Observations

on a case of

Actinomycosis.

By

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Observations on a case of Actinomycosis

I have selected for my thesis the subject of Actinomycosis in human beings, giving my remarks upon a case which has recently come under my observation. In order that the paper may be the more easily read I have divided it into the following heads.

1. Case of Actinomycosis of the Lower Jaw.
2. Remarks on the Character and Progress of this case.
3. A brief review of our present knowledge of the disease.
4. General Conclusions.

Case of Actinomycosis of the Lower Jaw

In the beginning of March 1901 an anaemic girl aged 17 consulted me in reference to a swelling on the right side of the lower jaw. On examination I found this to be a semifluctuant tumour, resembling an ordinary alveolar abscess (though without the continuous aching pain usually associated with that condition) surrounding a decayed second molar tooth. There was no rise of temperature and no evidence of adjacent glandular enlargement. I incised the swelling and some watery pus escaped. The muscles of the jaw, at this time, were somewhat affected with spasm.

As she was at the same time, suffering from slight digestive disturbance, I prescribed ℞

Sulphocarb. Sodii ℥iii
Mist. Bismuthi Co ℥i
Aq: Chlorof: ℥vi
m

Sig
℥ss ter in die, post cibos
ex aqua

followed by a mild saline in the morning. Her diet was regulated and she was ordered as much outdoor exercise as possible, without producing fatigue. Under these

conditions her dyspeptic symptoms disappeared. I then order-ed her the following, ℞

Liq: Arsenicalis m. XXIV
Ferri. Ammon. Cit: ʒij
Glycerine ʒj
Aq: Chlorof: ʒvi
Sig ʒj ter in die, post cibos, in aqua,

and Cod liver oil, in the form of Oppenheimers Malt Extract was taken at bedtime.

On March 29th, as the swelling, in spite of the previous incision, had increased the tooth was extracted in order to give a free exit to the discharge. Nevertheless the swelling and induration still increased and eventually an abscess pointed through the skin of the face. This was opened without much pus escaping and was probed for dead bone without success. In a few days two other points, in close proximity to the incision, formed and burst leaving sinuses, surrounded by small granulations - but with very little inflammatory redness round them.

Soon after this the granulations round the mouths of the sinuses enlarged attaining a height of three quarters of an inch, and small round bodies, of a pale yellowish colour were noticed in the discharge and also adhering to the

dressings. Examination by the microscope proved these to be granules of Actinomycosis. The decayed tooth had apparently been the channel by which the fungus found entrance.

Having determined the disease with which I had to deal I adopted the following measures, namely:-

a. To build up the patients strength — appropriate nourishment, exercise and fresh air.

b. To eradicate the disease — incisions, scraping and the aid of various germicides.

c. To supplement these measures by internal remedies - in the form of Iodides, and owing to its highly diffusible qualities Potassium Iodide was selected. At first owing to the weak state of the stomach - only five grains were given three times a day, well diluted. This, as toleration of the drug was shown, was rapidly increased up to twenty grains, then to sixty grains and finally ninety grains daily.

The physiological effect on the granules very soon became apparent, in their gradual disappearance in a few days, leaving the entrances to the sinuses almost level with the surrounding skin. The discharge became thinner and the granules, as seen under the microscope much disintegrated; the ray-like "clubs", so characteristic of the disease,

Before Operation – [illegible]

