On *post mortem* examination, very little fluid was found in the pleural cavities. There were no adhesions nor lymph, nor roughness of the pleura pulmonalis or costalis, even where the loud rubbing had been audible. The lungs were emphysematous, otherwise healthy. There was a little fluid in the pericardium. The heart was sound, but for some small warty vegetations on the auricular surface and edge of the mitral valve. The stomach was very large, V-shaped, the limbs passing high up in each chest; other viscera healthy. The left femoral vein and the iliac vein, from the point where it joins the trunk, to the leg, was very small and agglomerated, as it were, with the tissues, from which it could not be cleanly dissected. Its calibre was occupied by a clot passing into its branches. The clot was firm; in some parts dark, in others rusty red; it was closely adherent to the wall of the vessel, yet easily separable, and, when separated, left the lining coat of the vessel smooth and glistening in most parts, but here and there deeply stained purple, with a somewhat sloughy look. The arteries were healthy. The uterus was very small and hard. The hymen was perfect.

CASE VIII.—M. K., aged 21, single, for six weeks had had cough and palpitation after unusually hard work. She menstruated regularly but scantily; did so five days before admission. The day after her admission to the Infirmary, without assignable cause, "white leg" on the left side set in, with distinct cord-like ramification of the superficial veins. After a week, the left leg improving, the right began to swell, and was very tense, white, and shining, up to the hip. On the tenth day, a loud systolic *bruit* was audible at the apex of the heart and along the aorta and subclavians, with a cough and oppression of the chest (which, however, from her condition, it was impossible to minutely examine). She completely recovered.

CASE IX.—George H., aged 25, was admitted to the Infirmary, under my care, with ptosis on the left side, partial facial paralysis on the right, and impaired motor power and sensibility in both lower extremities, and the right upper. He was very dull and stupid. He had been a patient under me two years previously, with rheumatism. The heart was not then affected. For two months he had now suffered from severe pain in his head. For a month he was blind in both eyes. He was somewhat wandering and incoherent. He continued in much the same condition for a month after admission, with no cardiac, renal, or other perceptible cause. Then, his right leg swelled, with all the conditions of white leg, and no pulsation in the arteries. In four days, he suddenly became comatose and apparently moribund. The coma, however, passed off, convulsive movement in all the limbs ensuing. In seven days, pulsation was perceptible again, and the swelling began to diminish. He still wandered and talked incoherently, his hands being spasmodically clenched. In six days more, consciousness having returned, and the spasmodic condition passed, the right leg being well but for a numbness, the left leg began to swell, and went through just the same course as the right. The swelling subsided in six days, leaving only some oedema of the feet, and great want of heat and sensibility. He has since (for six years) been following his occupation as a porter, and has had no subsequent ailment, but is somewhat excitable and irascible.

To these cases I must add one which I find in the Proceedings of the Pathological Society of London, reported by Dr. Moxon. It is a case of thrombosis of the renal vein, from a man who died in a state similar to typhus, with albuminuria, and with white leg of a few days' standing. After death, there was found to have been acute meningitis. The spleen was full of embolic patches. There was a clot in the femoral vein, and the veins of both kidneys were filled with thrombi. There was an excess of white corpuscles. Mr. Pick also showed specimens from a corresponding case, but with gangrene of the lungs and two pulmonary abscesses.

In analysing these cases, we find that three occurred in women after childbirth, with rather severe hæmorrhage; two after severe hæmorrhage; and the third hardly to be connected with any uterine condition, as it was three months after her confinement in a phthisical patient. Four occurred in women anæmic; one from constant flooding, the other three with scanty and irregular menstruation. In two, an endocardial *bruit* preceded the attack of white leg. In two, and probably a third, pleuritis without effusion occurred either antecedently or concurrently. In three, pulsation in the arteries was not perceptible. In six, the left leg was affected; in three, the right; in two, both.

I have already occupied too much of your time to venture upon any further remarks upon this analysis; and I refrain from doing so with the less reluctance, from the conviction that, considered with regard to what we do know of embolism, pyæmia, and septicæmia generally, and the more or less obvious mal-condition of the blood in each of these cases, they sufficiently speak for themselves.

