Stereum hirsutum (Willd.) Fr. Putnam, 10, 1893; 12, 1894.

Stereum ochraceoflavum Schw. Vigo, 10, 1893.

Thelephora tephroleuca B. & C. Putnam, 7, 1894 (Melia Ellis).

AGARICACEÆ.

Collybia zonata Pk. At the foot of a maple, Putnam, 8, 1896.

LYCOPERDACEÆ.

Geaster fimbriatum Fr. Putnam, 11, 1894.

Lemanea catenulata grows in abundance, forming fringes on the rocks above the upper fall (Eel River Falls, Owen County), where I collected it in May, 1893. According to Dr. Atkinson this species has not before been reported from America. Its Chantransia stage is still a desideratum. The plant was distributed in Setchell, Holden and Collins: *Phycotheca Americana.*

Additional Hosts for Indiana fungi previously reported.

Carex Pennsylvanica (Puccinia caricis). Montgomery, 5, 1895 (Olive).

Galium aparine (Puccinia galii). Montgomery, 5, 1895 (Olive).

Ipomœa nil (*Albugo ipomœa-pandurinæ*). Tippecanoe, 9, 1895 (Arthur).

Phaseolus diversifolius (*Uromyces appendiculatus*). Tippecanoe, 9, 1895 (Arthur).

Columbia University, 26 December, 1896.

Changes in the Pith Cell Preliminary to the Development of Cavities in the Stems of Some Grasses. By George J. Pierce.

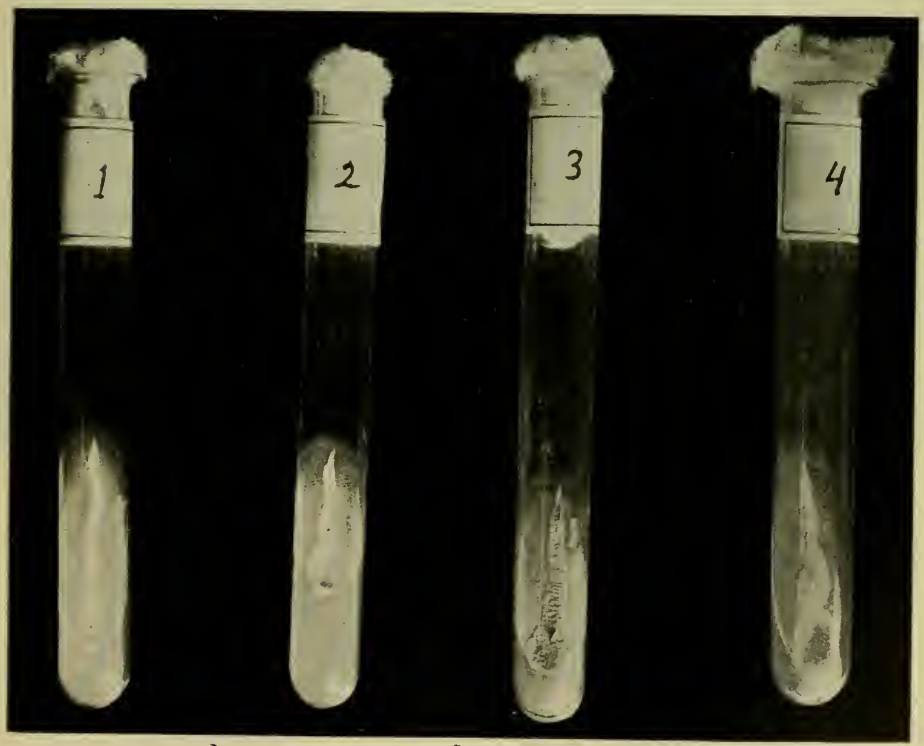
The Bacteriological Flora of the Air in Stables. By A. W. Bitting and Chas. E. Davis.

