

arsenious acid solution contained 1 per cent. of the oxide,  $As_2O_3$ ; the arsenite and arseniate of soda solutions contained each 1 per cent. of the element arsenic. From the formula  $As_2O_3$  is easily calculated the quantity of the solution of arsenious acid which must be taken in order to contain as much of the element arsenic as given quantities of the arsenite and arseniate solutions. The strengths of all three would have been made equivalent to 1 per cent. of the element, but for the insolubility of arsenious anhydride.

Of these solutions, definite quantities, containing known and therefore comparable quantities of the element arsenic, were injected under the skin of the back of frogs. The common English frog (*Rana temporaria*) was taken; and care was observed to select, for the parallel series of experiments, specimens as nearly as possible of the same size and condition. Each experiment consisted in the injection of three frogs with the above arsenic preparations; for each frog, one of the arsenic compounds. The three injections were performed at the same hour, one after the other, as speedily as possible. Each frog was then placed under a separate bell-jar, and observed. The observations extended over two days, as a rule; sometimes over three; they were taken morning, noon, and evening. The experiments were performed during the months of May and June 1882; a few during August of the same year.

Thus, *comparabilis* quantities of the element arsenic, in three different states of combination, were administered to frogs chosen as nearly alike as possible. The results obtained are given in the form of tables (pp. 1138-39). The headings chosen for the columns will not need explanation, except perhaps that described as "Death of the Central Nervous System". The evidence of this death is, that the frog neither moves spontaneously nor answers to any stimulus by volitional movements. The absence of these latter in response to stimulation has been assumed to correspond with abolition of sensation. This absence of the more complex co-ordinated movements was at times to be noted whilst the less complex co-ordinated movements constituting reflex action still persisted; but, as a rule, reflex action outlasted but a very short time the abolition of the more complex movements. Hence, practically, "Death of the Central Nervous System" corresponded to:

1. Absence of spontaneous movement;
2. Absence of volitional movement on stimulation;
3. Absence of reflex action.

Though these three occurred so nearly together as practically to constitute but one group, the above is the order of their disappearance. It may be further mentioned that, together with the above noted, the automatic centres of respiration and circulation ceased to perform their functions. It is clear that, with a peripheral apparatus, nerves, and muscles, still efficient, the above indicates extinction of the functions of the central nervous apparatus of the brain and spinal cord.

The subsequent death of this peripheral apparatus is given in the next column, headed "Death of Muscular Tissue". The nerves are left out, because their condition is rather less readily examined, and hence not so well adapted for comparative examination. The sciatic nerves were, however, tested in nearly every case; and it was established that, at the time of "death of the central nervous system", as above evidenced, the nerve-trunks still conducted well; and, further, that death of the nerve-trunk preceded, as a rule, by a considerable period, the death of the muscular tissue itself. Hence, then, the two test-tissues chosen are:

1. That of the central nervous system;
2. That of the muscles.

In the column headed "Remarks," is given the peculiar action on the skin in the shape of desquamation, which may vary from a slight separation of the epithelium to a condition in which this may be picked up or scraped off in large flakes. This condition has been fully described in the *Journal of Physiology*, vol. i. In this same column, anything noteworthy at the time is recorded.

[To be continued.]

**SOUTH MEATH AND DROGHEDA MEDICAL ASSOCIATION.**—The usual annual meeting of this society was held on November 24th, in the Board-room of the County Infirmary, kindly lent by Dr. MacDonnell. Several papers were read, and matters discussed of interest in connection with the profession; after which the members dined together at the Queen's Arms Hotel. The chair was occupied by Dr. Gartlan, senior member, who presided with his usual tact and ability. A number of toasts were given and happily responded to by the several members, many of whom also contributed much to a very enjoyable and intellectual evening by capital singing. Owing to pressing duties and the unfavourable weather, a number were debarred from coming, who had signified their intention to be present.

## NOTE ON MESENTERIC CYSTS AND TUMOURS.

By T. SPENCER WELLS,

President of the Royal College of Surgeons; Surgeon to the Queen's Household.

