the edges of the wound trimmed down until fairly healthy skin remains, without any undermining of the skin edges, for if particles or tags of skin be left in chronic cases, they become undermined, and nearly always have to be removed at a later date. The area should now be scraped thoroughly with a sharp spoon, and the internal opening into the bowel located, but not divided, for where there is an extensive area of subcutaneous tissue left to granulate the operation on the internal opening is best postponed for three weeks or a month, depending upon the size of the fistula and the progress of healing, as by this means the wound is kept free from faecal discharge. After dealing with haemorrhage, the exposed tracks and entire wound should be carefully and firmly packed to prevent oozing.

When the wound is covered by clean granulating tissue and the edges show a tendency to flatten down in the formation of new epithelium, the internal opening may be laid open, and this, if previously located, can often be done successfully with a local anaesthetic.

It is surprising how much diseased skin can be removed without any difficulty arising in the process of healing, and I am sure, from what I have seen, that free removal of infected skin is the best and quickest method of getting these large and old-standing fistulae to heal.

The coccyx should never be removed unless it is extensively diseased, and in doubtful cases it is better to scrape the bone and wait, as removal means a large wound which can only granulate slowly.

Much has been written about the damaging results of injury to the sphincter muscles in operating upon fistulae. In this connexion it must be recognized that the internal is the important sphincter muscle, which will explain the fact that the external sphincter may be destroyed without any loss of control. In one case, for example, a patient admitted under the care of Mr. Gordon Watson, it was found impossible to lay open all the tracks without division of the external sphincter in three places, and yet the patient made a good recovery without any loss of control. On the other hand, an operation involving serious injury to the internal sphincter would in all probability be followed by permanent weakness.

I have had little experience in the method of treating fistulae by scraping and suturing in the manner advocated by Sir Charles Ball of Dublin, but I may say I was not impressed by the results in the few cases I have seen treated in this way.

For the dressing of fistulae I think the best material is ordinary white wool soaked in hydrarg. perchlor. 1 in 2,000, and prepared in the following manner: The wool is cut into $\frac{1}{2}$ -yard lengths, and after sterilization is soaked in a solution of perchloride of mercury for half an hour. It is then wrung out, dried, and cut into 4-in. squares and kept in sterilized glass jars ready for use, and these can easily be separated into layers and pulled into any form suitable for the track to be dressed.

Unless the wound is soiled by faecal matter, no further dressing is required during the first three days after operation, and during this period very light diet should be insisted upon. The patient should be allowed two baths a day and directed to soak the parts thoroughly in warm water, for half an hour at a time, until the process of healing is practically complete.

It is well after the first dressing to pack the tracks lightly, as pressure may interfere with healing, which, indeed, may make very slow progress at first. By the end of the second week, if the granulations are not healthy, the addition of *lotio rubra* might be of service; and in the early stages iodoform oil (grains xx to 1 oz. of olive oil) is also useful, especially for tracks leading into the bowel, as facilitating the packing, for the first few dressings in these cases are usually painful.

No bowel track can be satisfactorily dressed without a finger in the rectum, and the same method should be employed when it is found necessary to examine the wound. The probe generally employed is too thin. It should be a solid, round probe, about half the thickness of an ordinary lead pencil, for with such an instrument the dressing is more readily inserted, and there is no danger of tearing the mucous membrane.

Hydrogen peroxide is invaluable for cleaning up unhealthy granulating areas and blind pockets, which latter should on no account, as Mr. Wallis points out in his book on *The Surgery of the Rectum*, be treated by

injections of silver nitrate, as the caustic acts as an irritant to the tissue, and if the external opening should become blocked, extensive and sloughing new tracks may form.

After the healing process has advanced well beyond the stage of uncertainty the patient may be allowed up for a little while each day, but he must not be lost sight of until the fistula is quite healed.

THE SIMILARITY BETWEEN ACUTE ABDOMINAL AND ACUTE PULMONARY CONDITIONS.

WITH ILLUSTRATIVE CASES.

By GERALD G. WRAY, M.B., CH.B. EDIN.,

SENIOR HOUSE SURGEON, BURY INFIRMARY.

ACUTE pulmonary conditions in certain stages simulate very closely indeed the signs and symptoms of acute abdominal lesions and vice versa. Nor is it generally recognized that the two are frequently combined. It is not uncommon, for instance, to find acute pneumonia combined with a pneumococcal infection of the appendix going on to suppuration. It is, perhaps, better known how frequently chest conditions supervene on acute abdominal lesions. Cases of abdominal lesions seen not quite at their inception sometimes show marked signs of bronchitis, and this bronchitis clears up when the abdominal condition is relieved. This is especially seen in children, and occurs fairly frequently in those who have some chronic obstruction of the bowels. In making a diagnosis of acute abdominal mischief, examination of the chest should never be neglected, and the converse is also true.