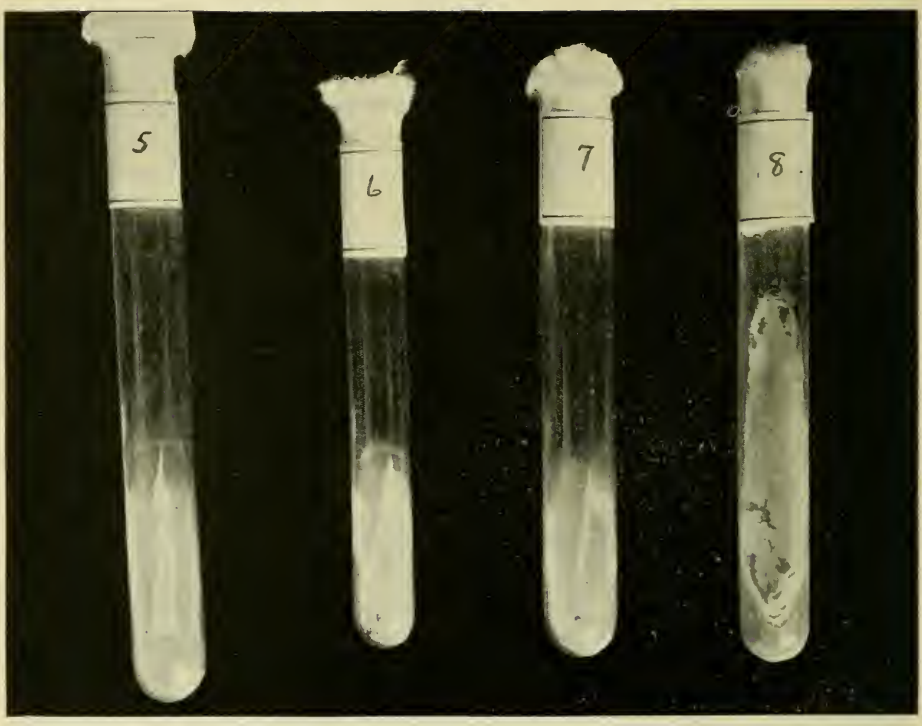
During the first five months of the present year a study was conducted to determine the number of bacteria found in the air in stables and to determine whether a relationship existed between the number of germs found in the air and the sanitary condition of the place.

Ten barns and stables were selected, representing fairly well good, average and poor sanitary conditions. Fifteen tests of the air were made inside the buildings with Hesse's apparatus and a corresponding number of tests made on the open air at the same time. The average number of colonies developed per liter from the air inside the stables was 86; the average number of colonies developed per liter from the air outside the stables was 27. Thirty tests were made by Petri dish exposures for two minutes each in the air inside the stables and fifteen tests

for the same length of time outside the stables. The Petri dish exposures were made at the same time the Hesse tests were made. The average number of colonies grown on the plates exposed inside the stables was 174, and 55 for those exposed on the outside. In almost every case the number of germs obtained by both Hesse's apparatus and Petri dish exposures was greater inside than outside the stables. It was determined that the number of germs per liter of air could not be taken as an index of the sanitary surroundings. The dust caused by the feeding operation, the moving of bedding, currying, etc., have more to do with the number of germs which will be drawn into a Hesse tube or fall upon a Petri dish than has lack of ventilation. A box stall with sides and ceiling lined with matched lumber with no place for ventilation or the admission of food except a tightly closing door showed the fewest germs. The air became so foul in twenty-four to thirty hours that acute catarrh developed in the three different horses confined in it during the experiment.

A description of eighteen forms studied in detail is herewith appended:

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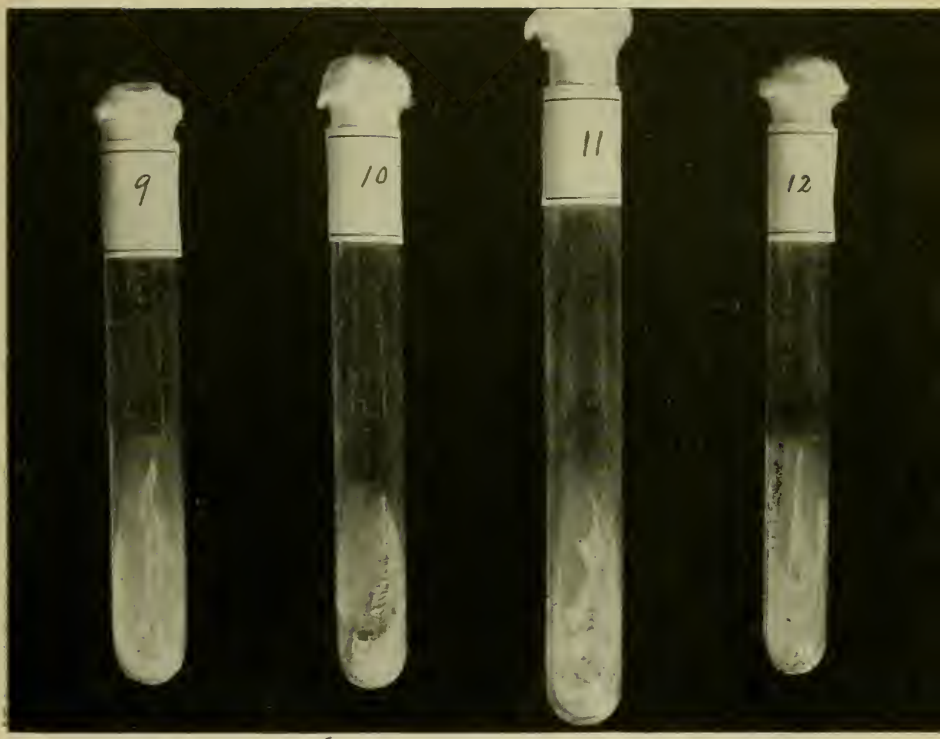
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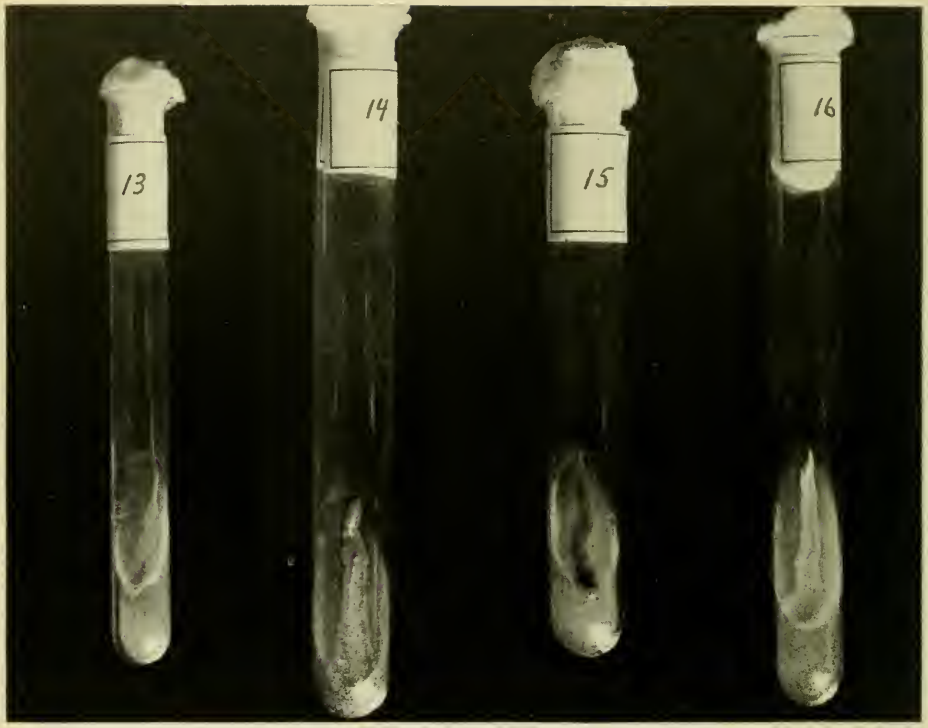
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DESCRIPTION OF FORMS OF BACTERIA OBTAINED FROM THE AIR IN STABLES.