UP to the date of the publication of my last work on *Ovarian and Uterine Tumours*, I had not met with any cases of mesenteric cysts or tumours. In the chapter on diagnosis, I had spoken of collections of fluid in the peritoneal cavity more or less completely encysted by adhesions—of hydatid cysts—of peritoneal cancer—and of fibro-plastic and fatty tumours of the peritoneum, of the omentum, and of the sub-peritoneal cellular tissue. But I had not then read Mr. Doran's interesting case of cyst of the great omentum, published in the *Obstetrical Transactions* (vol. 23, page 165); nor had I ever seen a solid tumour of the mesentery. During the past summer, however, I have seen one case closely resembling Mr. Doran's, with Dr. Duke of St. Leonard's, but which appeared to be rather mesenteric than omental. I did not attempt to remove the cyst, only removing the fluid contents. The lady died a few weeks afterwards; and, as no examination of the body was permitted, I cannot say more of the case. About the same time, I removed a large solid mesenteric tumour from a married lady, forty years of age, a patient of Mr. Arthur Jackson of Sheffield. She had been married eighteen years, but had no children, though she had a premature labour some months after marriage. Two or three early abortions followed, and no further pregnancy. She was in good health until about four years ago, when pain in the iliac regions and slight abdominal enlargement was noticed; but no tumour was discovered until early in 1881. After that, increase was very manifest, with some apparent diminution after each menstrual period. Various opinions were given as to the nature of the tumour—some believing it to be ovarian, others uterine. I frankly confessed my own inability to give a very positive opinion as to its nature or connections; but expressed a very confident belief that I could remove it without any unusual difficulty or danger. It was quite solid, central in the abdomen, freely movable, about the size of an adult head, and imparting transmitted rather than associated movements to a uterus somewhat enlarged. I removed the tumour on June 20th, 1882, at Sheffield. Mr. Shaw kept the patient in a state of perfect anaesthesia with bichloride of methylene, and I was ably assisted by Mr. Arthur Jackson, Mr. Favell, and Dr. Redpath. Phenolised spray and all the usual antiseptic precautions and dressings were carefully employed. The tumour was solid, and its origin was clearly in the cellular tissue, at the root of the mesentery proper, near the lumbar vertebrae. The ascending colon was closely connected with the tumour in front, and to the right. All its blood-supply was derived from the mesenteric vessels. Those which were divided were secured with carbolised silk, the ends of all the ligatures cut off short, and returned. The uterus and both ovaries were healthy. No drainage was employed, and the wound was closed exactly as after ovariectomy. There was some sickness during the first three days; but recovery may be said to have followed without fever. The highest temperature was on the third day, but was only 100°. The patient left her bed on July 12th, and I have heard of her lately as being in good health.

The tumour was sent to the Sheffield Pathological Society for examination and report. I have not yet received the report; but I hope it will be forwarded, as the removal of a solid mesenteric tumour may still be regarded as a surgical curiosity.

## ON FREE REMOVAL OF MAMMARY CANCER, WITH EXTIRPATION OF THE AXILLARY GLANDS

AS A NECESSARY ACCOMPANIMENT.\*

By W. MITCHELL BANKS, M.D., F.R.C.S.,

Surgeon to the Liverpool Royal Infirmary.

I HAPPEN to live in a district where cancer is common. Liverpool is in an area which the Registrar-General's statistics show to be clearly of a malignant habit. The reason of this I cannot say; but it is a fact, and possibly thus it is that my attention has been for some time drawn to the subject. In 1877, I published a little article in the *Liverpool and Manchester Medical and Surgical Reports*, based upon a paper read before a meeting of the Lancashire and Cheshire Branch of the Association. In it I asserted that surgeons did not remove cancers of the breast. Five years later, before the whole Association, I reassert

\* Read in the Section of Surgery at the Annual Meeting of the British Medical Association in Worcester, August 1882.

