

THE BACTERIA
OF
COMPRESSED YEAST.
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THE BACTERIA OF COMPRESSED YEAST.

Outline.

Introduction

Nature of yeast

Manufacture

Infection

Examination of samples

Description of bacteria

Conclusion.

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Yeast is one of the most interesting substances used in the household, and one that is usually but little understood. The knowledge resulting from even a superficial study will more than repay the effort by a gain in uniformity of results following its use.

The yeast plant is one of the simplest forms of vegetable life, consisting of a single cell microscopic in size. It belongs to the class of fungi and feeds only upon organic material. Under certain conditions unfavorable to the best development of the plant it forms spores which are fitted to withstand drying and live for some time in a quiescent state. These spores are widely distributed, being found in the air, on the surface of the ground, and for two or three inches beneath the surface as well as on nearly all fruits and vegetables. Many varieties of yeast have been studied and described but only two or three are cultivated. The yeast plant has been most carefully studied with respect to its power in producing alcohol, in breweries and distilleries. And much of the compressed yeast on the market is a by-product of such plants. There are, however, large establishments which make compressed yeast their principal product.

In the process of manufacturing compressed yeast the grain is carefully selected and washed. After crushing a part of it is allowed to sprout, forming malt. Lactic acid is also allowed to form as a small amount of this acid serves as a protection against bacterial growth. To the entire amount of grain an abundance of water is added as the yeast requires a liquid medium for its best development. Almost as soon as the seed yeast is sown fermentation

begins. During the early part of the fermentation some of the yeast cells rise to the surface. These are of an inferior quality and are usually discarded. After the active fermentation has ceased the yeast is separated from the other solid material and partly freed from water by filtering. Some manufacturers press the yeast cells alone into cakes, but the more common method is to add starch which makes the material easier to handle without injuring the quality. The yeast cake is carefully wrapped but only remains in a usable condition for one or two weeks.

One reason for this rapid deterioration is the short life of the yeast cells. Another reason is the presence of bacteria. Although special precautions are taken to keep the yeast free from bacteria it has not been found possible to exclude them entirely. For the growing yeast must be exposed to the air for its supply of oxygen and with all of the precautions of cleanliness, washing down the walls, spraying the air and covering the floor with water, some bacteria will find their way into the yeast. When the yeast has finished its growth and been pressed into cakes the bacteria find it a suitable culture media and increase rapidly at the expense of the yeast.

Wishing to study the bacteria present in compressed yeast I obtained at different times three samples of compressed yeast from different bakeries. Agar plates were inoculated from the samples of yeast and in all cases soon showed a large growth of bacteria. The cultures were kept at an ordinary room temperature and were protected from the light. The yeast when purchased seemed fresh but soon crumbled and in two to four days developed a putrid odor.

The offensive odor was particularly noticeable of the second sample examined. From the first yeast sample eight species of bacteria were isolated, bacillus subtilis, bacillus pseudo-anthraxis, bacillus tremelloides, micrococcus stellatus, planococcus citreus and three species of bacillus which I was unable to name. From the second sample four species were isolated. They were all species of bacilli, but liquifaciens was the only one I was able to name. From the third sample seven species were isolated, bacterium Mansfieldi, bacillus detrudens, bacillus sublantus, bacillus vitalis, bacillus hydrophilus, bacillus subtilis and another bacillus not named.

Description of the Bacteria.

Micrococcus stellatus.

Morphology - Small round organisms occurring singly.

Cultural characteristics

- Bouillon - Cloudy.
- Agar - Yellowish, white slimy growth.
- Gelatin - Arborescent growth.
- Potato - Dry, pale yellow growth.
- Litmus Milk - Lost color.

Habitat - water.

Bacillus subtilis.

Morphology - Large rods with rounded ends occurring in long chains.

Cultural characteristics

Bouillon - Wrinkled white pellicle.

Agar - White spreading growth.

Gelatin - Liquifaction funnel-shaped.

Milk - Coagulated and digested.

Litmus Milk - Lost color.

Potato - White wrinkled growth.

Habitat - air.

Bacillus pseudo-anthraxis.

Morphology - Large short rods with rounded ends.

Cultural characteristics

Bouillon - Slightly cloudy.

Agar - Almost transparent, granular growth.

Gelatin - Liquifaction funnel-shaped.

Potato - Mealy whitish growth.

Milk - Coagulated and digested.

Litmus Milk - Color gone.

Habitat - South American bran.

Planococcus citreus.

Morphology - Small round organisms occurring singly and in short chains.

Cultural characteristics

Bouillon - Slightly cloudy, becoming clear.

Agar - Slimy yellowish growth.

Potato - Scant yellow growth.

Milk - Not coagulated.

Litmus Milk - Color gone.

Habitat - air.

