

Pyogenic Bacteria

Albert F. Cassell

Thesis

In the early history of bacteria, *Ostin* Passet and others made demonstrations showing that micrococci were present in pus of acute abscesses. This inference led some scientists to believe, that there can be no pus formation without the presence of these micro-organisms. But this gave an erroneous idea of the study of bacteria. It has been shown by scientists that certain chemicals introduced beneath the skin give rise to pus formation independantly of bacteria. Among the several chemicals tested which give positive results are Nitrate of silver, oil of turpentine, strong liquid ammonia and a number of others. It has been shown that when pus cocci have been sterilized by heat, and then injected subcutaneously will still give rise to formation. Pasteur was the first investigator. In 1878 he secured results from sterilized tubes of pus as well as from the living organisms. This fact has been

confirmed in later years by other well known scientists. Dysozkowitsch produced abscess with sterile pus by injecting it subcutaneously, and Buchner obtained similar results. Buchner carried his experiments through forty different cases with the organism *Friedlandia bacillus* (pneumococcus) He also showed that the pus forming property belongs to the bacterial cells and not to any soluble chemical produced by them.

When cultures were filtered through the Chamberlain filter, the liquid caused no pus formation, but the dead organisms on being injected beneath the skin caused the formation of pus within forty eight hours after injection. Subsequent experiments gave similar results for seventeen different species. Among those that may be mentioned are *Staphylococcus pyogenes*, *Aureus*, *Sarcina Pauranteaca*, *Bacillus Prodigiosus*, *Bacillus subtilis*, *Bacillus Coli communis* etc. Two or more species are often times found in one abscess.

The found in our plate cultures as high as six different species. But as a general rule the number varied from two to four.

Roff and Ghisky have shown that under most rigid antiseptic treatment microorganisms are found attached to the wounds made by surgeons or some other means and that a skin abscess is most often the result from the presence of the most common of these microorganisms *Staphylococcus epidermidis albus* but this organism has but slight virulence. A wound at sometime of its existence always contains germs and they are more or less pathogenic. They either hasten or retard the progress of healing.

In all the material we have used we have kept a careful history of all material. The cause, effect and result of each case.

From the experiments carried on with sterilized cultures, the conclusion was reached that the pus formation

following the injection of sterilized cultures was caused by the albuminous contents of the bacterial cells. While it has been demonstrated that microorganisms may give rise to pus formation, both the living and dead organisms, there are but few found in acute abscesses of man.

Rosenbach and Passet were the chief instigators in this remarkable addition to science. Of these, the two most frequently found on man are *Staphylococcus pyogenes* and *Streptococcus pyogenes*. In addition some of the following may be found: *Staphylococcus cereus albus*, *Micrococcus tenuis*, *Bacillus pyogenes faecidus* etc. The first two mentioned are considered more virulent, and are more frequently found in the acute abscesses of man.

The first material that I received came from the shoulder of three calves, after they had been vaccinated. Three different methods of vaccination were tried upon as many calves.

The pus was collected and inoculated

into bouillon tubes. After growing for a few days it was made into plate cultures. After carrying it through the different media traced out the following organisms. Bact. Smaragdinus B. aureus, M Lactic, M creus, M Jougii.

In January a small boy while hunting shot himself in the leg with a 22 rifle. The bullet was extracted and pus formed in both the upper and lower wound. I secured some of this material and as before inoculated some bouillon tubes, finally inoculating into plate agar and carried through the various media for (10) ten days. I then with the help of Determinate of Bacteriology by Chester found the following germs. M pyogenes var. aureus M viticulosus, M pyogenes var. albus, M simplex str. erysipelatos and str capsulatos.

O. H. Symms of Atchison found on butchering a hog that small pusules of pus had formed on the lungs and on the inside of the

intestines. I proceeded to make inoculations and trace out the organisms as before.

The above described material was the most important cases that I had to work upon. Although I received material in small amount from different sources viz: from boils, cut and bruises. But none were of a serious nature. In all of my tracings leading up to determining the name of the organisms I followed a systematic method. To get the proper results one must keep everything scrupulously clean, and work with the utmost care. If once your plate culture becomes contaminated, there is no benefit derived in trying to trace out the organisms as it will result in total failure and give results that are mis-leading.