the statement. Surgeons, as a rule, do not remove cancers of the breast. They persuade their patients that they do, and they almost persuade themselves; but there is always that little bit which they leave behind, and which, they fondly hope, will not grow, because it is *such* a little bit. Alas! that so little leaven should leaven the whole lump. If one turns to the surgery-books of one hundred and fifty or two hundred years ago, the true method of removing a cancerous breast will be found. The breast was laid hold of with great pincers; and, having been cut clean off, the surface was rubbed over with a red-hot poker. Against a proceeding so shocking to the age, modern taste revolted; and so for many years surgeons have been removing a little elliptical bit of skin including the nipple, and have been carefully dissecting out the mamma. Then the remaining skin, all impregnated with cancer-germs, has been carefully laid down again, and neatly stitched together, so that everything should heal up quickly. Hence removal of a cancerous breast in this way came to be considered a safe proceeding. Very few people, indeed, died from the operation—very few indeed. Unfortunately, they all died at a little later period from want of a little more of it. Hence, looked at from another point of view, it was the most useless of all operations, inasmuch as it never effected a cure. My present contention, therefore, is for a return to the old plan of sweeping everything away, and leaving a great hole, if you like. The operation will no longer be the bit of surgical tailoring that it has been, and many more patients will die from it; but many more also will be spared to live useful lives, and escape the horrors of a return—tenfold worse than the original mischief.

I need not inflict upon my audience the steps of an ordinary operation for removing the breast and clearing out the axilla; but, when a man has done any job a good many times, he is sure to find out some small but perhaps useful details. In most cases, these may not be of any importance; in some, they may just turn the balance and save a weakly patient. May I venture to mention a few which have impressed themselves upon me?

First, then, as to Listerian antiseptics: as a rule, I employ them; in hospital, always. But, in the operation under consideration, they have one disadvantage; viz., that the spray seriously cools down the patient, and so lowers her vitality. If the operation be performed in the old-fashioned and useless way, there is very little shock; if performed in the thorough and sweeping way I am now advocating, there is a serious shock. From thirty to forty minutes is the shortest time in which it can be satisfactorily done. Now, let any healthy woman get out of a warm bed, strip herself naked to the waist, and then go and lie down on her kitchen-table for forty minutes; I shall be very much surprised if she have not a cold next day. But, in addition to this, let a cool spray play upon her; and, furthermore, let a great mass of heat-conserving skin and fat be carved away from the chest, so that nothing but ribs and muscles intervene between the lung and the air; and still let the cool spray play on her. Is this not likely to be very depressing? I am convinced that it is; and if the operator, in place of doing his work rapidly, niggles and fiddles about it, so that the patient is kept for a long time under the combined lowering influences of cold spray, anæsthetic, and loss of blood, then the result is such a depression of the *vis vite* that any erysipelatous or septicæmic condition finds a ready victim; while I have seen many times a distinct catarrhal pneumonia produced at once. For this reason, in private, where there is but little fear of septic influences, if the patient be weakly, I content myself with simply washing the wound well with carbolic solution, and maintaining a modified antiseptic dressing afterwards. Having cleared out the breast, I leave it hanging by the axillary end; and then, before attacking the armpit, I draw together as much of the wound as will possibly come, and cover the remainder up with sponges or gauze. This has two advantages; it keeps the cold from the chest; and it enables the operator, if he find he cannot thoroughly clear the axilla, or if he see the patient becoming collapsed, to terminate the operation at once. If the cancerous lump be deep, then some of the skin at the margins of the breast may be kept; but, if any part of the skin be involved, then a circle should be drawn round the breast, and it should be cut clean off, without the remotest regard to flaps or coverings of any kind. These are of secondary moment altogether.

The breast-wound being settled, the incision should be carried up into the axilla about an inch below the margin of the great pectoral muscle. Then comes a strong temptation to dissect down the lower flap, and lay bare the latissimus dorsi and the subscapular artery. There is very seldom any occasion for this; and, when it is done, if suppuration occur, a pocket for pus is left. I have twice seen the pus filter its way right to the back, and have had to make a counter-opening just below the angle of the scapula. With regard to the lower glands, they are capable of easy removal; and even the highest ones

can readily be brought down from the very top of the cavity and pinched away by the nails of the thumb and forefinger. I have never yet found occasion for dividing the pectoral muscles, as even in the three instances mentioned in the list, where I was unable to remove the glands, I saw them quite clearly, but was afraid to take away so much of the vein (to which they were closely adherent) as would have been necessary to remove them thoroughly. One must try this a little more. I last week removed an inch and a half of the internal jugular along with some cancerous glands of the neck, and the patient did not seem in the least affected by the performance.