Bacillus tremelloides.

Morphology - Small, short rods with round ends occurring singly and in short chains.

Cultural characteristics

Bouillon - Cloudy with delicate pellicle.

Potato - Dry brownish growth.

Milk - Coagulated.

Litmus Milk - Lost color.

Agar - Scant whitish growth becoming yellow.

Gelatin - Liquifaction funnel-shaped with pellicle.

Habitat - water.

Bacterium Mansfieldi.

Morphology - Medium rods of slightly irregular shape, singly and in chains.

Cultural characteristics

Bouillon - Slightly cloudy.

Agar - Slight, white beaded growth.

Gelatin - Slight white growth along line of stab.

Potato - Thick mottled growth.

Milk - Coagulated and digested.

Litmus Milk - Lost color.

Habitat - Milk.

Bacillus detrudens.

Morphology - Medium sized rods with round ends occurring singly.

Cultural characteristics

Bouillon - Clear with thin pellicle.

Gelatin - Liquifaction stratiform.

Agar - Creamy white, opaque, glistening.

Potato - Thin white growth becoming dark.

Milk - Coagulated.

Litmus Milk - Decolorized.

Habitat - water.

Bacillus Sublanatus.

Morphology - Medium sized rods with round ends, singly and in chains.

Cultural characteristics

Bouillon - Slightly cloudy with white pellicle.

Gelatin - Liquifaction funnel-shaped.

Agar - White, thin granular growth.

Potato - White spreading growth becoming brownish.

Milk - Coagulated.

Litmus Milk - Lost color and digesting.

Habitat - water.

Bacillus vitalis.

Morphology - Medium sized short rods with rounded ends occurring singly.

Cultural characteristics

Bouillon - Clear with delicate white pellicle.

Agar - Thin creamy white growth.

Gelatin - Liquifaction stratiform.

Potato- White growth becoming reddish brown.

Milk - Not coagulated.

Habitat - Isolated from potato.

Bacillus Hydrophilus.

Morphology - Medium sized short rods occurring singly and in short chains.

Cultural characteristics

Bouillon - Cloudy with slight pellicle.

Agar - Thin whitish growth becoming brown.

Gelatin - Liquifaction funnel-shaped with white sediment

Potato - Thin yellowish white growth.

Milk - Coagulated slightly.

Litmus Milk - Decolorized.

Habitat - water.

Bacillus liquifaciens.

Morphology - Medium sized rods with rounded ends occurring singly and in short chains.

Cultural characteristics

Bouillon - Cloudy with slight pellicle.

Agar - Whitish growth becoming brown.

Potato - Brown warty growth becoming lavender. Potato becoming dark.

Milk - Coagulated and digested.

Gelatin - Liquifaction stratiform.

Habitat - water.

No. I Bacillus.

Without endospores. Aerobic and facultative anaerobic.
 Without pigment. Gelatin colonies round. Gelatin not liquified.
 Decolorized by Gram's method. Milk coagulated and gas generated in
 glucose bouillon.

Morphology - Small short rods with rounded ends.

Cultural characteristics

Bouillon - Thin pellicle and cloudy.

Agar - Whitish growth.

Gelatin - White growth on top with delicate saccate
 growth along line of stab.

Potato - Dull yellowish white growth and potato
 becoming dark.

Litmus Milk - Lost color.

Milk - Not coagulated.

No. II Bacillus.

Without endospores. Aerobic and facultative anaerobic.
 Without pigment. Gelatin colonies round. Gelatin not liquified.
 Decolorized by Gram's method. Milk, not coagulated. Gas generated
 in glucose bouillon.

Morphology - Small short rods with round ends occurring
 singly and in pairs.

Cultural characteristics

Bouillon - Cloudy with sediment.

Agar - Slimy white growth.

Gelatin - White growth on top and delicate arborescent
 growth along line of stab.

Potato - Light gray, slimy growth and potato becoming dark gray.

Milk - Not coagulated alkaline.

No. III Bacillus.

Without endospores. Aerobic and facultative anaerobic. Produces yellow pigment on gelatin. Gelatin liquified. Gelatin colonies simple. Liquifaction funnel-shaped. Gelatin liquified rapidly.

Morphology - Medium sized rods with rounded ends occurring singly and in pairs.

Cultural characteristics

Bouillon - Cloudy.

Agar - Thin whitish growth becoming yellow.

Potato - Lemon yellow, moist, raised growth.

Gelatin - Liquifaction funnel-shaped.

Milk - Coagulated.

Litmus Milk - Lost color.

No. IV. Bacillus.

Produces endospores. Chromogenic. Orange yellow pigment.

Morphology - Medium sized short rods with blunt ends occurring singly.

Cultural characteristics

Bouillon - Turning green. Cloudy with delicate white film.

