

ABSTRACTS

This section of THORAX is published in collaboration with the two abstracting journals, *Abstracts of World Medicine*, and *Abstracts of World Surgery, Obstetrics and Gynaecology*, published by the British Medical Association. In this Journal some of the more important articles on subjects of interest to chest physicians and surgeons are selected for abstract, and these are classified into five sections: experimental; tuberculosis; neoplasm; asthma; thoracic surgery.

Experimental

Antibiotics and Chemotherapy

Morphological Studies of the Normal Growth of a Human Tubercle Strain, and the Effects of Some Antibacterial Substances on Same. [In English.]

ESPERSEN, E. (1949). *Acta path. microbiol. scand.*, 26, 178.

Micro-cultures of *Mycobacterium tuberculosis* of the Scandinavian human strain E₅ on Sauton's medium with Tween 80 0.05%, serum albumin 0.5%, mannitol 0.2%, and agar 1.8% (the glycerine being omitted from the original Sauton formula) were employed for the study of the normal growth of tubercle bacilli and the effect of streptomycin, penicillin, sulphathiazole, and glycerine on the morphology and reproduction of the organism. Normally, multiplication of the bacilli was by transverse fission, branching being only very rarely observed. After 24 hours the bacilli became elongated and thicker, more refractile, and eventually slightly curved—the pre-fission phase. From the second day onwards multiplication proceeded at increasing speed, resulting in small colonies by the 7th to 10th day, when growth was quite diffuse on the medium. Granules seen in the cultures were shown to be products of autolysis. They were observed for up to three months and were never seen to develop into bacilli. They appeared to play no role in the developmental cycle.

The most marked morphological changes were found with the addition of streptomycin in 0.25 µg. per ml. to the medium. The pre-fission phase was prolonged to two to three days, and was not followed by division of cells. The bacilli appeared swollen and considerably elongated, assuming various forms such as club- or spindle-shape. Distinct granulation was soon observed, followed by lysis and disintegration of the granular cells. Higher concentrations of streptomycin were immediately bactericidal, the bacilli becoming swollen and rapidly autolysing. Penicillin was shown to have a markedly bacteriostatic effect in concentrations from 10 units per ml. of medium upwards, a slight bacteriostatic effect at 5 units per ml., and none at 1 unit per ml. Lysis of the bacilli was marked

when they were exposed to the higher concentrations, and their acid-fastness was impaired. Sulphathiazole in concentrations of over 5 mg. per 100 ml. medium proved bacteriostatic and, from 10 mg. per 100 ml. upwards, also bactericidal. The morphological changes seen with the lower concentrations of the last two substances were similar to those seen with the lower concentrations of streptomycin. The observation of large club- or spindle-shaped bacilli undergoing lysis in some of the control cultures prompted the inclusion of glycerine in the investigation. Concentrations of over 0.75% in Sauton medium had a definite lytic action on the bacilli. Cultures with 10% glycerine showed morphological changes comparable with those produced by 0.25 µg. of streptomycin per ml. Concentrations of 20 to 30% of glycerine were bactericidal and intermediate concentrations were bacteriostatic.

Reduced oxygen supply was found to produce morphological changes in the bacilli practically identical with those observed with the lower concentrations of the substances tested. The author concludes that interference with the respiratory mechanism of the bacilli seems the most likely explanation of the effect of the substances tested. [An important paper. For technical details the original should be consulted.] E. Nassau.

The *in vitro* Effect of Paraaminosalicylic Acid (PAS) in Preventing Acquired Resistance to Streptomycin by *Mycobacterium tuberculosis*.

GRAESSELE, O. E., and PIETROWSKI, J. J. (1949). *J. Bact.*, 57, 459.

The rate of development of resistance in cultures of *Mycobacterium tuberculosis* (strain H37 Rv) in Dubos's "tween"-albumin liquid medium was studied after repeated exposure to graded concentrations of streptomycin, of *para*-aminosalicylic acid (sodium salt) (P.A.S.), and of a fixed combination of these two drugs. At each transfer the inoculum, taken from the tube containing the highest concentration of the drug in which a standard amount of growth (judged turbidimetrically) had occurred, was 5×10^6 to 5×10^7 organisms per 10 ml. medium. The growth of the original H37

Rv strain was inhibited by streptomycin 0.8 unit per ml., by P.A.S. 1 mg. per ml. (the low sensitivity to the latter being possibly explained by the relatively large inoculum), and by a combination of streptomycin 0.6 unit per ml. with P.A.S. 0.3 μ g. per ml.

After repeated exposure over a total period of 120 days to the two drugs singly, resistance of the organism to streptomycin had increased more than 2,500-fold and to P.A.S. not at all; the streptomycin-resistant strain had retained its sensitivity to P.A.S., and the P.A.S.-exposed strain had retained its sensitivity to streptomycin. After exposure for the same period to a combination of streptomycin and P.A.S. in the same ratio as before (1 unit: 0.5 μ g. per ml. [or approximately 2 : 1 by weight]), growth was inhibited by 1 unit of streptomycin plus 0.5 μ g. P.A.S. per ml., that is, by not more than twice the initial concentration (it may be noted that 0.5 μ g. P.A.S. per ml. is $\frac{1}{2000}$ of the inhibitory concentration—1 mg. per ml.—of this drug when used alone). Much more important is the fact that this strain which had been exposed to both drugs in combination, was as sensitive to streptomycin used alone as had been the original strain (0.8 unit per ml.); it had also retained its sensitivity to P.A.S. (0.5 mg. per ml.). The conclusion is that the combination of P.A.S. and streptomycin had prevented the development of streptomycin resistance. This conclusion may have direct clinical application.

P. D'Arcy Hart.

BCG Tuberculin Studies. An Experimental and Clinical Investigation. MAGNUSSON, J. H., and LITHANDER, A. (1949). *Pediatrics*, 3, 429.

It has been observed by Wallgren that newborn and young infants are remarkably insensitive to B.C.G. vaccination, which frequently fails to produce sensitivity to ordinary tuberculin, positive tuberculin reactions developing only after the lapse of a considerable period. The authors have therefore investigated the effect of using a tuberculin prepared from B.C.G. cultures for sensitivity tests instead of the ordinary standard tuberculin.

