SYNOPSIS OF COURSE ON CLINICAL MICROSCOPY.

The course begins on October 1st, and continues throughout the academic year (to June 1st). Two laboratory classes of two and a half hours duration are held weekly. In addition, a one hour's recitation on the work already taken up is held each week. The course includes a thorough study of the blood, urine, sputum, gastric juice, and fæces, and other specimens of importance occurring in the wards from time to time.

A. THE BLOOD.

I. Consideration of the various views held concerning the origin of the red blood cells and leucocytes during intrauterine and extrauterine life.

II. Examination of fresh specimens of normal blood: (a) Study of the normal red cell, and the changes it may undergo owing to improper manipulation; (b) study of the various types of leucocytes in a fresh specimen of normal blood; (c) study of blood platelets in normal and diseased blood.

III. Methods of counting the red and white corpuscles, with the Thomas-Zeiss blood counters, including the use of the hæmatocrit.

IV. Methods of determining the hæmoglobin: (a) Von Fleisch's; (b) Gowers's.

V. Demonstration of methods of determining the specific gravity of blood: (a) Schmalz's; (b) Hammerschlag's.

VI. Method of taking the coagulation time of the blood by Wright's tubes.

VII. Ehrlich's method of blood examination by study of dried specimens: (a) Fixing of specimens: (1) By heat, on a copper bar or in thermostat; (2) by alcohol and ether in equal parts. (b) Staining of dried specimens to show the various elements of the blood which have an affinity for acid, basic, or neutral dyes: (1) Specimens stained with eosin; (2) methylene blue; (3) dahlia; (4) eosin and methylene blue together; (5) Ehrlich's triple stain; (6) Neusser's modification of Ehrlich's triacid mixture to show perinuclear basophilic granules.

VIII. Examination of blood for malarial parasites: (a) Fresh blood, to show the various stages of development of the tertian, quartan, and aestivo-autumnal parasites; (b) permanent specimens stained in eosin and methylene blue to show the same.

IX. Demonstration of *flaria sanguinis hominis* in fresh blood.

X. Study of the leucocytes, with permanent specimens: (a) physiological; (b) pathological.

XI. Study of the bone marrow, spleen, and lymphatic gland, with especial reference to the origin of the red and white corpuscles, and to the regeneration taking place after hæmorrhages and in grave anemia.

XII. Study of the various varieties of anemia, with permanent specimens: (a) Primary anemia: (1) chlorosis; (2) progressive pernicious anemia; (3) leukemia, (a) spleno-myelogenous, (b) lymphatic; (4) pseudo-leukemia. (b) Secondary anemia: (1) following hæmorrhage, (2) following malignant diseases, (3) following malarial infections.

XIII. Consideration of the blood changes in: (a) Various infectious diseases—diphtheria, measles, scarlet fever, typhoid, tuberculosis, etc.; (b) syphilis; (c) nephritis; (d) diseases of the heart; (e) pneumonia; (f) trichinosis.

B. THE URINE.

I. Theories of the excretion and secretion of urine.

II. Physical examination of the urine. Full consideration of the features to be noted under this heading.

III. Chemical examination of the urine: (a) *Organic constituents*: (1) Tests for the various proteids and proteoses in the urine, including (a) albumin, with methods for quantitative determination, (b) peptone, (c) fibrin, (d) mucin, (e) albumoses, (f) hæmoglobin. (2) Tests for the different varieties of sugars, including methods for the quantitative estimation of sugar. (3) Organic substances which may reduce copper solutions and simulate glycosuria, as homogentisinic acid (alcaptonuria) and glycuronic acid. (4) Tests for acetone, diacetic acid, and β -oxy-butyric acid. (5) Colouring matters: normal: (a) urobilin, (b) urine indican; abnormal: (a) colouring matters of the blood, (b) pile pigments, (c) vegetable colouring matters. (6) Leucin and thyrosin and xanthin. (7) Urea, qualitative and quantitative determination of. (8) Uric acid. (9) Method of estimating total nitrogen in the urine by the Kjeldahl process. (10) Krüger and Wullf's method of estimating the alloxuric bodies in the urine. (b) *Inorganic constituents*: (1) Chlorides, quantitative and qualitative determination of. (2) Phosphates: (a) earthy, qualitative and approximate quantitative determination of; (b) alkaline: quantitative estimation of total phosphoric acid. (3) Sulphates, qualitative and approximate quantitative determination of.

IV. Miscellaneous tests: (a) For Ehrlich's diazo-reaction.

V. Consideration of the toxicity of the urine.

VI. Microscopical examination of urinary sediment: (a) Unorganised deposits, including crystalline and amorphous deposits; various microchemical tests for purposes of differentiation. (b) Organised deposits, including anatomical elements as epithelial, red blood and pus cells, false and true tube casts, etc. (c) Staining for tubercle bacilli; methods recommended for differentiation from smegma bacilli. (d) staining for gonococci.