Agar - Growth spreading. Orange yellow.

Gelatin - Liquifaction funnel-shaped with white pellicle and yellow sediment.

Potato - White growth becoming golden brown.

Milk - Coagulated with loose curd.

Litmus Milk - Lost color and green ring at surface.

Had very offensive odor.

No. V Bacillus.

Without endospores. Aerobic and facultative anaerobic.

Colonies on gelatin round. Gelatin liquified. Grow well on nutrient gelatin. Colonies at all stages round. Gelatin liquified quickly.

Morphology - Small rods with blunt ends occurring singly and in pairs.

Cultural characteristics

Bouillon - Cloudy with white film.

Agar -Growth mottled, brownish and dirty white. Media brown.

Gelatin - Liquifaction funnel-shaped.

Potato - Dry, brown, rough growth and media becoming brown.

Milk - Slightly coagulated.

Litmus Milk - Lost color.

No. VI Bacillus.

Without endospores. Aerobic and facultative anaerobic.

Colonies on gelatin plate round. Gelatin liquified. Grow well on nutrient gelatin. Colonies at all stages round. Gelatin liquified quickly.

Morphology - Medium sized rods with blunt ends.

Cultural characteristics

Bouillon - Cloudy with white sediment.

Agar - Gray, slimy spreading growth.

Potato - Yellowish, thin, spreading growth.

Gelatin - Liquifaction crateriform.

Milk - Coagulated.

Litmus Milk - Lost color.

No. VII Bacillus.

Without endospores. Aerobic and facultative anaerobic.

Chromogenic. Pigment yellowish. Gelatin liquified. Gelatin colonies simple. Liquifaction near surface. In gelatin stab cultures stratiform.

Morphology - Small rods, occurring singly and in irregular bunches.

Cultural characteristics

Bouillon - Very slight sediment.

Agar - Thin, slimy, yellow growth.

Potato - Sulphur yellow, slimy growth.

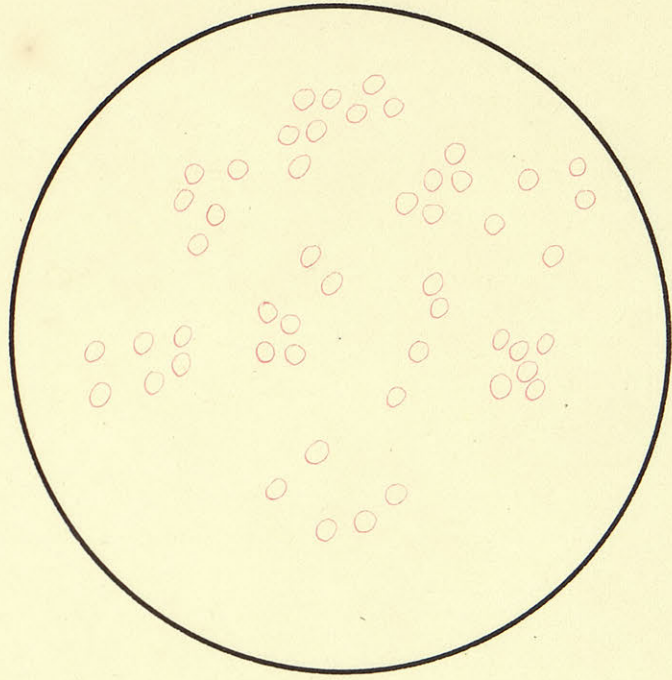
Gelatin - Liquifaction stratiform.

Milk - Coagulated, alkaline.

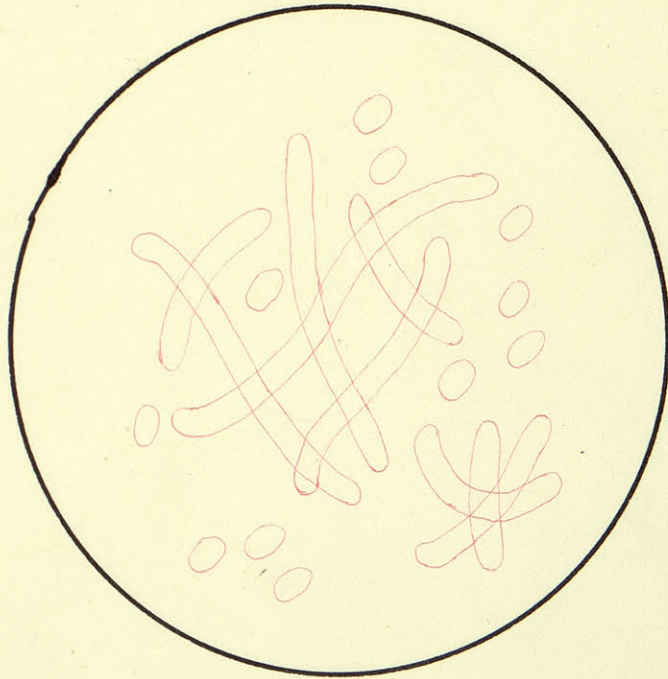
Of the organisms named six had been previously found in water, two in air and one each in potato milk and bran. So far as could be determined none of the organisms were pathogenic. Most of them were acid producing organisms. Thus it would seem that the bacteria in ordinary compressed yeast were not detrimental to the

health except in so far as they interfere with the functions of the yeast.

