from this, I maintain that the syphilitic origin of tabes is a mere *non sequitur* from the fact that a syphilitic history can be traced in a large number of tabetic subjects. In strict logic, the broadest conclusion which we can deduce from that fact is that syphilis alters the physiological condition in such a way as to favour the attack and operation of the actual cause of tabes and allied conditions. In this respect its influence, in my opinion, is similar to that of measles or scarlet fever in leading to the development of tuberculosis, and similar also to the action of the influenza bacillus in relation to other pathogenic organisms.

When to these facts of clinical experience we add the evidence of experimental bacteriology, from which we learn, for example, that the presence of staphylococci and streptococci leads to a much more luxuriant growth of the influenza bacillus, and further, that the latter will grow more readily in a medium through which these other organisms have passed, we are strongly attracted to the existence of an analogy in the relation of the syphilitic virus to the toxic agent responsible for tabes.

I submit that the proper line of investigation is directed to the discovery of the nature and source of the toxic substance at work. At the same time we must study the clinical facts of the disease in the light of the results obtained by experimental bacteriologists and others investigating the all-important subject of immunity. In my opinion the alimentary tract furnishes the chief area of investigation, and in all probability it will be proved to be the original source of the toxæmia. In this connection it is interesting to refer to the experimental work of Adami and others on the different forms of chronic infection due primarily to the presence in the tissues of bacterial poisons derived from the intestine. The diseases specially investigated by Adami were cirrhosis of the liver, hæmochromatosis, and pernicious anæmia, and this author, as quoted by Putnam and Taylor,⁸ suggested that this subinfection would be found to play a definite part in the development of many chronic fibroid conditions.

In conclusion, I have much pleasure in expressing my indebtedness to Dr. Ford Robertson, Director of the Laboratory of the Scottish Asylums, for invaluable assistance. It was originally proposed that a joint communication should be written by us, but the pressure of other work compelled Dr. Robertson to abandon the idea. He has, however, kindly allowed me to state that he accepts the interpretation which I have put on the histological appearances described. I have also to thank Dr. Carmichael for permission to investigate and record the cases of tabes under his care in the poorhouse hospital; Dr. W. R. Watson, Hawkhead Asylum, Paisley, for the tissues from which most of the illustrations have been derived; and the various members of the staff of the Royal Infirmary, who have kindly given me material used in the course of the investigation.

NOTE AND REFERENCES.

¹ *Arch. de Neurol.*, January, 1901. ² A histological demonstration of the condition of the cord was given to the Medico-Chirurgical Society some months ago, and the case has been fully recorded in the *Veterinary Journal*, March, 1901. ³ *Veterinary Journal*, June, 1901. ⁴ *Pathological Anatomy of a Case of Tabes with General Paralysis*, *Brain*, vol. xii. ⁵ *Brain*, vol. v. ⁶ *Neurol. Centralbl.*, vol. iv. ⁷ *Archives de Neurologie*, December, 1900, Discussion, p. 507. ⁸ *Jour. of Nerv. and Ment. Dis.*, January and February, 1901.

CASE OF MALIGNANT DISEASE OF THE LUNG, WITH PSEUDO-TUBERCULOSIS.

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THE literature dealing with the double infection of lung tissue by cancer or sarcoma and the tubercle bacilli is necessarily limited to the description of cases since 1882. It is, however, very remarkable how few cases have been described in which active tuberculosis of the lungs has been met with in association with cancer or sarcoma of the same organ.

History.—A gasfitter, aged 27, was admitted to University College Hospital suffering from pain in the left side of the chest, shortness of breath, and weakness. These symptoms had been present for four months, coming on rather suddenly in an attack of what was considered to be influenza; ultimately "pneumonia and pleurisy" developed.

State on Examination.—On admission the patient looked very ill, was distressed in breathing, and had a short spasmodic cough, which caused considerable pain in the left chest, and was accompanied by a copious

frothy expectoration. The left chest moved less than the right, and there was considerable flattening at the left apex, and on the same side the vocal fremitus was weak and the percussion note in the lower part of the axilla was dull, though a skodaic note was obtained at the apex. The breath sounds on the left side were very weak, more especially at the base. The temperature was 103.4°, pulse 100, and respiration frequency 36. Fluid was suspected at the left base, and a needle was inserted, but with negative results.

Progress.—Results. Nine days later the sputum became purulent, though very tenacious as on admission. Throughout the illness the temperature was raised, varying from 100° to 103°, the pulse increased to 120 per minute, the respiration to 40. Fifteen days after admission the patient's condition suddenly became much worse; he coughed up about half a pint of very offensive purulent material and had great dyspnoea and cyanosis. The earlier diagnosis of left pleural effusion having been disproved, and these acute symptoms appearing, it was thought an abscess or tuberculous cavity had suddenly burst into a bronchial tube or an empyema had burst into the lung, so a trochar was again inserted into the left base and a few drachms of blood-stained offensive pus were drawn off; the patient's strength, however, was falling so much that it was thought inadvisable to reset a portion of a rib. The patient died a few hours later.