C. THE SPUTUM.

I. General considerations regarding collection of and prevention from contamination.

II. Information obtained from a macroscopical examination of the sputum.

III. Microscopical examination of buccal secretion.

IV. Microscopical examination of sputum. Examination for (a) red blood and pus cells, including eosinophilic cells. (b) Epithelial cells. Squamous, ciliated and alveolar epithelial cells. Study of the myelin degeneration of the latter, and of the various varieties of pigment they take up giving rise to the different types of "dust cells." (c) Elastic tissue; methods of examining for it. (d) Curschmann's spirals; (e) Fibrinous casts of bronchi. (f) Various types of crystals; Charcot-Leyden, hæmatoidin, fatty, etc. (g) Examination for amœba coli.

V. Methods of staining for various pathogenic bacteria, tubercle bacilli, pneumococci, etc.

VI. The sputum in the following diseases was studied macroscopically and microscopically: (a) bronchitis, various types; (b) pneumonia, lobar and acute tuberculous pneumonia; (c) pulmonary tuberculosis, various stages; (d) asthma; (e) bronchiectasis; (f) hepatic abscess opening into bronchus, with examination for amœba coli, etc.; (g) pneumonokoniosis.

D. GASTRIC JUICE.

I. General consideration of the anatomy of the stomach and the physiology of gastric digestion.

II. Consideration of the normal constituents of the gastric juice.

III. Various forms of test breakfasts.

IV. Method of removing the gastric contents with a practical demonstration. Amount and appearance of contents in healthy digestion.

V. Chemical examination of gastric contents: (a) Reaction to litmus; (b) Tests for free acids; (c) Tests for free hydrochloric acid; (d) Tests for lactic acid; (e) Tests for butyric and acetic acids; (f) Quantitative estimation of total acidity; (g) Estimation of free hydrochloric acid; (h) Tests for pepsin, pepsinogen, and rennet; (i) Test for starch and its derivatives.

VI. Microscopical examination of gastric contents: (a) For food detritus; (b) For blood, or portions of mucous membrane and malignant growths; (c) For sarcinae and other vegetable growths.

VII. Method of determining the absorptive and motor power of the stomach.

VIII. Changes in the gastric juice occurring in various systemic and local diseases of the stomach: (a) Chlorosis; (b) Neurasthenia; (c) Gastritis, acute and chronic; (d) Atrophy of the mucosa; (e) Carcinoma of the stomach; (f) Ulcer of the stomach; (g) Dilatation of the stomach.

E. THE FÆCES.

I. Macroscopical examination. Effects of medicinal agents on the colour, etc.

II. Microscopical examination: (a) Food debris; (b) Red blood and pus cells; (c) Intestine epithelial cells; (d) Amœba coli; (e) Differentiation of amœba coli from trichomonas and cercomonas intestinalis, paramœcium coli and monads; (f) Examination of fæces for tubercle bacilli; (g) Various forms of crystals.

III. Intestinal parasites. These were fully dealt with by Dr. Stiles in his lectures on animal parasites, when a large number of parasites were demonstrated. Dr. Stiles also gave four laboratory demonstrations. Trichinæ in the muscles, adult male and female trichinæ in the rat's intestine, various forms of eggs, etc., were demonstrated. Class received permanently-stained specimens of tæniæ illustrating the solium and saginata types.

IV. The special features of the stools in various diseases are dealt with.

F.

Specimens of interest from ward cases not coming under the above headings are demonstrated to the class from time to time.

FOURTH YEAR WORK IN CLINICAL MICROSCOPY.

A place in the laboratory is set apart for each fourth-year student. No systematic instruction is given, but the clinical clerks and surgical dressers make here the special examinations, cut sections (under Dr. Fletcher's direction), and use the laboratory for general purposes. Some of them are able to carry out research work. The studies of MacCallum and Opie on the hæmatozoa of birds, MacCallum's studies on the flagellate forms of the malarial organism, T. B. Brown's work on *Trichinosis* illustrate the character of the work which the senior students can do.

REMARKS ON TWO CASES OF GANGRENE OF THE LUNG.

By BYROM BRAMWELL, M.D., F.R.C.P. EDIN.,
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WITH A SURGICAL REPORT ON ONE OF THE CASES

BY

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CASE I.—*Gangrenous Inflammation of the Lung, apparently due to the Rupture of an Ulcer of the Stomach into the Lung; Immediate Improvement under Rectal Feeding; Recovery.*—At first sight it was very difficult to explain the clinical phenomena which this case presented, but I am disposed to think that the gangrenous condition of the lung which seemed to be present was the result of the perforation into the thoracic cavity of an ulcer in the upper wall of the stomach, the production of a localised cavity containing foetid contents in connection with the ulcer, and the sudden rupture of the contents of this cavity into the lung tissue or bronchial tubes. This theory is strongly supported by the remarkable improvement which took place immediately rectal feeding was commenced. The notes of the case are as follows:

Mrs. McG., aged 28, was admitted into the Edinburgh Royal Infirmary on October 9th, 1895, suffering from cough and the expectoration of a large quantity of very foul-smelling sputum.

Previous History.—The history which we obtained was that the patient, whose home was comfortable and surroundings healthy, had suffered from measles and bronchitis in childhood, and pleurisy at the age of 17; that she had been married for seven years; and that during the whole of this time she had enjoyed excellent health, never having been troubled with any symptoms indicative either of disease of the lungs or stomach. The illness for which she was admitted commenced on October 1st, 1895, about ten days before admission. As I have already stated, she was up to this time feeling perfectly well, eating as usual, doing all her household work, not coughing, nor short of breath, and not feeling anything amiss with her digestion or stomach.