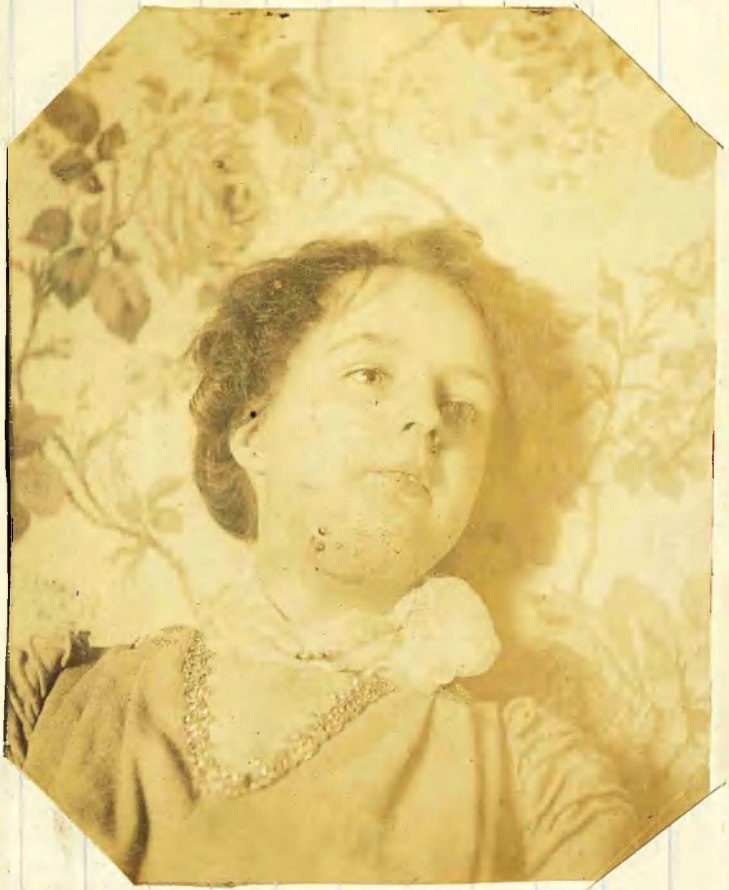
Three-quarter Face

Profile

April 19th 1901

Before Operation

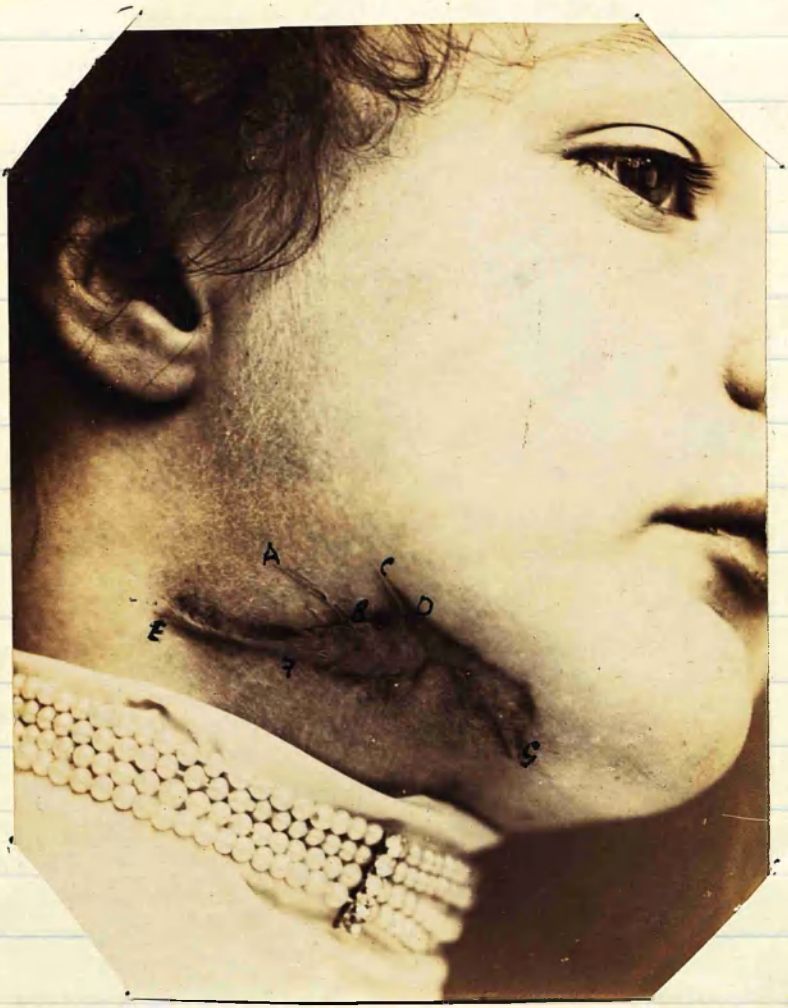
Three-quarter face



Profile

After Operation

27th Sept. 1901.



A–B – Third Operation, & first in which Rectified Spirit was used, showing linear scar.

C–D – Fourth Operation – Spirit also used in this, but thin pellicle, over abscess would not hold it.

9.-7. – First Operation & 7-E. Second Operation – both showing thickened cicatrix.

being less distended and in the course of a few days entirely disappearing.

On April 14th Mr. R. Godlee, University College Hospital was called in consultation and further operative measures for the radication of the disease were adopted. The appended photographs give some idea of the condition of the parts just before operation, which was performed on April 19th as follows:

An incision about two inches long, was made parallel to the lower border of the jaw and as far as the angle of it; when there was free bleeding from the cut surfaces. Digital examination of the abscess showed the diseased tissue, peculiarly soft and spongy, extending down to the bone on the inner side of the jaw, the periosteum being denuded to the extent of three quarters of an inch. Examination failed however, to reveal any communication of the abscess with the mouth, (the opening from which the pus escaped, after the inhalation of the broth, having closed). This is the more remarkable as showing that the disease did not follow the line of least resistance, as in most abscesses. The contents of the abscess, were pus, small granules and a peculiar brain like substance. The whole cavity and the denuded portion of bone, were thoroughly scraped with a sharp Volkmann's spoon, the affected

portions of skin cut away and after irrigation with hot water the cavity was swabbed out with pure carbolic acid, which was allowed to remain in undiluted for a few minutes; the wound was again flushed with hot water and packed with iodoform gauze.

The Potassium Iodide was discontinued for two days owing to digestive disturbance caused by the anaesthetic, which was used. The dressings were removed in three days, and the wound granulated and healed up. The Potassium Iodide was resumed starting with thirty grains and increasing up to ninety grains daily. About ten days after the healing there appeared a suspicious thickening at the posterior and inferior part of the cicatrix, and on May 14th, almost a month after the first operation, symptoms of the formation of pus reappeared. An abscess rapidly pointed and this was opened on May 16th and healed similarly to the previous one. It pursued a similar course and, as the wound was not so extensive, quickly healed.

On May 21st another indurated area, situated slightly above and posteriorly to the original incision, became apparent, and more pus rapidly developed. It was operated upon on May 24th and on this occasion I used ordinary Rectified Spirits, in the following manner, as likely to be more penetrating:-

A small trocar and canula were inserted into the abscess

cavity and the pus squeezed out; the spirit was then injected through the cannula under pressure, so that the entire cavity was filled up equally in all directions, the spirit penetrating the burrows and soaking into the deposit at the margins of the abscess. The spirit was left in for ten minutes and the abscess was then freely opened and thoroughly scraped and swabbed with pure carbolic acid and dressed as before. By June 4th the wound was completely healed, leaving no thickening around and only a linear scar. This was probably due to the direct effect of the spirit application together with the physiological action of the Iodides.