Now, having cleared out the axilla forty-one times, I have naturally come to know something about the state of the glands; and the first point was the recognition of the fact that, until we have these glands in our hand, and have split them open with a knife, we cannot tell whether they are infected or not. The usual fumbling in the axilla, which is practised by surgeons, tells nothing. When the glands are as big as walnuts, any first year's student can tell they are affected; but there is a stage—the earlier stage—when they are certainly infected, and yet when to the touch, through layers of skin and fat, nothing amiss can be felt. As a result of this, I came to the conclusion, about three years ago, that, in every case where the breast is removed, the axilla should be cleared out as a necessary accompaniment; and this I beg to urge upon the meeting. The one operation is useless without the other. As you cannot tell whether the glands are infected or not, remove them and dissipate the doubt.

And now, gentlemen, you naturally inquire from me whether I can show any practical proof that the removal of the breast and glands is likely to prove a more hopeful proceeding than the limited operations which have been the rule until the last few years. On looking over my notes, I find I have records of forty-six cases. I have done a good many more, but of many of my earlier cases I, unfortunately, did not keep any memoranda, as I had no idea that the subject would interest me so much as it has done. Concerning the forty-six mentioned in the table, however, I know all about them, and have quite recently verified the condition of those who are described as remaining free.

Turning to the fatal cases, you will notice that six have died; that is to say, about 13 per cent. That this is a heavy mortality, I admit; but, as I have just been endeavouring to show, if the operation is to be of any service at all, it cannot be other than a serious one. In all the fatal cases, both breast and glands were removed. In five out of the six the cause of death was undoubtedly a septicæmic state, accompanied with breaking down of the wound, and very generally with a fleeting erysipelas. One death was particularly galling, as it occurred in a patient who had to all intents and purposes recovered. The wound was healed till only a piece about the size of a shilling remained, and she was going to the country next day. That night she had a rigor; a little red blush came, and, after struggling hard for nearly a fortnight, she succumbed, in an undoubtedly poisoned state. There is, however, some satisfaction in noting septicæmia as the main cause of death, because it is a remediable one, and it is one that is not in any way special to this operation, but to all operations where great wounds have been made. Had the patients died from shock, from secondary bleedings, or from exhausting suppurations, the operation might have been considered directly answerable; but we know that had these patients been all in perfect hygienic conditions—had they, for instance, had the atmosphere of Zermatt about them—they would have recovered. Fortunately, every year is improving our knowledge of how to ward off these poisoned conditions; and when we shall have done away with them, the range of operative surgery will hardly know any bounds. [As or the sixth patient, she was killed by the folly of a nurse, one who night left a window open above her head, pouring down upon her a cataract of cold air, which set up a fatal bronchitis. Here neither surgeon nor operation was to blame, but a mistaken zeal in the cause of ventilation.

In this operation there will always be two serious difficulties to contend with—the age of the patients and their mental state. In my fatal cases the ages varied from 44 to 67. The patients were not young people of 18 or 20, whom it is hard work to kill by a surgical operation, but women who had seen their best days, and who, for the most part, had borne families, and seen much hard work. As regards age, therefore, the material is not good to work upon; and as regards hopefulness, it is very bad. The majority of women are completely precluded by the discovery that they have a cancerous breast, and look forward to its removal with great horror and dreadful forebodings. Every surgeon knows what a thing it is to have a hopeful patient, and, unfortunately, everyone who has had much to do with cancerous breasts knows that the patients generally consider themselves doomed from the beginning, and submit to removal as a last resource. The time of life, therefore, and the despondent mental state induced by the

disease, are always likely to act as depressing influences, apt to produce a state in which any septicæmic poison finds a congenial soil.