It is absolutely essential that any possibility of pulmonary lesions should be excluded before performing laparotomy for what is evidently an acute abdominal lesion, because laparotomy in the former condition has nearly always a fatal ending.

These points are illustrated in the following cases:

CASE I.

A boy, J. W., aged 9 years, was sent into hospital with a diagnosis of appendix abscess and with the history of having a typical attack of appendicitis. Four days before admission he had come home from school with a bad headache, which lasted till he went to bed at night; the next morning he vomited and complained of pain in the abdomen, apparently most round the umbilicus, especially on the right side. Temperature and pulse began to rise and he developed a very slight cough. These symptoms continued up to admission, his pain increasing every day.

On admission the boy complained of pain in the abdomen on the right side above the umbilicus, and said it felt worse when he coughed or breathed deeply. He was not sick, but felt thirsty. He was flushed and the face was pinched. Respiration was shallow, and, although chiefly thoracic, the upper part of his abdomen moved. He was unable to take a deep breath, but in his efforts to do so his whole abdomen moved, though with pain. The temperature was 104.4°, pulse 140, and respirations 40. The skin felt dry and pungent. The abdomen was tender, most so between the umbilicus and right costal margin. There was slight resistance in the right rectus muscle. There was no dullness of the abdomen, nor was any lump felt nor thickening round the appendix, nor was there any tenderness per rectum. There were no physical signs in the lungs. A diagnosis of diaphragmatic pneumonia was made, in spite of the history and the general signs, on the facts that the respirations were hurried and painful, his face flushed, the character of his pulse, and the pungency of the skin—a very valuable diagnostic sign of pneumonia. He was treated as a case of pneumonia. Next day the abdominal signs were less and the respiratory more marked. Physical signs were absent, except at one point in the seventh interspace, right side, mid-axillary line, where a small patch of dullness was localized, accompanied by bronchial breathing and very fine crepitations. These physical signs were more marked next day and the patch enlarged. On the eighth day of his illness the temperature fell by crisis, and he made an uninterrupted recovery.

The interesting points about this case were that his early symptoms were entirely those of acute appendicitis with absolutely no lung signs, while on admission he had signs of both, and later he had only lung signs.

CASE II.

A man, H. H., after breakfast went for a walk and suddenly felt a pain in his right side and had to go home. He had had some indigestion for a week or two and also had been troubled

with a cold and cough for a fortnight. When admitted he was evidently very ill, and his face was pinched. Respiration was hurried, and evidently gave him pain, as did a slight hacking cough. Temperature 100° F., pulse 108, respirations 44. The abdomen did not move well on respiration, and respiration was mainly thoracic in type and shallow. The upper abdomen was resistant and very tender to pressure, but no definite spot of tenderness was localized. No lump could be felt, and he was not tender per rectum. The abdomen was tympanitic all over, except slight dullness over the stomach, and there was very slight reduction of liver dullness, almost imperceptible. On the right side of the chest, about the fourth and fifth ribs, there was marked bronchial breathing with crepitations and dullness. A diagnosis of perforated gastric ulcer was made and the abdomen opened. A perforation was found in the stomach at its junction with the oesophagus; this was closed by an omental flap.

The interesting points about this case were that he had definite lung signs and that the abdominal signs were not very marked; the diagnosis of perforated gastric ulcer was made owing to the history of indigestion, sudden pain, resistant abdomen, and reduction of liver dullness. The lung signs were due to an old-standing phthisical cavity which had recently become active.

CASE III.

A boy, J. M., aged 18, was admitted to hospital with a diagnosis of appendix abscess, and operated on after this diagnosis had been confirmed. The abscess was opened and a considerable quantity of pus was evacuated and free drainage introduced. Some days after operation the patient had a sudden pain in the right side of the chest. This was attributed to burrowing of the abscess into the pleural cavity, but no definite signs could be elicited except a few crepitations. Temperature, pulse, and respirations rose, and his face became flushed. Commencing pneumonia was diagnosed. The attack seemed to abort, but the patient died, and a *post-mortem* examination was made. Pus was found between the liver and diaphragm, but not in the pleural cavity. In the lower lobe of the right lung were three recent infarcts.

This case was particularly interesting in its after course, and it was very puzzling to localize correctly the signs.

I am indebted to the surgeons of Bury Infirmary for permission to publish these cases.

THE MECHANISM OF TRANSMISSION OF TRYPANOSOMA LEWISI FROM RAT TO RAT BY THE RAT FLEA.

