Most chemotherapeutic measures involving the use of anthelmintics, antiseptics, disinfectants and related substances, organic arsenicals and similar substances, and certain miscellaneous drugs have been shown experimentally to be of no value and perhaps dangerous. There is experimental evidence, however, that the subcutaneous injection in olive oil or gum arabic of a suspension of the commercial thymol preparation carvasept or the oral administration of butolan (Bayer) (carbamic acid ester of *p*-oxy-diphenyl-methane) is lethal to a certain proportion of reproductive adults in rats, and their use results in a lessening in severity of the muscle invasion: a clinical trial of butolan should be made.

Excellent results have followed the intravenous administration of 5 c.cm. of gluco-calcium (Lilly) during the hitherto intractable acute migratory phase; this form of therapy should be given further clinical and experimental trials.

Experiments with rats, rabbits, and cats have shown that calcification after encystment may be considerably hastened by the administration of some vitamin-D-containing substance, supplemented by a supply of calcium in the form of a bland organic salt, thus protecting the host from toxic effects following encystment. Though a warning has been given that this treatment may result in a dangerous metastatic calcification of other organs, a further judicious clinical trial should be made. It should be noted, however, that this treatment is of no value before encystment of the larvae—that is, before four to five weeks have elapsed after infection.

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BRONCHOSCOPY IN PULMONARY TUBERCULOSIS

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The value of bronchoscopy in the diagnosis and treatment of non-tuberculous diseases of the lungs is well established, but its use in tuberculous disease is still in the experimental stage. That this is so is due to the fear that such an investigation might do more harm than good to a phthisical patient. The same fear delayed the use of lipiodol investigation in these patients, but it has proved to be without foundation, and both these methods are now being employed freely in the investigation of the tuberculous patient.

Cases indicating Use of Bronchoscopy

It is not suggested that a diagnostic bronchoscopy should be a routine investigation in all cases; nevertheless, the recent recognition of tracheo-bronchial tuberculosis (a condition which can only be diagnosed by bronchoscopic vision) demonstrates that the more frequent use of this method is justified. We have endeavoured to employ it only in those cases in which consideration of the symptoms, physical signs, and a skiagram has led us to believe that it would definitely provide further useful information. These cases have fallen into the following groups: (1) sputum-negative cases; (2) those showing areas of collapse; (3) those showing areas of obstructive emphysema; (4) those with symptoms suggestive of tracheo-bronchial tuberculosis; (5) those in which another pulmonary disease is associated with pulmonary tuberculosis.

Sputum-negative Cases

It is not uncommon for a patient to present symptoms, physical signs, and a skiagram very suggestive of pulmonary tuberculosis, and yet the sputum and faeces are repeatedly negative for tubercle bacilli. In such cases bronchoscopic examination, swabbing of the bronchus, and examination of the swab and drained material for tubercle bacilli are often of considerable value.

This procedure has been carried out in twenty-one cases. In nine cases a positive swab was obtained and in nine a negative result. In the remaining three cases the swab was negative, but tubercle bacilli were found in the sputum raised the following day. Although some of the cases which gave a positive result had previously undergone the "laryngeal mirror test" with negative result, our series is at present too small for conclusions to be drawn as to the relative values of the two procedures. Now all cases have a "mirror test" before bronchoscopy, and further results may be of some value. It is interesting to note that, in seventy cases of haemoptysis without physical or radiological signs, a bronchoscopic swab taken at the time a diagnostic bronchoscopy was made has never once given a result positive to the tubercle bacillus.

Cases showing Areas of Collapse

Areas of collapse are more readily recognized than heretofore. Often the physical signs suggest the possibility of a collapsed area; nevertheless it is usually the skiagram which establishes the diagnosis of an area of collapse. As a rule the presence of collapse means the presence of bronchial obstruction, and when this is suspected it should be investigated by bronchoscopic examination to ascertain the nature of the obstruction. Whenever the skiagram of a tuberculous patient has shown an area of collapse we have investigated the case with the bronchoscope. Fifteen such cases have been investigated, and in twelve of them a definite obstruction to the main bronchus could be seen. In the remaining three no satisfactory cause for the collapse was visible. The twelve cases of obstruction fell into four groups:

1. Those in which the obstruction appears to be due to an enlarged gland or tuberculoma.
2. Those in which gelatinous tuberculous granulations obstruct the bronchus.
3. Those in which pulmonary fibrosis with resulting deformity of the bronchus caused the block.
4. Those in which the bronchial mucous membrane is so oedematous as to cause narrowing of the lumen, which is filled with tenacious secretion.