Turning from the fatal cases, it will next be noticed that in eleven instances the disease has already recurred. Now, in three of these, when the highest point in the axilla was reached, it was found that there were still glands so adherent to the vein that they could not be removed, while the condition of the patient was such that it was clear the sooner she was off the table the better, lest an immediate sinking should occur. Thus, these three were known to be incomplete operations, and the continuance of the disease was expected as a matter of course. If it be asked, why were operations attempted under such circumstances? I reply that nobody can possibly tell what the state of the axillary glands is until he sees them. They may shell out like peas, or they may stick to the vein like limpets to a rock. To all appearances, none of these three cases seemed more unlikely to be incapable of thorough clearing out than any of the others. Not till the highest glands were reached did this become obvious. In two cases, the general nature of cancerous infection was manifested by the disease appearing in the other breast. The last case is interesting, inasmuch as the patient remained free for about a year and a half, and then the cervical glands over the subclavian artery and brachial plexus became enlarged. She suffered such intense pain in the arm that I cut down upon these and exposed them. I found one large cord of the plexus quite surrounded by a couple of hardened glands, which were so squeezing it that below the point of pressure it was red, and swollen to nearly twice its original size. With some trouble, I detached the glands from the nerve, and so freed it from their strangling embrace; but, unfortunately, there were others, which had become so intimately adherent to neighbouring tissues, such as the scalenus anticus muscle, that their extirpation was impossible. The wound was healed in about ten days, and the patient departed, greatly delighted with the immediate relief from pain which the freeing of the cord procured for her.

A very important matter is to note the period when reappearance of the disease was manifest, and the length of time the patient lived after the operation. In nine out of my eleven cases the disease reappeared, and the patients were dead and buried, before the lapse of twelve months. In the tenth, the patient lived fifteen months. This demonstrates two things: the first is that, if the disease be going to reappear, it is about ten to one that it will do so within eighteen months. In all the cases that I can remember, in the practice of other surgeons, I should say that pretty much the same thing held good. Now, in a paper upon this subject, read at the International Congress, by Dr. Samuel Gross, of Philadelphia (whose work on the breast is a most admirable one), he stated that, if a patient lived three years without reappearance of disease, the probabilities were most strongly in favour of her remaining permanently well. With this statement I am firmly inclined to concur.

The second thing that is demonstrated is, that the popular idea that operating prolongs life is quite wrong. I believe it to be a perfect delusion. I believe that all these patients would have lived longer if they had never been touched. Yet you hear the operation being constantly advised, on the ground that, if it do not cure the patient, it will give her a little longer lease of life. On the contrary, the excitement that is set up by an operation makes everything that is left behind of a malignant character grow with double and treble speed; and I am even inclined to think that the deaths after reappearances are more painful than those where the cancer has never been touched. If a surgeon do not see his way to a clean sweep, I can only implore him to let things alone; for in few diseases does meddlesome interference work more mischief than in this. It is but right that, while pleading the advantages of early and free operation, one should also admit that, if it fail thoroughly to cure, it does not improve the patient, but makes her most decidedly worse.

Let us now turn from the fatal cases, and from those where the disease has returned, to those more satisfactory ones where surgery has been of service. The list first shows three instances where the patients died in eighteen months to two years from the time of the operation, without any signs of return of the cancer. One died from paralysis, one from liver-disease, and the cause of death in the third instance I could not find out. Even if the disease, which finally took these patients off, had been internal cancer, the operation would have been one of immense service to them; but, as I have no evidence that that was the case, they may fairly take a secondary rank as cures. I can point to ten cases having an immunity for periods of two to ten years, and five from one to two years. Seven cases have reached the period of three years, which, as we have just seen, makes the chance of reappearance of the disease in them but little greater than that of its original appearance at all. Now let us take only these cases of three years

and upwards. They are seven in number, which may reasonably be reckoned cures, against seventeen deaths and reappearances; or one success to two and a half failures. Even at this very low rate, I claim that the operation is worth doing, considering the hopeless nature of the disease, and considering that, for a very long period, surgeons have been operating so unsuccessfully, that many had quite given the matter up in despair. I think any patient, if offered the chance, would take it, even with the odds of 25 to 10 against her; but, if we go down to one year and nine months, then there are twelve cases without return as against seventeen failures. And, remembering that I have showed you that every one of my reappearances were manifest within one year and six months, I think I may guarantee these twelve as safe. If I am right, it reduces the odds to 15 to 10 against the patient. Gentlemen, I firmly believe that that proportion will be attained by the time my cases are all followed up to the end, and I hope I may live long enough to report upon them once more to you, and prove the correctness of my estimate. I know that the weak feature in my paper is, that sufficient time has not elapsed thoroughly to test the cases; but some years must come and go before that can be done. Meantime, I am sufficiently sure of my ground to feel justified in pressing upon operating surgeons an early and free removal of cancerous breasts, and, as a necessary part of the operation, a thorough clearing out of the axillary glands.