THE INDICATIONS FOR TRACHEOTOMY IN CASES OF LARYNGITIS AND DIPHTHERIA.

By GEORGE JOHNSON, M.D., F.R.C.P.,

Physician to King's College Hospital; Professor of Medicine in King's College, London.

WHEN the symptoms of laryngitis, whether in a child or in an adult, continue and increase and threaten life, or when, in a case of diphtheria, the extension of the disease to the larynx causes the same threatening symptoms, we ought to have recourse to tracheotomy; and by this operation we may not unfrequently save a life which must otherwise inevitably be lost. The operation is more frequently successful in cases of simple laryngitis than in diphtheria—for the reason that, in the latter disease, the exudation often extends into the trachea and bronchi; so that an artificial opening in the windpipe does not counteract the cause of the apnoea. It is more frequently successful in adults than in children, and more frequently in older than in very young children. In adults, I have rarely failed to save life by the timely performance of tracheotomy; but in children I have rarely succeeded. In very young children, the trachea is so small that it is scarcely possible to introduce a metal tube; and the operation is, therefore, impracticable. The youngest child that I have seen saved by tracheotomy was one about two years old, who, while suffering from inflammatory croup, was operated on by Sir W. Fergusson.

Excluding those cases in which the operation is impossible on account of the small size of the trachea, the principles which should guide us in our determination to resort to tracheotomy are the same, whether the patient be a child or an adult.

In general terms, then, it may be stated that, when, in spite of prompt and judicious treatment, the obstruction in the larynx and the consequent dyspnoea continue and increase, and when there is commencing lividity of the lips and face, the time for tracheotomy has arrived. When a laryngoscopic examination is practicable, and when, by this means, we discover such an amount of structural change within the larynx as must obviously require several days, and perhaps even weeks, for its removal, the necessity for the operation will be still more apparent.

In considering the question of tracheotomy, it must continually be borne in mind that, if the operation be too long deferred, although it may remove the distressing sense of constriction in the throat, it will not save the patient's life. The reason is, that a prolonged partial apnoea gradually induces a condition of lung and of pulmonary artery which is irremediable and fatal.

The order of events appears to be this. The obstruction in the larynx limits the supply of air to the lungs; the blood in the pulmonary capillaries is imperfectly aerated; and some partially aerated blood passes on into the systemic arteries. At the same time, the minute pulmonary arteries, by their contraction, lessen the supply of blood to the pulmonary capillaries in proportion to the limited access of air. This contraction of the minute arteries is doubtless called into action by a nervous influence transmitted from the capillaries. A message is telegraphed to the arterial stopcocks, requiring a diminished supply of blood so long as the respiratory changes are partially suspended. The blood, therefore, accumulates in the trunks of the pulmonary artery, in the right side of the heart, and in the systemic veins. The distension of the superficial veins renders the lips and the skin more or less livid; while the retrograde engorgement of the bronchial veins and capillaries, which belong to the systemic venous system, results in a serous effusion into the bronchial tubes. This serous exudation gravitates towards the bases of the lungs, filling the air-cells and smaller tubes, and thus still further impeding respiration. Meanwhile, the slowly moving, partially stagnating blood in the pulmonary artery becomes more and more viscid, and at length partially coagulates. Hence, on *post mortem* inspection, fibrinous coagula, which had evidently been in process of formation for several hours before death, are often found in the pulmonary artery. A state of partial apnoea, therefore, exceeding a certain limit in degree and in duration, results in oedema of the lung, and coagulation of blood in the partially obstructed pulmonary artery; and these changes in the lung and in the artery may, alone, suffice to destroy life. Tracheotomy, then, to be successful in rescuing the patient from fatal apnoea, must be resorted to before the lungs have become highly oedematous, and before the blood in the pulmonary artery has lost its fluidity.

When the laryngeal obstruction has been of recent origin and rapid in its course, it is the more likely that life may be saved by the prompt

performance of tracheotomy; but, when urgent dyspnoea has been of long duration, there will always be reason to fear that the lung and the blood in the pulmonary artery may have passed into the condition that I have described.