On the night of October 1st she went to bed at 10 P.M., feeling in her usual condition of good health. About 11 P.M. she was awakened by one of her children moving. She got up, walked hurriedly across the floor, and, when bending over the child, suddenly felt a sensation as if something had given way in the lower part of the chest on the left side. This was immediately followed by a sensation of hot gas coming up into the mouth, and by an extremely bad taste in the mouth. She then began to cough, and immediately expectorated a considerable quantity of liquid material, which was almost black in colour and of an extremely foetid odour. During the night she had two or three other paroxysms of coughing, and on each occasion she expectorated a considerable quantity of the same foetid material. At first the cough was unattended with pain, but a few days after the onset of the illness she experienced a catching pain in the left side, which was aggravated by coughing. She has continued to cough and expectorate ever since. The sputum has become lighter in colour, but has always had an extremely bad taste and smell. On October 5th and 6th she expectorated a very large quantity of this foul-smelling frothy material. Since her illness commenced she has become weak and unfit for work. She states that she has never felt feverish, but has on several occasions suffered from cold sweats; her appetite has been very poor.

The morning before she was admitted into the infirmary the sputum was very black.

The family history is quite unimportant. So far as she knows none of her relations have suffered from any lung disease.

State on Admission.—The patient is a well-developed and well-nourished woman. The face is somewhat florid. Temperature 100° to 101°, pulse 84.

Respiratory System.—The respirations number 26 per minute. She states that she can lie in any position, but that the catching pain in the left chest is aggravated when she lies on her right side. When lying on the back or left side she does not feel short of breath; when she turns on to the right side she becomes short of breath, and has a fit of coughing. She is troubled with a frequent cough. The sputum is copious, very foul-smelling, frothy, somewhat brown in colour. The chest is well formed. The breathing is chiefly diaphragmatic, thoracic expansion being shallow, more especially over the lower part of the left chest, where the expansion is much less free than the corresponding part of the right chest. The vocal fremitus is normal, except in the left infra-axillary regions, where it is markedly diminished in intensity—in fact, almost absent. The percussion note is normal over the whole of both lungs, except in the left inframammary and left infra-axillary regions, where it is slightly impaired. Over the right lung and over the upper part of the left lung the breath sounds are normal, except for the presence of occasional high-pitched rhonchi and a few fine crepitant râles with inspiration. Over the lower part of the left chest, anteriorly, laterally and posteriorly, coarse friction, especially marked at the end of inspiration, is heard.

Circulatory System.—A well-marked, somewhat rough systolic murmur is audible in the mitral and tricuspid areas. The second sound is accentuated and occasionally reduplicated.

Alimentary System.—The appetite is poor, the tongue somewhat furred. There is no complaint of pain or uneasiness

after eating, and there has been no vomiting. The stomach, liver, and spleen appear to be normal in size.

Urinary System.—The urine is dark in colour and loaded with urates. It contains neither albumen, blood, sugar, nor bile.

Treatment.—Intralaryngeal injections of a 10 per cent. solution of menthol in olive oil, and boracic acid and sulphate of quinine internally were prescribed.

Diagnosis.—Such was the condition of the patient on admission. The diagnosis was difficult. There was, of course (1) dry pleurisy involving an extensive area of the left pleura and (2) a foetid cavity, either bronchiectatic or gangrenous, in the left lung. The extremely foul character of the sputum and its copious frothy character showed this. Bronchiectasis seemed to me to be excluded for the following reasons: (1) The patient had not suffered from bronchitis; and, up to the time of the occurrence of the rupture into the bronchial tubes of the foetid gas and foetid sputa, had not previously been troubled with cough or expectoration; (2) marked constitutional symptoms—fever, debility, etc.—were present; and (3) there was extensive dry pleurisy, obviously due to the same cause as the lesion of the lung itself.

Consequently, having excluded bronchiectasis, we came to the conclusion that the patient was suffering from gangrene, or inflammation of the lung. But gangrene of the lung is very rarely, if ever, developed idiopathically; it is almost always the result either of a pneumonia, or of the introduction into the lung tissue or the terminal bronchi of some septic material, the introduction into the bronchi of food particles, the extension to the lung tissue of a septic inflammation from the wall of a bronchiectatic cavity, the oesophagus, etc.; or compression of the root of the lung (blocking of the bronchi), trophic changes due to pressure on the nerves, septic inflammation in the compressed lungs, etc.

In this case, none of these causes appeared to be at work; the patient was perfectly well up to the time when she suddenly felt something giving way in the lower part of the left chest. This sensation was immediately followed by cough and the expectoration of a considerable quantity of dark and extremely foul-smelling sputa. This rupture was followed, but not preceded, by inflammatory symptoms (fever, etc.), pleurisy, and gangrenous inflammation of the lung.

At this stage of the case, I did not see my way to offer any explanation of the exact mode of causation of the attack—that is, the nature of the rupture; but the course of the case threw considerable light upon this point. The progress of the case was as follows:

October 11th. The patient is feeling much better to-day; has coughed very little; the sputum is not so dark in colour.

October 15th. The temperature is not so high (see chart).