The following is a synopsis of forty-six cases, in five of which the breast alone was removed, while in forty-one the breast was removed and the axillary glands cleared out. Six cases proved fatal after the operation. Eleven cases had reappearance of the disease, and ten are already dead from it. Three cases remained free, and died from other causes under two years. Ten cases remain free from two to ten years after operation. Five cases remain free from one to two years after operation. Nine cases have been done within the last twelve months, and cannot be reckoned upon yet. One case recovered, but has been lost sight of. One operation was done for relief only, without hope of cure.

*Cases fatal after Operation.*

| No. | Condition. | Age. | Cause of Death.                          | Period after Operation. |
|-----|------------|------|--|-------------------------|
| 1   | Married    | 45   | Septicæmia and fleeting erysipelas .. .. | 3 weeks.                |
| 2   | Single     | 60   | Erysipelas .. ..                         | 2 weeks.                |
| 3   | Married    | 44   | Bronchitis .. ..                         | 20 days.                |
| 4   | Married    | 67   | Sloughing of wound and erysipelas .. ..  | 7 days.                 |
| 5   | Married    | 49   | Septicæmia and fleeting erysipelas .. .. | 8 days.                 |
| 6   | Married    | 40   | Septicæmia and fleeting erysipelas .. .. | 6 weeks.                |

*Cases in which the Disease reappeared.*

| No. | Condition. | Age. | Notes.   | Interval between Operation and Fatal Termination. |
|-----|------------|------|--|---|
| 1   | Married    | 42   | Operation incomplete, inasmuch as glands could not be thoroughly removed, from adhesion to axillary vein. Reappearance in axilla of same side and also in opposite breast. | 8 months.   |
| 2   | Single     | 36   | Operation incomplete for same reason as above. Reappeared in axilla of same side.  | 7 months.   |
| 3   | Married    | 52   | Operation incomplete for same reason as above. Reappeared in axilla of same side.  | 3 months.   |
| 4   | Married    | 70   | Breast alone removed, as tumour seemed small, and glands were not palpably affected. Reappeared in axilla.   | 10 months   |
| 5   | Married    | 74   | A rapidly growing juicy sarcoma; not scirrhus. Breast alone removed. Rapid reappearance in neighbourhood of cicatrix.  | A few months                                      |
| 6   | Married    | 38   | Cicatrix and axilla remained sound. Reappeared in intercostal muscles close to sternum, and spread to lung.  | 15 months   |
| 7   | Married    | 40   | Reappeared in cicatrix. This removed, but opposite breast became affected. Died from a pleurisy, probably due to disease penetrating to pleura.                            | 6 months.   |
| 8   | Single     | 54   | Cicatrix and axilla remained free. Reappearance in intercostal muscles close to sternum.   | 11 months.  |
| 9   | Married    | 45   | Recurred in upper part of axilla .. ..   | Under 12 months.                                  |
| 10  | Married    | 40   | Recurred in form of small shot in the skin around the cicatrix.  | Under 12 months.                                  |
| 11  | Married    | 54   | Remained for eighteen months free. Reappearance in cervical glands with great pain in the arm. Attempted removal in May 1882. Patient still living.                        |   |

Cases where Death has occurred from other Causes in Patients remaining free from Breast-Cancer.

| No. | Condition. | Age. | Operation.         | Cause of Death. | Period between Operation and Death.              |
|-----|------------|------|--------------------|-----------------|--|
| 1   | Married    | 54   | Breast only        | Not known       | Died after 2 years; no reappearance.             |
| 2   | Married    | 41   | Breast only        | Paralysis       | Died after 1 year and 6 months; no reappearance. |
| 3   | Married    | 62   | Breast and glands. | Liver-disease   | Died after 1 year and 9 months; no reappearance. |