I sent some pus from this abscess to Professor R. Muir, Glasgow University, who reported upon it as follows:-

"I have examined the pus which you sent me and have found granules of Actinomycosis. They are in a comparatively early stage and are almost entirely composed of filaments. I have not seen any clubs"

For several days after this last operation the patient did not feel well and thinking, perhaps, that such large doses of the Iodide were not agreeing, I reduced the dose to forty-five grains per diem. As she continued to feel low and dispirited, with loss of appetite, I changed the Potassium

for the Sodium salt with a vegetable bitter. This latter salt was given in doses of seven grains thrice daily, in water, and increased to fifteen grains thrice daily; this was continued for the next three weeks with good results. However, the Potassium salt was again resumed, starting with twenty-grains and increasing to thirty-grains per in die. Things seemed going on well until July 21st when a small dark coloured vesicle appeared over the scar of the first operation. It contained grumous looking matter, in which granules of actinomycosis were afterwards found. These granules were less numerous, much smaller in size and more disintegrated. I determined, on July 23rd, to inject spirit again, but the thin pellicle on the surface of the scar would not hold it and pus and spirit, at once came out. Probing showed a cavity extending to the bone, in the site of the first abscess. I incised this freely, thoroughly scraped the cavity, paying particular attention to the condition of the bone, as the probable seat of the disease. The cavity was filled with spirit, which was left to soak into the tissues for some minutes. The wound was then treated, as before, with pure carbolic acid. There

was a good deal of serous discharge for some days afterwards, however this, in no wise hindred the healing, which was complete on August 14th, when all dressings were discontinued. The patient, during convalescence continued to take the 3ij of Potassium Iodide per diem. The general health now considerably improved, the anaemia being less, and there being a distinct gain of flesh. It is interesting to note that never at any time was there any rise of temperature during the whole course of the disease.

30th September, there is no sign of the disease returning, the Potassium Iodide is still administred as a precautionary measure.

Remarks on the Character and Progress of this Case.

In a general review of the subject based on such a case as I have above described some points stand out for special remark, namely.

a) The insidious onset and Character of Actinomycosis.

It shows how careful one should be in giving an opinion in the early stages of such a case, and that the possibility of actinomycosis simulating an ordinary alveolar abscess should always be kept in view.

b) The difficulty of early diagnosis.

This is impossible until the granules in the pus or expectoration are seen. Even if possible to get pus or expectoration

in an early stage of the disease then much of the difficulty would be removed.

c) The uncertainty of complete eradication of the disease, even after apparently successful treatment.

It also teaches one not to regard the disease as eradicated until a lengthened period has elapsed from the date of supposed cure, as shown in the following table of operations in the case.

The first operation on the jaw abscess was performed on April 19th
The second " May 16th.
The third " May 24th.
The fourth " July 23rd.

Although the diseased parts were not of very great extent, yet after each operation recrudescence occured after a time - sometimes shorter, sometimes longer.

d) The relative values of internal remedies

As in Syphilis, so in Actinomycosis, Potassium Iodide has an undoubted specific action, and in both diseases is extremely well tolerated even when well pushed. The following effects were noticed after its administration:-

1. The discharge became more profuse but much thinner.
2. The granulations round the mouths of the sinuses disappeared, while the openings became level with the sur-

1. Dr. Pringle – Med: chir: Trans: London Vol 78 P: 34.

Dr. Barton – Pathol: Soc: London. 1889

Dr. Farrweather – Brit. Med: Journal June 1896

2. Royal Med Chir: Soc: Trans: London June 1882

surrounding skin.[1] This has also been noted by other observers.

3) a decrease took place in the number and size of the granules and an alteration in their colour, from a yellow to a whitish tint, and under the microscope the density of the circumference of each granule was found to be diminished.

4) a disappearance of the "clubs" after two or three days.

All this is, I think, interesting and important as pointing to a steady diminution in the vitality of the actinomycotic fungus, when Potassium Iodide is administered by the mouth, and the drug should, I consider, be administered and pushed as far as toleration will allow. The Sodium Iodide has a less depressing effect than the Potassium salt, and may be used in its stead, more especially if there should be much gastric disturbance.[2] The respective effects of the two salts is confirmed by experiments on the ventricle of the frog's heart, showing that the Potassium is about fourteen times more poisonous than the Sodium compounds. The Iodides seem to have a strong action in resolving the chronic inflammatory tissue, perhaps by causing absorption or disintegration, and thus robbing the fungus of its food. At the same time I cannot but regard the action of the Iodides in actinomycosis as more or less directly that of a germicide.

1. Eustace - Case of Testicle - British Med: Journal Dec. 1899

2. Giordano - " - Uterus - Vaginal hysterectomy - La Clinica Chir. June 1895

3. Macarthur - Mammary Gland - Chicago Gynecology 1897.

5) The value of operative procedure with external Applications

When operative measures can readily be employed in actinomycosis it is always in favour of the patient. By incising and scraping much of the disease can be removed, but as was shown in my case, perhaps, not all or entirely, even after three operations. This is explained by the minute ramifications of the fungus so that no curette can reach every end of the burrows. Excision, certainly, would be the radical cure, but is seldom practicable, where, however complete excision is impossible, then incision and scraping, with injections of rectified spirit, and concurrently the free internal use of Potassium Iodide, should be at once resorted to, with good prospects of success.

Judging from effects washing out the abscess cavity with rectified spirits is of great value. Carbolic acid when tried, not having the diffusibility of rectified spirits did not penetrate the very minute burrows, and consequently did not apparently reach all the diseased parts. In the two operations, already described, there was no relapse of the fungus when the spirit was used, but it recrudesced when Carbolic acid only had been used.

1. Krauen – Wiener und Wock. No 18. 1898.

2. E. Briau – Lyon Med Trau: Jau: 24 1897: b Fautino – Rif: Med: April 1898

3 My own case.

A brief review of our present knowledge of the Disease

Actinomycosis is a parasitic disease frequently found in cattle, and known as "Lump-jaw;" but it may also occur in swine and horses, and a good many cases have been reported in man.

The life-history of the organism is still little. Lau-genbeck (1845) and Lebert (1857), were the first to describe its fungus-granules, but Bollinger was the first to prove the connection of the so-called ray fungus with the disease in cattle.

Israel of Berlin, 1878, described a similar disease in man, which has since been recognised under the name of Actinomycosis. Ponfick of Breslau demonstrated Actinomyces in infection in man, and first placed the disease upon a firm clinical and pathological basis. By 1892 Illick of Vienna had collected four hundred and twenty-one cases in man, but it is by no means a common disease, although it cannot be called a rare one.