Necropsy.—A round-celled sarcoma was found involving the root of the left lung constricting the vessels and bronchus; the apex of the left lung was somewhat consolidated, and showed numerous granulations resembling tuberculous granulomata (see photographs); the upper lobe of the lung was also the seat of an infarction. The middle and lower portions of the lower lobe were in part riddled with cavities, in some cases large enough to admit a walnut; in part the lung was consolidated, and showed, especially at the base, yellowish-white areas, in some cases quite caseous. Signs of antecedent and recent pleurisy were present in the left lung. The cavities above mentioned contained offensive greenish pus. The naked-eye appearances suggested at once that the sarcoma, by pressing on the bronchus and vessels, had so interfered with the lung that tubercle bacilli had developed over a considerable part of the lower lobe, producing a pneumonic condition with cavities, and had begun to invade the apex of the lung. The right lung was quite free from disease. Microscopic examination was made of the left lung; sections were made of the granulations at the apex, of the pneumonic areas present at the base, and of the walls of the abscess cavities, and Ziehl-Neelsen's method applied for the detection of tubercle bacilli, but with negative results. Film preparations were made of the contents of the cavities, and again tubercle bacilli were not found. No inoculation experiments were made, as the specimen had been kept in formalin for some time before the microscopic examination had been made. Some twenty-five or thirty preparations were made altogether, and in nearly all of them streptococci, staphylococci and a few slender bacilli were found. No giant cells were seen or tuberculous granuloma systems, but abundant fibrinous exudation was seen in many of the alveoli. The granulations above mentioned proved to be mere foci of fibrinous pneumonia.

The pathological diagnosis thus resolved itself into one of sarcoma of the root of the left lung, producing stenosis of the bronchus and vessels, and associated with pneumonia of the lung, probably due to the septic organisms present. The lung condition so closely resembled that met with in tuberculosis, with the exception that the process was more marked at the base than the apex, as to merit the application of the term pseudo-tuberculosis. In accordance with the report of a subcommittee on pseudo-tuberculosis in 1899, appointed by the Pathological Society, such a term is inadmissible, and the granulations found in the lung alone had better be described as "coccal" or "bacillary" nodules.

Though modern research has shown that all cases of granulomatous disease in which the granulomata closely resemble the tuberculous granulomata, are not necessarily due to the tubercle bacillus, so that observers working before 1882 may have misnamed many pathological specimens, it is very striking how comparatively rare is the infection of the body or particular organs with tuberculous disease and cancer or sarcoma. Walshe¹ and Rokitsky,² writing in 1846, were both impressed by this observation. Rokitsky admitted that cancer followed tuberculous disease, and rarely tuberculosis followed cancer; in either case the combination was not frequently met with. Walshe found in 104 cases drawn from his own personal experience or from reliable sources, only 7 cases of malignant and tuberculous disease of the lung occurring at the same time. Walshe quotes Bayle, who found the same combination in 3 cases out of 900 cases of phthisis. Pollock³ described a case of mediastinal growth of the right lung complicated by tuberculous deposits at the apex of the lung on the same side. No cavities were present, but Quain, who examined the specimen, confirmed Pollock's opinion that the granulations were tuberculous, and found large cells present, containing several nuclei.

Bristowe⁴ described another case showing miliary tubercles at the apex of the left lung also in the right lung, and consolidation and cavities were also seen; a cancerous growth involved the root of the right lung and a secondary deposit was present in the liver. Bristowe thought the granulomata were tuberculous, but Jenner and Brinton were convinced that the

small tubercles were composed of cells identical with those of the original growth. Lebert⁵ opposed the views put forward by Rokitsky; in the examination of 173 cases in which some of the organs were the seat of cancer, he found recent tubercles in 15. He considered that patients suffering from cancer were as liable to become tuberculous as those of the same age who were free from cancer; on the other hand, he believed the occurrence of cancer in the progress of phthisis was very rare, in fact, he had never seen a case. Gull⁶ reported a case of involvement of the root of the lung by a new growth and found appearances in the lung somewhat like the case above described in that abscesses were found at the base, but no mention is made of tubercles being present. Cockle⁷ quotes Heinrich and Popp who found in 1,121 necropsies that cancer of the lungs

cles. Risdon Bennett¹⁰ paid great attention to the similarity of cancerous and tuberculous lesions, and called attention to the fact that miliary tubercles might be closely simulated by deposits of malignant disease. He had never seen a case in which cancer and tuberculosis were combined; and, in making a summary of reported cases, he found tubercles described in cases of cancer only once, and that was Pollock's case (*vide supra*). Pearson Irvine¹¹ called attention to the fact that stenosis of a bronchus might be followed by a "distinctive pneumonia," the pneumonia existing especially in the lower lobe of the lung, and associated with abscess cavities, but he makes no reference to the occurrence of tubercles. Friedländer¹² described a case in which cancer developed in the wall of a