FORM No. 1.

Obtained from the air of the stable in the horse barn at Purdue.

Morphology, a diplococcus 1 to 1.5^{n} in diameter. Sometimes three or four are joined together.

Biological Characters. An ærobic, liquefying motile diplococcus. It grows in various media at room temperature. In Bouillon it produces turbidity and a white sediment is formed in bottom of the tube. In Gelatine Stick culture, growth occurs only at the surface; is not luxuriant, of a whitish color; producing a liquefaction which is covered with a white film. It grows at a temperature of 102° F. producing a whitish though not luxuriant growth. On Potato it gives a luxuriant reddish growth with a white growth intermingled. On Agar Plate the colonies

are white, slick, smooth surface, regular outline with a finely granular portion at the edge. On Agar Streak it gives a cream-colored, raised convoluted growth with folds running from the center to the edge. On Lactose Litmus Agar Plates the colonies were large. They produce no change in the litmus, showing that lactic acid is not formed.

FORM No. 2.

Obtained from the air in the Purdue horse barn. The form is very abundant.

Morphology. A micrococcus 1 to 1.5$^{\mu}$ in diameter. It often occurs in masses of three or four.

Biological Characters. A liquefying, motile ærobic, micrococcus. In Bouillon it produces turbidity and forms a yellow ring on tube at surfaces of the liquid. A yellow precipitate collects in bottom of tube. On Potato it produces a raised, yellow, granular growth along the streak. In Gelatine Stick culture a yellowish growth occurs only on the surface which liquefies the gelatine. On Agar Plate the colonies are of a brownish color, of irregular outline and of a granular appearance. The colonies that grow on the surface are larger than those that grow on the bottom of the plate. This form grows at a temperature of 102° F.; giving a medium, irregular, white slick growth along the streak. On Agar Streak it forms a light yellowish, granular growth of irregular outline. On Lactose Litmus Agar plates the colonies are large and white. They produce a small amount of lactic acid.

FORM No. 3.

Obtained from the air in the Purdue cattle barn. Only a few colonies obtained.

Morphology. A bacillus 4$^{\mu}$ in length and about 1$^{\mu}$ in width. It occurs in short chains.

Biological Characters. A liquefying facultative anærobic, motile bacillus.

In Bouillon a white flacculent mass forms both on the surface and in the liquid. In Gelatine Stick cultures it produces a slight white growth along the puncture. It gives a light brownish, slick, luxuriant growth at a temperature of 102° F. It grows over the whole surface of the Agar and colors it brassy. On Potato it gives a raised, wrinkled, luxuriant, white powdery growth. On Agar Streak it forms a convoluted, raised, white growth, which is slightly granular at the edge. The colonies on Agar Plate, white with a pale spot in the center and are fringed at the edge. On Lactose Litmus Agar Plates the colonies are white, raised, wrinkled, with a granular growth around the edge. The litmus is changed slightly pink, showing a small production of lactic acid. The growth on this media is quite rapid.

FORM No. 4.

Obtained from the air in the Purdue horse barn. This form is quite abundant.

Morphology. A bacillus 3^{μ} long and 1^{μ} in width.

Biological Characters. A facultative anærobic bacillus.

In Bouillon it produces turbidity and a white sediment forms in bottom of tube. On Potato it forms a luxuriant, light brownish, raised growth. The growth at a temperature of 102° F. is very luxuriant over the whole surface of Agar and has a slick appearance. On Agar Streak it produces a greenish slick growth only along the streak. On Agar Plate, pale white colonies with a smooth outline are found, which later turned slightly green. The colonies which grow on the surface are larger than those on bottom of the plate. On Lactose Litmus Agar it produces no change in litmus, showing that this form does not produce lactic acid.

FORM No. 5.

Obtained from the air in the Purdue sheep barn.

Morphology. A diplococcus about 1^{μ} in diameter.

