operation over it. The left side of the scrotum was apparently normal; the external abdominal ring was considerably larger on that side than on the right, and the inguinal canal seemed large to the examining finger. No tumour could be felt in the inguinal region, and there was no appearance of a hernia on attempts at coughing. The rectum was empty; the abdomen slightly distended and tender all over.

From the history of the patient's symptoms a diagnosis of a strangulated inguinal hernia was made, and from the appearance of the parts it was thought probable that the hernia had been reduced *en masse* by the patient and his son.

Herniotomy was at once performed. A long oblique incision was made over the left inguinal canal. The external oblique aponeurosis was laid open along the full length of the wound. The spermatic cord and the tissues around appeared bruised and infiltrated with blood. Situated high up the inguinal canal, and covered by the internal oblique and transversalis muscles lay a dark-coloured sac, which on opening proved to be the old hernial sac full of very darkly-congested intestine. The intestine was almost black in colour, but after division of the neck of the sac it improved somewhat in colour, and so it was decided to return it. The empty sac was ligatured at its neck and excised. The aponeurosis and skin wound was treated in exactly the same way as in the first case.

The patient's recovery was slow but uninterrupted. The bowels were open naturally on the third day, and all stitches removed on the eighth day. On July 5th it was found that the lower rectum had become distended with hardened masses of fæces, which copious enemata completely failed to dislodge. These had to be removed mechanically, after which the bowels acted regularly. He was discharged well on July 15th.

A CASE OF OPERATION FOR ABSCESS OF THE LUNG DUE TO LOCALISED NECROSIS.

BY

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THE patient, a labourer, aged 45, was admitted into the hospital at the end of July, 1896, during my absence from home, and I saw him first on my return on August 25th. His family history was good, and there was no history of any family tendency to tuberculous or other lung disease. He had always been subject to epileptic fits, but had no other illness of any kind, and had never suffered from bronchitis or winter cough. There was no history of syphilis. He denied alcoholism, but had probably drunk freely at times.

He had been engaged in working at the sewers, and stated that "he got the sewer gas into his stomach" at the beginning of June, 1896, and to this he attributed his illness. The illness began with nausea on returning home at night from work. After some days he began to have attacks of vomiting, with the ejection of a quantity of "heavy phlegm." He also suffered from violent paroxysms of cough, coughing until he was black in the face. The expectoration, little at first, rapidly increased in quantity and became very offensive. The cough was especially apt to come on at meal times, causing him to vomit. He was unable to go on eating afterwards on account of the nausea produced by the smell of the vomit and of the eructated gas. He went on with his work for a week after the vomiting began, and was then obliged to desist. He had then dyspnoea on any exertion. The breath soon became offensive apart from the attacks of cough. There had been no hæmoptysis. He had lost flesh from the first week of the illness, and suffered from profuse perspirations, and probably from slight fever towards night. In other respects he felt well. The onset of the illness was thus subacute, not sudden in character, but clearly defined from a period of previous good health.

On examination July 29th the patient was thin and rather dusky in colour; his face was somewhat puffy. Pulse 96,

regular; respiration rate 30. Skin perspiring freely. Breath very offensive. The chest in front showed evidence of some emphysema, moving rather as a whole, and only 1 inch on deep inspiration, the percussion note being hyperresonant, and the heart overlaid with lung. The breath sounds were harsh. The apex beat could not be felt, and the heart sounds, though feeble, were normal. Posteriorly on the right side there was dullness over an area corresponding to the two intercostal spaces above the angle of the scapula, and between its posterior border and the dorsal spines; from the level of the spine of the scapula downwards, the breath sounds were tubular over the above dull area, harsh and attended with rhonchi elsewhere; over the base of the lung there were scattered moist crepitant râles. The vocal resonance was increased over this area. The suprascapular region and the left side of the chest gave normal physical signs. He brought up a quantity of foetid, frothy, rather watery sputum. The abdominal organs were normal. Urine acid, specific gravity 1010, it contained no albumen or sugar. He was treated with stimulant and expectorant mixtures, with creasote in a dose of mij every four hours, and with various antiseptic and deodorant inhalations.

On July 31st the patient had two epileptic fits, and the temperature rose in the evening to 104.4° . During the next three weeks of his stay in the hospital the patient made no progress. He suffered from violent paroxysms of cough, with the expectoration of a quantity of foetid sputum, from frequent attacks of vomiting, together with dyspnoea, profuse sweats, loss of flesh, and moderate pyrexia of irregular type, as shown in the accompanying chart. He took his food well.