The initial investigations were carried out on 121 guinea-pigs which were infected with B.C.G. and, after six weeks, tested for sensitivity to ordinary standard tuberculin, either 0.5 mg. or 1 mg., and to a dose of B.C.G. tuberculin equivalent by titration to the amount of standard tuberculin against which it was being tested. The testing with both types of tuberculin was carried out weekly up to 13 weeks after infection. The positive reactions obtained with B.C.G. tuberculin rose from 74% six weeks after infection to 90% 13 weeks after infection, while with equivalent amounts of standard tuberculin the corresponding figures were

9.1% and 72.3%. To ensure that repeated tuberculin testing was not causing sensitivity, approximately 80 guinea-pigs were tested six weeks after infection and again 11 weeks after infection. The percentage of positive reactors at each time was materially the same as in the original series. In another series of guinea-pigs tested weekly from three weeks after infection B.C.G. tuberculin gave positive results in about 40% of cases, whereas standard tuberculin gave positive reactions first at five weeks and then only in 13.5% of cases.

Tests were then carried out on children who had been vaccinated with B.C.G. during the first week of life, one of six groups, totalling about 500 children, being tested at each weekly interval from 5 to 11 weeks after vaccination. The percentage of positive reactors to B.C.G. tuberculin rose from 97% at five weeks to 100% at 11 weeks, while with standard tuberculin the corresponding figures were 31% and 94% at 11 weeks. In a group of 237 children vaccinated with B.C.G. between the ages of 1 and 10 years the positive results with standard tuberculin were 10% at three weeks and 93% at eight weeks, and with B.C.G. 75% at three weeks and 100% at seven weeks. In 162 children who at the first testing were positive to B.C.G. tuberculin and negative to standard tuberculin, a positive reaction to standard tuberculin was obtained on retesting after an unspecified interval. It was ensured by the careful use of controls that the results were not affected by pseudoreactions to the culture media used. The authors thus seem to have shown conclusively that tuberculin prepared from B.C.G. cultures gives a positive reaction at an earlier stage in successfully vaccinated children than does standard tuberculin.

P. T. Bray.

The Control of Experimental Pneumonia with Penicillin. III. Inhalation Therapy of Established Pneumonia, as Related to Blood and Lung Levels. WILSON, C. E., DURLACHER, S. H., and BLISS, E. A. (1949). *J. Pharmacol.*, 95, 509.

The exposure of rats with pneumonia induced by intrabronchial instillation of a mucin suspension of pneumococci to aerosols containing 400 units of penicillin per litre of air reduced the mortality by at least 75%. Intramuscular injections of penicillin were not so effective, despite the fact that blood penicillin levels were much higher than those found after aerosol treatment. Approximately three times as much penicillin was recovered from the lower respiratory tract (lungs, bronchi, and trachea) of normal animals similarly exposed as was recovered from the same tissues of the pneumonic rats. Moreover, whereas in normal rats the amount of penicillin deposited in the trachea was only a small fraction of the total recovered from the lower

respiratory tract, in pneumonic rats the proportion was much higher and there was only a trace of penicillin in the consolidated parts of the lung. Nevertheless, the pneumonic rats had 25 times as much penicillin in their lungs and trachea after inhalation as after intramuscular injection. In both normal and pneumonic rats appreciable amounts of penicillin persisted in the lung one hour after inhalation.

G. B. West.

Neohetramine in the Treatment of Experimental Tuberculosis. DUCA, C. J., and SCUDI, J. V. (1949). *Ann. Allergy*, 7, 318.

Guinea-pigs were infected by subcutaneous injection in the groin with 0.1 mg. of virulent human-type tubercle bacilli. One group of animals was used as a control; in the other, each animal received 6 mg. of "neohetramine" (thonaylamine; 2-(N-dimethylaminoethyl - N - p - methoxybenzyl)-aminopyrimidine monohydrochloride) twice daily. Necropsy showed that in the treated animals the extent of the disease was about half that found in the controls. There was no alteration to the reaction produced by 1 mg. of "old tuberculin" given intracutaneously in the treated animals.

Respiratory Function

Physiologic Observations Concerning Decortication of the Lung. WRIGHT, G. W., YEE, L. B., FILLEY, G. F., and STRANAHAN, A. (1949). *J. thorac. Surg.*, 18, 372.

As a method of obliterating a pleural space decortication has considerable value, but a factor that has not been fully decided is the degree of functional restoration in the previously collapsed lung. The authors investigated the respiratory function in two cases before and after an extensive decortication and in another instance after operation only. Decortication led to full expansion in each case and was followed by good movement on the affected side.

A most elaborate and detailed series of observations were made to determine pulmonary and circulatory function; maximum breathing capacity, pulmonary volume, and ventilation efficiency were measured, bronchspirometry was carried out, arterial blood samples were analysed (at rest and during exercise), and metabolic responses were assessed. From these figures it is deduced that in some cases the recovery after decortication is satisfactory, but in others, particularly cases of tuberculous empyema, the result is disappointing and function may even be further impaired by decortication. The character of the underlying pulmonary disease and the duration of pleural restriction are factors that may influence the degree of recovery

after successful freeing and re-expansion of the lung.

[The methods of assessing pulmonary efficiency described in this paper merit careful study, for they are more comprehensive than most of the physiological estimations usually put forward.]

T. Holmes Sellors.

Respiratory Function and Blood Flow in the Bronchial Artery After Ligation of the Pulmonary Artery. BLOOMER, W. E., HARRISON, W., LINDSKOG, G. E., and LIEBOW, A. A. (1949). *Amer. J. Physiol.*, 157, 317.

The authors have demonstrated in dogs that after ligation of a main pulmonary artery under sodium pentobarbital anaesthesia the lung can carry on the function of respiration, its capacity to absorb oxygen gradually increasing over a period of months. There is considerable enlargement of the bronchial vascular bed, which is supplied by collateral branches from enlarged oesophageal and pericardiophrenic vessels, and blood from the bronchial vessels reaches the capillaries of the alveoli. Although in the intact lung of the dog and of man precapillary anastomoses do not normally exist between the bronchial and pulmonary arteries, reference is made to anatomical studies which have demonstrated the opening up of such anastomoses in cases of congenital pulmonary stenosis (Hales and Liebow, *Bull. int. Ass. med. Mus.*, 1948, 28, 1) and bronchiectasis (Liebow *et al.*, *Amer. J. Path.*, 1949, 25, 211). Most of the increase in the bronchial blood flow occurs within the first few weeks of ligation of the pulmonary artery, and after the fourth month the flow usually exceeds 1 litre per sq. m. of body surface per minute.