BY

C. STRICKLAND, M.A.,

ASSISTANT TO THE QUICK PROFESSOR OF BIOLOGY IN THE UNIVERSITY OF CAMBRIDGE.

(From the Quick Laboratory, Cambridge.)

ANY study of the common rat trypanosome, *T. lewisi*, is important in that it is akin to the trypanosome of sleeping sickness. It was demonstrated by Nuttall (1908) and others that this trypanosome is carried from rat to rat by fleas. Nuttall transferred fleas (*Ceratophyllus fasciatus*) from infected to healthy rats, and found that the latter generally became infected.

Minchin and Thomson (1910) proved that the rat flea does not immediately carry the trypanosome from the infected to the healthy animal unless about a fortnight has elapsed from the time the flea first fed on infected blood—that is to say, the trypanosome must live or develop in the flea for about a fortnight before the flea which carries it can infect a healthy rat.

It has been the general idea that the mechanism of this infection is by the flea biting the healthy animal, and inoculating trypanosomes through its mouth-parts. My object was to discover, if possible, if this were so; or in what other manner the fleas infected the rats.

The following procedure was adopted. The infective fleas were always used in batches of ten for each rat. They were first starved for about three days, so as to ensure their feeding on the rats on which they were to be placed. They were then put on the rats and taken off in about half an hour, by which time they had fed. It was intended by this method to see if the fleas infected the rats either by biting them or, possibly, by contaminating them. In the next place, either these or other fleas were squeezed between fine forceps and then put in a bolus

of bread-sop which was given to hungry rats to eat. In this way it was intended to imitate the rats' natural habit of chewing up and eating the fleas which infest them, and to ascertain if infection was caused thereby.

Result of the Experiment.

A. Fleas placed on rats for half an hour, and then picked off. Of 9 rats none became infected.

B. Crushed fleas fed to rats with bread. Of 9 rats 6 became infected.

C. Fleas placed on rats and allowed to stay thereon, as in Nature. Of 7 rats 2 became infected.

It will be seen (A) that none of those rats on which fleas had been left for a limited time became infected, whereas (B) six out of nine became infected after they had fed on the infective fleas. We can thus say, contrary to previous preconceived ideas, that rats become infected with *T. lewisi* by the process of eating the infective fleas, and not by being bitten, or contaminated by them in a short time.

The result of putting fleas on rats and leaving them as in Nature (C) was that two out of seven became infected, which shows, when compared with the results under (B) that in Nature many infective fleas do not cause infection, probably because the rat only catches a limited number of them.

It has usually been assumed that the trypanosomes, after undergoing a "development" in the flea, are inoculated into the blood of the rat by the mouth-parts of the flea. We see, however, that they must pass through the wall of the alimentary tract of the rat, and thus reach the blood. The forms which do this are probably the "small trypanosomes" described by Swellengrebel and Strickland (1910).

It is interesting to find blood parasites behaving thus, and it is possible that other trypanosomiases are transmitted by more devious means than by the simple bite of blood-sucking insects. It may be found that non-blood-sucking creatures are the intermediate hosts in some cases.

SUMMARY AND CONCLUSIONS.

1. Infection of rats with *T. lewisi* is caused by the rats' act of eating infective fleas.
 2. It is not caused by contamination of the rats during a short time, nor by their being bitten by the fleas.
 3. Many more fleas are infective than cause infection in Nature.
 4. The infective form of the trypanosome, which is probably the "small trypanosome" of Swellengrebel and Strickland, must reach the blood through the gut wall.
 5. It is possible that other trypanosomiases may be transmitted by perhaps even non-blood-sucking creatures.
- I would like here to take the opportunity of thanking Professor Nuttall for his kind advice in this work.

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THE Town Council of Macclesfield has adopted recently a proposal put forward by Dr. Hedley Marsh, M.O.H., through the Health Committee, for making provision for the treatment of cases of phthisis selected from among the dwellers in the more crowded and poorer parts of the town. The treatment in view is primarily educational but also curative. From six to eight patients are to be kept in the at present disused small-pox hospital for periods of about six weeks each; it is believed that during this time it will be possible materially to improve their condition as well as educate them in the care of their own health, imbue them with a sense of the value of fresh air, and drill them thoroughly in methods of preventing the spread of infection to others. It is considered that in this way it will be possible to pass through the hospital about 50 cases a year at an annual cost of not more than £337. The food allowance included in the estimate is on a liberal scale as compared with the outlay on the same item at the fever hospital of the town. At the latter the cost is 8½d. a day per head, while 1s. a day is allowed for each phthisis patient.