B. pyogenes minutissimus.

Morphology Baccilli are small rod shaped Motile.
 Bouillon A white flocculent deposit
 Agar A light green growth
 Gelatin Beaded growth in depth.
 Potato A yellow dry growth
 Milk Coagulated
 L. Milk digested and decolorized

B. exanthematicus

Morphology irregular in size, some long
 rods and others short
 Bouillon Turbid with sediment and a
 membranous growth
 Agar growth a glistening white translucent
 Potato growth brown with pellicle
 Milk coagulated.
 L. Milk digested and decolorized.

M. Freundreichii

Bouillon	Turbid, sedimentary growth
Agar	White raised growth on surface
Gelatin	Liquefied stratiform
Potato	A white yellow like growth
Milk	Digested
S Milk	Decolorized

They are round or spherical and none motile.

M. auranticus

Morphology	Round or slightly oval. occur singly
Bouillon	A white sediment
Agar	An orange yellow growth
Gelatin	Orange yellow growth on top slowly liquifying yellow sediment settling.
Potato	A slimy growth
Milk	Coagulated
S Milk	Digested and decolorized

L. Milk: Slightly coagulated or
digested

Bact. Aromaticum

Morphology

Borrillon Small particles in suspension.
A white ppt.

Agar A heavy white growth.

Gelatin

Potato A white dry pellicle growth

L Milk A white precipitate, the liquid
has cleared up

Milk: The milk has coagulated
and settled to bottom leaving
a clear liquid on top.

M Lactes

Morphology

Borrillon The media is turbid

Agar It seemed to partly liquify
and was of a grey growth

Gelatin Growth along line of stab also growth
on top. Not liquified. Cup shape growth
on top of gelatin

Potato A creamy slimy growth

L Milk A small precipitate in bottom

M. Jougii

- Morphology Appear in small clumps singly and pairs
- Borrillon Precipitate in the bottom: slightly turbid.
- Agar A light growth, doubtfully chromogenic
- Gelatin Not liquified growth along line of stab and growth forms cup on top
- Milk: A small yellow precipitate settled to the bottom
- S Milk A very small yellow precipitate
- Potato A white heavy pellicle growth
- M Cerend.

- Morphology
- Borrillon Turbid, with white sediment
- Agar A light white growth slightly liquified
- Gelatin Yellow growth on top also growth along line of stab, cup shape on top edges slightly elevated.
- Potato A creamy yellowish slimy growth
- Milk Coagulated, clear liquid on top slightly acid
- S Milk.

Dact. aquatilis

Morphology Rod shaped, rounded ends
0.8 x 2 to 3 μ

Porillon slightly Turbid

Agar A grey growth

Gelatin Sacate liquifaction pellicle
growth on bottom

Potato A yellow growth

L Milk Slightly digested

M. polymyosites

Morphology Occurs single and in pairs
nearly spherical

Gelatin No action owing to dryness
of media, we secured a slight
growth in some new media

Agar A light grey growth surface
soft and milky looking

Potato A dark milky looking growth jelly
looking.

Milk Coagulated. clear liquid on top

L. Milk Slightly pink.

M. pyogenes var *albus*

- Morphology Occur singly and in groups,
about 1.7 in dimension
- Borrillon Turbid, a heavy white sediment
- Gelatin Liquefaction begin in 2 or 3 days
is of saecate form
- Agar A light yellowish grey growth
- Potato growth whitish thick, and pasty
in appearance
- Milk Coagulated

Datt. Tenne

- Morphology are of different forms, but
invariably are together in twos
and chains are long rod shaped
organisms 0.6×4 to $5 \times$
- Gelatin Beaded in growth along line
of stab a raised growth upon
surface
- Agar a slight grey growth
- Borrillon Liquid very turbid
- Potato A slight yellow growth
- Milk Coagulated
- S Milk a slight pellicle on top.

D. Smaragdinus

Morphology. Bacilli 1 to 3 μ are single and in pairs

Gelatin Liquifaction along line of stab on surface growth a green growth

Agar a dirty yellow growth

Milk Yellow precipitate in bottom

Potato a dark brown color

B. aureus

Morphology Bacilli are short spindle shaped, are 2 to 3 times their breadth occur singly.

Bouillon Turbid with dense flocculent sediment

Gelatin slight growth in depth. surface yellow. after short time crateriform depression

Agar Thin growth, a light yellow

Milk Clear liquid.

Str Septicus

Morphology Cocci about 1. and are in chains
 Bouillon Turbid, with sediment in bottom
 Gelatin Is fibriform along stab
 Agar Small minute grayish
 bodies

Milk Coagulated

Potato A very light grey growth

In the above the organisms seemed to form no definite relation. in forming chains some would just simply group together, while others would form the characteristic chain.