A. I. Suchette-Kaye.

Tuberculosis : Clinical

Studies on the Chemotherapy of Tuberculosis. [In English]. HASEGAWA, S. (1949). *Jap. J. exp. Med.*, 20, 69.

While in the West the chemotherapy of tuberculosis has relied on sulphones and antibiotics, Japanese workers have been experimenting with an alkaloid, cepharanthin ($C_{37}H_{38}O_6N_2$), derived from the roots and stem of *Stephania cepharantha* and *S. sasakii*. Both plants are members of the family Menispermaceae. Cepharanthin has been tested in human tuberculosis with very promising results. Of 37 patients in the first stage of pulmonary infection (Turban-Gerhardt classification) 32 were cured; among 24 second-stage patients 12 recovered; and among 229 in the third stage, 93. Patients with cavity formation were less amenable to treatment than those with less pronounced

lesions. The effects on lupus were striking when as much as 1 mg. was given daily. In laryngeal tuberculosis the effects were less striking, but with daily doses of from 0.05 to 0.1 mg. pain and hoarseness rapidly disappeared; infiltrative lesions of the vocal cords did best. Some beneficial effects were noted in tuberculosis of bones and of the urogenital tract, and in eye lesions the action was remarkable in 10 or 11 cases. Cepharanthin was also, it appears, used prophylactically in Japan in schools and factories. Striking results are described in the Kobura arsenal and in schools in Toyama, but full statistical information is not provided. Excellent results are claimed in all forms of leprosy and in whooping-cough.

[If these results are confirmed a new and interesting antibacterial substance will have been discovered.]
G. M. Findlay.

The Importance of Erythema Nodosum in the Prognosis of Primary Tuberculosis in the Adult.

(L'importance de l'érythème noueux dans le pronostic de la primo-infection tuberculeuse de l'adulte.) LÖFGREN, S. (1949). *Poumon*, 5, 147.

The author analyses 178 cases of erythema nodosum occurring in patients over the age of 15. Of these, 104 (58.4%) were of probable tuberculous origin—that is to say, there was a positive tuberculin reaction and radiographs of the lungs showed a primary tuberculous lesion. In 78 (43.8%) either tubercle bacilli were demonstrated or tuberculous complications supervened. He compares the incidence of pleural effusion (regarded as an unequivocal tuberculous infection), in those of his cases in which there were both erythema nodosum and a primary lesion, with that in series described by Heimbeck (*Zbl. ges. TuberkForsch.*, 1937, 45, 537) and by Malmros and Hedvall (*Studien über die Entstehung und Entwicklung der Lungentuberkulose*, Leipzig, 1938) in nurses and medical students of a roughly similar age group. The results are expressed in the following table:

Authors	Type of Infection*	Sex	Number of Cases	Complicated by Sero-fibrinous Pleurisy
Heimbeck ..	E.N.	F	43	5 (11.6%)
Heimbeck ..	Without E.N.	F	241	20 (8.3%)
Löfgren ..	E.N.	F	94	23 (24.5%)
Malmros and Hedvall ..	Without E.N.	F	49?	1 (2.0%)
Löfgren ..	E.N.	F+M	103	25 (24.3%)
Malmros and Hedvall ..	Without E.N.	F+M	142	10 (7.0%)

* E.N. = Erythema nodosum.

In each pair of series the difference in the number of cases of sero-fibrinous pleurisy within a year

of infection is statistically significant, and the author concludes that erythema nodosum in primary tuberculous infection carries an unfavourable prognosis. In 90 cases of erythema nodosum and a primary tuberculous infection β -haemolytic streptococci were isolated from the throat in 26, compared with 8 of 65 normal adults. In the former group 28 of 86 patients had antistreptolysin titres of over 200 units, compared with 11 out of 65 in the control group.

Finally, quoting figures previously published by himself (*Acta med. scand.*, 1946, 124, Suppl. 174), the author relates the number of cases of primary tuberculosis in which tuberculous complications develop within a year to the height of the antistreptolysin titre. He found that tuberculous complications occurred within a year in 26% of cases with a low antistreptolysin titre (0 to 99), in 58% of cases with an average titre (100 to 199), and in 73% of cases with a high titre (200 and over).

John Crofton.

The Initial Stage of Post-primary Tuberculosis.

(Le stade initial de la tuberculose pulmonaire post-primaire.) HEDVALL, E. (1949). *Poumon*, 5, 75.

This paper summarizes previous literature, mainly German and Scandinavian, on the characteristics of post-primary tuberculous lesions in the lung. In conclusion the author gives his own views, based on serial radiographic studies after Mantoux conversion. He considers that post-primary lesions may present in one of two ways. In the "chronic" form, which is the commoner, the lesion is first detected about a year after Mantoux conversion, an attack of erythema nodosum, or the finding of a primary tuberculous lesion in the lung. The post-primary lesions consist of small foci usually 1 to 2 mm. in diameter, occasionally up to 5 mm., situated most commonly above the clavicle, sometimes high in the first intercostal space. The foci may be bilateral. They may heal, with or without treatment, leaving residual scarring or calcification or disappearing altogether. More often fresh shadows appear below the original foci, either shortly after the latter are first observed or, commonly, after the lapse of several years, during which the original foci may have remained static or tended to heal. These fresh shadows become confluent to form infiltrates, and the latter may then break down with subsequent bronchogenic spread. The initial foci are usually symptomless and the erythrocyte sedimentation rate is often normal, but tubercle bacilli may be obtained by guinea-pig inoculation or by culture of sputum or stomach washings.

The "acute" form of post-primary lesion develops directly from the pulmonary element of the primary complex or from foci in its immediate vicinity; the lesion is, therefore, frequently situated in the middle or lower zone of the lung. There is usually lymph-node enlargement, often followed by rapid progression to cavitation. Temperature and erythrocyte sedimentation rate are often raised and tubercle bacilli readily obtained from the sputum.