On August 25th the patient was no better, but expressed himself as feeling fairly well except for the constant attacks of cough and the offensive expectoration. He was decidedly dusky and dyspnoeic, being unable to lie down comfortably. He sweated very profusely, and the breath was very offensive, having a faintly gangrenous odour. He was bringing up a quantity of most offensive sputum, about 12 to 16 ounces in the twenty-four hours; placed in a glass it separated into three layers, the uppermost frothy, the next a thick purulent layer, and the lowermost watery with muco-purulent masses floating in it. No tubercle bacilli were found in the sputum on several examinations. He complained of a sharp, "catching" pain in the interscapular region opposite the spine of the right scapula. Pulse 112, small but regular. Respiration 30, fairly easy. Tongue moist and clean. Skin rather greasy to the touch.

The left lung was normal. In front the resonance over the right side of the chest was higher in pitch than on the left side. Posteriorly on the right side dullness began at the level of the fourth dorsal spine, and extended to a little below the lower angle of the scapula and outwards to mid-way between the scapula and posterior axillary lines. Over this area the breath sounds were everywhere more or less tubular, accompanied by occasional moist crepitant râles,

and the vocal resonance was increased. Over a portion of this area, about the size of a crown piece, opposite to the interval between the fifth and sixth dorsal spines, and internal to the posterior border of the scapula, the breath sounds were loud, tubular, and hollow, or almost cavernous in character; and there was here marked bronchophony. There were some deficient resonance and coarse moist crepitations over the base of the lung at this date, but by September 1st there was much less crepitus at the base, and the percussion note was more resonant there.

As the signs opposite the interval between the fifth and sixth dorsal spines pointed to the presence of a cavity, possibly containing fetid pus, my surgical colleague, Mr. C. A. Morton, kindly saw the patient, and on September 4th opened and drained a cavity in this situation.

Over shaded area dulness, tubular breathing, and scattered small moist crepitations. At o signs of excavation.

ACCOUNT OF THE OPERATION BY MR. C. A. MORTON.

The operation was performed on September 4th. The patient was placed on his right side, on which the physical signs of abscess were present, so that pus might not drain into the trachea and bronchus of the sound lung while he was under the anæsthetic. Chloroform was very carefully administered by Mr. Druitt, who told me at the end of the operation that a slight conjunctival reflex had been present throughout. He took the anæsthetic remarkably well. His right arm was drawn to the front, and the scapula thus displaced outwards. I first explored at the spot which Dr. Clarke selected, 3 inches external to the interval between the fifth and sixth spines, using an exploring syringe with a needle 4 inches long and with a lumen of considerable size, but got no pus. I then explored at a spot 3 inches outside the ninth spine, or just where the angle of the scapula would have been had it not been displaced outwards by the position of the arm. This also was unsuccessful. I then tried again in the first area, and at a depth of 2 inches withdrew half a drachm of stinking pus. I left in the needle of the exploring syringe as a guide, and then turned inwards a flap of skin, $2\frac{1}{2}$ inches in diameter, of which the needle formed the centre, splitting the flap so as to allow it to be turned inwards without disturbing the needle. A corresponding flap of muscle (which was of considerable thickness) was turned inwards in a similar manner, so as to expose the two ribs lying on either side of the needle. I then resected 2 inches of each rib, from their angles forward, and dissected up the periosteum and intervening intercostal muscles, thus exposing an area of lung 2 inches square. My object in exposing an area of lung of this size was that I might have sufficient room for suturing the two layers of pleura together

if they were found non-adherent. They were, however, found firmly adherent and considerably thickened. I made an incision with the scalpel through the lung, along the track of the needle, to the depth of half an inch, and there was very little bleeding. I then passed sinus forceps along the needle track, and on expanding them a little pus escaped, and I passed my finger into a cavity which was just large enough to hold the tip, but soft septa around seemed to break down on gentle manipulation, and thus enlarge it. While my finger was in the cavity he coughed up some offensive pus, and became a little cyanosed. The cavity was not flushed out or scraped, but was stuffed with iodoform gauze, and the flaps united, the muscular one with catgut, the skin one with fishing gut sutures, leaving an opening in the centre through which the end of the gauze in the abscess cavity was brought out. The actual cavity discovered was very small indeed, but as shown by the *post-mortem* examination the area of breaking down lung around was of considerable size. On the day after the operation pus was found to have drained from the lung, and the gauze plug when removed was very offensive. An india-rubber drainage tube was substituted for it. At first the pus thus drained away was offensive, but it quickly lost this character. The flaps readily united. He was in no way the worse for the operation; indeed he was beginning very greatly to improve after it, when he died from a condition which was not associated in any way with the disease in his lung. The chief points of surgical interest in the case are: (1) The discovery of so small a cavity; (2) the value of repeated punctures, even in the same area, if pus is not at once discovered; and (3) the trifling amount of hæmorrhage which occurred on incising the lung with a sharp scalpel, in its superficial portion. I cannot help thinking that if I had flushed the cavity with an antiseptic solution, some of the fluid would have passed through the patent bronchial tube, which was discovered at the *post-mortem* examination opening into the abscess cavity, into the bronchial tubes of both lungs; and that by attempting to scrape away the wall of the abscess cavity with a sharp spoon severe hæmorrhage might have been set up, though no doubt such hæmorrhage could be readily dealt with by firmly plugging the cavity with gauze.