Cases remaining free from Two to Ten Years.

| No. | Condition.    | Age. | Operation.        | Period since Operation. |
|-----|---------------|------|-------------------|-------------------------|
| 1   | Single .. ..  | 62   | Breast and glands | 10 years.               |
| 2   | Married .. .. | 40   | Ditto             | 7 years.                |
| 3   | Married .. .. | 56   | Ditto             | 3 years, 8 months.      |
| 4   | Married .. .. | 49   | Ditto             | 3 years, 4 months.      |
| 5   | Married .. .. | 63   | Breast only       | 3 years, 4 months.      |
| 6   | Single .. ..  | 67   | Breast and glands | 3 years, 2 months.      |
| 7   | Married .. .. | 57   | Ditto             | 3 years.                |
| 8   | Single .. ..  | —    | Ditto             | 2 years, 6 months.      |
| 9   | Married .. .. | 47   | Ditto             | 2 years, 3 months.      |
| 10  | Married .. .. | 50   | Ditto             | 2 years.                |

Cases remaining free from One to Two Years.

| No. | Condition.    | Age. | Operation.        | Period since Operation. |
|-----|---------------|------|-------------------|-------------------------|
| 11  | Married .. .  | 47   | Breast and glands | 1 year, 10 months.      |
| 12  | Married .. .. | 57   | Ditto             | 1 year, 9 months.       |
| 13  | Married .. .. | 41   | Ditto             | 1 year, 3 months.       |
| 14  | Married .. .. | 50   | Ditto             | 1 year, 2 months.       |
| 15  | Married .. .. | 52   | Ditto             | 1 year.                 |

In the case where the operation was done for relief, without hope of cure, the patient was a married woman, aged 58. The breast was a great ulcerating mass, smelling horribly, and giving great pain. It was removed along with both pectoral muscles, which were infiltrated. The glands were removed. The third costal cartilage subsequently necrosed and dropped out, but the wound healed over. She died, after eight months, from recurrence in the lungs and lower end of the humerus, having lived free, during that time, from pain or serious discomfort.

“THE CHEMICAL LUNG.”

OR A READY MEANS OF SURROUNDING PATIENTS WITH ABSOLUTELY PURE AIR.\*

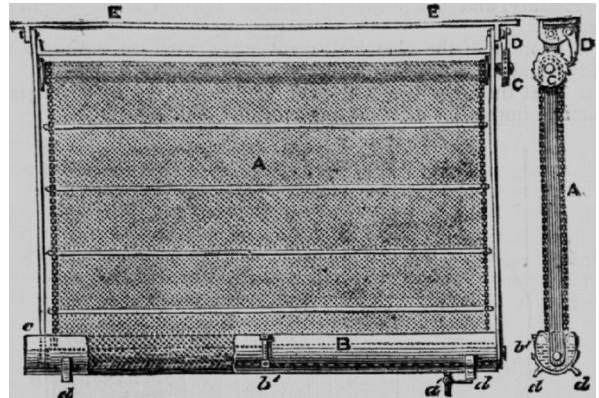
By RICHARD NEALE, M.D.

THE vast importance of securing a supply of pure air, whether to restore health, or to retain that great essential for the enjoyment of life, is being daily more and more intelligently pressed upon the consideration of both medical and non-medical minds.