Biological Characters. A liquefying, motile ærobic, non-spore forming diplococcus. It grows in various media at room temperature. In Bouillon it produces turbidity, and forms a white precipitate in the bottom of the tube. In Gelatine Stick a white growth forms only on the surface. The growth at a temperature of 102° F. is very slight, and is of a pale white or bluish color. On Potato a whitish growth forms over the whole surface of the Potato. On Agar Plate small white colonies. with smooth outline and smooth edges, are formed. They grew as luxuriantly on the bottom of plate as on the surface of the Agar. On Lactose Litmus Agar a portion of the litmus is colored pink, showing that a small quantity of lactic acid is produced.

FORM No. 6.

Obtained from the veterinary hospital when the ventilation was very poor.

Morphology. A bacillus from 2 to 3^{μ} in length and $\frac{1}{2}^{\mu}$ in width.

Biological Characters. A liquefying ærobic, motile, a trembling motion, spore forming bacillus. It grows on various media at room temperature. In Bouillon it causes considerable turbidity, but forms only a slight sediment. On Potato it produces a yellowish, raised, wrinkled growth. In Gelatine Stick it liquefies the gelatine on the surface and forms a white scum over the part that is liquefied.*

* See Plate No. 10.

On Agar Plate it forms small white irregular colonies which are fringed at the edge. The growth at a temperature of 102° F. is white, smooth, very luxuriant, and grows over whole surface of Agar. On Lactose Litmus Agar Plate the colonies are white and produce a slight change in the litmus, showing the production of a small amount of lactic acid.

FORM No. 7.

Obtained from the veterinary hospital.

Morphology. A sarcena about $1\frac{1}{2}^{n}$ across.

Biological Characters. A non-liquefying ærobic sarcena. It grows in most media at room temperature. In Bouillon it produces turbidity and forms a white sediment in bottom of tube. On Gelatine Stick cultures a very slight yellow growth forms on the surface. On Agar Streak it gives a slick yellowish growth. The growth extends over surface of Agar, and has an irregular outline.* On Potato it forms a deep yellow, slick growth along the streak. The growth at the temperature of 102° F. was very slight, and has an irregular outline. On Agar Plate it forms small, yellow granular colonies with a smooth outline. The colonies that grow on the bottom of the plate are transparent at the edges and granular in the center. On Lactose Litmus Agar Plate small white colonies are formed, which produce a slight change in the litmus showing the formation of lactic acid.

FORM No. 8.

Obtained from the veterinary hospital. Only a single species was obtained.

Morphology. A short round bacillus 2^{n} long and 1^{n} broad. It occurs singly.

Biological Characters. A non-liquefying, non-spore forming motile bacillus. The growth on usual media at the room temperature is very slight. In Bouillon it produces slight turbidity and forms a brownish sediment in bottom of tube. It does not grow on potato. In Gelatine Stick it produces a very slight, transparent growth. The growth at a temperature of 102° F. is very slight, and is of a pale white color, with an irregular outline. On Agar Plate it forms small, white or transparent colonies with a smooth edge. Lactose Litmus Agar Plate, it produces no change in litmus, showing the production of no lactic acid. In a hydrogen atmosphere this form grows very luxuriant. The growth is white granular and extends over surface of Agar.

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* Plate.

FORM No. 9.

Obtained from the air in the veterinary hospital.

Morphology. A bacillus 3^{μ} long and $\frac{3}{4}^{\mu}$ broad. It occurs singly.

Biological Characters. A non-liquefying, faculative anærobic, actively motile-spore-forming bacillus. In Bouillon it produces turbidity and forms a slight, whitish sediment in the bottom of the tube. On Potato it forms a white, smooth growth. In Gelatine Stick cultures it forms a small cup-shape growth on sur, face. It grows slightly along stick and did not liquefy the gelatine. On Agar Streak it forms a slick white growth over the whole surface of Agar. On Agar Plate white, irregular, finely granular colonies are formed. It grows both on surface of Agar and on bottom of plate. The growth at a temperature of 102° F. is slick, white, luxuriant and extends over surface of Agar. On Lactose Litmus Agar Plate it forms pearly white colonies, which produce lactic acid in considerable quantity.