John Crofton.

Relapse in Pulmonary Tuberculosis. A Five-year Follow-up of 256 Sputum-positive Cases.

TATTERSALL, W. (1949). *Tubercle, Lond.*, 30, 74.

In this investigation the clinical condition and working capacity of a "sometime sputum-positive" population drawn from a town with 100,000 inhabitants were followed over a 5-year period. The series consisted of 256 patients who had had a positive sputum during the preceding 25 years, and were selected from a group of 1,192 patients studied in an earlier investigation ending in 1940. These 256 patients had then been classified as follows: recovered, 73; disease quiescent, 52; with active disease but on full work, 17; with active disease but limited working capacity, 35; various, 79 (28 totally incapacitated, 12 in whom the condition had relapsed and who were undergoing treatment, and 26 new cases).

From this survey it has been possible to make some rather unexpected observations. Of the 73 "recovered" patients 10 had a relapse, and in only one instance did the relapse occur less than a year after supervision ended. Of the 52 patients in the "quiescent" group, one-third recovered, in one-third the disease remained quiescent, and in one-third the condition deteriorated. In half of this last group the condition remained satisfactory for more than three years before a relapse occurred. Of the 17 patients with active disease but in full employment, and of the 35 doing limited work, one-half in each group died during the 5-year period.

Detailed examination seems to indicate that there may be some personal factor which can influence the course of the disease, irrespective of recognized organic pathological causes, but there was no suggestion of any common factor which might have precipitated the breakdown. In nine cases, the case-histories of which are briefly reported, the relapse is stated to be related to features in the life situation of the patient. In five other cases no such predisposing cause could be found. The high relapse rate among those patients who had been classified as "recovered" raises the question whether any "once sputum-positive" patient should at any time be discharged without further supervision.

Frederick Heaf.

The Remote Results of Collapse Therapy in the Treatment of Pulmonary Tuberculosis. LIVINGSTONE, R. (1949). *Tubercle, Lond.*, 30, 79.

This investigation was carried out to ascertain how much confidence could be placed in the improvement that follows treatment by artificial pneumothorax, when the patient is discharged from sanatorium while the sputum is still positive. The clinical material consisted of 630 patients (348 males and 282 females) over the age of 10 years who had been treated by collapse therapy for pulmonary tuberculosis during the past 20 years. Of the total number 278 are known to be dead, 261 having died within 10 years. Tables are given relating the mortality rate to sputum conversion. Of those patients whose treatment resulted in sputum conversion 32.8% died within 10 years, but where sputum conversion was not obtained 94.5% died within the same period. It is concluded from an analysis of the causes of death that successful collapse may result in a patient's expectation of life being considerably prolonged, but it does not appreciably alter the ultimate cause of death.

The author reviews the findings in other surveys, which all emphasize the high mortality rate in cases where treatment fails to produce sputum conversion. He concludes that collapse therapy is valueless, and may not be without danger, if it is maintained after it has become evident that it will not lead to sputum conversion. *Frederick Heaf.*

Closure of Tuberculous Pulmonary Cavities, As Accomplished by Residence in the Immobilizing Lung Chamber. BARACH, A. L., EASTLAKE, C., CULLEN, J. H., and HERBEN, G. F. (1949). *J. Amer. med. Ass.*, 139, 833.

In this paper the authors describe a method whereby lung rest may be achieved by means of an immobilizing chamber as an alternative to the usual methods employed in the treatment of cavitary pulmonary tuberculosis. It is claimed that by use of this apparatus adequate pulmonary ventilation is provided, with constant lung volume and without discernible motion of the chest and diaphragm, and that more complete rest both for the lungs and for the laryngo-tracheo-bronchial tree is thus achieved than by any other method hitherto used. A period of 10 hours' treatment daily for 4 to 5 months has resulted in marked improvement in a number of cases which had previously resisted treatment.

The immobilizing lung chamber, in which the patient is totally enclosed, provides a means of equalizing the air pressure on both sides of the chest wall and diaphragm while ventilation of the lungs is taking place. Alternating positive and negative pressures, 55 to 65 mm. of mercury above

and below atmospheric pressure, are produced within the chamber 20 to 25 times a minute, this being sufficient to ventilate the lungs of the patient. Resistance in the respiratory passages during the initial stage of each phase is simultaneously counter-balanced by means of a partition around the neck of the patient which enables a slightly different pressure to be exerted, as necessary, on the chest and abdominal wall, from that in the chamber as a whole. The resulting immobility after the patient has learnt to renounce voluntary respiration is illustrated by radiographs with lead markers on the chest wall, the outline of which remains sharp after an exposure of 10 minutes.

The degree of physical and mental rest achieved in the absence of voluntary respiration is striking. Pulse rate, systolic blood pressure, and temperature are diminished. The patients co-operate well and their morale is good. The first series of 11 patients with advanced bilateral pulmonary tuberculosis treated by this method and described in 1941 (Barach, *Amer. Rev. Tuberc.*, 1941, 42, 56) have been followed up; of the six patients in whom clinical arrest was obtained two were lost sight of one year after discharge, one had to return to bed on three occasions for four months over a period of 11 years, but was well most of that time, one was well for four years when a fall caused a relapse; and two patients who had advanced cavities at the time of treatment have been well and working for five and six years respectively. Among the failures two patients required more than one course of chamber treatment and received inhalations of "promine" before cavity closure was obtained. In a more recent series of 11 patients the cavity closed and the sputum became negative after a single course in nine, of whom six had previously been unsuccessfully treated with pneumothorax.

The use of the chamber in early cases of cavity and exudative lesions is justifiable, and, in the authors' opinion, combined with chemotherapy, it may be of value in otherwise hopeless cases with low immunological resistance. The cause of cavity closure is discussed and a number of questions are posed concerning the wider use of the chamber, to which further experience alone will provide the answers.

Ronald S. McNeill.

Neoplasm

Pulmonary Adenomatosis of Man. A Review of the Literature and a Report of Nine Cases.

SWAN, L. L. (1949). *Arch. Path.*, 47, 517.