It may at an early stage appear as an ulcer, or as growing with Cancrum, - when the Temporo-maxillary region is affected - or as tumour, and when as the latter it is most like a Tubercular or Syphilitic deposit. The tumour is rounded in shape, of a

1. Delpine – Trans: Pathol: Soc: London 1889

2. Podlee – Lancet – January 1901

3. Zeit. f. Hyg u Infekt. Vol xxix p 94. 1898

Kanthack – Path: Soc: Trans: 1894 – describes a form of "Bacillus Actinomycosis".

yellowish colour, very vascular and may have several ramifications containing pus. Nothing seems to turn its course aside, as it invades every structure with which it comes in contact. It may burrow in any direction, causing abscesses in solid organs, spreading in bones and making communications between hollow viscera. The skin itself is not exempt, and it may sometimes be carried to different parts of the body as "embolic phycomia" In fact, once having gained an entrance to the body no part is safe from its ravages.

The natural history of the fungus is uncertain, as it is very difficult to classify and decide whether its varying forms belong to one or more species.[2] "It has been suggested that Tuberculosis and actinomycosis spring from the same plant. This should be considered when both are found clinically associated." According to Bersteff[3] there are two forms - the typical and the atypical - the former having the characteristic mycelial masses with club shaped radiations, while the latter includes such diseases as Nocards' 'farcin de boeuf' and infections which clinically and anatomically resemble actinomycosis, and are caused by branching mycelial organisms which correspond quite closely to the cultural peculiar-

ities of the Streptothrix actinomycosis, but fail to produce the characteristic granules or tissue.

Clinical Appearances of the Disease.

The first appearance of the fungus clinically is in yellowish granules, usually disseminated in the pus of an abscess, or in expectoration. These appear as small rounded bodies of varying size and colours, either of a pale yellow, white or greenish or almost black, or even transparent and jelly-like. They readily adhere to the edges of a wound or to dressings and can be easily picked off; the simplest way to demonstrate their presence is to spread some of the suspected discharge on a slide and hold it up to the light.

If glycerine or water be added to the discharge and a coverglass gently pressed over it, microscopical examination shows a number of small rounded masses adherent together, yellowish at the border, and somewhat lighter in the centre. Under a high power rosettes of clubs are also seen, radiating from a common centre (hence, the name, Ray fungus). While loose ones of different sizes may also be seen round the circumference, and in the centre thread-like mycelium, consisting of extremely delicate branched fibres, with sometimes transverse markings, likening them to cocci; and sometimes with knobs at the ends of the filaments,

A.
Professor A.C. Sullivan. Royal Acad: Med Ireland. March 1900.

1. New York Medical Town: May 26 1900.

2. a) International Book of Surgery.
b) Apassieff and Schultz – Munchener Med: Woch June 1889
c) Francis Harbitz – Norsk. Mag: f. Lageird. Vol: LIX p 1. 1898.

differentiating them from Favus mycelium which is composed of wide branching threads and spores
In the case under my own observation there was only a few clubs found at the commencement of the disease, but in some cases none are discernable at all.
Hektöen says "that the Tubercular Bacillus and Diphtheric Bacillus assume branching forms sometimes, but that the occurence is so rare, that while demonstrating a certain degree of relationship, particularly of the Tubercular Bacillus & the Ray fungus, it does not, as yet, form a basis of ultimate classification." He argues, however, with Flugge, that the usual designation, Bacillus and Bacteria, are not adequate to represent the situation correctly and scientifically.
Cultivation is, it appears, very difficult. If grown at the ordinary temperature of a room (65°) the growth is very slow. The best plan is to break up portions of tissue and place the spores on glycerine-agar in some place having the temperature of the body. In two or three days colonies will appear as small transparent drops, which gradually enlarge, forming rounded elevations of a reddish colour. On gelatine, whole spherical colonies appear, followed by very slow liquefaction, the liquified result being brownish and

1. Godlee – Lancet, January, 1901

and thick, with colonies at the bottom like little beads. The growth on potatoe is similar to that upon agar. If these beads or cocci, are transplanted to other media they branch out into a mass of threads or mycelium.

"The clubs are seldom produced by artificial means, and it is held that they are only produced when the organism is grown under difficulties."

Dr T. J. Bingle, Middlesex Hospital, showed that the disease flourished on gelatine containing one per cent of Potassium Iodide.

It is more than probable that the fungus spreads by a filament or part of one, separating from a larger colony, working into the tissues in the neighbourhood and thus forming a fresh starting point for new centres of infection.

The presence of these granules gives rise to irritation and to proliferation in the surrounding tissues, which develops in the formation of giant cells, the deposit of leukocytes, and increase of the fixed tissue cells. The diseased mass consequently soon becomes surrounded by layers of granulation tissue; and by contraction of such newly formed connective tissue the life of the parasite may actually be cut short by pressure. The granular masses lie close together, as a rule, and by joining cause indurations;

[1] Archiv f. Derm u Syphilis. Bd 38 Heft 2. 1896

while the more diffuse the disease, the greater the extent of induration. Degenerative changes occuring in the diseased mass; purulent material forms, which may be taken up and carried into different parts of the body as "embolic pyaemia".

If a bone is attacked, it is eaten away round the disease, while that further away increases in thickness, through chronic inflammatory processes.

Israel holds strongly to the pyogenic powers of the fungus, while Eppinger and Bostroem argue that the acute inflammation set up soon becomes a chronic process of a reactive character, resulting in exudation followed by disintegration. Hobell thinks the same; but considers actinomycosis one of the forms of pseudo tuberculosis. Eschoff and Kozaki assert that the disease has a specific pyogenic power, and in support, allude to the metastasis usually associated with pus.

From the foregoing description of the diseased mass, induration, thickenings, and formation of pus may be expected - in any case, however, but little, in fact much less of these changes took place than would have been anticipated from the size of the original tumour or swelling.

*

Slater - British Med Journal Nov: 1899, holds that the ray-fungus is only found in animals & not in the vegetable kingdom at all.

