

HODENPYL (E.)

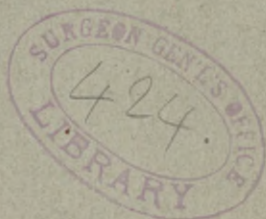
# ACTIONOMYCOSIS OF THE LUNG

BEING THE JOSEPH MATHER SMITH PRIZE  
ESSAY FOR 1890

BY

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*Reprinted from the* MEDICAL RECORD, *December 13, 1890*

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NEW YORK  
TROW'S PRINTING AND BOOKBINDING CO.

201-213 EAST TWELFTH STREET

1890





# ACTINOMYCOSIS OF THE LUNG.

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IN 1878 J. Israel showed that actinomycosis, first described in animals by Porroncito, in 1875, also occurred in man; and it was early shown to be due to the presence of actinomycis, or the "ray fungus." Since that time upward of three hundred cases have been reported, and actinomycis has been given a provisional place in our present classification of the bacteria. It has several times been isolated, grown on artificial culture media, successfully inoculated into animals, and, in fact, is now definitely proven to be the cause, and the only cause, of the disease.

The disease is wide-spread, having been observed in almost all parts of the world, although the greater number of the cases have been in certain parts of Germany, Russia, and Austria. But few cases, comparatively, have thus far been recognized in this country. So large a number of cases have been seen during the past two years, it would seem as if the disease were actually on the increase; or, as is more probable, with the more wide-spread knowledge among physicians of the malady, it is more frequently recognized. Actinomycosis, in man, has been observed in almost every organ and every tissue of the body; although, as is also the case in animals, the disease more commonly affects, primarily, the regions about the jaws. Rutimeyer estimates that about fifty per cent. of all cases are of this class, in twenty per cent. the lungs, and in fifteen per cent. the gastro-intestinal tract are the parts first involved.

For the following two cases I am indebted to Drs. F. Delafield, and Charles McBurney.

CASE I.—S. O——, aged eighteen, female, native of Sweden. Admitted into Roosevelt Hospital. For past six months has not felt well. For three weeks previous to admission has suffered from pain over the right side. Dyspnoea, severe cough with profuse fetid expectoration, fever, night-sweats. On admission, patient pale and emaciated; pulse, 104; respiration, 32; temperature, 98° F.

**Physical Examination.**—Over the right side of the chest, from the spine of the scapula to one inch above the angle, dullness, thence downward, flatness. Over the dull area bronchial voice, breathing, and whisper; over the flat area diminished breathing and distant voice. Vocal fremitus less marked than on the left side. Over the left side exaggerated breathing and distant voice, with a few subcrepitant râles. The dullness over the right side gradually extended to the apex, so that the lung became completely consolidated. Patient complained of constant pain over this side, which was also painful on pressure. The cough, with offensive expectoration (not examined microscopically), continued. The fever was constant but irregular, and was accompanied by attacks of sweating. An area of redness, swelling, and fluctuation formed over the right side, just below the costal border, which was incised, and about one pint of pus evacuated. The patient gradually grew worse, and finally died, exhausted, about five months after the commencement of the disease.

*Autopsy*, by Dr. Delafield. Left lung very large and œdematous. There is some diffuse hepatization over the upper part of both lobes. Right lung completely adherent to the chest-wall. Bronchi contain pus. Lung completely consolidated, with thickening of the connective tissue, and a very general broncho-pneumonia.

The lung is of fair size; no part of it is gangrenous. There is a small collection of pus shut in behind the posterior aspect of the right lower lobe, just above the diaphragm, and communicating with the abscess in the back. There is a suppurating sinus behind the lung, between the pulmonary and costal pleuræ, running up along the vertebral column; and behind, the ribs and vertebræ are eroded. The lung emitted a peculiar fetid odor, similar to that which had previously been noticed in the sputum. The other organs showed no gross lesions. On account of the fetid odor, and the absence of gangrene, or other distinctive features in the lung, it was suspected that the case was one of actinomycosis.