We may sometimes obtain more positive evidence as to the oedematous condition of the lungs. There may be dullness on percussion over the lower lobes of the lungs, and a fine moist crepitation over the same extent. As a rule, however, when there is great obstruction in the larynx, auscultation teaches us little as to the condition of the lungs. The loud laryngeal stridor completely masks the pulmonary sounds; which, besides, are very feeble, in consequence of the small volume and force of the tidal air in the lungs.

We may suspect that the blood in the pulmonary artery is coagulating, when, with increasing dyspnoea, there is a combination of pallor and lividity of the skin and lips, with extreme feebleness of the pulse. The lividity is a result of over-distension of the systemic veins, while the pallor and the pulselessness are due to a corresponding emptiness of the arteries; the venous fulness on the one hand, and the arterial emptiness on the other, being direct results of the obstruction in the pulmonary artery.

I have nothing to say as to the mode of performing the operation of tracheotomy. That is a purely surgical question, with which I do not meddle. But I must insist upon the importance of keeping the air of the room warm and moist so long as the patient has to breathe through the opening in the trachea. A neglect of this precaution might result in an attack of bronchitis or pneumonia.

Another point which deserves notice is that; while a patient is breathing through the artificial opening, so much is the reflex excitability of the larynx lessened, that, during deglutition, liquids sometimes enter the larynx, and then escape through the cannula. This may, to some extent, be prevented by directing the patient to close the tube with his finger during the act of deglutition.

A gentleman suffering from acute laryngitis, whom I attended with Mr. Heckstall Smith and Dr. Allfrey, and who was rescued from impending suffocation by tracheotomy performed by the latter gentleman, while he was breathing through the tube, one day got a piece of bone into his larynx from soup that he was drinking. The foreign body caused him much annoyance until it was expelled by a cough. The patient completely recovered, and returned to his work in India. The lesson taught by this and other cases is that, while a patient is breathing through an artificial opening in his windpipe, unless deglutition be performed with care, the food may "go the wrong way", and either lodge in the larynx, or, passing through the larynx, it may enter the bronchial tubes.

THERAPEUTICAL MEMORANDA.

[Under this head, we shall publish from time to time, as materials accumulate, short records of remarkable cases in practice which are sufficiently rare, interesting, or instructive, to deserve record, but do not call for lengthened statement or comment. Brevity and point should be the valuable characteristics of cases forwarded for this column.]

CHLOROFORM IN THE TREATMENT OF BILIARY CALCULI.

By JOHN BARCLAY, M.D., Physician to the Infirmary, Leicester.

SEEING some reference in a contemporary periodical, to the proposed use of chloral as a solvent of biliary calculi, I crave space to state that I have met with very great success from the internal administration of chloroform in that disease.

I first used it in 1861, in the case of a clergyman, aged 58. He had suffered for twenty-three years from gall-stones; the peculiar pain, jaundice, with subsequent discharge, by stool, of the calculi, coming on so suddenly and without warning, as seriously and frequently to interfere with his duties. Just then, writing on alcohol, I had been studying the experiments of Lallemand and others, on the existence of alcohol unchanged in the blood. Knowing that ethers are solvents of cholesterine, I ventured, on his third attack in that year, to prescribe chloroform in doses of two or three drops, three or four times a day, on the chance of its reaching the calculi through the blood. To his surprise, and my gratification, pain, tenderness, distension and jaundice disappeared together, and in the eight years since elapsed, he has never had another attack. He keeps a bottle of "chloric ether" by him, for occasional use. I have found it to give invariable and permanent relief in many instances since.

The theory of thus dissolving the calculi *in situ*, followed by the disappearance of the symptoms, leads to a deduction that may be legitimate, that relief was obtained by their being so dissolved.

ON THE PHYSIOLOGY OF EAR-COUGH.

By J. LOCKHART CLARKE, M.D., F.R.S., etc.

IN an interesting article, by Dr. C. B. Fox, on "Ear-cough and its Mode of Production" (BRITISH MEDICAL JOURNAL, December 18th, 1869), the author observes that "unanimity of opinion does not yet prevail as to the exact origin of the greater root of the fifth cerebral nerve."