Nine cases of so-called alveolar-celled tumour were found among the records of 900 pulmonary neoplasms in the U.S. Army Institute of Pathology,

and 27 other cases have been collected to add to those already described by Neuburger and Geever (*Arch. Path.*, 1942, 33, 551). Microscopical examination revealed tall columnar cells investing the alveolar walls, often with mucus-production and having papillary processes. Metastases in the peribronchial lymphatics were found in four cases, although elsewhere they were visible to the naked eye in only one instance. The author discusses the relationship of the disease to jagziekte in sheep and similar lesions in horses and mice, and adduces evidence to support the view that these tumours arise in the alveolar epithelium and have cancerous potentialities.

E. T. Ruston.

Diagnosis of Bronchial Carcinoma by Tomography.

(Zur Diagnosestellung des Bronchuscarcinoms mittels Schichtaufnahme). STANGL, A. (1949). *Radiol. clin.*, Basel, 18, 206.

The author assigns a place to tomography amongst other diagnostic methods in bronchial carcinoma. The importance of radioscopy which might reveal mediastinal swing in bronchial obstruction, diaphragmatic paralysis, or displacement of the oesophagus, is stressed, as is the need for routine radiography and the usefulness of penetrating radiographs. Bronchography, not entirely harmless and followed by irritating cough, is only to be employed when tomography fails. Bronchoscopy though useless in cases of peripheral growths is essentially a pre-operative procedure for verification, localization, and biopsy. The optimal plane for tomography of the bronchial tree lies at half the distance between table and xiphoid (with the patient lying on his back) minus 1 to 2 cm. This plane, the "anatomical middle," cuts through the bifurcation of the trachea.

Bronchial stenosis does not necessarily imply carcinoma. In differential diagnosis, foreign body tuberculosis and para-tracheo-bronchial lymph nodes must be taken into account. Peripheral tumours are readily visualized on ordinary x-ray photographs but cannot be demonstrated by tomography of the bronchial tree, because bronchi of the third order lie outside the plane of the main bronchi. The small, early, central bronchial carcinoma, often overshadowed by the mediastinal organs, is most easily detected by tomography. In the first stage before the bronchus is completely blocked, tomography reveals an ill-defined tumour shadow radiating into the periphery. In the second stage with complete bronchial obstruction the picture shows lobar atelectasis with a bronchus cut short, leading into a dense nuclear tumour shadow within the diffuse atelectatic shadow zone. If in a later stage the central area of this dense parahilar nuclear shadow has broken down, a picture of lung

abscess or of bronchiectasis within an atelectatic shadow obscures the situation. Broadening of the angle of the bifurcation indicates that carcinomatous lymph nodes lie below the carina.

[The description of 10 well-illustrated cases seen and followed up at the x-ray department of the Second Surgical University Clinic, Vienna, makes this very instructive paper a valuable contribution to the diagnosis of bronchial carcinoma.]

E. G. W. Hoffstaedt.

Asthma

The Significance of the "Aleudrine" Test in the Diagnosis of Bronchial Asthma. (Die Bedeutung des Aleudrintestes in der Diagnose des Asthma bronchiale.) WYSS, F., and STUCKI, H. (1949). *Helv. med. Acta*, 16, 138.

A group of 10 children and 24 adults, suffering from bronchial asthma, were examined by "pneumometry" during periods when they were clinically free of asthmatic symptoms, and a control group of 13 children and four adults who had no past, present, or family history of asthma were subjected to the same examination. The pneumometer measures the velocity of the air-current produced by forced expiration, and the values obtained are thus dependent on the degree of spasm of the bronchial muscle and of swelling of the mucosa, and on the amount of accumulated secretion in the bronchi.

Pneumometric readings were taken before and after the inhalation of an aerosol of "aleudrine" (isopropylnoradrenaline). The readings in the normal group were not changed, whereas the velocity of the expired air was markedly increased in 80% of the individuals of the asthmatic group. The authors believe that this "aleudrine test" is a suitable method of measuring latent bronchospasm.

K. Maunsell.

Disseminated Focal Necrosis with Eosinophilia and Arteritis in a Case of Asthma (? Loeffler's Syndrome). SMITH, J. F. (1948). *J. Path. Bact.*, 60, 489.

A woman aged 48, after a cold, developed asthmatic attacks with productive cough and occasional blood-streaked sputum. The first of these attacks was treated with sulphonamides, but they recurred at intervals over a period of six months, and were associated with eosinophilia (about 40% of a total leucocyte count averaging 17,000 per c.mm.) and faint radiological mottling of the lungs. The last attack was severe, and resulted in death from cardiac failure.

At necropsy, numerous groups of confluent, brownish-yellow nodules, up to 1 cm. in diameter,

were found throughout the lungs, heart, spleen, and kidneys, sections of which were stained with haematoxylin and eosin, Weigert's iron haematoxylin and Van Gieson, Hart's elastic stain, Gram's stain, and Ziehl-Neelsen stain. Microscopically, the lungs showed several types of lesion: (1) a necrotizing lesion; (2) a lesion similar to those of periarteritis nodosa; and (3) thrombotic lesions with haemorrhagic infarction. All the tissues were heavily infiltrated with eosinophil leucocytes, these cells being particularly numerous in and around the lesions described above. The heart also showed diffuse infiltration by eosinophil cells, which were particularly numerous in and around the necrotic areas. The spleen and kidneys were similarly affected. The liver showed only slight eosinophilic infiltration of the portal tracts.

From the histological picture the author considers that the lesions in the lungs are more chronic than those in the other organs, and suggests that the condition originated in the lungs and subsequently spread elsewhere. The findings are discussed in relation to anaphylaxis in general and to periarteritis nodosa and Loeffler's syndrome in particular.

R. B. T. Baldwin.

Thoracic Surgery

Cervical Esophagogastric Anastomosis Following Subtotal Resection of the Esophagus for Carcinoma. WYLIE, R. H., and FRAZELL, E. L. (1949). *Ann. Surg.*, 130, 1.

These authors give a detailed account of the case of a patient, treated for carcinoma of the oesophagus at the level of the first rib by a one-stage operation, who was alive and well 14 months later.