**Microscopical Examination.**—By a variety of inflammatory processes the lung has become profoundly altered. The larger bronchi show intense bronchitis. In the medium-sized bronchi, besides inflammation, there is well-marked dilatation of some. In others there is further

added a growth, into their lumina, of organized connective tissue containing blood-vessels (see Fig. 1). Although growths of organized connective tissue into the lumina of the air-vesicles are not infrequently seen, similar growths in the bronchi, especially in those of considerable size, have not, so far as I know, been described. The walls of the bronchi are infiltrated with pus-cells, and the surrounding air-vesicles are hepatized, or are the seat of interstitial pneumonia.

The smaller bronchi are very generally converted into little abscesses, and frequently, imbedded in these pus-foci, actinomyces are found, usually surrounded by a zone of necrosed cells. While some stain diffusely and with difficulty, and are of a homogeneous or finely granular character, even sometimes calcified; others show fairly well radiation, and with the Gram method the usual hair-like threads of the bacterium. None of the clusters, when examined in water or glycerine, show the usual club-shaped extremities to the threads.

Scattered about the lung, and making up about one-third its entire bulk, are patches of dense fibrous tissue, in which no trace of the former structure is preserved. In other parts are seen various phases and combinations of simple hepatization, with interstitial and intra-alveolar (organized connective tissue) pneumonia. In places the air-vesicles are filled with desquamated epithelium, pus-cells, and fibrin. In other places, either with or without exudation, the walls of the air-vesicles are thickened, and growing into the lumina of some of them are growths of organized connective tissue. Here, as is sometimes observed in these intra-alveolar growths, the cells covering them and lining the air-vesicles and air-passages are of a cuboidal shape. That is, they have reverted to their foetal type. The blood-vessels generally are the seat of arteritis, with thickening of their walls.

CASE II.—J. F.—, aged thirteen, school-girl. Patient was perfectly healthy up to three months ago, when she had an attack of broncho-pneumonia from which she never entirely recovered, but has continued to cough until the present time. Six weeks ago she noticed a painful swelling over the right shoulder-blade, which has gradually increased in size. On admission into Roosevelt Hospital the swelling over the scapula measured six by four inches. It was incised, and a considerable quantity of pus and necrotic tissue was evacuated. The cough, which was accompanied by considerable expectoration, gradually increased in severity. Shortly before death an abscess formed in the right axilla, which was evacuated. Death took place about four months after the commencement of the disease.

*Autopsy.*—Left lung, a few old adhesions and some fresh fibrin on the pleura. There was broncho-pneumonia of the lower lobe.

Right lung completely adherent to the chest-wall, except over a small part of the lower lobe. Pulmonary pleura over the upper lobe is very much thickened. The bronchi are congested and their walls thickened. There are small zones of peri-bronchitic pneumonia in the upper and lower lobes. The upper lobe is small, and bands of fibrous tissue run into it from the pleura. The bronchial glands are enlarged, but not cheesy. The first, second, and third ribs are eroded.

The other organs showed no gross lesions.

Microscopical examination showed almost the same minute lesions as has been described in Case I., except that in this case they were developed to a lesser degree. The bronchi contained large numbers of actinomycetes.

**Summary of Symptoms and Lesions in Pulmonary Actinomycosis.**—I have found records of thirty-four cases of the disease, including the two just described. Mossburger, Baumgarten, Eichwald, Ullmann, Mossdorf-Birch Hirschfeld, Koschlakow, Munch, Canali, Petroff, Weigert, König, Conti, Rotter, Paltauf, Wildermuth, Wolff, each a single case; while 5 are by J. Israel; Ponfick, 2; Jakimovitsch, 2; Golubrim, 2; Braun, 3; and Szemasy, 2.

Of these, fourteen include a description of the autopsy. The following summary of the symptoms, lesions, treatment, and certain points in diagnosis, is based upon these cases.

Pulmonary actinomycosis may be defined as a chronic, infectious disease of the lung depending upon the presence of actinomycetes. It may further be characterized as being attended with fever, cough with more or less profuse, often fetid, expectoration, pain in the affected side, progressive emaciation, a well-marked tendency to the secondary involvement of adjacent parts, and to the formation of secondary abscesses (actinomycotic) elsewhere. It generally terminates fatally.