Notwithstanding the discrepancy of opinion that has prevailed among different investigators upon this point, the question is now, beyond all doubt, completely set at rest. In several of my memoirs, published in the *Philosophical Transactions*, but more particularly in my last ("Researches on the Intimate Structure of the Brain", second series; *Phil. Trans.*, part 1, 1868), I have shown that the greater root of the fifth cerebral nerve arises from the grey tubercle of Rolando in the fourth ventricle; or, in other words, from the upward prolongation of the caput cornu, or expanded extremity of the posterior horn of the spinal cord, from which the posterior roots of the spinal nerves take their origin. Of this fact, any one sufficiently skilled in anatomical manipulation may convince himself by making the dissection which I have described at page 292, and represented in fig. 47, plate xii, *Phil. Trans.*, 1868. In making this dissection, the observer will find at the side of the fourth ventricle, beneath the junction of the posterior with the middle peduncle of the cerebellum, a conical or nipple-shaped projection of grey substance, which may be distinctly seen by the naked eye to give origin to the large root of the trigeminus. By dissecting downwards, and by making a descending series of transverse sections from this point in a medulla hardened in chromic acid, the observer may again satisfy himself that the conical projection of grey substance which gives origin to the large root of the trigeminus is uninterruptedly continuous with the caput cornu, or expanded extremity of the posterior horn of the spinal cord; and that through this caput cornu in the medulla oblongata, and not through the restiform body, as hitherto described, the descending portion of the nerve is transmitted. Stilling referred the origin of the greater root of the trigeminus to the gelatinous substance. So far he was right, and the figures which illustrate his descriptions are exceedingly beautiful and correct; but he committed a great error in mistaking what I have shown to be the loop of the facial nerve for what he calls the "constant root" of the fifth, which in reality has no existence at all. As to Langenbeck and Förg, mentioned by Dr. Fox, they evidently knew nothing whatever about the origin of the fifth cerebral nerve. That which they considered as the origin, or nucleus of the greater root of this nerve, and which Stilling erroneously described as the nucleus of the glossopharyngeal nerve, I have shown to be really the *inner* auditory nucleus. The inner auditory nucleus gives origin to the posterior root of the auditory nerve, which winds round the restiform body to reach it (see fig. 36, plate xi, and fig. 43, plate xii, *Phil. Trans.*, 1868). The morphological changes by which I have shown it to be evolved out of other elements of the medulla oblongata are in the highest degree interesting, and have been confirmed by other anatomists both on the Continent and in America. I will now remark only that it is partly formed out of the nucleus of the vagus (see plates viii and ix, *Phil. Trans.*, 1868), and that the nucleus of the vagus forms one continuous column with the nucleus of the spinal-accessory, which supplies motor fibres to the inferior laryngeal nerve.

The *outer* auditory nucleus gives origin to the *anterior* division of the auditory nerve which runs beneath, or in front of, the restiform body. Both this nucleus and its nerve are intimately connected, by means of a beautiful network of fibres and small cells, with the posterior side of the grey tubercle, which a little higher up gives origin to the large root of the trigeminus, as well as with the descending bundles of that root which the grey tubercle contains (see fig. 46, plate xii, and its explanations).

With regard to the mode in which ear-cough is produced, I have no doubt that Dr. Fox is correct in considering the fibres of the fifth cerebral nerve distributed to the auditory canal as the starting-point in the circle of reflex actions. For, although the nucleus or central origin of the fifth nerve is some distance above that of the vagus, still, as I have already shown, it is directly continuous downward with the grey tubercle or expanded extremity of the posterior horn of the cord, and through the front of this tubercle the fifth nerve sends down a considerable portion of its sensory root. Now the nucleus or central origin of the vagus lies quite at the base of this tubercle, and is intimately connected with it; while the vagus-nerve, in passing inward to its nucleus, traverses the root of the fifth nerve contained in the grey tubercle in connection with small cells. I have also shown that the nucleus of the vagus is directly continuous with that of the spinal-accessory, which