Temperature chart in the case of Mrs. McG., showing the course of the temperature for the first three weeks after admission to hospital.

The sputum, though still very copious, is less dark in colour and less foetid in odour. The cough is still at times very troublesome. The patient says that she feels fairly well, and that the bad taste in the mouth is not so marked.

October 17th. The cough and expectoration are still very troublesome in the morning; the sputum is less dark in colour, and less offensive. On microscopical examination my house-physician, Dr. Henderson, detected some starch

corpuscles in the sputum. On the evening of this day the temperature, which since the 12th has been normal, began to rise; at 7 P.M. it was 100° .

October 18th. At 3.30 A.M. there was an attack of copious hæmoptysis; and at 8 A.M. a second attack, the bleeding being still more copious; temperature 102° , pulse 112. At 11.30 P.M. the patient stated that she felt rather better than she had done during the previous night. The evening temperature was 103° , and the pulse 96.

On October 19th the patient was rather better, the temperature falling.

On October 20th she was still spitting a little of the foul-smelling sputum, and in addition a good deal of dark blood, chiefly liquid, but partly composed of small clots, which had apparently been lying in a cavity. On the evening of this day the temperature went up to 104° , and the patient complained of feeling very sick. She vomited a teacupful of dirty brown, hare-soup-like liquid, which was, however, free from odour. The vomiting was not preceded by coughing. Since yesterday afternoon the patient has complained of an itchy feeling in her arms and legs; this afternoon a dull, red, papular eruption, which in places was almost confluent, appeared on the arms and legs, and to a slight extent on the trunk. With the appearance of the eruption the itchiness disappeared.

October 21st. The eruption on the legs, forearms, and face is still very marked; it is very symmetrical in its distribution. The papules, especially on the face, are more confluent and of a duller red colour than they were last night. The cough has been very troublesome this morning, and the patient has expectorated a large quantity of brownish, frothy, blood-stained fluid, having a foul smell. She has also vomited a considerable quantity of brownish, clear fluid containing some curds of milk. At 5 P.M., during a fit of coughing, the patient brought up half a teacupful of dirty brown fluid with an offensive odour, followed by some dark frothy blood. So far as could be judged, this material came from the stomach. The patient states that she feels "a rattling in the left side of the chest when she coughs." The physical signs are as follows: The condition of the right chest is normal, the breathing harsh, vesicular, the expiration prolonged, no accompaniments. On the left side, below the second rib, the percussion note seems to be slightly duller and higher pitched than normal; above the second rib it is normal. Above the second rib the breath sounds are harsh, the expiration prolonged and accompanied by some snoring rhonchi. From the second to the sixth ribs the inspiration is blowing and whistling in character, expiration high pitched, markedly prolonged, and accompanied by numerous chirping *râles*, coarse and medium in size, and by snoring rhonchi. The diet was limited to iced beef-tea and iced peptonised milk.

October 22nd. Patient much the same to-day. About 5 A.M. she vomited about a teacupful of reddish-brown material which was not foetid in character. Has been somewhat drowsy. Is taking a good deal of iced milk. The eruption on the face is now so confluent that it has the appearance of a uniform dark purple blush. Over the limbs, legs, and trunk the eruption is also more copious, but the papules are discrete. Over the lower part of the left chest, inspiration is blowing in character, while expiration is completely masked by coarse gurgling crepitations.

October 23rd. During the night the patient vomited about half a teacupful of dirty, brownish-green fluid containing some curdled milk. This morning she spat up a considerable quantity of bright red blood. The erythematous rash on the body is fading. Since even the iced milk and beef-tea produced sickness, it was decided to feed the patient entirely by rectal enemata.

October 24th. Patient has had a good night, and is feeling much better this morning. The cough has been much less troublesome. She has not vomited since yesterday afternoon, when the rectal feeding (consisting of peptonised milk, meat juice, egg, with thirty minims of laudanum) was commenced. Has been able to take her medicine by the mouth this morning without any sickness. The erythematous rash has almost disappeared. The tongue is much cleaner, and the temperature has fallen somewhat.

October 25th. The patient is very prostrate this morning, having had an attack of diarrhoea during the night. She

feels very drowsy, headachy, and inclined to sleep. The rash has entirely disappeared. The cough has not been troublesome, and there has been very little expectoration and no vomiting. The tongue is fairly clean. The temperature has suddenly fallen to below the normal, 97.8° (see chart), pulse 84. The urine contains a trace of albumen and bile. At 2 P.M. the patient vomited a teacupful and a-half of clear, colourless fluid, which was acid in reaction and which contained some brownish masses. At 7 P.M., after a drink of water, the patient vomited two teacupfuls of clear watery fluid, acid in reaction. Is still somewhat drowsy, but looks and feels better. During sleep the breathing is slow, 16 to 18 per minute.

October 26th. The patient feels fairly well, but is dull and drowsy. She slept pretty well during the night, and coughed very little. She expectorated a small quantity of dark, reddish-brown sputum, having a bad odour. This morning, after taking her medicine, she again vomited about half a teacupful of clear, watery fluid without any bad odour. The physical signs are as follows: Over the left chest, from the clavicle to the fifth rib, the respiration is blowing and bronchial in character; this is especially marked between the second and fifth ribs and in the lateral aspect of the chest. Inspiration, but especially expiration, is attended with numerous medium-sized and coarse crepitations having a tinkling character, and also with numerous purring and snoring rhonchi. Below the fifth rib the breathing is harsh, the expiration prolonged, and there is coarse pleuritic friction. The urine still contains albumen and bile.