1. Fairweather - British Medical Journal. June 1896

2 Beitrage Zur Patholog: Anat: und Zur Allgem 1890.

3. Fantino - Rif Med: April 1898.

Source of Infection:-

* Infected grain, especially barley, is said to be a source, and the spread is either direct by contact, or airborne or waterborne. Bertha mentions a case where the disease attacked the pharynx, in which an infected cereal grain was found lodged. [1] Patients have testified to their infection by chewing grains or grass; [2] and eleven post mortem cases are known in which parts of cereal grains have been found in the caecum &c. In my case, although there was no confession of grass or grain chewing, there was a distinct story of quantities of dried dates and uncooked foreign tomatoes having been eaten. The latter come from Valencia and the Canary Islands packed in buckwheat chaff, and it is possible that in this way the patient may have become infected through disease in chaff. The dates might also have been a medium, though there is no record of any case being traced to this source.

In the Leipzig Pathological Institute a case of Pulmonary Actinomycosis on examination revealed a suspected cereal grain in the lung - which was thought to have been inhaled. When the face or cervical parts are affected the fungus seems usually to gain admission through a decayed tooth, - [3] Yankind mentions the fact, that in seven

A. G. Dillsbury (case of act: in pharynx) – Revue de Laryng d'Otol et de Rhin. October 15 1895

1 Deutsche. Med: Woch: March 1894

2. was brought under his notice in March 1901.
Dr Bennett – case of cattleman with disease of Neck & Jaw. Roy. Acad: Med. Irel. (May 19

3. Wiener Med: Presse January 6 1889

4. British Med: Journ: January 1884.

facial cases, all had carious teeth,— Through the follicles of the tonsils or papillae of the tongue may also serve as sites for propagation. It further remains uncertain whether infected meat or milk can convey the disease- unless indeed there is an alternate stage in the devel--opment of the fungus, between its full evolution, and origin, in vegetable matter.—

It may spread through germ laden objects, as in, vaccine, tuberculosis, anthrax, plague, glanders, scarlet fever, lepe--rosy, etc by contact with cutaneous lesions; as has been proved by direct successful inoculation, by [1]Max Wolff and [2]Cruikshanks. It can be readily understood how the dressings may in this way become a means of spreading the ray-fungus. [3]R.T. Godlee, mentioned bone a case of actinomycosis in a dairy man who had handled a suspected animal. [4]Baracz records a case where the disease was transmitted from the bride--groom to the bride by kissing. [5]Ponfick failed, however, to directly inoculate dogs and rabbits with the fungus.

Sites of Infection:-

Almost any part of the body may become an in--fected centre, but chiefly the following:-

1 Tour: des Soc: Med. de Lille august 1895.

2 Tour des Soc. Med. de Lille August 1895.

3. Delepine - Trans: Pathol: Soc: London 1889
Bonguin and de Guervain - Rev: Méd. de la Suisse Rom. March
4. Archive. Prov: de Chir: ~~Med~~ March 1896

a, The Skin
b, The Head and Neck.
c, The Thorax (Lungs etc)
d, The abdomen.

A) If The Skin is attacked thickenings ensue with openings on the surface and formation of sinuses. According to [1] Derville there are pathognomic spots, which are more or less deep in colour according as the general colour of the lesion is more or less pronounced. The lymphatics dont become affected - at least primarily - differing thus, from cancer, syphilis, and Tuberculosis. Perhaps that is due to the method of spreading which seems to be rather by continuity of tissue than by the lymphatic or vascular channels - and more like an eroding ulcer. [2] "Monestre" however, holds, that in all cases there are a few painless and distinctly enlarged lymphatic glands, which occasionally are bilateral. At no period of the ailment, in my case, was there any glandular affection whatever.

B) The Head and Neck seem to be the most favourite site - the upper jaw less frequently than the lower, but in all cases it is more serious if it spreads to deeper structures[3] (brain etc). According to [4] Poncet the angle of the

A. Sir Dyce Duckworth – Clinical Soc: of London October 1900 – case of abdominal
Godlee.
1. W.G. Spencer – British Med Journal " 1900 – case of chest.
do do do – " of neck
Poncet and Bérard – Le Bull: Med: August 1897.

2. Le Bull Med: November 17 1897.

3.
a) Flexner – case of Pulmonary Actinomycosis – Patholog: Soc: Philad: April 190
b) Trans: – Royal Med. and Chir. Society. Page 179. 1889.
c) Netter – Tribune Med: No 46. 1893.
d) F.S. Eve – case of Pleural Actinomycosis – British Med: Journ: April 1897.

4. Lancet – January 1901.
5. Royal Med and Chir: Soc. Trans: 1895
6 Patholog: Soc: Trans: London Nov: 1900.

jaw is the part most often affected, while the course of the disease may be[A] acute or subacute. [1]Recent Statistics of cases, show the head and neck affected in fifty-five per cent, The abdomen twenty percent, Thorax twenty per cent, and other parts five percent. Of sixty-six cases reported in France eighty five per cent were situated in the head and neck. [2]Ullmann says the disease is frequently met with in shoemakers, owing to the habit of putting their needles in their mouthes. He fails, however, to mention how the needles become infected.

C) [3]The Thorax (Lungs etc). When the lungs are affected with actinomycosis the course run is much like that of Tuberculosis both in its clinical and other aspects. In this situation it is apparently produced by inhalation of the actinomycotic granules from some affected source. This disease, as in other affections of the lungs, produces a high mortality, it is differentiated in the lower lobes being usually the site, while the reverse is the case with Tuberculosis; but the microscope only is able to settle the diagnosis. [4]R.J. Godlee mentions two or three cases in which actinomycosis produced curvature of the spine towards the affected side. [5]Drs. Pringle and S.H. Habershon

1. Vienna

2. Berlin: Klin: Woch Nos. 15.16.17. 1898.

3. Nouv Revu XLV p 288. 1898

4. Sir Dyce Duckworth - Trans: Clin: Soc. London Oct. 1900.

5. Ransome - appendix - Kelynack's work on appendix Veriformis

Fairweather - do British Med: Journ: June 1896.