M. Viticulosus

Bouillon A white sediment in bottom
 Gelatin Not liquified arborescent
 Agar A white grey growth
 Potato A dirty greyish slimy growth
 Morphology Cocci oval 1 to 5 μ also
 masses

M. pyogenes var. *aureus*

- Morphology Cocci occur in irregular clumps
 Bouillon Clear with a heavy yellow sediment
 Gelatin Liquefaction saccate with yellowish sediment
 Agar A glistening growth turning to bright orange
 Potato A small growth of orange color
 Milk Coagulated slightly acid

Str. erysipelatos

- Morphology Cocci about 1.0 I got the best results from bouillon cultures. Chains were formed very nicely.
 Bouillon Very turbid, clearing up with heavy sediment.
 Gelatin Not liquefied. Bumpy growth, filiform in growth.
 Agar A raised white irregular growth / have grown in separate colonies
 Milk Coagulated
 S Milk Pink color, a light sediment

M. pyogenes var *Albus*

Morphology Cocci about 1.0 μ in size
occur mostly in chains, although
they occur singly.

Bouillon Turbid a light skum over
the top, with a heavy white
sediment.

Gelatin Liquifaction was rapid, after
a while a heavy white sediment
formed

Potato The potato has a limited growth
it being a white thick growth.

Milk Coagulated.

Str. Capsulatis

Morphology Cocci appear in long chains

Bouillon Very turbid

Gelatin Liquified slowly stratiform
liquifaction

Agar A white grey growth

Milk Coagulated

Potato No action.

M. Pyogenes var *albus*

- Morphology occur singly and in pairs
 Bouillon Turbid with a slight membrane
 on top and light sediment
 Agar A white growth.
 Gelatin It liquified very rapidly
 and later a white sediment
 formed
 Potato A thick heavy growth
 Milk Coagulated

M. Simplex

- Morphology Is of medium size occur
 in pairs on clumps
 Bouillon Turbid and flocculent
 growth
 Gelatin Filiform growth in depth
 with stratiform liquifaction
 Potato slight growth of whitish
 color
 Milk Digested
 L Milk Decolorized.

B. aromaticum

Bouillon Turbid with floating growth
 Agar A white film like growth
 Gelatin Liquified stratiform
 Milk Coagulated
 L Milk Decolorized and digested

M. pyogenes var. *aureus*

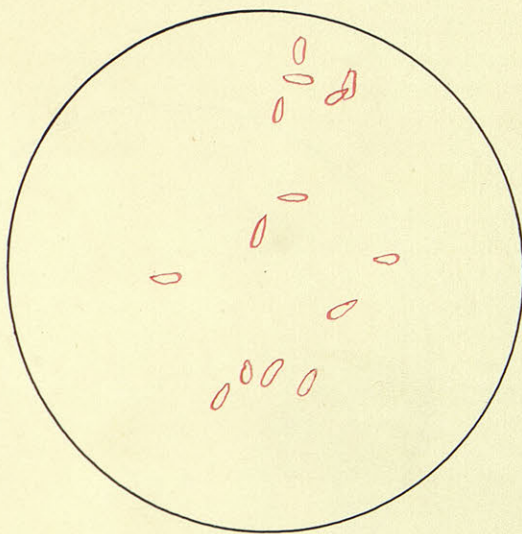
Morphology occur singly and in groups
 groups are irregular
 Bouillon Liquid clear but has a
 heavy yellow sediment
 Agar growth turning to gold
 orange
 Gelatin Liquifaction saccate with
 yellowish sediment
 Potato Slight growth of orange color
 Milk Coagulated
 L Milk Slightly acid. coagulated.