October 28th. Lips and tongue dry. Distinctly jaundiced. Expectoration much less copious, scarcely a dessertspoonful in the twenty-four hours, thick, muco-purulent, and slightly blood-tinged. When the patient coughs the odour of the breath is still very offensive. Albumen and bile in considerable amount are still present in the urine.

October 31st. Patient slept well last night. Lips and tongue moist; tongue clean; still markedly jaundiced. The urine contains bile and a trace of albumen. Fæces very fluid, pale, just like potato soup, with very offensive odour. Has coughed very little, and has scarcely expectorated at all. The sputum is much less offensive, but the breath after coughing is still very offensive. Twenty drops of laudanum to be added to each enema.

November 1st. The patient still complains of difficulty in lying on the right side; turning to the right side still causes coughing.

November 2nd. After a fit of coughing yesterday, the patient vomited a cupful of clear watery material containing some mucus, curdled milk, and a small quantity of blood.

November 5th. Jaundice less marked. On account of the irritability of the bowel the rectal feeding had to be stopped yesterday. To-day the patient is taking peptonised milk and beef-tea by the mouth without any feeling of sickness.

November 6th. The apex beat of the heart is situated between the fourth and fifth ribs an inch and a-half outside the sternum. The murmurs have disappeared.

November 9th. Still improving. Is coughing very little. The sputum is very small in amount and has almost entirely lost its foetid character. The patient, however, still complains of a bad taste in the mouth after coughing. Jaundice almost gone. The urine now contains only a trace of bile.

November 14th. There has been a slight rise in temperature in the evening. Yesterday morning after a fit of coughing she felt a bad taste in her mouth and vomited a small quantity of brown-coloured material.

November 17th. The patient was up for a short time yesterday and again to-day. Yesterday and to-day she had fish for dinner and a light-boiled egg and toast for tea. On the evening of this day the temperature rose to 102° , apparently either the result of the exertion of getting up or the more liberal dietary. To be kept in bed and on milk diet.

November 19th. The patient says that she feels a great deal better. Slept well. Tongue clean. The pleuritic friction has entirely disappeared, and the respiratory murmur is now natural over the whole of the left chest. There is no tenderness in the epigastrium. No expectoration. No cough.

November 25th.—The patient remained in bed from the 17th to the 22nd. She was then again allowed to get up.

After this date she made an uninterrupted recovery, the temperature, pulse, and respirations being normal.

She was discharged on December 7th feeling perfectly well in every respect, though still somewhat weak.

REMARKS.

From the detailed account of the progress of the case it will be seen that on the evening of October 17th the temperature, which had previously been subnormal, began to rise. This rise in temperature was followed by the occurrence of copious hæmoptysis. For several days the temperature remained high. During this period an erythematous eruption, evidently due to some form of intoxication, developed, and the patient frequently vomited, the vomited matter on several occasions being brown in colour and containing blood. The irritability of the stomach was so urgent that rectal feeding was commenced. After this, immediate improvement occurred; the vomiting ceased, the temperature suddenly fell, the cough became much less urgent, the expectoration much less copious and less fœtid in character.

The fact that immediate improvement, both in respect to the local (lung) symptoms and the general condition (fever, etc.), resulted as soon as the rectal feeding was commenced throws important light upon the nature of the case, and explains, I think, the manner in which the gangrenous inflammation of the lung was developed.

The only theory which seems to me to satisfactorily account for all the facts of the case is the following: That there had been a latent ulcer in the upper wall of the stomach which had formed adhesions to the diaphragm, and had perforated into the thorax; that a localised cavity, the contents of which were fœtid, had been formed above the diaphragm in connection with this ulcer; that under the effort of suddenly bending forwards this cavity had ruptured into the lung and bronchi; that a localised gangrenous inflammation of the lung with pleurisy had followed; that the introduction of food into the stomach had kept up this irritation and inflammation; and that as soon as the rectal feeding was commenced and the sources of irritation were removed, the intoxication and gangrenous inflammation of the lung had gradually subsided; that the papular erythema, the jaundice and albuminuria were the result of intoxication—the absorption of some poisonous product from the gangrenous cavity.

In confirmation of this view, it is interesting to note that on several occasions the vomited matter, although it was not fœtid, yet resembled the sputa in its other characters; that the vomited matters on several occasions contained blood or blood clots; and that on one occasion at least, before any stomach symptoms were complained of, Dr. Henderson detected starch corpuscles in the sputa.

I cannot explain the facts of the case on any other supposition than that advanced above. The great objection to this theory is that up to the time of the occurrence of the rupture, and indeed for some time afterwards, there were no stomach symptoms; but this objection is not conclusive. I have met with several cases of ulcer of the stomach in which there were absolutely no stomach symptoms until a copious hæmatemesis suddenly occurred. In one of these cases the patient had, a year previously, suffered from all the characteristic symptoms of ulceration of the stomach, including hæmatemesis. This patient remained absolutely free from stomach symptoms for a year, and during this time she was constantly and actively employed as a domestic servant in the family of a skilled observer, a medical man. She was then suddenly again attacked with profuse hæmatemesis.