FORM No. 10.

Obtained from the air in the veterinary hospital.

Morphology. A long slender bacillus with square ends. It occurs united in chains of two or three cells. Length 4^{μ}, width 1^{μ}.

Biological Characters. A liquefying, non-motile, spore-forming, facultative, anærobic bacillus. In Bouillon it forms a white sediment on bottom of tube and a white film over surface. On Agar Streak it produces a brownish slick growth with an irregular outline and a white portion on the edge.* On Potato luxuriant white, raised, wrinkled growth appears. In Gelatine Stick culture it rapidly liquefies the gelatine and forms a white scum on the surface. On Agar Plate it develops into white colonies with a smooth outline. They grow both on surface and on the bottom of the plate. The growth at temperature of 102° F. is white and not luxuriant. On Lactose Litmus Agar Plates no change is produced, showing that lactic acid is not formed.

FORM No. 11.

Obtained from the air in the veterinary hospital. This form is quite abundant.

Morphology. A short, thick bacillus. It often occurs united in chain of two cells. Length 3^{μ}, width $1\frac{1}{2}^{\mu}$.

Biological Characters. A liquefying, non-motile, facultative, anærobic, spore-forming bacillus. In Bouillon it forms a white sediment in bottom of tube and a

*See Plate.

white scum over the surface. On Agar Streak it produces a white, raised, folded growth. On Agar Plate it forms smooth white colonies with an even outline. The colonies grow both on bottom of plate and on surface of Agar. In Gelatine Stick culture it liquefies the gelatine in a dish-shape growth. It grows along the stick and liquefies the gelatine. On Potato it forms a raised, wrinkled, white growth.* On Lactose Litmus Agar small white colonies grow, which produce lactic acid.

FORM No. 12.

Obtained from the air in Mrs. Morley's barn.

Morphology. A small bacillus 1 to 2^{μ} in length and $\frac{1}{2}^{\mu}$ in width. It occurs singly.

Biological Characters. A liquefying, actively motile, facultative, anærobic, non-spore-forming bacillus. In Bouillon it produces turbidity in a short time and forms a white sediment in bottom of tube, On Potato it gives a reddish growth extending over surface. On Agar Streak the growth is of a cream color and not very luxuriant. The growth presented an irregular outline and was lined with small white dots near the edge. It produces a white growth all over the surface of Agar at a temperature of 102° F. In Gelatine Stick culture it liquefies the gelatine in a saucer-shape growth, and it grows slightly along the stick. On Agar Plate it forms white, granular colonies with a smooth outline. It grows mostly on the surface of the Agar. On Lactose Litmus Agar large round colonies grow. It produces no change in litmus, showing no lactic acid.

FORM No 13.

Obtained from the air in the veterinary hospital.

Morphology. A short bacillus with round ends. $2\frac{1}{2}^{\mu}$ in length and 1^{μ} in width. It occurs in short chains.

Biological characters. A liquefying non-motile, spore forming, facultative anærobic bacillus. In Bouillon it produces turbidity and forms a white sediment in bottom of tube. On Agar Streak it forms a light yellow smooth growth with an irregular outline. The growth was near the edge and was of a whiter color than the center. On potato it forms a slick, raised, cream-colored growth along the streak. In Gelatine Stick culture it liquefies the gelatine and forms a white scum over the surface. The growth at temperature of 102° F. is slight and of a white color. On Agar Plate it produces large pearly white colonies with a smooth outline, which later turned to a brownish color. On Lactose Litmus Agar it forms white colonies which do not produce lactic acid. (See plate.)

*See Plate.

FORM No. 14.

Obtained from the air in the veterinary hospital.

Morphology. A diplococcus $\frac{1}{2}^{n}$ in diameter.

