especially at the margins. No pleuritic friction could be detected. The rest of the pulmonary organs seemed quite normal. Respiration was about 50 and the pulse 140 and fairly regular. On the 28th the temperature was 101°, the respiration 48, and the pulse 150. On auscultating the heart the mitral murmur heard before was slight, but I heard three distinct sounds in the place of the usual two, occurring at regular intervals rapidly one after the other and followed by a slight pause. The heart's action was too rapid to distinguish one from another. There was great pain on breathing over the area in the right side mentioned, no cough, no sputum, but a strong desire to cough, which the patient absolutely controlled on account of the pain produced. The patch was slightly dull on percussion. Crepitations were heard all over it now. The temperature in the evening was 102·5°, the respiration 60, and the pulse 144. On the 29th, the morning temperature was 102°, the pulse 140, and the respiration 44. Dyspnoea was less urgent, and the patient on the whole seemed stronger. On the 30th, the morning temperature was 102·8° and the evening 102·2°. Respiration was 49 and the pulse 132. The patch of crepitations was larger—about the size of the palm of the hand; Bronchial breathing was audible towards its centre. The temperature the next night was 103°, but in the following eight or ten days it fell gradually to normal, the respirations then remained about 30 and the pulse about 100 and fairly regular in force and rhythm. As she recovered the cardiac sounds resembled those heard at the commencement of the case with the mitral bruit somewhat more marked than before. A small quantity of blood-stained mucus was noticed one day. On Dec. 3rd the limb was still painful, but no swelling was present. On the 4th the temperature was 100·6° in the morning. The right thigh was slightly swollen and whitish, the veins appearing abnormally blue, there was slight pitting. In a few days this condition dispersed and both lower limbs became normal in shape and size. The patient made a very good recovery. The mitral systolic bruit was still audible at the apex and in the axilla in February, 1894. There was no history of rheumatism. I regret that owing to the exigencies of a busy practice the record of the temperature is incomplete.

CASES 2 and 3.—These patients were young women aged twenty-one and eighteen years respectively. The left leg and thigh were affected in the same manner as in the first case, the swelling gradually increasing and reaching its maximum in about four or five days and then gradually subsiding. Tender veins were present in both, in Scarpa's triangle and at the back of the knee joint, and anæmia was apparent with its usual symptoms. A hæmic murmur, which disappeared absolutely after a few weeks, was audible over the sternum. Both recovered without any bad symptoms and were following their usual avocations about six weeks from the beginning of illness. There was moderate pyrexia in each for a few days.

Staines.

BILATERAL PARALYSIS OF THE RECURRENT LARYNGEAL NERVES DUE TO MALIGNANT STRICTURE OF THE OESOPHAGUS.

By FRANK SAVERY, M.R.C.S. ENG., L.R.C.P. LOND.,
With Remarks by Dr. FELIX SEMON.

THE patient, a man aged fifty-four years, first consulted me for dysphagia on Oct. 17th, 1895. He was at this time rather stout and thick-set and looked the picture of health. He noticed the difficulty in swallowing in the July previous and could remember the day on which it first occurred. It appeared to him to be due to an accumulation of wind opposite the lower end of the sternum. He had been able to take ordinary food, but with difficulty, often taking a long time over meals, and especially over solids. He had lost no flesh and had had no pain. Nothing abnormal could be detected in the neck or throat and no enlarged glands could be felt. The chest and abdomen appeared to be healthy. On getting him to drink water the liquid could be heard to gurgle as if passing through a funnel. On Nov. 5th I took the patient to see Mr. Charters Symonds, who examined the larynx and found it healthy;