Further, it is well known that an ulcer situated on the upper surface and at the cardiac end of the stomach is more frequently latent than an ulcer in the usual position—that is, in the neighbourhood of the pyloric orifice. I am, too, disposed to think that an ulcer of the upper surface of the cardiac end of the stomach, which had formed adhesions to the diaphragm, would be more likely to be unattended with symptoms than an ulcer which was free; but I speak with hesitation on this point.

CASE II. Large Gangrenous Cavity in the Lung: Incision: Drainage: Recovery.—This case is of great interest from the large size of the gangrenous cavity, the difficulty in accounting for its formation, and the very successful result of the surgical treatment. The notes are as follows:

MEDICAL REPORT BY DR. BYROM BRAMWELL.

G. T., aged 40, a ship's captain, was seen with Dr. Smith of Leith on February 20th, 1897, suffering from gangrene of the lung. The patient and his wife gave us the following account of the previous history:

Previous History.—A year ago the patient was a good deal troubled with his stomach. At that time he suffered from severe pain after taking food, and occasionally vomited, but never vomited blood or "coffee grounds." With this exception he enjoyed good health until his present illness commenced three weeks ago.

On January 27th, 1897, the patient left Leith for Middlesbrough in command of his steamship. He was on the bridge all night. Shortly before getting into Middlesbrough he was seized with pain in the abdomen; he described the exact position as "the middle of the stomach." The pain was so severe that he took three doses of laudanum (25, 20, and 15 drops respectively). On arriving at Middlesbrough he immediately sent for a doctor. He was laid up in lodgings in Middlesbrough for three weeks. The doctor said he had peritonitis and congestion or inflammation of the liver. The patient, however, states that there was not much tenderness on pressure over the abdomen. Soon after the illness commenced he experienced severe catching pains over the region of the liver. He did not, however, feel short of breath until a week ago (the last week he was at Middlesbrough), and he had no cough until after his return to Leith (February 18th). During the first fortnight that he was laid up in Middlesbrough he was feverish; after this the temperature became normal; it rose again above the normal on Sunday last (the first day on which he was allowed to get up). The doctor who attended him in Middlesbrough sent the following note with the patient to Dr. Smith: "Captain T. had a severe peritonitis, which caused me at one time to contemplate laparotomy (as I have little faith in idiopathic peritonitis); however, improvement took place and the idea was abandoned. Subsequently pains occurred over the hepatic region. No pleuritic evidences could ever be detected. Increased dulness and decreased breath sounds are very marked in right chest; I cannot find evidence of effusion. There have not been any pneumonic symptoms throughout. Temperature normal last week; began to rise on Monday, February 15th."

The patient came home to Leith in an invalid carriage on Wednesday, February 17th, and was seen on his arrival by Dr. Smith. The temperature was elevated (102°). The patient was markedly short of breath. There was extensive dulness over the lower part of the right chest.

On Thursday, February 18th, the patient began to cough (there had been no cough previously) and to spit up some very foul-smelling material.

On Friday, February 19th, he spat up large quantities of the same foul-smelling material, the stench of which was so offensive that his wife could hardly remain in the room with him.

Condition on Saturday, February 20th.—When I saw patient on the afternoon of Saturday, February 20th, he was lying on his right side, looking extremely ill. The temperature was 102°, the pulse 110, the respirations (when at rest) 26. He was spitting up large quantities of extremely fœtid sputum having a distinctly gangrenous odour. The abdomen was now perfectly natural in every respect, and was not tender on pressure; no distension. The liver appeared to be of normal size, and was certainly not enlarged downwards. Percussion showed a localised area of hyper-resonance over the front of the right chest; it extended from the second rib above to the fifth rib below; externally it extended to the nipple, and internally to the right border to the sternum. Over this hyper-resonant area harsh vesicular breathing was audible; but on making the patient cough a very distinct succussion shock or sound, highly suggestive of a cavity, was found to be present. Beyond (externally to) the nipple an area of well-marked dulness extended into the mid-axillary region. Over this dull area the breath sounds could not be heard. Posteriorly there was dulness on percussion up to the middle of the scapula. Over this dull area distant bronchial breathing could be heard; a diagnostic puncture which had been made by Dr. Smith over the dull area at the base of the right lung had failed to demonstrate the presence

of the fluid. At a localised spot just below the inferior angle of the right scapula very distinct metallic tinkling and a succussion sound on coughing were heard. When the patient was turned on to his left side he immediately became very short of breath and began to cough. This procedure (and placing the patient in the sitting position for the purpose of examining the back) produced a notable difference in the physical signs. Over the (formerly) dull area external to the right nipple the percussion note was now resonant, and over the hyper-resonant area between the second and fifth ribs very marked metallic tinkling could now be heard. These facts were independently verified by Dr. Smith.

