention the case now in the hope that some one else may be induced to give this mixture a further trial.

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HAEMOPHILIA IN A FEMALE.

THIS condition is, I think, sufficiently uncommon to be recorded. I merely give the history of the child itself; I could obtain no family history of haemorrhages (except from the lungs in members of the parents' families known to be phthisical) on going back two generations beyond the parents.

Born December, 1907. At birth brown patch over left eye, which cleared up in a few days, showing disease, probably congenital. Mother often noticed that the child easily bruised on falling.

December, 1908. Sharp attack of bronchitis with melaena, much blood being lost.

Spring, 1909. Severe haemorrhage lasting three to four days from mere scratch on finger.

April 9th and 16th, 1910. Bleedings from mouth, on both occasions stopping spontaneously.

April 18th. Further attack of bleeding from two points in mouth, death ensuing.

Child well nourished, had had a liberal and varied diet. No history of swollen joints, or suggesting purpura; no signs of scurvy. One brother, showing no disposition to haemorrhages.

Reading.

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