On September 5th the patient expressed himself as feeling better; he breathed more easily, the cough was less, and the temperature rather lower, but he still brought up over half a pint daily of sputum of the same character. On September 10th he appeared better; the cough was less, the expectoration smaller in quantity, though still considerable, but much less offensive. On examination of the lung signs of excavation were still distinct at the position above mentioned, but the surrounding area of dulness and tubular breathing was reduced in size, indicating a partial clearing up of the consolidation. The base of the lung was now resonant, and the crepitations were no longer heard there. During the next few days his condition remained much the same, the improvement being maintained; he still brought up a quantity of frothy rather watery sputum, with muco purulent masses, but it was no longer so offensive as before the operation. At 11.30 A.M., on September 16th, the patient had a series of epileptic fits; these fits were all of the same character; they began with slight twitching of one or other side of the body, rapidly passing into general convulsions, attended with loss of consciousness and profound cyanosis. The convulsions lasted about a minute, the breathing was then stertorous, and the patient remained unconscious, and after an interval of five or six minutes the convulsions came on again. There were six fits in all, the duration of the whole being forty-five minutes, when the patient died in coma, never having recovered consciousness from the onset of the first fit. There was nothing to indicate any change in the patient's condition previous to the occurrence of the fits.

NECROPSY.

The *post-mortem* examination was made twenty-six hours after death. The body was rather emaciated. Rigor mortis was present. On opening the chest the thoracic viscera were in their normal position. On the right side the pleura was thickened and adherent all over the lower lobe of the lung posteriorly. The right lung weighed 2 lbs.; the upper lobe was normal. The

upper part of the lower lobe over an area about 3 inches in each diameter was solid, in part indurated, and non-crepitant. The lung tissue here was in the main dark in colour, smooth on section, and traversed by thickened bands of fibrous tissue along the bronchi, vessels, and interlobular connective tissue, and was also studded over with small rounded areas or nodules, some of which were composed of shreddy granular material, others had become purulent. In this consolidated portion of lung, about $1\frac{1}{2}$ inch below the apex of the lobe, was a cavity about 1 inch in diameter, containing broken-down lung tissue and shreds of flaky pus. This cavity communicated directly with a dilated bronchus, the walls of which were thickened, and its mucous membrane ulcerated. Into this cavity the opening made at the operation passed. The necrosed portions of the lung had only a slightly gangrenous odour. The bronchi throughout the lower lobe contained mucus, and their mucous membrane was thickened and deeply congested; but the striæ were visible, and they were not dilated. There were some recent adhesions over the left pleura. The left lung, which weighed 1 lb. 6 oz., was normal. There was slight atheroma at the commencement of the aorta. The liver showed a moderate degree of fatty change. The kidneys were deeply injected, especially the vessels of the cortex, boundary zone, and the Malpighian capsules. The spleen was very soft, almost diffident. The brain weighed 54 oz. The cerebral cortex and grey matter throughout were deeply injected; the other parts of the brain and the meninges appeared healthy. The vessels of the brain were normal and free from clot.

REMARKS.

From the point of view of clinical diagnosis the physical signs indicated consolidation of the upper part of the lower lobe of the right lung, with excavation proceeding in one part of the consolidated area. A most important symptom was the pronounced factor of the breath and expectoration. The quantity of the latter was also large. With regard to the fetid breath and expectoration, it was in the first place obviously due to affection of the lungs, and did not arise from the alimentary canal. Of the pulmonary affections in which this symptom occurs, general bronchiectasis with retained bronchial secretions is perhaps the most frequent, but bronchiectasis could be practically excluded by the history of good health and absence of any disease of the bronchi or lungs before the present illness, the onset of which was very very definite and sharply marked off from previous good health; there was, further, no evidence of aneurysm or tumour pressing upon a bronchus; the history and physical signs also excluded another possible cause—the rupture into a bronchus of an empyema with decomposition of the retained pus. There remained necrosis of the lung. Diffuse gangrene of the lung was negatived by the length of the illness, and the general condition of the patient. Putting all the features of the case together, the diagnosis made was that of localised necrosis with suppuration in the lung communicating with a bronchus. As to the direct cause of this necrosis, the history gave no evidence of lobar pneumonia, nor of inhalation of a foreign body, particle of food, etc., and consequent ulceration of a bronchus, so that it seemed probable that the cause assigned by the patient himself—the inhalation of sewer gas—was the correct one, and the inhalation of poisonous gases is known occasionally to give rise to necrosis of the lung.

