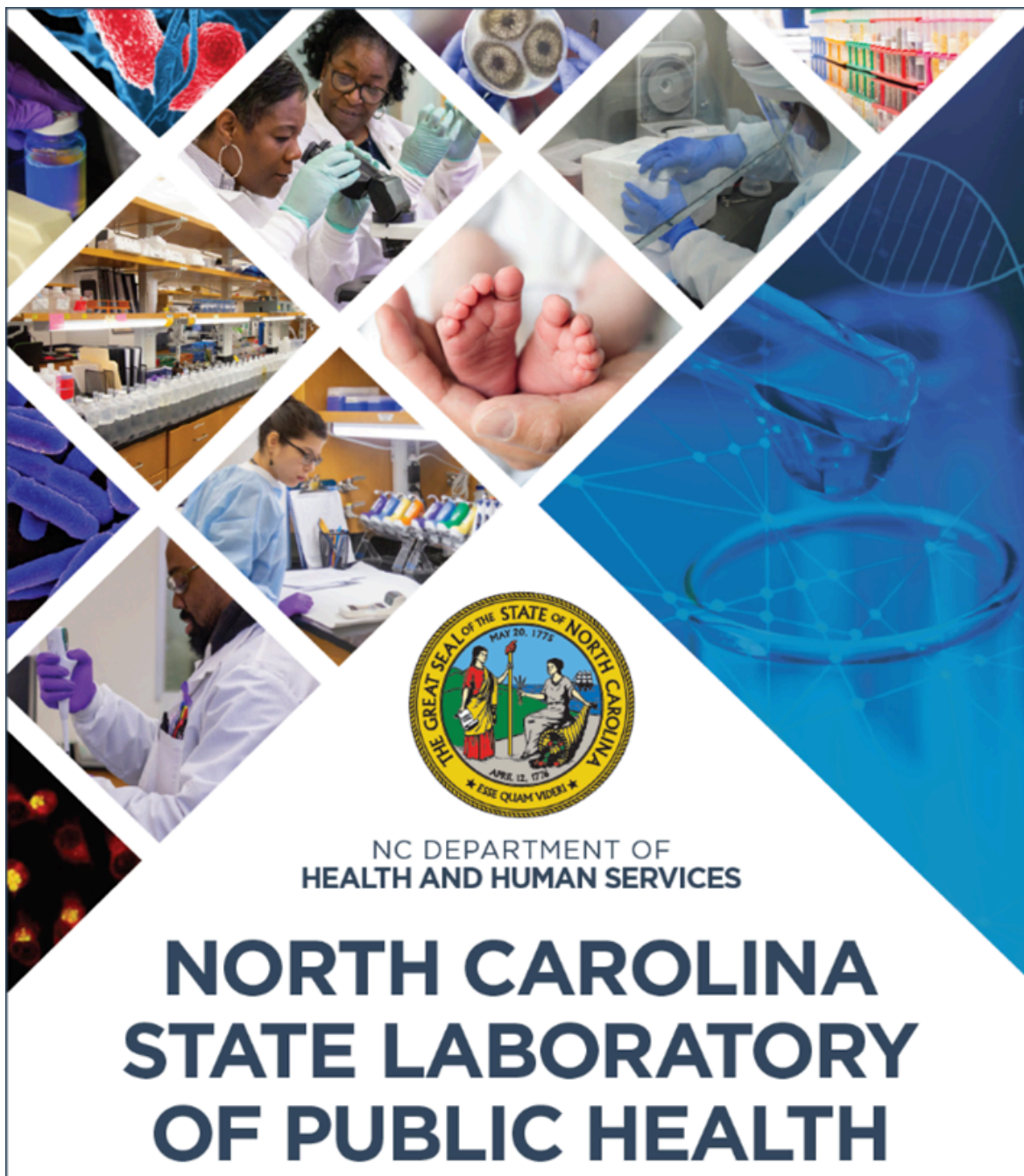




This packet provides teachers with age-appropriate activities designed to improve science education.

- 1: PPE Paper Doll**
- 2: Guess That Microscopic Image**
- 3: Name that Microbe**

CDC PPE Paper Doll Activity



Overview:

Students learn the purpose and correct order of putting on and removing Personal Protective Equipment (PPE) used by health care and laboratory workers to prevent contamination. This hands-on activity reinforces infection control, sequencing, and critical thinking skills.