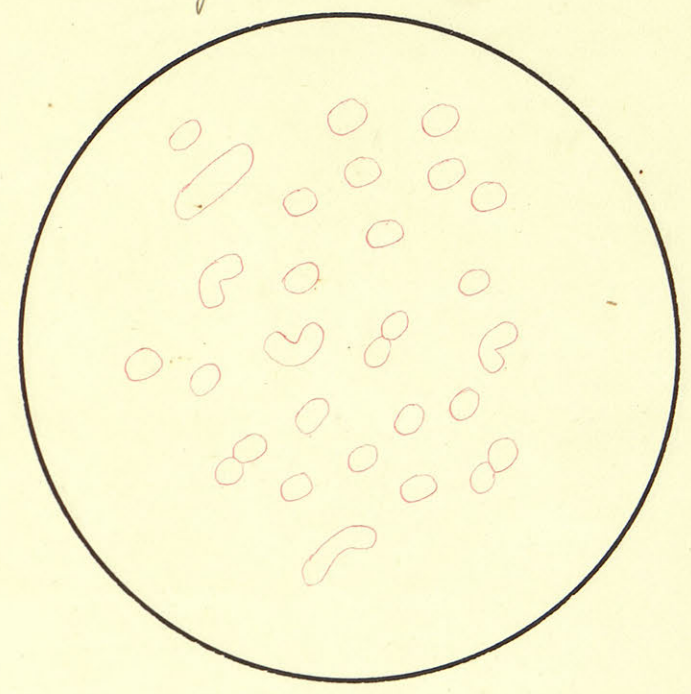
M. stellatus



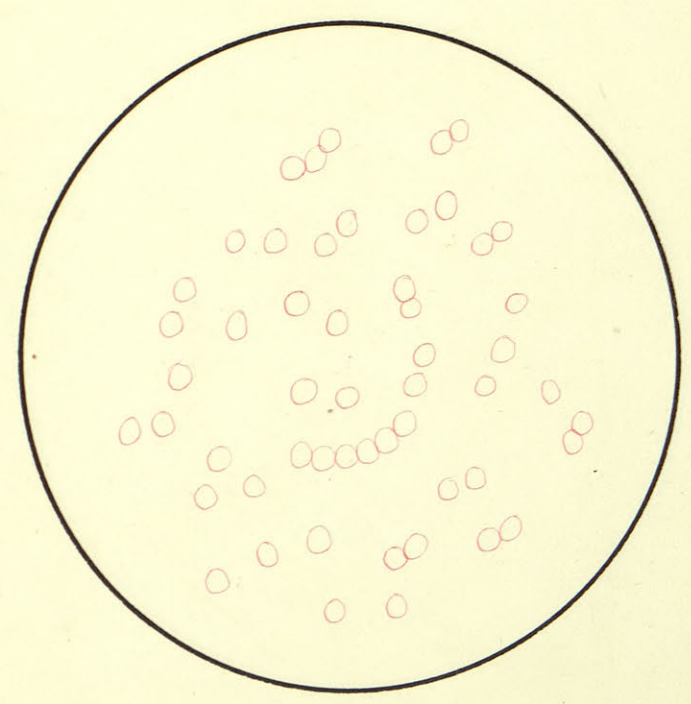
B. subtilis



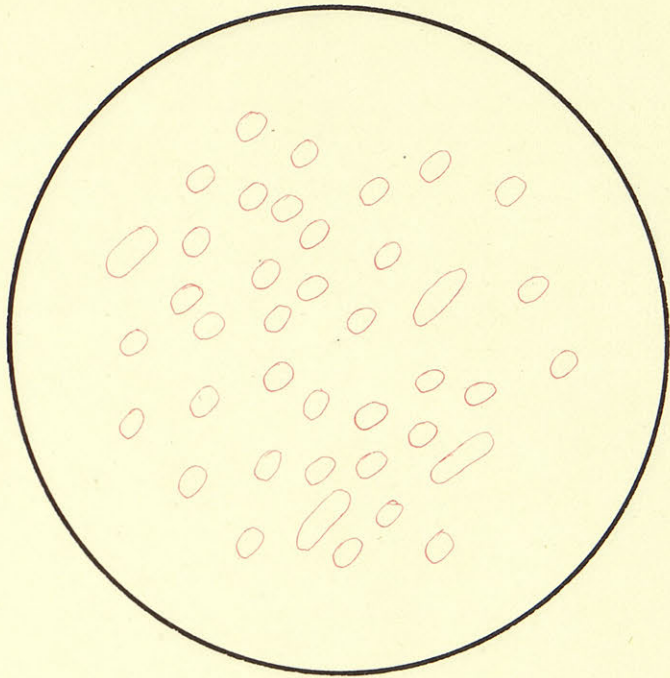
B. pseudo-anthraxis



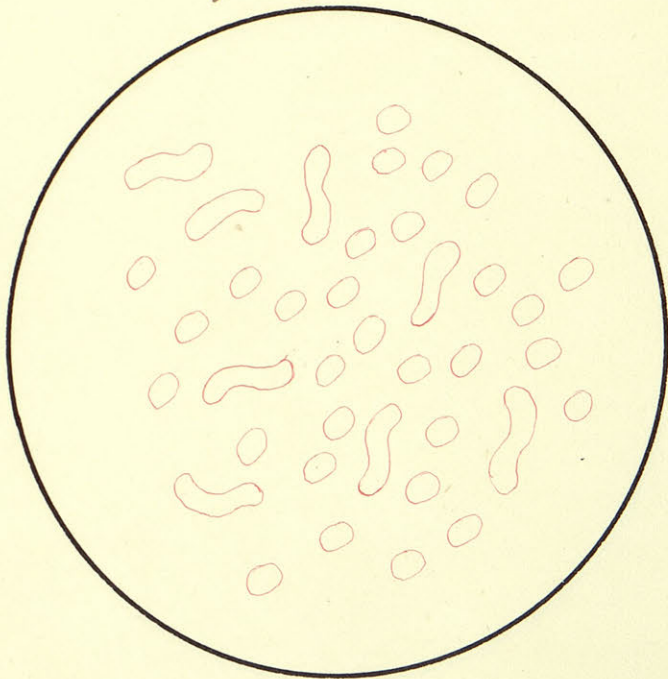