Sir T. Grainger Stewart & Dr. R. Muir ~~Leith~~ Liver and Ovary. Edin: Hospital Report. Vol 2. 1889?

D. Giordano - Uterus - La Clinica Chir: June 1895.

Ransome - Prostrate - Med: and Chir: Soc: 1891.

Dolore - Anus - Comp: rend de la Soc: de Bol. December

6. Fairweather - Brit: Med. Journ. 1896 June.

Billroth - Bladder - Wiener und Woch March 1891

Eustace - Primary actinomycosis of Testicle - British Med: Journal. Dec: 16 1899

Barker - actinomycotic abscess in Abdominal Wall - British Med. Journal Nov. 1899.

7. Recovery.

D. Giordano - Uterus - vaginal hysterectomy - recovery. (La Clinica Chir: 1895).

Josef Jurinka - Perityphlitis - Mittheilungen aus den Grenzgebieten d' Med: u. Chir. Vol 1. Hg II

Kern - do - Correspondenz aus Blatt für Schweizer Aerzte - Sep: 1891

Ransome - Prostrate - Med: Chir: Trans: 1892

Billroth - bladder - Wiener und Woch. March 1891.

Eustace - Testicle - British Med: Journal. Dec 16. 1899.

each mention similar cases. [1]Illick, after exhaustive study of cases, in 1892 cites only two of recovery in Pulmonary Actinomycosis. [2]Karowski, mentions a case which recovered after a very extensive operation in which skin, fascia and muscles were removed. [3]J. Butler, also had a successful case, in which the disease was mistaken for gangrene of the lung, but was rapidly cured by doses of Oil of Eucalyptus. [4]The Pericardium may also be attacked by the disease.

D) [5]**In The Abdomen** any part may be attacked:- appendix, caecum, liver, ovary, uterus, bladder, prostate and anus. When it attacks the caecal region it presents ordinary appendicitis and is indeed [6]mistaken for that disease. Diagnosis can only be certain in such cases when the fungus is demonstrated in the discharges evacuated by the rectum or bladder or through abscesses forming and bursting on the surface. Some cases of abdominal cures are reported either spontaneously or by [7]operative surgery and medical treatment combined. "Therefore", says Koranyi, "it is essential in abdominal cases to find the granules before making a certain diagnosis in cases of easily discovered indurations". In cases of the female organs of generation it is usually secondary to some other affected centre.

1. Leith - Edin: Hospital Reports 1883

2 Vedeskrift f. Veterinaire. 1883.

In Cattle, the disease is usually seen as a large and very hard tumour on the jaw, or tongue.[1] It has also been found on the udder.[2] An epidemic is stated to have occured in cattle fed on grain grown on land recently reclaimed from the sea.

Course of the Disease:-

As the disease is slow in development and chronic in course it may be very difficult to trace the channel by which the fungus originally made its entrance. Thus, an infected wound may heal and leave little or no visible trace, while the fungus is still meanwhile spreading in the neighbourhood; this happened in my case. The disease may finally end in recovery, or prove fatal by gradual extension to different parts of the body through embolic pyaemia, causing abscesses and setting up secondary processes.

Differential Diagnosis:-

When the disease is first suspected there will usually - until the granules are apparent, - be a great difficulty in forming a sure diagnosis. The diseases from which actinomycosis must be differentiated are;-

1. Glasgow Med. Journal. April 1895.

a, Tuberculosis.
b, Syphilis.
c, Carcinoma and Sarcoma.
d, Fibroma & Epulis of the Jaw.
e, Lupus.

The first two will cause the most difficulty, as they closely resemble actinomycosis.

a) Differentiation will be assisted when it is remembered that in Tuberculosis the regional glands are affected, but not usually in Actinomycosis, and that in Tuberculosis the apices of the lungs are affected usually, whilst in Actinomycosis the lower lobes. The microscope should confirm the diagnosis.

B) In Syphilis there are usually other well known symptoms, and a history to give a clue; and according to Poncet, syphilis will, in two or three weeks, be affected by large doses of Potassium Iodide, whilst it takes longer to have effect in Actinomycosis.

C) In Carcinoma pain and tenderness, liability to ulceration, and glandular enlargement, will suggest differentiation, whilst in Sarcoma the affected area does not break down or ulcerate

1. Professor Oesteilage – Use of Iodine Therapy in animals
(Munatsheft f prakt Thierheilkde)

2. New York Bureau of Animals Industry p. 210. 1893.

as rapidly.

D) In Fibrous Epulis the tumour grows slowly and does not return if removed.

E) In Epithelioma as in Lupus the microscope will determine the diagnosis.

Treatment:-

a) In Cattle the treatment has hitherto entirely consisted of the internal administration of Potassium Iodide.

In 1885 Professor Thomassen of Utrecht suggested Potassium Iodide for bovine actinomycosis, and showed it was useful. He also first tried Injection of Iodine locally but gave it up, in favour of the internal treatment alone, by which eighty cases were cured. Nörgaard, nasales successful with this remedy in cases attacking the jaw of the animal- one hundred and thirty one out of one hundred and eighty five cases were thus cured. Those showing the reaction of iodism most fully were the most benefitted. "In most cases, says Dr Salmon, after successful treatment was finished there was only a bunch of fibrous tissue to show where the tumour had been." The dose varied from one and a half to two

1 Prov: Med: Journal Vol 1 p60 1894

2. ao do

3. Wiener und Wock March 1891

4. Boston Med & Surg Journal Trans: January 1897

and a half drams daily, which produced iodism in a week or ten days. Cures were effected in about a month.

B. In Man: the treatment consists of.

1. Local: applications.

Operative measures.