A healthy man of 68 had a 2½-month history of dysphagia and regurgitation. Barium swallow revealed an oesophageal obstruction in the upper mediastinum; a biopsy specimen was reported as a squamous-celled carcinoma. Operation was performed with the patient in the lateral position. The first incision was made along the course of the left seventh rib, which was resected, the thorax being widely opened. The mediastinal pleura was incised behind the subclavian artery and in front of the descending aorta and the whole length of the oesophagus exposed and freed. The aortic arch was mobilized by division of intercostal vessels. The oesophageal dissection was continued into the neck and completed by finger to the level of the cricoid. The diaphragm was then divided and the stomach mobilized by division of the omenta (not too close to the organ) and of the left gastric and left gastro-epiploic vessels. The peritoneum along the right border of the duodenum was incised. The

cardia was divided and sutured. A jejunostomy was made. A second incision was now made along the sternomastoid and the left lobe of the thyroid, which was adenomatous, resected. The oesophagus was drawn up and freed to the level of the thyroid cartilage. The stomach was passed under the arch of the aorta and through the thoracic inlet so that it lay in the normal bed of the oesophagus. Anastomosis was effected with two rows of interrupted silk sutures, all layers being joined. Several stitches fixed the stomach in the chest. Both wounds were closed in layers with drainage. A nasogastric tube was left in for five days, when oral feeding began cautiously; the jejunostomy tube was removed on the 10th day. Its use was probably superfluous. Tracheo-bronchial aspiration was required for atelectasis. Two and a half months after operation the patient returned to work, with unrestricted diet.

M. Meredith Brown.

Carcinoma of the Cervical Oesophagus with One-stage Total Esophageal Resection and Pharyngo-gastrostomy. SHEFETS, L. M., and FISCHER, A. (1949). *Surgery*, **25**, 849.

This article gives a résumé of the literature relating to treatment of carcinoma of the cervical oesophagus. The procedures hitherto used are mainly based on local excision and plastic repair. In all these procedures there is a high percentage of local recurrence in either the oesophagus, or the local lymph nodes, with recurrent dysphagia. In an attempt to avoid these difficulties a one-stage total oesophagectomy and pharyngo-gastrostomy was performed.

The procedure was carried out through an incision along the anterior border of the left sternomastoid, and a second incision through the 7th rib with section of the posterior end of the 6th, 7th, and 8th ribs. The stomach was mobilized through the latter incision, and brought up through the diaphragm, lateral to the aorta and behind the subclavian artery. The patient died on the 6th day after operation of massive pulmonary embolism. At necropsy, the site of the anastomosis appeared to have been healing satisfactorily.

J. E. Richardson.

Palliative Anastomosis in Cancer of the Middle Part of the Oesophagus. (L'anastomose palliative dans les cancers de la partie moyenne de l'oesophage thoracique). OLIVIER, C. (1949). *Pr. méd.*, **57**, 599.

At least 45 examples of palliative oesophago-gastrostomy for inoperable carcinoma of the lower end of the oesophagus, with seven operative deaths, are to be found in the French literature. In the successful cases there were restitution of normal de-

glutition and, for the patient, an illusion of cure. There are also six instances recorded in the French literature of a similar procedure being carried out for inoperable growths of the middle two-thirds of the oesophagus (between aortic arch and inferior pulmonary vein), with two operative deaths—one due to pulmonary embolus and the other to breakdown of the anastomosis—and four successes. To these is now added a seventh case.

The technique of the operation is as follows. A preliminary laparotomy is carried out which permits mobilization of the stomach, and the right crus of the diaphragm is divided between ligatures which secure a branch of the right phrenic artery running in its substance. This allows easier elevation of the stomach and freeing of the lower third of the oesophagus. The right chest is then entered through the bed of the sixth rib and the azygos vein divided. If the neoplasm is inoperable, a point is chosen well above the growth and a double-layer side-to-side oesophago-gastrostomy performed, the stomach wall being anchored to the prevertebral tissues to avoid traction.

Geoffrey Flavell.

Solitary Tumors of the Chest. The Differential Diagnosis in Fifty Proved Cases. ARBUCKLE, R. K. (1949). *Amer. J. Roentgenol.*, **62**, 52.

An increasing number of solitary tumours of the chest are now discovered as a result of mass surveys. Fifty such cases, in all of which the diagnosis was proved, are reviewed in this paper. Most of the tumours were of one of three types, namely, bronchial carcinoma, nerve tissue tumour, and aneurysm. Needle aspiration under radioscopic control, for the purpose of procuring biopsy material, afforded the most prompt and accurate method of establishing diagnosis.

There were no radiographic findings that could be considered characteristic of any particular type of tumour. In many instances the diagnosis which was finally established was not considered among the possibilities when the first examination was made.

A. Orley.

Mediastinal Tumors of Blood Vascular Origin. SEYBOLD, W. D., McDONALD, J. R., CLAGETT, O. T., and HARRINGTON, S. W. (1949). *J. thorac. Surg.*, **18**, 503.

This article is based on a study of 3 cases of mediastinal tumour of vascular origin and a review of 14 other proven cases. The infrequency of this type of neoplasm is illustrated by the fact that only these 3 were found in a total of 200 mediastinal tumours removed at the Mayo Clinic.

The first tumour was too extensive for removal, and the patient died shortly afterwards. The

biopsy examination suggested a haemangio-endothelioma of low-grade malignancy. The second tumour resembled a low-placed neurofibroma; the tumour was removed to the accompaniment of some haemorrhage. Histological examination revealed a capillary and cavernous pattern with endothelial proliferation. The third tumour was at first also thought to be of neurogenic origin, but proved to be a haemangioma. Analysis of these and other cases suggests that malignant changes are common. On the other hand it would appear that excision, if properly carried out, offers a good hope of survival. The signs and symptoms, as might be expected, depend on the size and situation of the mass in the mediastinum; the condition is one that affects younger patients.

T. Holmes Sellors.

Alveolar Cell Carcinoma of the Lung (Pulmonary Adenomatosis, Jagziekte?) A Multicentric Tumor of Epithelial Origin. DELARUE, N. C., and GRAHAM, E. A. (1949). *J. thorac. Surg.*, **18**, 237.