As a rule, and perhaps in all cases, the living germ is first taken into the bronchi, and from thence gains access to the parenchyma of the lung.

The ages of the patients varied from nine to sixty-three years; although the majority of the cases were in young adults, and a somewhat larger proportion were in males than in females.

Fever was present in nearly all cases. Usually it was one of the first symptoms, but sometimes it did not come on until later in the course of the disease; it was constant, but of an irregular type, and seemed dependent



FIG. 1.—A Medium-sized Bronchus, Showing an Ingrowth of Organized Connective Tissue.

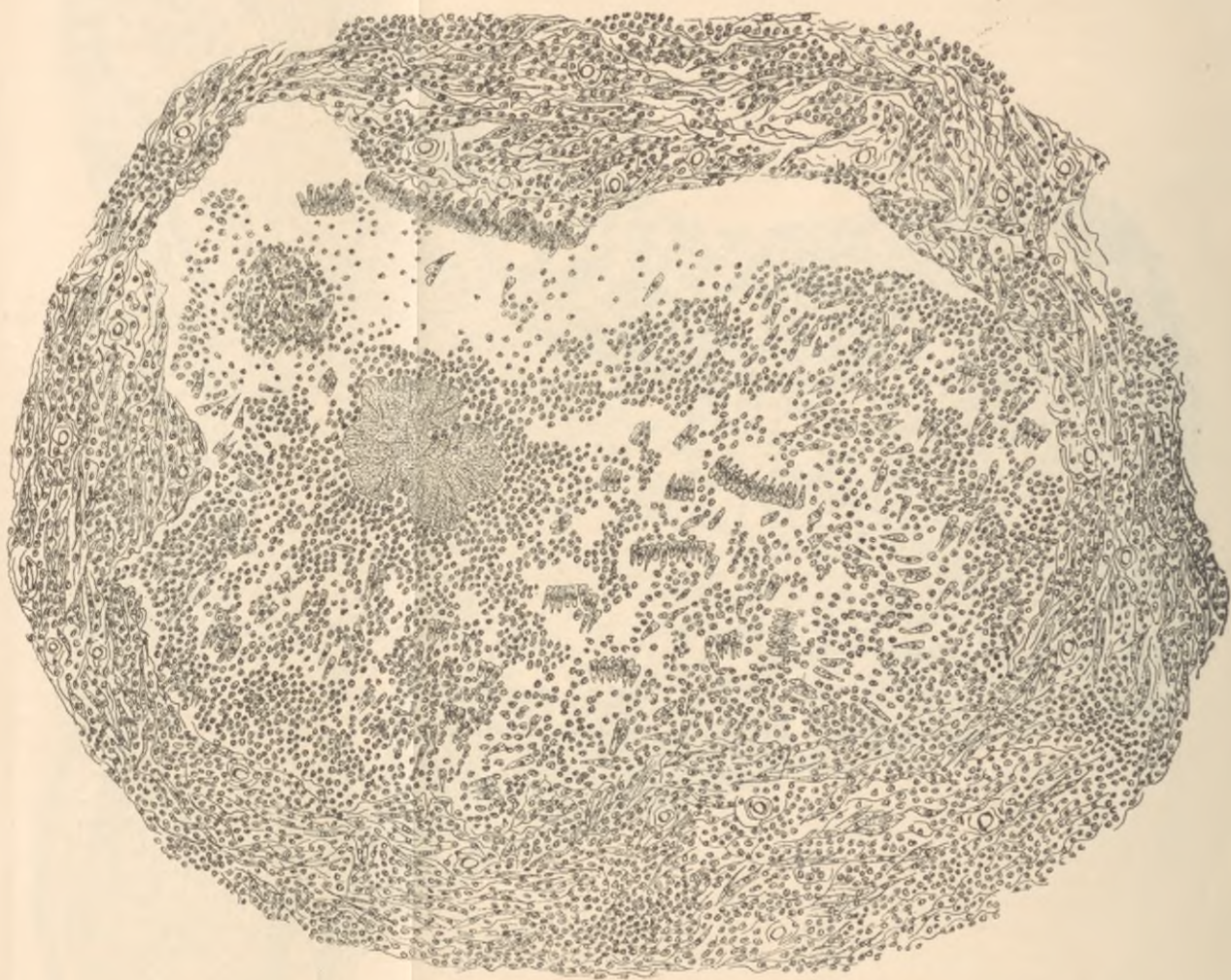


FIG. 2.—A Smaller Disorganized Bronchus Containing a Cluster of Actinomycetes.

upon the extent and nature of the lesions, and later by the development of pus-forming centres.