Fig. 1.—Vertical section through lung showing sarcomatous growth at the hilus of the lung, tubercles at the apex of the lung, an infarct in the upper lobe, cavities (collapsed) at the upper part of the lower lobe, areas of pneumonia at the base.

was combined with tuberculosis in 6 cases out of 68 in which cancer was present. Friedreich⁸ described a case of primary cancer of the left lung with metastases in the heart, kidneys, and suprarenals. Obsolete and fresh tubercles were present in the right lung, and there was recent tuberculous enteritis, but no mention is made of multinucleated cells in the sections of the miliary deposits. Friedreich was, however, quite of the opinion that this was a case of tuberculosis occurring subsequently to the onset of cancer, and quotes Dittrich, who had recorded a similar case in a series of 150 cases of cancer. Riegel⁹ gives many references to the literature of the subject, and in the case of malignant disease reported by him mention is made of the presence of tuber-

Fig. 2.—Section of the same lung in a more posterior plane. The cavities are shown present also at the base, whereas the apex, though showing tubercles, is free from cavity formation.

tuberculous cavity; he mentions no granulations or any microscopic evidence of giant cells or tubercle bacilli. Wilson Fox¹³ analysed 112 cases of cancer of the lungs, etc., reported in the first twenty-eight volumes of the *Transactions of the Pathological Society*, and found tubercles present in only 3 cases.

The above cases and analyses serve to fix the frequency of the occurrence of the two diseases from a contemporary point of view before the application of Koch's discovery of the tubercle bacillus; and seeing how closely miliary deposits of malignant disease in the lung can simulate tuberculous granulomata, and that the caseous pneumonia, puriform infiltration, or grey hepatisation and cavity formation of the lung, described by Wilson Fox, produced by pressure on a bronchus,

can assume the characters of pneumonic tuberculosis of the lungs with cavity formation, it is impossible to accept reports before 1882 as very material evidence of the occurrence at the same time of malignant disease and progressive tuberculosis of the lungs.

Dr. V. D. Harris¹⁴ recorded a series of cases in 1892 of mediastinal malignant disease. Reference is made to two cases (Nos. xvi and xix) of tuberculosis of the lung combined with malignant disease. In the first-mentioned case sarcoma of the lung was present in the left lung in combination with chronic tuberculous disease; no bacteriological examination was reported, however. In Case xix the lower half of the right lung was occupied by a new growth (medullary cancer) and near the root of the lung was a large mass of new growth as large as the two fists; here also there was old tuberculous mischief at the apex of the right lung and to a less extent at the left.

In a contribution by Kurt Wolf¹⁵ a great effort is made to prove the comparative frequency of the combination of the two diseases; he says in not fewer than 13 out of the 31 cases reported by him was tuberculosis combined with malignant disease (cancer). On examining the reports of the cases, however, it would appear that the possibility of the combination occurred in only 8, namely, Cases i, ii, iv, vi, vii, viii, x, and xxiii. In Case i the tuberculosis was old, in Case ii tubercle bacilli could not be demonstrated in the granulomata described, in Case iv giant cells and caseation were quite absent, and no mention is made of tubercle bacilli. In Case vi fresh tubercles were present, some round the tumour, and a small tuberculous ulcer was present in the intestine; again no microscopic evidence is given of the presence of tubercle bacilli in the tissues. In Case vii giant cells and caseation were found; tubercle bacilli, however, are not mentioned. In Case viii giant cells were found in section of tuberculous pleurisy, but again no evidence of bacilli. Case x is important as being the first reported case met with in which giant cells and tubercle bacilli were demonstrated microscopically; in this case the cancer obstructed a bronchus and tubercles were present at the apex of the right lung; the patient was 54 years of age. In Case xxiii the evidence is very slight; tuberculous granulomata were present in the liver, but the other granulomata were cancerous; tubercle bacilli were not reported. Kurt Wolf goes so far as to say that he considered that in 8 of the cases of combined disease, the tuberculosis was the cause of the cancer. He calls attention to the fact that in more recent years cases have been reported (reference not given) in which cancer and tubercle have been present together in the same individual and even the same organ, but he does not say whether in such cases the tuberculous disease was active or not.