2. Internal remedies.

Local Applications were it appears early tried. [1]Ziegler successfully treated a case with injections of Protein. [2]Professor Von Mosetig Moorhof used Tuberin – injecting three c.cm of the extract daily into the subcutaneous tissue. He also found it useful in local Tuberculosis, but great care had to be taken in its employment. [3]Billroth used injections of Tuberculus, commencing one sixth of a minim increasing to four minims. In one case he used fifteen injections, which after causing characteristic local and general disturbance caused the disease to disappear. Albert used corrosive sublimate injections Carbolic Acid and Glycerine, with methylviolet, were employed by Raffa. [4]Dr H.B. McIntyre used injections of five percent Permanganate of Potassium with marked relief, after having given internally fourty-five to ninety grains of Potassium daily without effect on

1. Mittheilungen aus den Grenzgebieten d' med. un chir. Vol 1. H. 2 1896.

2. Wiener Klin: Woch. No 37. 1895.

3. British Journal of Dermat: 1896

4. Bull de l'acad: de Med. July 1896.

5. Annals of Surgery. Sept. 1896

6 Nouv Revu. XLV p. 288 1898.

1. Dr. L. L. Macarthur - case of mammary gland. - Chicago Gynecol: Soc. 1897
My own case.
C. B. M. Smith - case of neck - Lancet. March 1897
Guillaumot - " of " & Cheek. Lyons Med. Journ: Jan 1896

2. Kern - perityphlitis - cured by incision & scraping (correspondenz Blatt für Schweizer Aerzte. Sept 1891.)
D. Giordano - Uterus - Vaginal hysterectomy - cure - La Clinica Chir: Jan/95.

3. Dr. Macarthur - Mammary gland - incision - cure - Chicago Gynecol: Soc/97.

3. Delobny - Pharynx - Revue de Larynx d'Otol et de Rhin Oct: 1895.
Ransome - Orbit - British Med: Journ: 1896
Bourquin and Guenaud - Left Infer: Maxillary region extending to brain.
Revue Méd de la Suisse Rom. March 1897.

4. C. B. M. Smith - case of neck - cured by 15 grs Pot Iod: daily. Lancet Mar/97.
Ransome - do - in a fortnight by 100 grs daily B. M. J. 1896
Eustace - Case of Testicle - Incision - 5 grs Potassium Iodide ter die B. M. J. Dec 1899.

on the disease.[1] Juruika,[2] Rydygier,[3] Wolfler and [4] Dugnet used Potassium Iodide as injections with good results. [5] A Mayer and Kottmitz tried Nitrates of silver and lime injections into the sinuses and tissues, with recovery. [6] J. Butler records a successful case of inhalations, and internal administration, of oil of Eucalyptus.

Operative Measures: Cases in and about the face and neck usually only require the simpler surgical treatment, - incising and scraping. Should the disease, however, be where surgical treatment can be effectively applied, so much the better for the patient's chance of recovery. But, if the disease attacks some inaccessible part operative interference is impossible and then only Potassium Iodide can be given, keeping up the strength by nourishment and tonics.

2 **Internal Treatment**: seems to resolve itself wholly into the administration of Potassium Iodide, in varying doses. From a survey of the literature of the subject it appears that Potassium Iodide has wide limits of action. In some cases a small quantity, comparatively, is all that is required, while

1. Rydygier - gave 150 grs Ref in Bakt Centrable 1895.
2. Therapeau Gazette p. 35. 1894. & Riforma Med: May 1893.
W.G. Spencer & Godlee, each gave 40 grains Hinco daily.
3. Annals of Surgery 1897
4. Lancet. March 1897.
5. Tribune Med: No 46 1893.
6. Royal Med: & Chir: Soc: Trans: 1895
7. Journal Compar Pathol: and Therapeut Vol II 1893.
8. Bull de l'Academ de Med: July 1896.
9. Mitheilungen aus den Grenzgebieten d. Med. und Chir: Vol I. Hft 2 1896
10. Wiener und Wock. Nov: 1898.

in others even a large dose does no good. [2] Buzzi and Valois gave thirty grains daily continued for two months. Treatment was always most successful when decided iodism was produced. [3] Parker Syms records a case which after eleven months of Potassium Iodide administration, proved fatal. [4] Dr. C.B. Smith mentions a case (seven) of the neck in which fifteen grains daily for a time proved successful. [5] Nelson started with ninety grains daily, gradually reduced to fifteen grains until in one month a cure was effected. Thyroid Extract, in conjunction with Potassium Iodide was used by [6] Dr. T. Pringle with benefit, but the Potassium was in all probability, the chief factor in the treatment. [7] Thomassen of Utrecht had four successful cases the dosage varying from fifteen to forty grains daily. [8] Dugnet had a case in the lower jaw cured in four months by seventy-five grains daily of Potassium Iodide, with the same salt injected into the sinuses and diseased tissues. [9] Josef Jurinka succeeded with Potassium Iodide in a case of actinomycotic pericephalitis. [10] Ramen mentions a case of a profound ulcer of six years standing in which the fungus was found in the pus and

1. International Book of Surgery. 1900.

2. Chicago Gynecol. Society 1897

3. Therapeutic Gazette p. 35 1894

4. Mittheilungen aus Grenzgebieten d. Med. u. Chir. Vol. 1 Hft 1, 1896

and which recovered under sixty grains of Potassium daily, whether the ulcer had been actinomycotic all the time is doubtful; but if so it shows the disease may sometimes be of a very chronic character; [1]Dr Van Hook of Chicago, mentions the case of a woman who had an actinomycotic discharge from the uterus for some years, and where the granules disappeared when Potassium Iodide was administered, but returned on discontinuing the drug. In some cases Potassium has proved of no avail, as in that of [2]Dr D. L. Macarthur's where the mammary gland was affected, and which had to be excised. Dr Van Hook and [3]Bazzi Valeri mention like cases.
Several causes may lead to this resistance of the Iodine treatment, namely,-

a, Virulence of the disease,
b, Extent of the disease.
c, Weak resisting power of the patient.
d, Being mixed with a secondary fault.