**Cough and Expectoration.**—Of special importance, and usually the first symptom to be complained of, is cough. It lasts throughout, generally becoming more and more severe. The expectoration varies a good deal, according to the severity of the cough. It was profuse in many cases, often spoken of as fetid, occasionally bloody, and sometimes contained actinomycetes.

In Canali's unique case, that of a girl who suffered for a considerable time from bronchitis, the only symptoms were cough, with profuse fetid expectoration containing actinomycetes. The patient, who greatly improved during the summer months, continued without additional symptoms for several years, until she finally passed from observation.

Pain over the affected side was present in all but the above-mentioned case, and was as a rule constant and severe.

Attacks of sweating were mentioned in several cases.

Hæmoptyses were not observed, although the sputum was sometimes tinged with blood.

Emaciation was gradual, and often became extreme; sometimes the patient passed into the so-called "typhoid state;" or, as happened in many, other organs became involved, or extensive abscesses formed beneath the skin which, opening externally, left fistulæ into the lung. As a result of the excessive production of pus, a condition described as chronic pyæmia, and attended with chills, sometimes ensued.

Physical signs were very variable, according to the condition of the lung in the different cases. There were always signs of bronchitis, usually of consolidation, sometimes of cavities, or of empyema.

**Duration.**—The average duration was ten months; the shortest case lasted four months, and the longest was still living after a duration of several years.

**Prognosis.**—Of the thirty-four cases all have died except two. Canali's case, already referred to, was lost sight of; and Soltmann's case was pronounced cured (?) after four years.

**Diagnosis.**—In eighteen cases the disease was positively diagnosed during life by the detection of actinomycetes. In nine cases they were found in the sputum, in the cases of Israel, Canali, Braun, Jakimovitsch, Affanassiew, and Shultz, two, Matschiuski, Kirschew, and Eichwald. The remaining nine cases were diagnosed on finding the bacterium in pus obtained from abscesses which communicated with the lung.

In the cases in which the diagnosis was not made, no

mention was made of the sputum being examined ; moreover, we are not informed, in the nine cases in which the sputum showed actinomyces, at which period of the disease they first made their appearance. We are, therefore, not in a position at present to determine the earliest time during the course of the disease when we may reasonably expect to find the germ in the sputum of pulmonary actinomycosis. From the fact that the bacterium has been found in sputum in large numbers, and also that it is commonly found in the bronchi after death, it is to be presumed that actinomyces are likely to be contained in the sputum during life, although in certain instances, possibly, not until the disease is considerably advanced. Inasmuch as actinomyces are the only positive evidence of actinomycosis ; and since the disease in the lung may often resemble, clinically, certain forms of pulmonary tuberculosis ; and further, since it may be of more frequent occurrence than is at present generally supposed ; it is advisable, in the routine examinations of sputa for tubercle bacilli, to further determine the presence of actinomyces.

As found in abscesses, or when seen imbedded in the tissues, actinomyces present such characteristic appearances, microscopically, as are not to be easily mistaken. But sputum may contain certain other bodies so closely resembling the "ray fungus" that careful observation is required in order to distinguish between them. In his original monograph, J. Israel, and later Affanassiew, described masses of leptothrix as closely simulating actinomyces. Bizzozero ("Manual Clinical Microscopy," p. 141, Paris, 1885) calls attention to certain degenerated epithelial cells ; and, more recently, Loesch (Congress of Russian Physicians, St. Petersburg, 1889) to collections of leucin crystals as also liable to be mistaken for actinomyces. Although not generally mentioned in text-books on clinical microscopy, this resemblance of various structures to the "ray fungus" is of important practical value in the examination of sputum. Leptothrix threads may grow about the summits of the papillæ of the mouth, in a radiating manner, and these masses, becoming detached and mixed with the sputa, form the masses, somewhat resembling the bacterium of actinomycosis, and have therefore been called "false actinomyces." They are to be differentiated by the presence of epithelial cells about their centres, the absence of club-shaped extremities to the radiating threads, and by the thicker, coarser rods of leptothrix compared with the delicate hair-like threads of actinomyces.