Group 1.—Of the glandular type we have had three examples, and in all cases we removed the gland piecemeal, with dramatic results as regards the collapsed area, this having re-expanded completely by the next day when a skiagram was taken. No patients have suffered harm as the result of this operation. Two of the cases occurred in children and were subsequently treated on sanatorium lines, with very good results. The other was an adult who, because of disease in the other lung, was given an artificial pneumothorax; this patient progressed satisfactorily.

Group 2.—The two cases in this group were particularly interesting. Both occurred in young adult males and were situated in the left upper lobe bronchus. One of these patients suffered from chronic tuberculosis of the right lung. He was attending as an out-patient for solganol injections. The collapse appeared insidiously and disappeared just as quietly. The other was an apparently

healthy young man whose only complaint was cough, and whose skiagram revealed a collapsed left upper lobe. He is now at a sanatorium and responding quite well. In each case the gelatinous tissue had filled the opening of the upper lobe bronchus completely and lay absolutely flush with the surrounding mucous membrane of the bronchus, so that at first sight it appeared as though there was a congenital absence of the left upper lobe bronchus. However, closer examination revealed the gelatinous area. In both cases a piece of tissue taken for section proved to be tuberculous. Unfortunately, owing to the position it was impossible to remove it and relieve the obstruction.

Groups 3 and 4.—The third and fourth groups of collapse cases call for no special comment as their occurrence appeared to be the result of pulmonary disease, running its normal course, and no special treatment was indicated. There is, however, one point of interest; all these patients were over 40 and the presence of collapsed lobe raised the suspicion of a new growth.

Cases showing Areas of Obstructive Emphysema

In the same manner that the works of Chevalier Jackson have taught us to recognize that a collapsed area or lobe means bronchial obstruction, so the works of Coryllos have led us to suspect that a particularly large cavity, an emphysematous bulla, an emphysematous lobe, or even a totally emphysematous lung may be due to partial bronchial obstruction. The bronchoscopic investigation of such cases has been of interest, as the following four instances demonstrate.

In three patients the skiagram revealed apical cavities the size of an orange, but the symptoms were less than one usually associates with such apparently extensive lung destruction. Bronchoscopic examination showed that in two cases the opening of the upper lobe bronchus into the main bronchus was partially obstructed by greatly swollen and inflamed mucous membrane; in the third case there were large cavities at both apices, and by means of the retrograde telescope branches of both upper lobe bronchi were seen to be so distorted as to cause partial obstruction during expiration. The fourth case was the most interesting.

A girl of 20 with tuberculosis of the left lung was treated by an artificial pneumothorax. The lung collapsed well except for two adhesions in the mid-axillary region. Within the lower lobe of the collapsed lung there was a cavity the dimensions of a small hen's egg. In spite of increased pressures the cavity increased to the size of a large egg within a few weeks. We therefore cauterized the adhesions. Subsequent films, notwithstanding an increase in the collapse of the lung, showed a further enlargement of the cavity. Although no adhesion could be demonstrated by antero-posterior or lateral skiagrams, we thought that an adhesion might still be present, but on further thoracoscopic examination the lung was found to be entirely free. Skiagrams taken over the course of the next few weeks showed that in spite of a positive intrapleural pressure the cavity had reached the size of a small grapefruit. It seemed most probable, therefore, that we were dealing with an obstructive emphysematous cavity and that a bronchoscopic examination might prove it. On examination we found that at a point one and a half inches distal to the opening of the upper lobe bronchus the main bronchus was almost completely occluded by a bulge in the posterior wall. The problem then was, Should we attempt to complete the block and so cause collapse distal to the obstruction, or try to remove the partial obstruction and relieve the obstructive emphysema? As regards the first suggestion, the fear that permanent obstruction might produce suppuration distal to the obstruction was thought to be sufficient reason to abandon the idea. We have discussed the matter with Chevalier Jackson junior, and he expressed

the same misgivings. We therefore attempted to remove the obstruction by cauterization with the diathermy electrode, by the application of 20 per cent. silver nitrate, and by repeated dilatations with bougies. But we failed, and the cavity grew in size and the disease spread to the other lung, the patient dying some months later.

There is no doubt that the Brooks balloon, described since this case was under our care, will produce a successful temporary collapse, but as yet we have seen no reports of the late results. To deal with such cases as these, Mr. Shrantz of the Genito-Urinary Company has been trying to produce for us a reverse check valve, to be inserted in the lumen of the bronchus at the level of the obstruction, which will allow air to pass out during expiration but will prevent air entering during inspiration. So far, however, no suitable valve has been devised.