In support of his view that tuberculosis is the basis often for the development of cancer, he quotes the growth of cancer in a chronic tuberculous ulcer of the leg. He admits that the occurrence of primary cancer in a lung in which there is progressive tuberculosis is very rare; unfortunately he does not give the reference to these cases. In answer to the question how to account for the rarity of the development of cancer in a tuberculous cavity, he gives an explanation that does not seem quite satisfactory, for he says the cancer could only arise in those cases in which the tuberculous disease has not yet destroyed all the epithelium in the neighbourhood of the cavity. Pepper and Stengel¹⁶ do not report any cases of the above combination of tuberculous and malignant disease in any of their cases. Pässler¹⁷ reports four cases of malignant disease of the lung; in the third case cancer developed in a lung the seat of some old caseating tuberculous disease, but there is no mention of the discovery of tubercle bacilli. He also gives a brief account of 70 other cases drawn from former reports, and in only one of these, the fifty-third, a case of cancer of the bronchus, sections of the lung showed multinucleated cells. Kasem-Beck¹⁸ reports 2 cases of primary cancer of the lung, but tubercles were not present in either; he reiterates the statement made by Kurt Wolf of the occurrence of tuberculosis in 13 out of the 31 cases reported by the latter. Dr. Kingston Fowler¹⁹ found tuberculosis twice in 30 cases of malignant disease of the lung. Weismayr's²⁰ third case showed carcinoma of the peritoneum and pleura, and obsolete tubercle at the apex of one lung; no tubercle bacilli are reported.

CONCLUSION.

So far as can be gathered from the appended literature, the number of cases of progressive tubercle of the lung occurring in association with any form of malignant growth of the lung is very small—that is, if the absolute evidence of the presence of tubercle bacilli in the tissues is relied upon. The nodules present in the lung of the case above described were very suggestive of a tuberculous origin; the Ziehl-Neelsen method was applied merely as corroborative evidence with the negative result above stated.

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SEQUEL TO A CASE OF PULMONARY HYPERTROPHIC OSTEO-ARTHROPATHY : NECROPSY.

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IN THE BRITISH MEDICAL JOURNAL of February 8th, 1896, and in the *St. Thomas's Hospital Reports*, vol. xxiv, Dr. Rufenacht Walters published a full clinical report of a patient, J. M., under his care at the North London Consumption Hospital, who was suffering from a typical form of pulmonary hypertrophic osteo-arthropathy. The report was accompanied, in the first reference, by a photograph of the patient, and, in the second reference, by a skiagraph of one of his hands. It will suffice, therefore, to say that the man was an umbrella maker, aged 34, with a chronic form of lung disease, with the characteristic deformities of the upper and lower extremities and with a kyphosis of the upper dorsal vertebrae which was rightly judged by Dr. Walters, as the sequel proved, to be the result of a quiescent spinal caries.

J. M. was transferred from the North London Consumption Hospital on July 31st, 1899, and admitted into the National Hospital for the Paralysed and Epileptic under the care of Dr. Hughlings Jackson, to whom I am indebted for permission to publish these notes.

For six months previous to this date he had been losing power in his legs, and the paralysis had been preceded by acute pain in the region of the angular spinal curvature. He stated that he had been coughing up increasing quantities of sputum for three years.

On admission the man was found to be rather emaciated, and much troubled by a distressing cough and the expectoration of considerable quantities of thick purulent sputum. The lower extremities were paretic and rigidly flexed at the knee and hip-joints. Considerable impairment of sensation was present from the level of the umbilicus downwards. Delayed micturition and obstinate constipation had been noticed for some months. The arms and legs presented the deformities described by Dr. Walters, only in a more marked degree, and a skiagraph of one hand showed a striking resemblance to the one taken three years previously. There was no oedema of the feet. The physical signs in the lungs varied from day to day, but there was a permanent impairment of percussion resonance at both bases, with numerous bubbling *râles* heard on auscultation. The heart showed no signs of organic disease, and the liver and spleen were not enlarged.

On October 2nd, 1899, it was noted that the patient had become markedly dyspnoeic, with cyanosis from time to time.

On October 7th the heart had become feeble and irregular, and on October 9th the patient died of gradual cardiac failure.

Dr. F. E. Batten, who performed the necropsy, has kindly supplied me with the following report of the macroscopical condition:

Body fairly well nourished. Marked curvature at level of third and fourth dorsal vertebrae. Enlarged ankle and wrist-joints; clubbed fingers with incurved nails; first finger of right hand partly absent. Skull considerably thicker than normal, and bone very hard and dense; otherwise no abnormality.

Brain: A good deal of oedema over surface and in substance. The convolutions appeared natural, and the vessels and nerves at the base normal. The pituitary body was soft on removal; a little pus-like material