Two years since, when nearly suffocated in the Metropolitan Railway, the idea occurred to form a “lung” that should rob the atmosphere of noxious gases, just as the human lung appropriates the surrounding oxygen; and hence the title “chemical lung”. Some, however, object to this name, as there is no strict analogy between the human lung and the “chemical lung”. The great affinity that the caustic alkalies have for carbonic acid and sulphur gases, showed that the idea was not impossible to carry out. In its punkah form, the “chemical lung” is constructed thus. An endless cellular sheeting (A), four feet broad by five feet in circumference, giving a superficial area of 140—150 cubic feet (calculating the cells), is caused, by a simple mechanism (C D), to revolve, when swayed to and fro like an ordinary punkah, through a trough (B) containing between two and three gallons of a weak solution of caustic soda or potash. This, hung in the sick-room or ball-room, or in any other place where the heat and impurity of the atmosphere are objectionable, renders the air perfectly cool and absolutely pure; and free not only from carbonic acid and other products of respiration, but also from all the mechanical impurities of the atmosphere, such as dust and infective germs, which, coming into contact with the wet sheet, are fixed and washed down into the trough. On one occasion, eight young children were treated, during an attack of measles, in one small room, it being essential to isolate them from the mother, who was daily expecting her confinement; and, by the aid of the “chemical lung”, the air was kept perfectly pure, and they all rapidly recovered without any complication, the mother also escaping the infection. One such “chemical lung” has for months kept the air of a mission-room, in one of the poorest localities in London, so pure, cool, and sweet, that, despite twenty-four flaring bat-wing gas-burners,

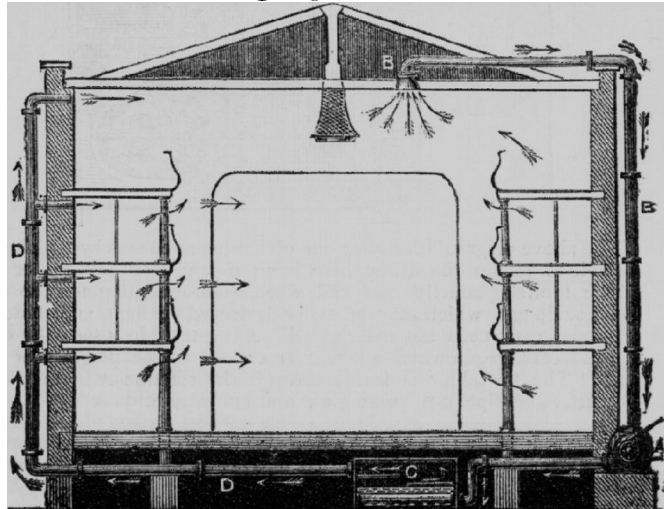
and crowded audiences, the missionaries and other workers leave, after many hours’ labour, free from headache and from that peculiar nausea frequently attending work among large assemblies of unwashed poor in confined spaces. During the winter, the room of a consumptive patient was kept so pure and fresh, night and day, that, on entering, one involuntarily took a deep breath to inhale the deliciously pure air. At Aden Civil Hospital, a ward previously untenable, owing to a case of phagedænic gangrene, was kept perfectly pure by the aid of the “chemical lung”, in its punkah form. Last June, a room crowded for five hours by twenty couples, while dancing, was also most efficiently cooled and purified, the windows being purposely closed.

The importance of being thus able to surround both patient and attendants with a chemically pure atmosphere will be particularly appreciated, should the experiments of M. Giboux prove to be accurate, who found that rabbits, made to inhale the air expired by consumptive patients, rapidly became tuberculous; and, although it is not proved that such air is as noxious to the human race as to rabbits, still no one doubts that pure air is an essential in the cure of pulmonary, as well as of all other diseases. During an experiment before Professor Lister, a room filled to suffocation with the odour of burning fat and sulphur, together with the products of fifty gas-jets burning for an hour or more, was absolutely purified, and its temperature lowered seventeen degrees, in twenty minutes, while a few whiffs of the burning fat vapour that had escaped into other parts of the house were appreciable for hours.



In its punkah form, the “chemical lung” has the power of rendering the air of any room absolutely pure, and of any required temperature; evaporation cooling the atmosphere if overheated, while, by simply placing a spirit-lamp below the trough, filled with hot water, the temperature may be raised, and the room filled with warm moist air. The accompanying diagrams illustrate how this “chemical lung” can purify theatres and other buildings, and also that great opprobrium of sanitary science, the atmosphere of the underground railway, when, for an outlay of less than one shilling per train, a noxious atmosphere could be rendered pure and pleasant, to the great advantage of the shareholders.

Reference to the following diagrams will show how the “chemical



\* Read in the Section of Public Medicine at the Annual Meeting of the British Medical Association in Worcester, August 1882.