Although difficult to demonstrate, an epithelial lining appears to exist in the human pulmonary alveolus, proliferating under certain pathological conditions and occasionally giving rise to a peculiar type of carcinoma. Histologically, this tumour consists of sheets of columnar cells lining alveoli, the delicate septa between the alveoli being long preserved. The condition resembles jagziekte (a disease of South African sheep supposedly caused by a virus) and the pulmonary adenomatosis of mice, and, like them, is often multifocal in origin, the foci tending to coalesce. The tumour is of low malignancy, although lymph-node metastasis and gross infiltration may occur. Despite the tendency to multifocal origin, the treatment called for is operative excision, pneumonectomy being preferred by the authors to lobectomy; without such treatment, the patient inevitably dies of sepsis. A case of the disease is described in which the patient, after 2 operations, has survived more than five years.

D. M. Pryce.

Completing the Multiple-stage Operation for Atresia of the Esophagus. LAM, C. R. (1949). *J. thorac. Surg.*, **18**, 327.

In those cases in which primary end-to-end repair of congenital oesophageal atresia is not feasible, the completion of antethoracic multiple stage operations presents many hazards. Of 13 patients treated, the author has completed an anastomosis in nine, three of whom survived. Of the remaining four patients, two died following the intramediastinal ligation of the fistula; the histories

of the other two, ending in success, are detailed. If initial anastomosis is impossible the lower oesophageal segment is detached from the trachea, ligated, and allowed to retract. After two days the upper portion is exteriorized below the left clavicle and left open to permit sham swallowing. By a later abdominal approach the cardia and lower segment are mobilized and an oesophagostomy formed as high as possible on the chest wall. The child is fed by this during the following year and, as it retains the gastric juice, excoriation of the skin does not occur. During the second year of life the two oesophagostomies are connected by a skin-lined tube raised between them, and covered in turn by advancing flaps or tubed pedicles. Difficulties are most apt to arise from strictures at the oesophago-dermal junctions and from attempts to avoid the use of pedicles.

Geoffrey Flavell.

The Use of Tubed Pedicle Grafts in Carcinoma of the Upper Esophagus. BRICKER, E. M., BURFORD, T. H., and EISEMAN, B. (1949). *J. thorac. Surg.*, **18**, 304.

The lymphatic drainage of the oesophagus above the aortic arch is chiefly to the superior and inferior deep cervical nodes. Hence radical extirpation of malignant growths in this situation must include a block dissection of these nodes, and therefore a combined cervico-thoracic approach is necessary. Experiments on dogs showed that long skin pedicle grafts could be transplanted into the mediastinum and anastomosed to the oesophagus without stricture formation, and this procedure, as carried out in one human patient, is described. The carcinoma, at 18 cm., was first resected via a 3rd right intercostal incision, the distal oesophageal end being closed and anchored to prevent retraction. The neck was then widely opened and, after block dissection of the nodes, the upper end was exteriorized in such a manner that it lay attached to the skin of the anterior chest wall, from which the tubed pedicle was later formed. Later still, it was transplanted through the thoracic inlet and anastomosed with the distal oesophagus. The functional result was wholly satisfactory, but numerous metastases demanded repeated deep x-ray therapy.

Geoffrey Flavell.

Transthoracic Small Bowel Substitution in High Stricture of the Esophagus. HARRISON, A. W. (1949). *J. thorac. Surg.*, **18**, 316.

The author describes two cases in which a complete lye stricture of the cervical oesophagus in a 3-year-old boy was successfully treated by 3-stage transthoracic substitution of a jejunal loop. The jejunal segment is so chosen that the arterial radicals are longest at its proximal and shortest at its distal

end, giving on the one hand maximum mobility and on the other minimum redundancy. At first the proximal artery is not divided and the loop is brought up through the transverse mesocolon, lesser sac, and gastrohepatic omentum after the continuity of the jejunum has been restored by end-to-end anastomosis. The distal end of the loop is then anastomosed to a circular ostium in the fundus of the stomach, and the proximal end closed. The loop is then coiled up, wrapped in an omental veil to prevent adhesions, and left under the diaphragm. At the next stage the chest and diaphragm are opened, the proximal arm of the arterial arch of the loop cut, and the upper end of the loop brought out together with the oesophagus through an incision in the neck, where anastomosis can safely be performed later. In this way both anastomoses are outside the thorax, gastric capacity and function remain normal, gastrostomy is not interfered with, the final route is direct and isoperistaltic, and the cosmetic result is good.

Geoffrey Flavell.

Partial Esophagectomy with End-to-end Anastomosis in the Posterior Mediastinum: An Experimental Study. SWENSON, O., and CLATWORTHY, H. W. (1949). *Surgery*, 25, 839.

Experiments were carried out on 30 dogs to determine the safety of resection of the oesophagus with end-to-end anastomosis. Previous failures were due mainly to: (1) lack of firm tissue, that is, submucosa; (2) difficulty in avoiding a destructive amount of tension; and (3) necrosis resulting from freeing the oesophagus from its bed. The length of the oesophagus was taken as from the top of the first rib to the midpoint of the oesophageal hiatus. Various types of incisions were used, but in general one rib was resected on the left side for the lower end, and one on the right side for the middle and upper portions. The oesophagus was freed, but the blood vessels entering the portion adjacent to the site of the proposed suture were left intact. The suturing was carried out with two layers of fine interrupted braided silk. In the later cases an attempt was made to reduce the tension at the anastomosis by suturing the lower segment to the prevertebral fascia and by crushing the phrenic nerve. The pleura was also carefully closed to make the anastomosis extrapleural.

The results are judged from work on 26 animals, since two died from the anaesthetic, one dog regurgitated food during the operation and developed an empyema, and one animal died of perforation of the oesophagus and was found to have a gauze swab in the pleural cavity [it would seem this dog should be included in the series]. Among the 26 dogs, six deaths were due to break-

down of the anastomosis with mediastinitis and empyema. In these dogs between 50 and 80% of the oesophagus had been removed. The remaining dogs were killed from the third day onwards. At necropsy there was some scarring at the site of the anastomosis, and in the one killed early after operation it was shown that the mucosa had pulled apart for a short distance. There was no failure in any animal in which less than 50% of the oesophagus had been resected.

J. E. Richardson.

Healing of Tuberculous Pulmonary Cavities by Means of Skin Grafts. VINEBERG, A. M. (1949). *Proc. Soc. exp. Biol., N.Y.*, 71, 578.