Diagnosis.—From these physical signs—the extremely foetid character of the expectoration, the fever, and grave constitutional disturbance which was present—it was obvious that the patient was suffering from pulmonary gangrene, and that there was a large cavity either in the lung or pleura or in both. The exact causation of the gangrene was, however, doubtful. The most likely supposition seemed to me to be either that the case was one of gangrene of the lung following a pneumonia, or that there was a subphrenic abscess, perhaps associated with an ulcer of the stomach, and that the subphrenic abscess had made its way through the diaphragm and produced a localised empyema and gangrene of the lung. Against the latter view were the facts that the onset of the attack had not been preceded or attended by any symptoms distinctly suggestive of ulcer of the stomach, and that the cavity in the lung seemed to be situated too high for a gangrenous cavity due to this cause. Another possibility which was thought of was that an abscess of the liver had perforated into the chest, but there was no evidence of this. The patient had never resided abroad, he had never suffered from dysentery or intermittent fever, and physical examination showed that the liver was not enlarged.

Treatment.—It was agreed to continue the antiseptic inhalations, stimulants, and tonics which the patient was taking, and to send him into the Royal Infirmary as soon as arrangements could be made for his admission, with the object of having the gangrenous cavity incised and drained.

On February 21st Dr. Smith wrote me to say: "The patient's general condition is more satisfactory this morning. Temperature 99.4°; respirations while at rest 18; pulse 102. He had a good night's rest."

On February 22nd the patient was admitted into the Edinburgh Royal Infirmary under the care of Mr. Cotterill, and immediately after his admission a consultation was held between Dr. Smith, Mr. Cotterill, and myself. The physical conditions were very much the same, except that metallic tinkling was no longer audible. The patient continued to expectorate a large quantity of frothy material, streaked with blood, having a very foul and offensive odour.

February 23rd. The patient had a bad attack of dyspnoea during the night, but is looking better this morning. Temperature only slightly above the normal. Pulse quiet. Still spitting a good deal of foul-smelling material.

Physical signs much the same. The hyper-resonant area extends out as far as the nipple and as low down as the 6th rib (from the 2nd to the 6th ribs), most marked between the 2nd and 4th interspaces. Over this position the vocal fremitus is very marked, and harsh vesicular breathing can be heard. There is to-day no metallic tinkling and much less succussion shock on coughing. It would therefore appear that the opening into the cavity is partially closed, and that a thin layer of adherent lung overlies the cavity.

There is marked dullness external to the nipple. An aspirating needle inserted by Mr. Cotterill into this dull area drew off pus. On turning the patient over on to his left side this dull area becomes quite resonant. There is marked dullness along the spine behind and up to the top of the scapula. Over this area the breath sounds can be heard rather bronchial and harsh in character. The signs of a cavity below the inferior angle of the right scapula are much less obvious to-day.

These physical signs seemed to show that in addition to a large cavity in the lung or pleura or in both, the upper lobe of the right lung was adherent both in front and behind; and further that there was probably some consolidation of the lung, for the breath sounds over the dull area posteriorly were much more marked than one would have expected if the

dullness had been merely due to compression of the lung and the presence of pleuritic effusion.

Temperature chart in the case of G. T., showing the course of the temperature before and after the operation.

SURGICAL REPORT BY MR. COTTERILL.

February 24th. The patient, G. T., having been recommended to my care by Drs. Smith and Bramwell, was operated on to-day.

Immediately previous to operation the pulse was 110 and of small volume, the respirations 24, the temperature 98.8°. The patient looked very ill.

An incision having been made over the seventh rib in the anterior axillary line, I removed about 2 inches of that rib and incised the pleura, which was found adherent and considerably thickened. No fluid escaped at first, though a diagnostic puncture made on the previous day about 2 inches in front of this point had demonstrated the presence of pus. I first passed the finger forwards, but found no fluid; then backwards, when I opened into a large cavity containing clear pleuritic fluid, perfectly odourless. As this cavity was evidently distinct from the one from which I had previously drawn pus with the exploring needle, I passed the finger in a forward and downward direction, and eventually found a swelling at some little distance from my original opening. This swelling being explored with a fine needle was found to contain very foetid pus. I accordingly passed in sinus forceps along the needle, enlarged the opening, and put in a large drainage tube. The patient then began to cough violently and expelled from the abscess cavity about 8 to 10 oz. of thin, flaky, and extremely foetid pus, after which the cavity was very gently washed out with warm boracic lotion allowed to flow into it by gentle hydrostatic pressure.

In spite of the view held by some surgeons that washing out of such cavities is attended by great risk to the patient, I am of opinion that no risk exists if the following precautions are taken, namely, the fluid should be some mild antiseptic (not carbolic lotion); it should be warmed to about blood heat; it should be injected slowly and without any force, great care being taken that it runs out as easily as it runs in; and the patient should be rolled over into such a position that it is impossible for a large volume of lotion to collect at one time in the chest, and so by its weight embarrass the heart. If these points be observed it is a perfectly safe proceeding, and is obviously of great advantage in washing away the foetid contents of such an abscess as this, or even in getting rid, as it often does in cases of empyema, of large masses of lymph which are apt to block the drainage if left behind.

The fluids I prefer to wash out with are boracic lotion, a solution of creolin, or a solution of izal, the latter of which is a particularly useful deodoriser. As for insufflations of iodoform, which are pretty commonly used, I look upon them as of very doubtful use from the antiseptic standpoint; they possess a foetor not much pleasanter than that of gangrene of the lung itself, and they are not devoid of the risk of causing iodoform poisoning.