Biological Characters. A non-liquefying ærobic, probably motile diplococcus. In Bouillon it produces turbidity and a light greenish sediment forms in bottom of tube. A white scum forms on tube at surface of liquid. On potato it forms a greenish yellow growth along the streak. The growth on potato is not luxuriant and has a granular appearance. The form does not grow very luxuriant at a temperature of 102° F. In Gelatine Stick culture it forms a dish shape white growth and does not liquefy the gelatine. On Agar Streak a greenish yellow, slick growth with a smooth outline appears. On Agar Plate it forms yellowish green colonies with a ragged outline. The colonies present a granular appearance with a light or transparent ring about half way between the edge and the center. The colonies that grew on the surface are larger than those that grew on the bottom of plate. On Lactose Litmus Agar it forms large white colonies which do not produce lactic acid. (See plate.)

FORM No. 15.

Red yeast.

Obtained from the air in Professor Troop's barn.

Morphology. It appears as oval shaped cells 3 to 4^{n} long and $\frac{1}{2}^{n}$ broad.

Biological Characters. Aerobic. In Bouillon it forms a reddish sediment in bottom of tube. On Potato it produces a pinkish though not luxuriant growth. On Ager Streak it forms a pinkish slick growth. It does not grow at the temperature of 102° F. In Gelatine Stick culture it grows only on surface and does not liquefy the gelatine. (See plate.)

FORM No. 16.

Obtained from the air in Professor Troop's barn. Only one colony was obtained.

Morphology. It appears as tetrads, and is composed of four germs in a group; it is about $2\frac{1}{2}^{n}$ across.

Biological Characters. A non-liquefying, facultative anærobic motile, non-spore forming tetrade. In Bouillon it produces turbidity and forms a white sediment in bottom of tube. On Agar Streak it forms a white branched growth. On Potato the growth is slow, does not show the branched appearance, and has a granular appearance. In Gelatine Stick culture it forms an irregular dish shape growth.

It grows slightly along the stick. It does not grow at a temperature of 102° F. On Agar Plate it forms small pearly white colonies with a smooth outline and a white spot in center. It grows as well on bottom of dish as on surface of agar. On Lactose Litmus Agar it forms branched white colonies. It produces no lactic acid. (See plate.)

FORM No. 17.

Obtained from Gregory & Dobbins' livery barn. This form is fairly abundant.

Morphology. A diplococcus $\frac{3}{4}^{n}$ in diameter.

Biological Characters. A non-liquefying, non-motile ærobic diplococcus. In Bouillon it produces turbidity and forms a white sediment in the bottom of tube. A white ring forms on tube at surface of liquid. On Agar Streak it forms a slick, red colored growth along streak. In Gelatine Stick culture it grows only on surface, is of a pink color and does not liquefy the gelatine. On Agar Plate it forms small white colonies. The growth is very slow. On Lactose Litmus Agar no change was produced in litmus, showing no lactic acid. It does not grow on Potato.

FORM No. 18.

Obtained from Godman's livery barn.

Morphology. A small micrococcus about $\frac{1}{6}^{n}$ in diameter.

Biological Characters. A non-liquefying, non-motile, ærobic micrococcus. In Bouillon it produces considerable turbidity and forms a white ring on tube at surface of liquid; it also forms a white precipitate in bottom of tube. On Potato it forms a raised granular cream-colored growth along streak. In Gelatine Stick it produces a white convoluted growth on surface, and does not liquefy the gelatine. On Agar Streak it forms a milk white growth with irregular outline. On Agar Plate it produces pale white luxuriant colonies with a smooth outline. On Lactose Litmus Agar the colonies are small and white, producing considerable lactic acid.

Have the Common Yeasts Pathogenic Properties?—An Experimental Study. By Katherine E. Golden.

Yeasts have always been considered as purely saprophytic organisms, and not supposed to be parasitic in any sense; but, in the light of some recent experiments, this classification would seem to need reconsideration. These experiments indicate not only that some yeasts are parasitic, but that they are also pathogenic. These results are not at all at variance with developments made in the study of other organisms, as many bacteria which at first were supposed to be saprophytic