If, as some think, there is more than one kind of actinomycosis, then Potassium Iodide may have special effects on different varieties.
From the experiments of [4]Turinka it does not seem as if the drug had any decided germicide action, but

1. British Journ: of Dermatology 1896
2. Journ Med: Journ: 1894
3. British Journal of Dermatology 1894
4. Prov: Med: Journal. March 1894.
5. Journ Med: 1894.

as iodine reactions are found in the discharges of patients taking the drug, it proves that it locally reaches the parasite, and may act directly upon it. [1]Wolfler thinks that it acts by increasing local tissue action. [2]Bérard and [3]G. Pennett broadly hold that Potassium Iodide cannot be considered a certain specific in man, while [4]Meunier and Thomassen take the opposite view. According to [5]Bérard in two thirds of chronic cases of actinomycosis affecting the head and neck Potassium Iodide is of no use; but in three fourths of recently recovered cases that remedy combined with surgical measures have proved successful while the remaining fourth proved amenable to the internal Iodine treatment alone.

General Conclusions:-

It is not my intention and it would be impossible in such a thesis as this to give a resumé of all the known cases of Actinomycosis but I have selected a few, with the aid of which, I intend to draw some general conclusions, and I shall endeavour to illustrate by reference to most

1. Godlee - Lancet. 1901 — mistaken for Syphilis

West - Brit: Med. Journ. 1894 do

Fairweather - British. Med: Journal - mistaken for appendicitis

G. Butler. - Revu Hom XLV. p 288 1898, - mistaken for gangrene of Lung.

1. Hektoen - New York Med: Journal May 1900.

of the recently recorded cases the diversity of opinion which is held with regard to the origin and character of the disease.

Actinomycosis in the human subject is a disease in the discovery of which the microscope has played a most important part, as previous to microscopical research it was frequently mistaken for other diseases the symptoms of which were similar i.e. Syphilis, Carcinoma, Tuberculosis etc. and although not a rare ailment (Ulich of Vienna, in 1892. collected over four hundred cases of Actinomycosis in the human subject, and since then numerous others have been reported) it is however uncommon enough to be the subject of much speculation.

For instance let us take:-

1) Its supposed relation to Tuberculosis.

One must here consider whether, when the two diseases are associated in the same person, they are separate and independent of one another or whether they are stages in the life cycle of a common disease. This, I think, we may dismiss from our minds although the theory has been

Dr. Kanthack - described a "pyaemic actinomycosis" - Path: Soc: Trans:, 1894.

1. Berestrieff says there are the Typical and the Atypical forms.
Zeit f Hyg. u Infekt. Vol XXIX p 94. 1898.

Slater - British Med: Journal Nov 1899

2. C.B.M. Smith - Lancet March 1894 - gave 15 grains.

3. Dr. L.L. Macarthur - Chicago Gynecological Soc: 1897 - gave 90gr.

Rydygier - Wiener klin Wock - gave 150 grains.

advanced by some, for if there was any direct connection between the two diseases, surely, there would be some equality in the number of cases observed to be affected with either, but this is not so and one can quite understand that an error in this connection between diseases would easily arise because a patient suffering from Tuberculosis might readily be a prey to the actinomycetic fungus or vice versa, the vitality of the patient being undermined in either case, a thing which is true of most infective diseases.

2. Then again, as to there being more than one species of Actinomycosis.

The evidence of this being so is rather flimsy, the only thing in favour of this theory being the fact that in one case a small dose of Potassium Iodide suffices while in another case a large dose of the drug is of no avail.

3. As to the manner in which it is propagated as an animal parasite.

Most probably the filaments are the reproductive source because in many cases in which the disease has been very active no clubs have been observed;

1 Lancet - Jan: 1901

2 D. Giordano - case of uterus - La Clinica Chir: Trans: January 1895
Ransome - " prostate - Med & Chir: Trans 1892
do " Orbit - British Med: Journ June 1896
Billroth " bladder - Wiener und Lock March 1891
Barker - Actinomycotic Abscess in abdominal wall - Brit. Med Journal Nov 1899
Eustace " Primary Actinomycosis of Testicle. - British Med Journal Dec 1899

but one has always to remember that in the lower forms of life such as fungi reproduction may also take place by spores and in this connection the "club-like" forms of actinomycosis may be analagous to them and indeed it is possible that the club is a filament with a spore at the end, although Godlee thinks that it is by pressure during growth – at the end of a filament that the 'knob' of the club is produced. Moreover, the filaments when seen under the microscope, have certain transverse markings which would lead one to think that the intermediate portions break off and become offshoots of the parent fungus.

4) As to the method of Infection:-

This is probably by direct contact with the fungus when it is a vegetable parasite, although in many cases it cannot be traced to chewing grass or cereals. In my case there was no history of such a habit, and one may well inquire through what medium the fungus attached her. I think it more than probable that the medium for the disease was some infected food which on being masticated was pressed down into the decayed tooth and

1. G. Butler - Nouv Rem XLV p. 288 1898

there found a suitable medius to grow in, and as the patient was in the habit of eating dried dates and uncooked foreign tomatoes, it is quite possible this was the source of infection. It is peculiar when we consider the frequency of the disease in cattle and the known habits that cattlemen and farm labourers have of chewing straws, grass etc, that we do not find this particular class of person attacked more than others, as in the case of Anthrax, glanders, etc, where we can trace infection from hides, horses etc.

With these few general observations on actinomycosis, I now pass on to the question of **Treatment**:

It is surprising in perusing all the evidence of recorded cases to find such a number of local remedies which have apparently been successful, but the internal treatment (i.e. Potassium Iodide) has been the same in most recorded cases, except in one case, where Oil of Eucalyptus was used successfully internally and as an inhalation, the results of the treatment in reported cases would appear, as if the

fungus could easily be eradicated. Unfortunately this was not my experience, and I consider the more the disease is investigated the more firmly the conviction will be that actinomycosis is exceedingly hard to get rid of, that without surgical interference local applications (owing to the difficulty of reaching the various parts to which the disease has spread) are of little or no avail, and that the treatment must be supplemented by the administration of Potassium Iodide internally.

Robinson Simpson Dickson.