Planococcus citreus



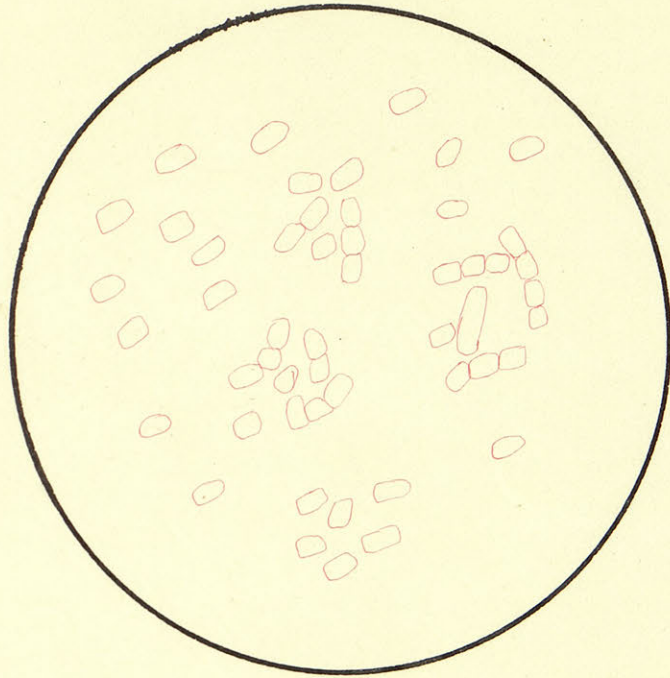
B. tremelloides



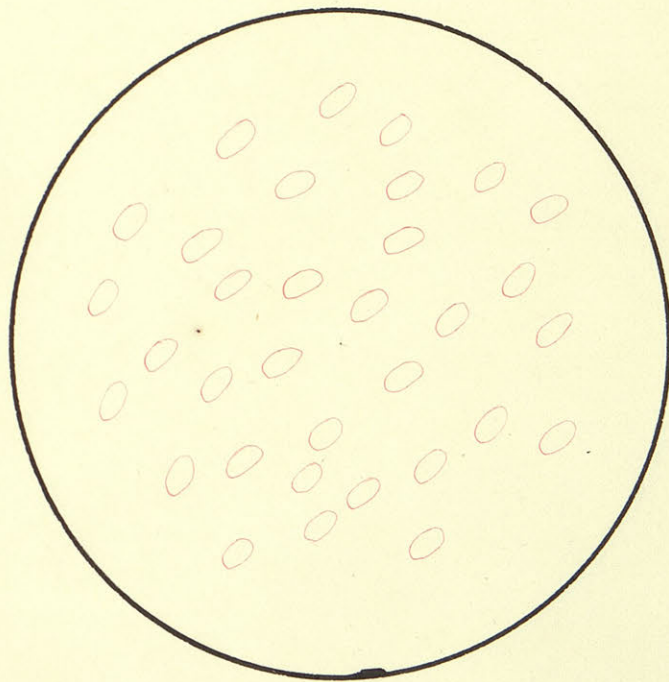
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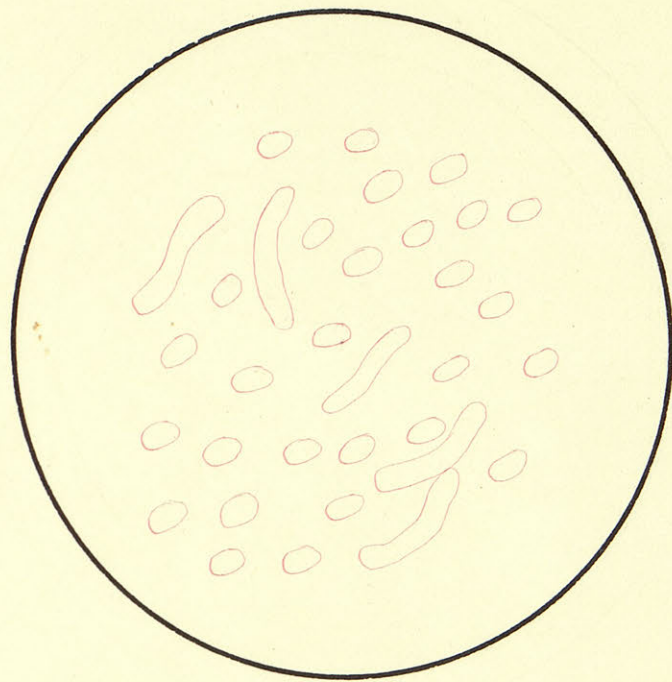
Bact. Mansfieldi