B. smaragdinus



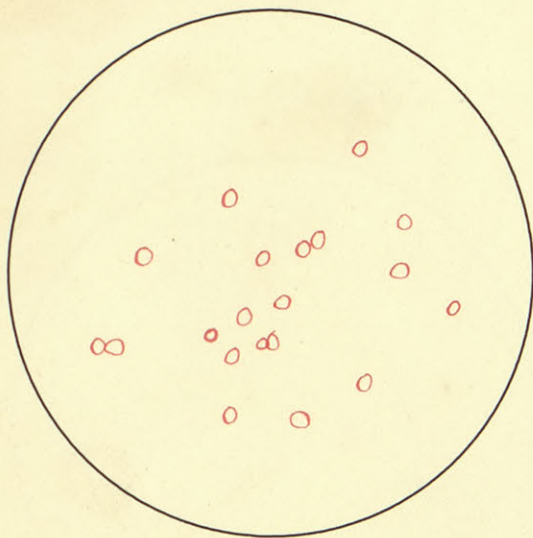
B. auratus

2



M. lactis

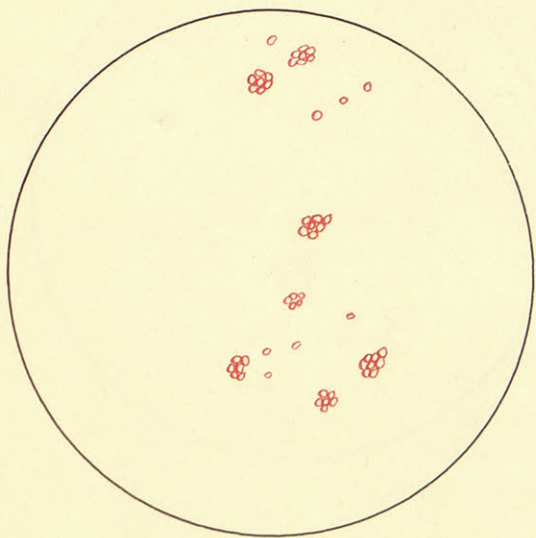
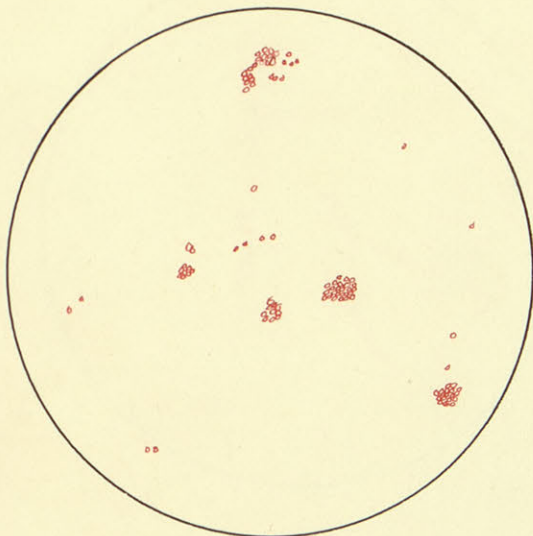
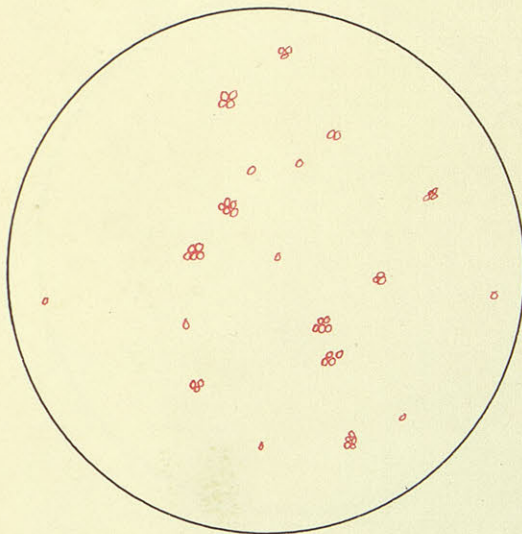
3