The limited character of the disease rendered the case eminently suitable for surgical exploration, and the patient's death in the unexpected manner above related was very disappointing, for there was good reason to hope, as the area of necrosis and excavation had been successfully reached and free drainage established, and as his strength was well maintained and his general condition improving after the operation, that in time the necrosed tissue would have been eliminated and replaced by fibrous tissue, and that the patient would have made a good recovery. In favour of such a termination was the decrease during life in the extent of the consolidated (inflamed) lung around the diseased focus which followed the operation, and the *post-mortem* appearances, showing a limited area of disease confined to one portion of the lung, and the formation of fibrous tissue in and around it, pointed in the same direction.

THE METHOD OF DR. DE BACKER IN THE CURE OF TUBERCLE AND CANCER.

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THIS method is founded upon the discovery that certain of the lower forms of vegetable life, whose sole entity consists of a single cell, the saccharomyces, sugar fungi, or yeasts, possess under certain conditions the same phagocytic power as the leucocytes of the blood.

It was in 1892 that M. Bruhat, an analytical chemist at Paris, noticed, during a microscopical examination of some wine that had gone wrong, sent to him for analysis, that certain of the cells of the ferment (saccharomyces *Pastorianus*) contained englobed within them the bacillus *aceti*. He mentioned this curious fact to Dr. de Backer, and the two instituted a series of experiments with other bacteria, the result being that it was found that young vigorous cells of most species of saccharomyces were energetic phagocytes to all shapes and kinds of bacteria; and that the bacteria so englobed were killed by the nuclein within the cell, and finally digested by it.

It occurred to Dr. de Backer that if Metchnikoff's theory of immunity were the true one, what a splendid auxiliary to leucocytes these cells would be, if injected into the blood of animals, provided that these cells could exist in the blood and were themselves innocuous.

This was tried on guinea-pigs, but the earlier experiments were not encouraging; abscesses resulted, and the experiments were very nearly being abandoned. Fortunately, however, M. de Backer remembered that, up to that time, he had only employed the yeasts of commerce, which when subjected to analysis showed great impurities, upon which he then set to work to breed up a pure strain of one particular kind of yeast. The saccharomyces *cerevisiæ* was chosen for many reasons. A pure culture of this was injected, with aseptic precautions, into a healthy guinea-pig: this produced little or no effect. The next step was to inject a healthy animal with the pure culture mixed with a proportion of fermentable matter, previously sterilised, to see if the yeast cells would be able to multiply and carry out the function of fermentation within the system of the animal. The experiment was carried out in the following manner: An apparatus was constructed in the shape of a box, large enough to hold a guinea-pig or rabbit comfortably, but hermetically sealed except at two points, at each of which a glass tube, provided with a double bulb, was fixed; each bulb was half filled with chromo-sulphuric acid in such a manner that all air passing through the tubes must of necessity pass through the fluid in the bulbs. To one of these tubes a suction apparatus was applied; an animal was introduced into the apparatus and kept there several hours without food; no results were obtained. The animal was then injected with a dose of pure culture of saccharomyces *cerevisiæ* mingled with fermentable matter, and replaced; still without being fed. After some hours the bulbs at the outlet or suction tube showed the characteristic greenish colour of alcoholic reaction, whilst the bulbs of the inlet retained its original golden orange colour, showing plainly that the alcohol did not get in that way; hence the alcohol must have emanated from the animal, by its breath and perspiration, proving that alcohol had been generated by the action of the ferments within the animal economy. The animal itself seemed well after the experiment.

The next experiment that suggested itself was that of trying the injection of such a preparation (this combination of the pure ferment with sterilised fermentable matter soon acquired the name of "Backérine" in the laboratory, and now we generally use the term) into an animal, experimentally infected with a bacterial disease. Accordingly, a guinea-pig was inoculated in the ear with diphtheria, and an injection of Backérine administered subsequently. The results were astonishing—the little animal making a most perfect recovery. In the next experiment a longer time was allowed to elapse before the Backérine was administered; the animal was exceedingly ill, but eventually recovered. A long series of experiments were then made upon guinea-pigs rendered