Fetid expectoration is a common symptom, and is of some diagnostic importance. It was not present in all

cases, nor is it confined to this disease ; but it is of sufficient importance when present to suggest microscopical examination of the sputum.

**Treatment.**—Thus far treatment has been purely symptomatic, except in one case where operative measures were resorted to, apparently with the result of prolonging the life of the patient. It is to be remembered, however, in explanation of the present unsatisfactory results of treatment, that in many of the cases the diagnosis was not made during life, or not until late in the course of the disease, and that most of the cases were of hospital patients ; consequently the treatment instituted was of necessity under unfavorable circumstances. When we recall the remarkable results being obtained from the climatic treatment of pulmonary tuberculosis, and also the facts that actinomyces withstand the action of even comparatively weak antiseptics with difficulty, and also that they seem prone to die in the tissues, and to undergo absorption or calcification, we may confidently hope that the immediate removal of the patient to a more suitable climate, together with an intelligent application of antiseptics to the bronchial mucous membrane, may give better results than have thus far been obtained. There seems to be no evidence to show that the disease may be transmitted from one person to another, although Afanassiew saw two children of the same family who were both suffering from the disease at the same time.

**Pathology.**—The lesions are, as a rule, unilateral in about the proportion of 3 to 1, or the lungs may be affected unequally.

They may be classified into three groups.

1. There are the lesions of chronic general bronchitis, the germ being found in the sputum, as illustrated by Canali's case. Such a variety is based solely on clinical grounds, as no opportunity has thus far been had of demonstrating such a condition post mortem.

2. Scattered throughout the lung are large numbers of small dense nodules looking like miliary tubercles to the naked eye. There is no hepatization, and such a lung resembles very closely the gross appearances of acute miliary tuberculosis. On microscopical examination the nodules are composed of clusters of actinomyces surrounded by a zone of granulation-tissue. Munch has seen such a condition in the lung of an ox, no example of this group having been seen in the human cases.

3. Comprises most of the cases of which the author's are examples. The cases vary as to the extent of lung involved. In one it was confined to the apex of the right lung. In the others the whole of the lung was involved. The affected lung was normal, or diminished

in size. Pulmonary and costal pleuræ were firmly adherent. There was intense bronchitis of the larger bronchi, and a general broncho-pneumonia, more or less diffuse hepatization, and a well-marked thickening of the connective tissue (interstitial pneumonia). Although not in essential relation to the disease, large numbers of staphylococcus pyogenes aureus and streptococcus pyogenes were found in the lungs, resulting in abscesses, usually of small size, but sometimes sufficiently large to form cavities, which were diagnosticated during life. In certain parts of the body Böstion has shown that actinomyces may develop without the presence of pus. In the lungs the production of pus was an important feature of the cases. Actinomyces were found in the bronchi, broncho-pneumonic nodules, the abscesses, or sometimes in the air-vesicles.

**Secondary lesions** may develop in almost any part of the body. In all of the autopsies were found secondary lesions. Most frequently pus formed in the pleural cavity, usually sacculated; the ribs, sternum, or vertebræ were eroded, and abscesses beneath the skin adjacent developed; or the pericardium, heart, or opposite lung became involved; or the disease extended to the abdominal organs; or, as in a single case, to the brain. In one case the specific growth penetrated the portal vein, and metastases all over the body were formed; and in another case the vertebræ became so greatly eroded as to cause marked deformity, so that the case was mistaken for one of Pott's disease,

In many cases there was developed amyloid degeneration of the organs.

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