Estimated Time: 20-30 minutes

Objectives

- Identify different types of PPE (gown, gloves, mask, goggles/face shield)
- Demonstrate the correct order for putting on (donning) and taking off (doffing) PPE
- Understand why PPE order matters for safety and contamination prevention

Materials

- CDC Paper Doll Printable (figure and PPE cutouts)
- Scissors
- Glue stick or tape
- Optional: markers, crayons, or colored pencils for decoration
- “Clean” and “Contaminated” work space labels (optional)

Instructions

Part 1: Donning PPE (putting It On)

1. Distribute paper doll and PPE cutouts
2. Have students cut out all PPE pieces
3. Review the correct order for donning PPE
 - a. Gown
 - b. Mask/Respirator
 - c. Goggles/face shield
 - d. Gloves
4. Students layer or glue each PPE piece on the paper doll in this order
5. Discuss why PPE is layered this way

Part 2: Doffing PPE (Taking It Off)

1. Start with the fully dressed doll
2. Review the correct order of removing PPE
 - a. gloves
 - b. goggles/face shield
 - c. gown
 - d. mask/respirator (after leaving the contaminated area)
3. As students “remove” each piece, place it in a designated “disposal zone” on their table or worksheet
4. Discuss what could happen if the order is not followed

Extensions

- Elementary: Color and label each PPE item; discuss real-life helpers who use PPE.
- Middle School: Have students create a PPE safety poster or write steps for donning/doffing.
- High School: Connect the activity to current CDC biosafety or infection control protocols.

Guess That Microscopic Image



Overview:

Students examine close-up/microscopic images of everyday objects and try to match each microscopic image to the correct whole-object photo. The activity develops observation skills, vocabulary (including texture, pattern, and scale), scientific reasoning, and predictive inference.

Estimated Time: 20-40 minutes

Objectives

- Use visual clues (color, texture, pattern) to match microscopic images to whole-object images.
- Practice describing observations using scientific vocabulary (grain, fiber, pore, crystalline, cell-like).
- Form and justify hypotheses about what materials or surfaces look like under magnification.
- (Middle/High) Connect observed features to function or material properties.

Materials

- Set of whole-object photos (everyday items such as onion skin, banana peel, butterfly, etc.)
- Corresponding close-up/microscopic image for each whole photo
- Printed image cards (cut into two decks: Whole-Object Deck and Microscopic Deck) OR digital slideshow with randomized order
- Labels, answer sheets, pencils
- Optional: Magnifying glass or classroom stereo microscope for demonstration
- Optional: "Hint" tokens - for younger students

Main Activity - Matching Game (15–25 minutes)

Instructions

• **Option A - Card Match (hands-on)**

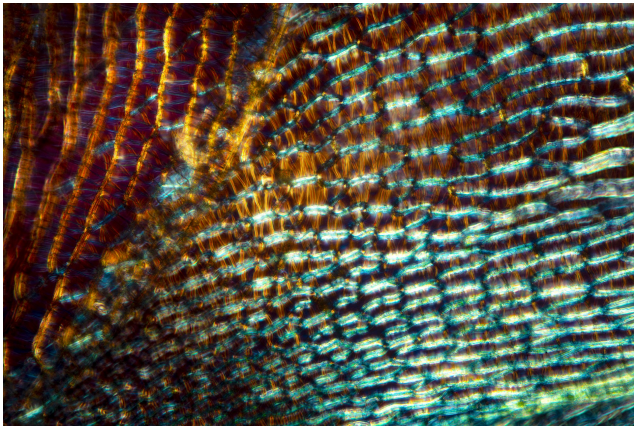
- Give each group a shuffled Whole-Object Deck and a shuffled Microscopic Deck (face up or face down, depending on difficulty).
- Students work in groups to match each microscopic image to a whole-object image. They record their match number and write 1–2 sentences explaining the visual clues used (color, texture, pattern, edge shape, scale cues).
- Teachers may allow 1–2 'hint' tokens per group (reveal a matching clue or let them view the object under a magnifier).

• **Option B - Slideshow/Board Match (whole class)**

- Project all whole-object images on one side of the board and all microscopic images (random order) on the other.
- Call on groups or individual students to propose matches and justify their choices. Place connecting lines or labels as the groups agree.
- Alternative: Speed Round (for review/competitions)
- Give teams 60–90 seconds per microscopic image to choose a match. Award points for a correct match plus bonus for best reasoning

Guess That Microscopic Image Continued

For example:



Name That Microbe

Overview:

Students take on the role of laboratorians, identifying an unknown bacterium using visual observations and simple biochemical tests. They will examine Gram stain results, perform oxidase and catalase tests, and use a decision tree to determine the microbe's identity. This hands-on activity introduces students to basic microbiology lab techniques and diagnostic reasoning used in real-world public health laboratories.