In cases of tuberculous lung abscess, because the surrounding lung tissues are usually diseased and therefore cannot expand to fill in the space occupied by the abscess cavity, intracavity drainage is of cleansing value only. Unless combined with collapse therapy, it does not lead to cavity closure. The author has successfully treated large cavities by intracavity drainage, followed by wide cavernostomy performed through the sinus tract, and subsequent covering of the cavity walls and floor with split-thickness skin grafts or pinch grafts. The new skin gradually grew out to meet the skin on the surface of the chest wall.

John Borrie.

Indications for Ligation of the Large Branches of the Pulmonary Vessels. GERASIMOVA, A. V. (1949). *Khirurgiya*, No. 7, 18.

The results of 21 operations for ligation of pulmonary vessels are presented. Clinical recovery was complete in three cases. Temporary amelioration was observed in four patients. In six cases of malignant bronchial tumour there was no improvement after the operation. Eight patients died in the post-operative period.

The author divides her cases in three groups. In the first, the operation was performed to control severe haemoptysis. Artificial pneumothorax was tried first and when ineffective was followed by ligation of the pulmonary vessels and in suitable cases by lobectomy or pneumonectomy. In the second group ligation was carried out in the presence of inoperable malignant growths in order to prevent fatal haemorrhage and to slow down the progress of disease by reducing the blood supply to the invaded lung. To the third group belonged patients with advanced bronchiectasis. Ligation of the pulmonary vessels sometimes improves the condition of these patients and makes radical operation possible in previously hopeless cases. The author concludes that this operation may have some practical importance. It is easy to perform and is well tolerated by the patient.

[It is not clear from the text which patients benefited from the operation. The illustrative case clinically cured by ligation of the left pulmonary artery was one of suppurative bronchiectasis of the left lower lobe.]
Z. W. Skomoroch.

A Polythene Prosthesis to Replace the Lung After Pneumonectomy GRINDLAY, J. H., CLAGETT, O. T., and BULBULIAN, A. H. (1949). *Proc. Mayo Clin.*, **24**, 346.

The satisfactory obliteration of the "dead space" in the thoracic cage after removal of a lung has been one of the acute problems of thoracic surgery. The dead space offers the opportunity for an empyema to form and even more for disorganization of function of the other vital intrathoracic organs, during the physiological process of closure of the space. This problem was tackled experimentally by the authors, one of whom (J. H. G.) has previously published papers on the uses of plastic materials in surgery. The use of an absorbable material like gelatin foam has been abandoned because it absorbed fluid and in turn was absorbed; obliteration therefore was short-lived.

In the present study non-absorbable, non-toxic "polythene" sheet was made into a roughly lung-shaped bag and the cavity of this bag was weighted with "fibre-glass." The edges of the polythene sheeting were then fused by heat and pressure and the prosthesis was introduced in 21 dogs after pneumonectomy and phrenicotomy. Mechanical defects (sharpness of the edge of the bag and splitting of the bag, which had a non-sterile interior) marred the success of the experiment, but a few animals survived long enough for the soundness of the procedure to be demonstrated. In these the pleural cavity contained very little fluid on exploration four and seven months, respectively, after the operation. Whilst polythene is the authors' material of choice, lightweight methyl metacrylate (lucite) prostheses were used in five further dogs with no complications at the time of publication, four to five months after the experiment. Work continues on the further adaptation of polythene to this obviously important purpose.

G. Blaine.

Late Relapse in the Collapsed Zone of the Lung after Apparently Successful Thoracoplasty.

(Rechutes tardives au niveau du poumon collabé après des thoracoplasties ayant été apparemment efficaces). BERNOU, A., and TRICOIRE, J. (1949). *Arch. Tisiol.*, **4**, 201.

The authors describe 10 cases of late relapse among 1,200 cases in which thoracoplasty had apparently been successful. All the relapses occurred at least two years after operation. The

original thoracoplasty was deemed successful if: (1) numerous sputum examinations, often including culture and guinea-pig inoculations, failed to reveal tubercle bacilli; (2) the radiographic and tomographic pictures were satisfactory. [In two of the cases described in detail small persistent cavities were found on post-operative tomography, and in two others there is no mention of tomography being carried out after the original operation.] The relapses may be classified under the following headings: (1) Persistence under the operation site of minute cavities which later enlarged; (2) persistence of "blocked cavities," which later opened up; (3) secondary caseation in the parenchyma surrounding the scar representing the healed cavity; (4) later development of tuberculous bronchitis.

John Crofton.

Thoracic Complications of Amebiasis. SHAW, R. R. (1949). *Surg. Gynec. Obstet.*, **88**, 753.

The incidence of amoebiasis among the American population has been estimated to be 20%; hepatic abscesses are a complication in 5% of cases, in the ratio of 15 men to 1 woman, and 15% invade the thorax. Most abscesses are single and situated in the right lobe of the liver. They may rupture into the right pleura, or the right lung if it is adherent to the diaphragm, but rarely into the pericardium. There is no history of dysentery in 50% of patients. Thoracic involvement is characterized by pain in the right shoulder and lower chest, accompanied by cough and later haemoptysis and the production of "anchovy-sauce" sputum; there are fever and sometimes rigors, and there may be much loss of weight. Radiography will reveal a humped diaphragm and lower-chest opacity which may indicate an empyema or an abscess of the lower or middle lobe, and a fluid level will be seen if a bronchial fistula is present. With empyema a mortality rate of 77.7% has been recorded; with lung abscess, 42.2%; and with bronchial fistula, 10%. But in a series of cases with pleuro-pulmonary involvement in which emetine was not given the mortality rate was 56.6%, whereas in cases treated with emetine the mortality rate was only 9.1%. The authors stress that emetine should always be employed first, with complete aspiration of any hepatic abscess; this leads to cure in most cases. However, should secondary infection, or persistent empyema, or biliary-bronchial fistula, or pulmonary destruction supervene, surgery is indicated; this should take the form of extraserous drainage of abscesses, decortication of empyemata with diaphragmatic repair, or pulmonary excision. Detailed case-histories are given of four successfully treated cases.

Geoffrey Flavell.