M. curus

4



M. jongii*M. pyogenes* var *albus**M. viticoloris**M. pyogenes* var *aureus*

M. simplex



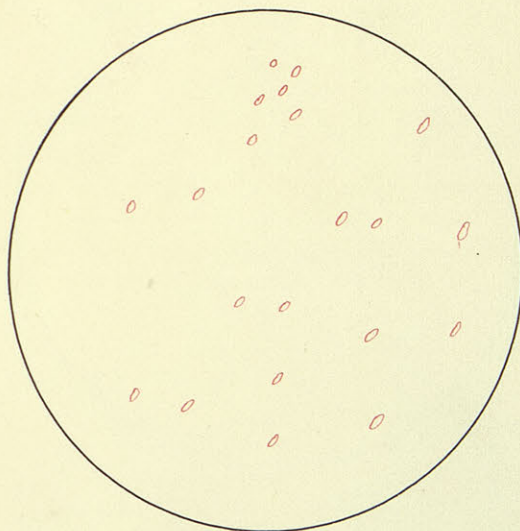
Str. erysipelatos



Str. capsulatos



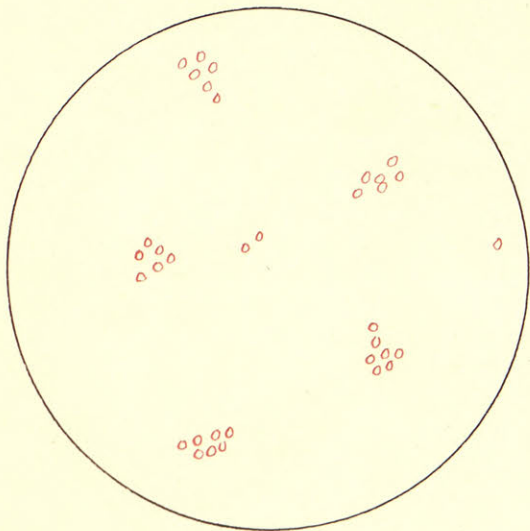
M. rubescens



x

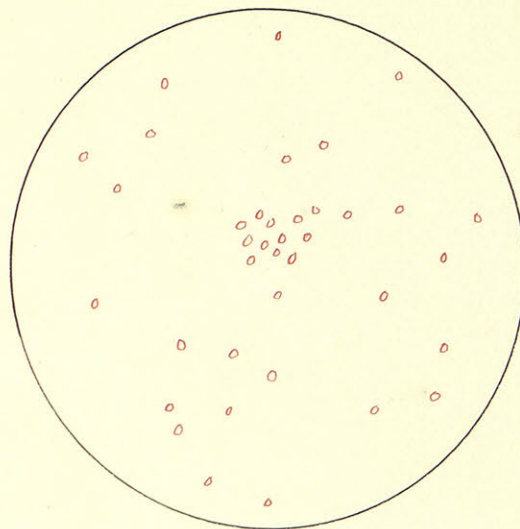
M. fundenreichii

1



M. pyogens var. *albus*

2



M. aurantiensis

3



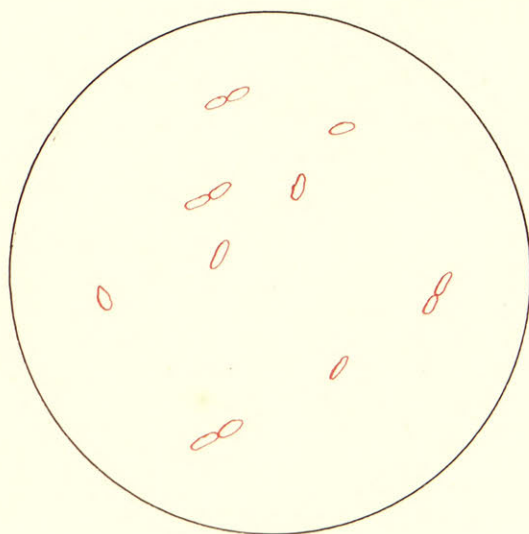
M. aurantiensis