he was unable to pass a bougie as the patient could not submit to it. On Nov. 10th I passed a No. 12 silk elastic bougie easily—the bigger sizes would not go. The obstruction was nine and a half inches from the teeth. On Nov. 18th Mr. Charters Symonds again saw him and confirmed the diagnosis of malignant stricture, passing a No. 12 bougie. He advised that the bougie should be passed twice a week and that perchloride of mercury with quinine should be administered. This treatment was carried out; the medicine at first gave the patient some relief, especially to the feeling of "wind"; the swallowing also was somewhat improved. About Dec. 9th the bougie would not go through the stricture, and though various sizes and kinds of bougies were tried I was unable on this or on any other subsequent occasion to get anything through. The swallowing varied very much; sometimes he could only swallow liquids, at other times solids fairly easily. At this time also he complained of pains in the right shoulder. Until Dec. 28th the patient had been to business fairly regularly. On this date he had an attack of bronchitis, to which he was subject, and this kept him at home. There had been little or no loss of flesh. On Jan. 6th the bronchitis was much better. The pains in the shoulder were worse and were shooting down the right arm and also up the right side of the neck and face; for this various remedies were tried; phenacetin, antipyrin, salicylate, and quinine; nothing, however, gave any relief except "nepenthe." He now began to lose flesh and depended for the greater part of his nourishment on liquid food. In the evening of Jan. 30th quite suddenly he noticed the taking of food caused coughing; this came on immediately after swallowing, all the food returning, and each time afterwards the food returned with coughing when he attempted to swallow—in fact, he could get down no food at all. He also found he could only speak in a whisper. On the 31st the symptoms remained the same, so nutrient suppositories were ordered with opium, and the patient kept in bed. It was hoped that by giving the stricture complete rest a long tube might be passed. On Feb. 2nd Dr. Felix Semon saw the case. He examined the larynx and found there was complete paralysis of both recurrent laryngeal nerves, the vocal cords remaining motionless in the cadaveric position. He asked the patient to lie on the side near the edge of the bed with his head hanging over the edge and then, water being poured into the mouth by means of a feeding cup, try to swallow. This was done, the patient swallowing quite easily and without any cough. Dr. Semon also advised that the patient should be kept in bed. From this time forward to March 9th only liquid food was taken, and always in the position just described on the right side; he was unable to take it on the left side as it caused great pain. As a rule he took about ten ounces at a time, getting it down in ten minutes or so, and about three or four pints of food in the twenty-four hours. On several occasions, however, he was unable to swallow at all for some hours; on one occasion (Feb. 21st) not for twelve hours. On the 4th inspiratory stridor was noticed, but he never complained of dyspnoea. On the 10th some enlarged glands could be felt just above the right clavicle and close to the trachea; these glands gradually enlarged and were tender. The position necessary to take food caused considerable pain in the right neck and face; it was relieved by giving "nepenthe." The vocal cords remained in the same position. On March 9th the patient was unable to swallow at all. As no bougie could be passed and gastrostomy was not allowed there was nothing further to be done except to give nutrient suppositories; he, however, rapidly got worse, wasted quickly, and died on March 17th. No necropsy was obtainable.

Dr. Felix Semon has kindly consented to add some remarks on the case, so I will add none myself except to say that I quite overlooked the paralysis, and thought the symptoms could only be caused by the ulceration of the growth through the oesophagus into the trachea.

Remarks by Dr. FELIX SEMON.—The interest of this case centres, of course, in the occurrence of complete bilateral paralysis of the recurrent laryngeal nerves. Whilst more or less incomplete paralysis of both these nerves is not of infrequent occurrence, really complete bilateral paralysis is but exceedingly rarely met with, owing to the fact that the lesion which causes the laryngeal paralysis almost always ends fatally before the stage of complete paralysis is reached. There are only a few cases of really complete bilateral paralysis of the recurrent laryngeal nerves on record, and I have seen it but once before, in a case published by my

colleague Dr. Ormerod in THE LANCET of March 13th, 1880. The symptoms resulting from this condition have always been described as complete aphonia and dyspnoea—the latter on exertion only. The present case, however, teaches that a further important symptom may be the result of the bilateral paralysis—viz., impossibility of taking nourishment in the ordinary erect position. The explanation of this is easy: during the act of swallowing the glottis must be closed. When both recurrents are paralysed closure is impossible, and food and drinks are therefore apt to penetrate into the larynx. Inasmuch as the sensibility of the laryngeal mucous membrane is intact, owing to the fact that the internal branch of the superior laryngeal nerve cannot be affected by a peripheral lesion attacking the recurrent laryngeal nerve, the entrance of any foreign substance into the larynx will be immediately followed by reflex cough and expulsion of the offending foreign body. This, no doubt, is the explanation of the symptoms described in the present case by Mr. Savery as occurring on Jan. 30th. It was obvious that when a position could be devised in which fluids might penetrate into the food passages without running the gauntlet of accidentally getting into the open glottis the patient might be enabled to take his food again *per vias naturales*. For this reason I suggested to try the position recommended by Dr. Norris Wolfenden for cases of painful dysphagia connected with laryngeal disease—viz., horizontal position on the side, with the head well over the edge of the bed, and fluid nourishment to be taken through a feeding-cup inserted into the lower angle of the mouth. When drinking in this position the fluid passes not over, but by the side of, the larynx through the hyoid fossa, and penetrates into the oesophagus without coming in contact with the posterior aperture of the larynx. From Mr. Savery's description it is seen that this plan proved perfectly successful and enabled the patient till the very last days of his life, when the increasing oesophageal obstruction rendered the passage of fluids altogether impossible, to take his nourishment by the mouth. I wish to avail myself of this opportunity to warmly recommend the adoption of this method in cases of tuberculous and malignant disease of the larynx and of malignant disease of the oesophagus, in which in several instances it has proved very useful in my hands, and would also suggest trying it in cases of post-diphtheritic anæsthesia of the larynx, in which the entrance of nourishment into the air passages must be feared. In conclusion, I beg to draw attention to the remarkable fact so often met with in such cases—viz., that the difficulty in swallowing and the loss of voice, which, according to the nature of things, must have originated quite slowly and gradually, are so often traced, as they were in the present case by the patient himself, to one definite occasion, and it would seem the most natural explanation that on that occasion he himself for the first time became conscious of there being something wrong.