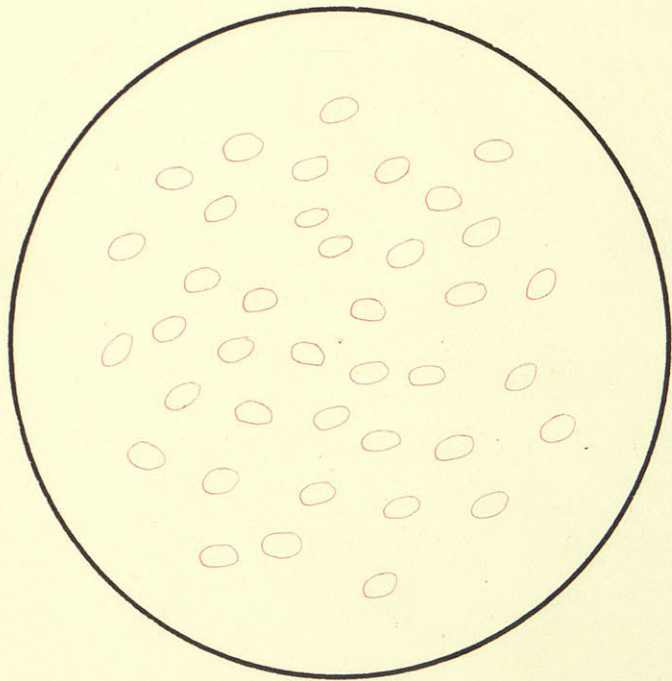
B. detrudens



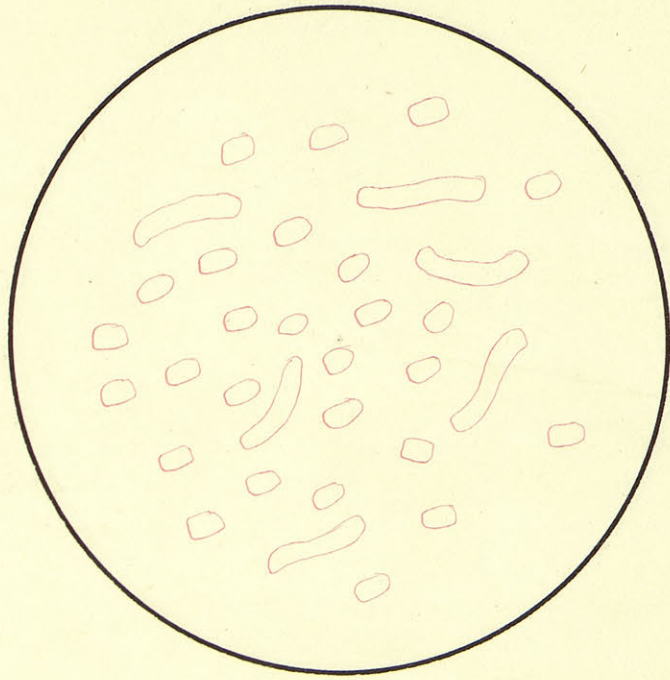
B. sublanatus



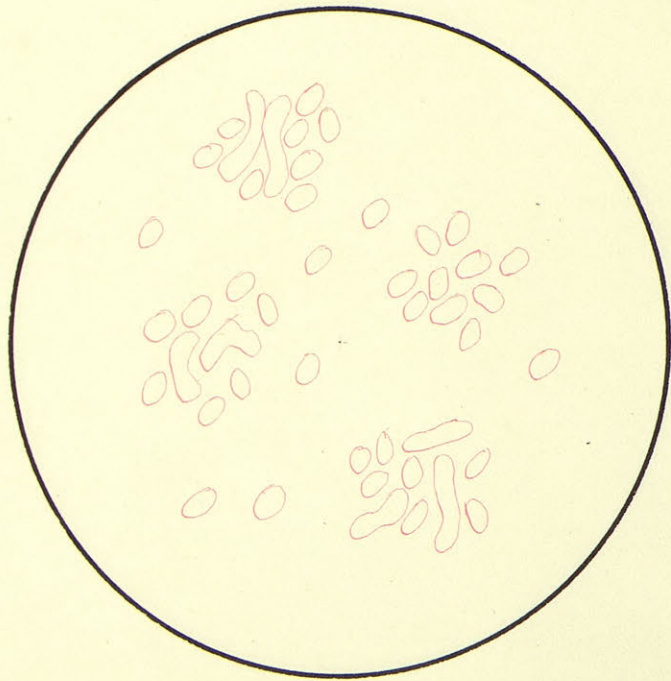
B. vitalis



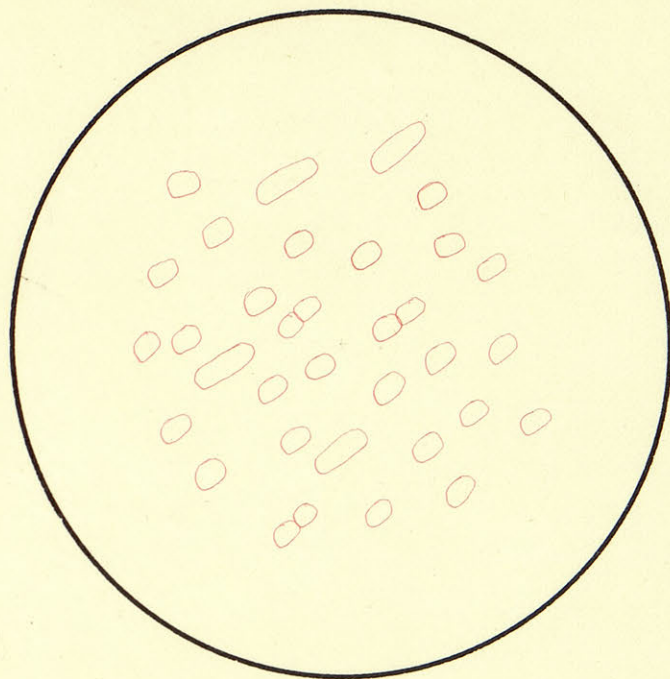