4



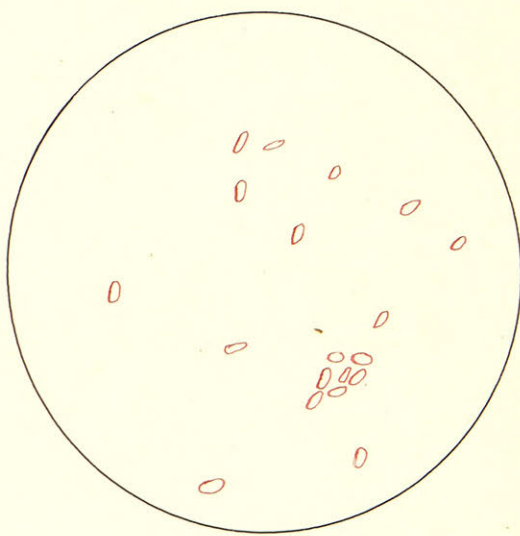
Bact aromaticum

1



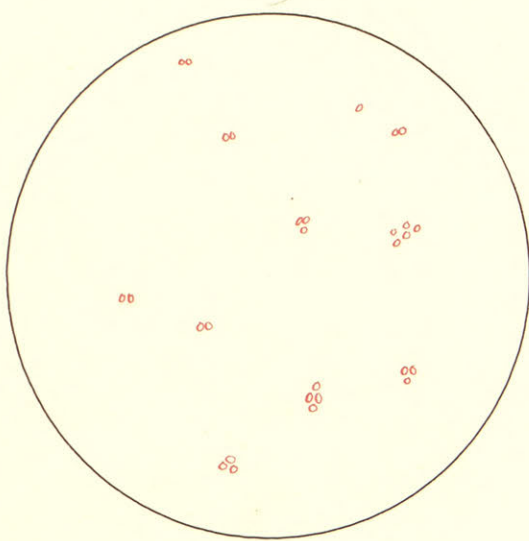
M polymyosites

2

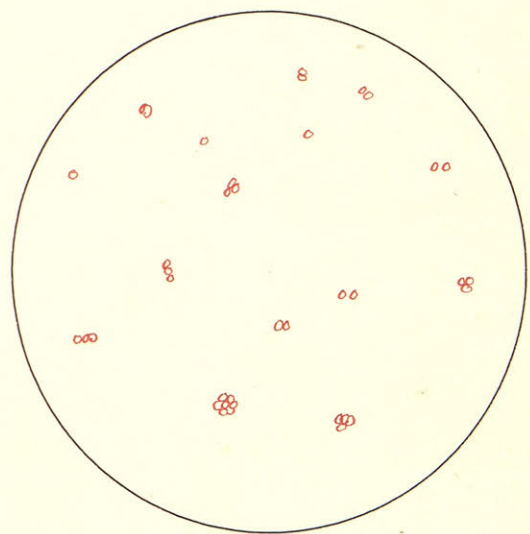


M pyogenus var. albus

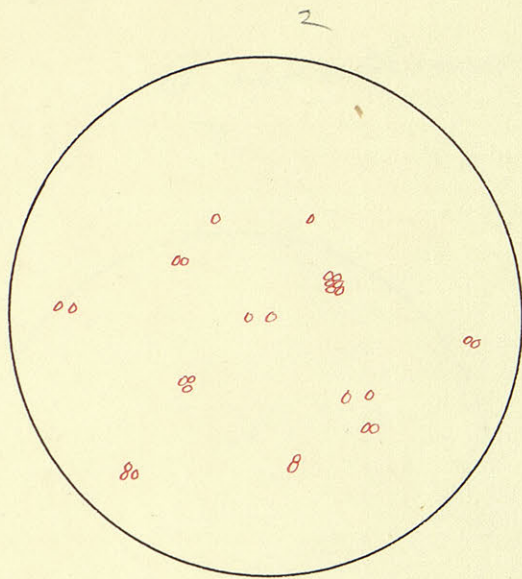
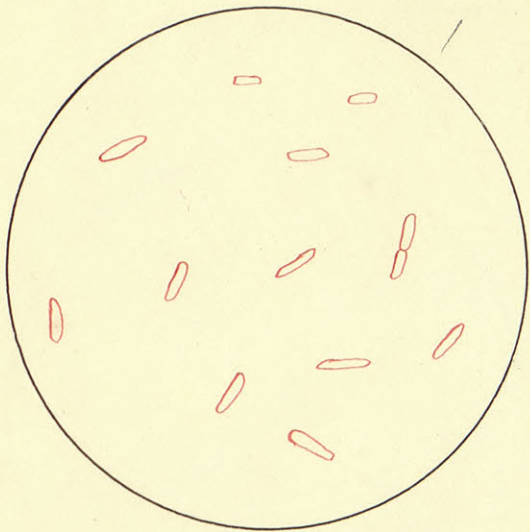
3



4



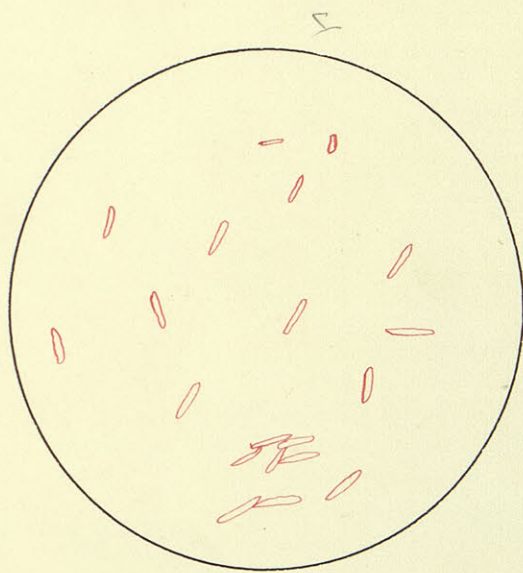
Bact aquatilis



M. aurantiæus



Bact tenuis



B. pyogenes munitarimus



B. scanthematicus