Ealing, W.

ON THE DETECTION OF SMALL QUANTITIES OF SUGAR IN URINE.

By MARK McDONALD, M.B. DUB.

MUCH difficulty is often experienced in making a urinary analysis in deciding as to the presence or not of a small quantity of sugar. All the ordinary tests, which depend on the reducing action of sugar, simply show that some substance is present capable of exerting a reducing action, and since all normal urines contain reducing substances one has to resort to some further procedure in order to decide definitely whether the urine contains a little sugar, or whether it is simply that its normal reducing constituents are present in excessive quantity. Take, for example, Trommer's test, which is probably the most popular. On applying the test we often get a liquid appearing by reflected light to be of a dirty-looking opaque greenish or brownish colour, and which appears by transmitted light to be brown or red and more or less transparent, but apparently contains no precipitated cuprous-oxide. This condition may be caused either by an excess of uric acid and kreatinin (practically, if not actually, the only normal reducing constituents), or a small quantity of sugar may be present and precipitation of cuprous-oxide prevented by various bodies contained in the urine. We can proceed

on one of two principles to settle the question. Either apply some test distinctive for sugar—i.e., one not simply dependent on reduction—or eliminate the normal reducing substances. Elaborate chemical processes for the separation of the sugar will not be considered.¹

In a recent paper² Sir William Roberts strongly recommends filtration through animal charcoal as a means of removing the normal reducing agents. This procedure was proposed by Seegan many years ago³ as a method for detecting small quantities of sugar in urine. The differences in the methods and conclusions of these writers led me to work at the subject. While Sir William Roberts applies the tests for sugar to the filtrate from the animal charcoal, Seegan used the washings of the charcoal, which he found to contain a much purer sugar solution. Again, Seegan especially warns against filtration through animal charcoal where a quantitative estimation of the sugar is to be made, as he found that part of the sugar was retained by the charcoal, whereas Sir William Roberts recommends it as being specially well adapted for quantitative estimations since the sugar passes through in quantity "undiminished or nearly undiminished." I found that normal urines after thrice-repeated filtration through animal charcoal were quite colourless. They exerted extremely little reducing action. They contained no uric acid, but did contain some kreatinin, though in very much diminished quantity. It is remarkable that this kreatinin acts so far as if it were in pure solution in that it does not reduce picric acid unless a much larger quantity of potash is added than is required in natural urines to effect the reduction. I also found that when a little sugar was present (about one grain to the ounce), though the filtrate from the charcoal gave a much more satisfactory reaction with Trommer's test than the original urine, still there was no true precipitation of cuprous-oxide. The filter was then filled with distilled water twice and the washings collected separately and Trommer's test applied. The first washing gave a very distinct precipitate of cuprous-oxide, but the solution was muddy. The second washing acted very nearly like a pure solution of sugar. I then tried the effect of filtration through animal charcoal of solutions of dextrose of various strengths, the proportions present before and after thrice-repeated filtration being estimated by Fehling's solution. The following examples show the general tenour of the results obtained:—

Percentage of Dextrose found by Fehling's Solution.

No.	Before infiltration.	After infiltration.
1.	0.203	0.151
2.	0.62	0.48
3.	2.04	1.49

Therefore the charcoal retains a large part of the sugar. Much of this (but not all) can be recovered by thoroughly washing the charcoal with water. My results, therefore, agree with Seegan's, and the method which he recommended—i.e., the application of Trommer's test to the washings of the charcoal—is, I think, to be preferred. This procedure gives very pleasing results, but takes up some time and requires some apparatus and manipulation.

Of all the methods for determining the presence of small quantities of sugar by far the most satisfactory to my mind is the phenylhydrazine test. This test appears to have gained some by no means merited discredit. This is due, not to the test, but to the methods of applying it. Unless one is prepared to spend time and trouble over it is better to leave it alone. The method which I have used and found absolutely satisfactory is as follows. To 20 c.c. of urine in a test tube add 0.75 gramme phenylhydrazine hydrochloride and 1.0 gramme sodium acetate. Put in a water-bath at about 90°C. for forty minutes. Allow to cool slowly and after some hours examine the precipitate under the microscope. If albumin is present in any quantity it should first be removed, as it sometimes interferes with the formation of the crystals of glucosazone. The only objection to the test is, I think, that it is rather too sensitive. At any rate, small, isolated

¹ The fermentation test, the most reliable of all, is not applicable to the small quantities of sugar considered here.

² On the Verification of Sugar-testing in the Urine. The Practitioner, January, 1895, p. 11.

³ On a Method of Detecting Small Quantities of Sugar in the Urine: Brit. Med. Jour., 1872, vol. i., p. 469.