The patient stood the operation fairly well, and the wound had to be dressed every two or three hours. He was extremely weak during the night following the operation, but the next morning (February 25th) he was slightly easier, and was able to take more food than he had been doing. To-day it is noticed that the expectoration is less profuse and much less foetid.

For the next day or two the patient remained in a very precarious condition, the temperature ranging from normal to 102° F. (see chart) quinine, strychnine, and digitalis were prescribed.

After a while, the patient began to make steady though slow progress, and with the exception of occasional severe attacks of dyspnoea there was nothing of particular note.

On March 2nd it was noted that the expectoration was muco-purulent, much less in quantity, and absolutely odourless.

He was discharged from the hospital on May 18th, having been in the wards just over three months.

He returned on May 28th, when it was found that the wound was firmly healed; the expansion of the lungs was good; there was slight dulness on percussion over an area some 8 inches in diameter surrounding the cicatrix, due to thickening of the pleura. He had put on a great deal of flesh, and was looking in very fair health.

He subsequently went a short sea trip, and returned on June 25th, looking in robust condition.

PULSUS BISFERIENS.

By WALTER BROADBENT, M.D. CANTAB., M.R.C.P.,
Brighton.

WHILE house-physician at Brompton Consumption Hospital three years ago a patient came under my care who presented the curious condition of having a well-marked "bisferiens" pulse on the left side, while on the right the pulse was only that of aortic regurgitation; and since that time I have come across two similar cases, so the condition is apparently not uncommon.

CASE I.—A man, aged 41, who had had rheumatic fever at the age of 16 and again at 20. His radial arteries were large and a little tortuous; the pulse was short and sudden on the right side, but not completely collapsing; on the left side it could be distinctly felt to be double, especially when a little pressure was applied.

Right Pulse. Case I.

Left Pulse

This state of his pulses was invariably present during his six weeks' stay in the hospital. Three months later he died suddenly. His heart weighed 2 lbs.; both ventricles were greatly dilated and hypertrophied, especially the left. The aortic valve was incompetent and the orifice narrowed, admitting only the tip of a finger; the valves were retracted and rigid. The mitral orifice was also narrowed, admitting one finger easily; its aortic cusp was much thickened and contracted, the other less affected. The aorta was quite normal up to the origin of the left subclavian artery, but just beyond this point was a shallow pocket, the size of a shilling, in the aortic wall, which was here thinned and atheromatous, and from this point a long line of atheroma extended down the left side of the thoracic aorta. Nothing abnormal was found in the carotids or subclavians.

CASE II.—A boy, aged 18, who had had attacks of rheumatic fever at 13 and 16. His radial arteries were larger than in the last case, and they emptied almost completely between the beats; his right pulse was short and sudden, but the left was markedly bisferiens. The left carotid could be felt to be bisferiens, but the right not; a tracing of the right, however, showed an approximation to the bisferiens character. On examining the posterior tibial artery I found the pulse was not bisferiens, and the tracing corresponded to that at the right wrist.

Posterior Tibial. Case II.

This boy died suddenly about a year later; his heart weighed 2 lbs. 1 1/2 oz., both ventricles were greatly dilated and hypertrophied. The aortic valve was incompetent, and the edges of the cusps were thickened, causing slight stenosis; the right posterior cusp had on its aortic surface a calcified prop which kept the cusp stretched across the orifice. The aorta was slightly dilated generally; nothing abnormal was found in the large arteries; the mitral orifice admitted three fingers; the valves were

normal; the tricuspid was slightly stenosed, not admitting two fingers its valves were thickened.

Case II.

Right Radial

Right Carotid

Left Carotid

Left Radial

The Aortic Orifice. Case II.

CASE III.—A woman, aged 32, had attacks of rheumatic fever at the ages of 17 and 20. Her radial arteries are larger than normal, and pulsation is visible in them; her right pulse is sudden and moderately collapsing, while the left is strikingly bisferiens to the finger. The left carotid feels bisferiens but the right does not; the dorsalis pedis artery gives a tracing similar to that of the right pulse. Her apex beat is in the sixth

Right Pulse

Left Pulse

Dorsalis Pedis

space, 1 1/2 in. below and 1 in. external to the nipple. It is powerfully thrusting. At the apex are heard a low rumbling presystolic murmur leading up to a short loud first sound, a systolic murmur, and a diastolic which runs into the presystolic. At the tricuspid area a loud first sound, blowing systolic murmur, a second sound, and a louder and longer diastolic murmur. At the pulmonary cartilage a harsh rough systolic murmur, loud second sound, and a diastolic murmur. At the aortic cartilage a long rough systolic murmur, faint second sound, and a diastolic murmur. In the neck a loud rough systolic murmur and a faint diastolic murmur, no second sound. The amount of hypertrophy of the heart taken with the artery at the wrist, which is only moderately large and does not collapse entirely between the beats, makes it probable that there is in this case also aortic stenosis as well as regurgitation. Previous to these cases I had seen four patients in whom one radial artery gave an anacrotic tracing, but I do not know whether both arteries gave it or whether it was the right or the left; they all had evidence of aortic regurgitation with stenosis, and in one, post mortem, the aortic