B. hydrophilus



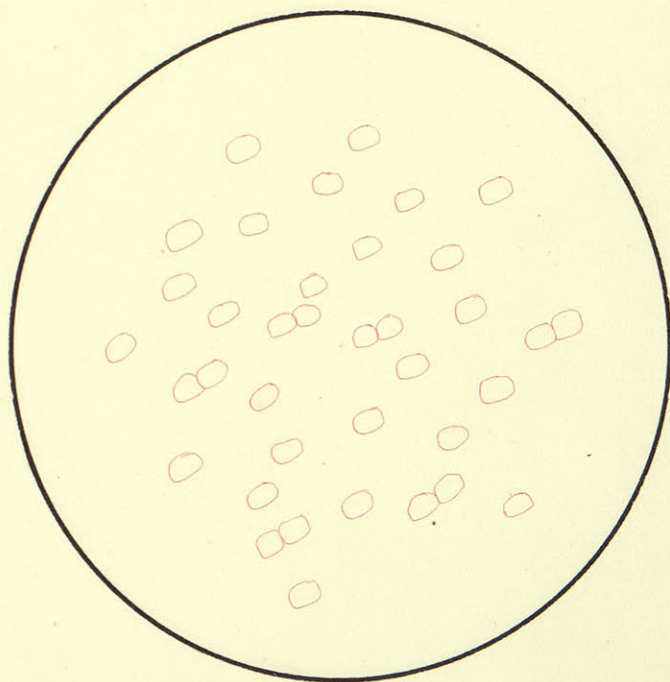
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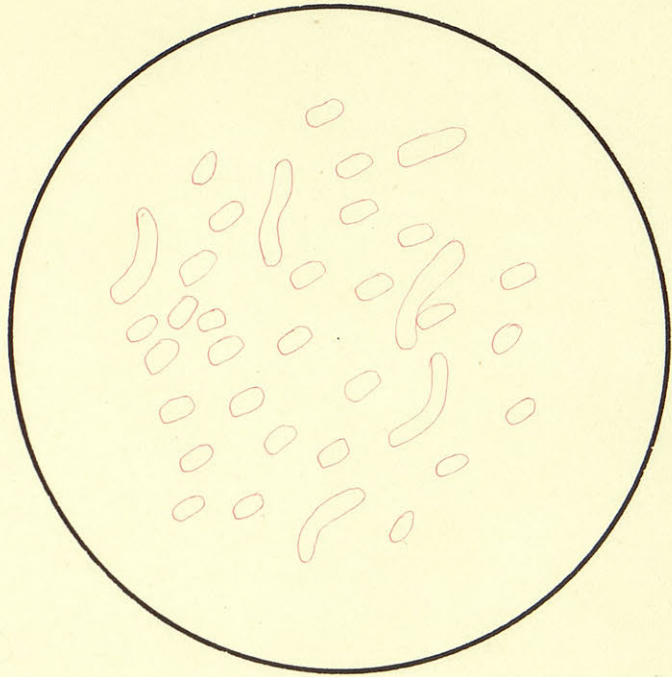