Tracheo-bronchial Tuberculosis

During the last few years there have appeared in the American literature several articles dealing with the condition known as tracheo-bronchial tuberculosis. In this condition there develops in the trachea or main bronchi a tuberculous lesion which may take one of the following forms: (1) a discrete ulcer, (2) a granulating ulcer, (3) a healed stenosis, (4) an unhealed stenosis, (5) a tuberculoma. One or more of these types may be found in the same patient. The condition usually exists with tuberculosis of the lung parenchyma, but may be the only tuberculous lesion present in a patient with a positive sputum and a negative skiagram. The condition is said to give rise to characteristic symptoms, and as the lesion is situated in the trachea or main bronchi these symptoms are, as would be expected, primarily those of bronchial obstruction—namely, a wheeziness suggestive of asthma, sometimes with physical signs localized over the bronchus affected; a degree of dyspnoea out of proportion to the physical or radiological signs of tuberculosis present; a paroxysmal cough, sometimes almost asphyxial; a marked irregular variation in the quantity of sputum, depending on the degree of obstruction present; a variation in the presence of tubercle bacilli in the sputum; the occurrence of a positive sputum or haemoptysis in a patient in whom the disease is apparently completely controlled by collapse therapy. Any of these symptoms, or a combination of them, should raise the suspicion of tracheo-bronchial tuberculosis, and should indicate a bronchoscopic examination.

Treatment.—As regards treatment of the condition it is obvious that owing to its position collapse therapy is of no help. The ulcerative type can be assisted by diathermy or the application of 20 per cent. silver nitrate. The healed stenosis can sometimes be overcome by dilatation with bougies. The unhealed type is best left alone. In the tuberculomatous type the obstruction can be removed either piecemeal or by diathermy.

ILLUSTRATIVE CASES

From the above description it will be recognized that a number of the cases described in the paragraph dealing with collapse are in fact examples of tracheo-bronchial tuberculosis. The cases described below are further examples.

A man aged 24, complaining of cough and wheezing, presented right apical signs, and a skiagram revealed a fibrotic condition with collapse of the right upper lobe. Bronchoscopic examination showed the opening of the right upper lobe to be partially occluded by a ring of calcified tissue, obviously a well-healed lesion of the stenotic type.

A girl of 21, complaining of dyspnoea, presented physical and radiological signs at the left base, the sputum being

negative and the lipiodol examination showing slight bronchiectasis. Bronchoscopic examination disclosed an ulcerative stenosis in the left lower lobe bronchus. A piece removed for section showed tuberculous granulation tissue.

A young woman aged 23 who presented almost the same physical and radiological signs and bronchogram as the last patient was found on bronchoscopic examination to have a healed stenosis over the left lower lobe bronchus. At the time it was not recognized that this was tuberculous, and the patient was treated by postural drainage (as a case of bronchiectasis). She returned some months later with active tuberculosis throughout the left lung.

We have had one other identical case in a young man.

Cases Associated with another Pulmonary Disease

Occasionally when pulmonary tuberculosis is associated with other pulmonary disease a bronchoscopic examination may be of value in assessing the relative parts played by each disease in the production of the patient's condition.

A man aged 60 complained of cough and loss of weight with physical signs of collapse of the right upper lobe. The sputum was positive for the tubercle bacillus. The collapse at the age of 60 suggested the possibility of new growth. Bronchoscopic examination confirmed this. It is probable that the carcinoma had lighted up an old tuberculous lesion.

A young man aged 20 was admitted to hospital with high fever, cough, and signs at the right upper lobe. The sputum was positive to the tubercle bacillus and very offensive. Bronchoscopic examination suggested that the condition was primarily an abscess. The patient, not under our care, was first treated as suffering from tuberculosis. Necropsy showed an abscess cavity which had probably opened up an old tuberculous lesion.

Conclusion and Summary

Whether bronchoscopy be restricted to the indications we have mentioned or whether the indications be extended, we are of the opinion that it can yield valuable information in a number of cases of pulmonary tuberculosis, and that it is an investigation which is harmless and will in time be used more extensively.

A suggestion is made that diagnostic bronchoscopy might be more frequently used in certain cases of pulmonary tuberculosis.

The cases are divided into five groups, the signs and symptoms of which are reviewed.

Cases illustrative of some of the groups are given.

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The Minister of Health on February 9 received a deputation from the Trades Union Congress, who submitted a memorandum on the inquiry into the continued increase of incapacitating illnesses of long duration, and urged that immediate steps should be taken to provide assistance for the general practitioner, linked with a method for compiling records so as to give a better picture of the incidence of occupational disease. The deputation stressed that the inquiry already set on foot was a limited one, and urged the collection of statistics over a wider field or, if necessary, the introduction of a new system of collecting such statistics. The Minister, in reply, said that he appreciated the points put forward by the deputation. He drew attention to the results which might be expected from the present survey, and hoped for the further co-operation of the Trades Union Congress in suggesting further fields of inquiry when the present one was completed.