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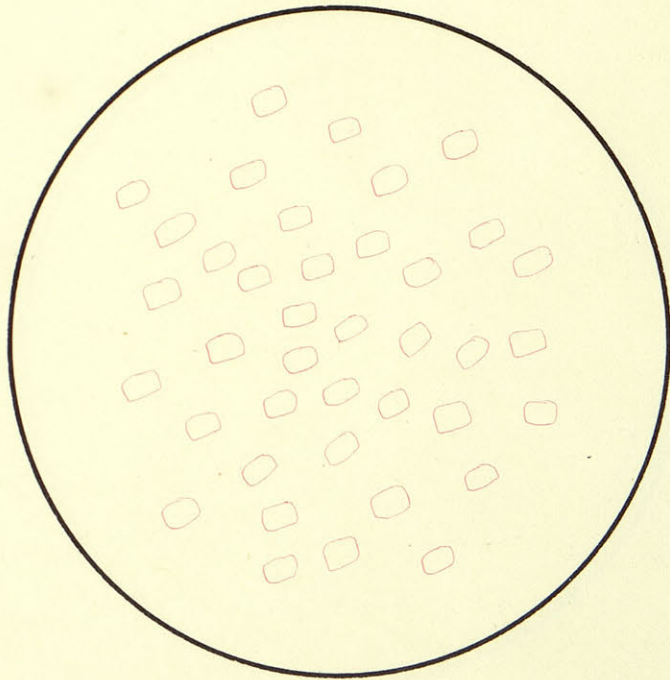
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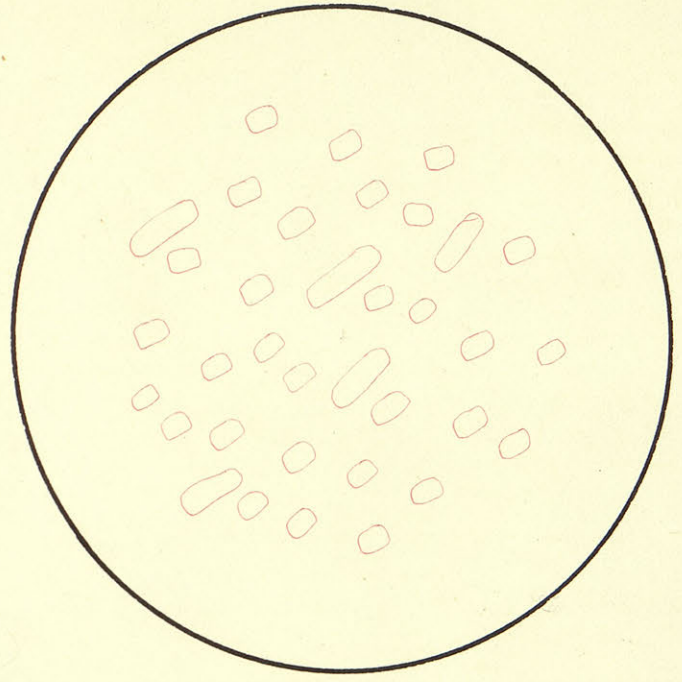
III



IV



V



VI