Estimated Time: 30-45 minutes

Objectives

- Describe the difference between Gram-positive and Gram-negative bacteria
- Identify bacterial shape (morphology) using Gram stain results
- Perform and interpret the oxidase and catalase tests
- Use a decision tree to correctly identify an unknown microbe
- Understand how laboratory results are used in medical and public health investigations

Materials

- Activating yeast
- Warm water
- Cornstarch
- Hydrogen peroxide
- Iodine
- Yellow food coloring
- Dropper/pipette
- Plastic test tubes or containers
- Empty petri dish or small clear plates
- Pen/pencil
- Activity handouts

Instructions

Step 1: Introduction

- Present the PowerPoint slides explaining the role of a laboratorian.
- Review safety guidelines and the concept of bacteria as helpful or harmful.
- Explain that students will work through evidence to identify a mystery microbe.

Step 2: Gram Stain Observation

- Observe the provided Gram stain image or sample.
- Record observations
 - Morphology - Round (cocci) or rod-shaped (bacillus).
 - Gram result - Positive (purple) or negative (pink).

Step 3: Oxidase Test

- Add 2–3 drops of your bacteria's Oxidase Test bottle in the first well of the plate
- Add 2-3 drops of iodine on top of your bacteria
- Observe color change and record findings



Instructions Continued

Step 4: Catalase Test

- Add 2–3 drops of hydrogen peroxide to your Catalase Test bottle in the first well of the plate
- Add 2-3 drops of hydrogen peroxide on top of your bacteria
- Observe reaction and record findings.

Step 5: Observe growth on MacConkey Agar/Blood Agar

Step 6: Identify the Microbe

- Use the decision tree to combine your Gram, oxidase, and catalase results.
- Determine which bacterium fits your results.
- Record your final identification and reasoning on the worksheet.

Step 7: Conclusion

- Discuss how a laboratorian reports the result to a healthcare provider to help guide treatment.
- Connect this process to how public health labs investigate disease outbreaks (e.g., foodborne illnesses).

Extensions

- Middle School: Create a “microbe trading card” with name, shape, Gram reaction, and a fun fact.
- High School: Research one identified organism and its role in human health or disease.
- Cross-Curricular: Tie to careers in microbiology, epidemiology, or biomedical science.

Each group needs

- 1- Catalase reagent
- 2- Oxidase reagent
- 1- Bacteria sample (A, B, C, D)
- 3-4 droppers/pipettes
- 1-2 empty petri dishes or a small clear plate/container
- Handouts - test instructions, growth pictures and Gram stain images associated with the sample letter, decision tree and observation worksheet

Note: Allow 1-2 minutes for test reactions to occur. It is encouraged to mix sample tubes (gently invert, securely close the tube to stir) before testing, as material tends to settle at the bottom of containers.



Name that Microbe!

Did you know that the NCSLPH's Microbiology unit performs over 50 tests to identify organisms that cause various diseases? The organism's reactions to the tests can be used as a guide to identify the organism. Today you will be the laboratorian identifying a bacterium. Observe the results of the bacteria's Gram stain and growth. Perform the oxidase test and catalase test on your bacteria. Then use the decision tree to make your identification.

Let's Experiment!

Oxidase Test

1. Place 2-3 drops of your bacteria's Oxidase Test bottle in the first well of the plate
2. Add 2-3 drops of iodine on top of your bacteria
3. Write your observations on the worksheet

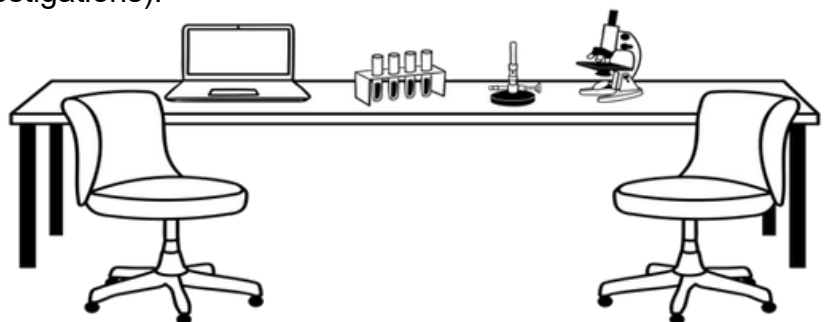
Catalase Test

1. Place 2-3 drops of your bacteria's Catalase Test bottle in the first well of the plate
2. Add 2-3 drops of hydrogen peroxide on top of your bacteria
3. Write your observations on the worksheet

Conclusion

Alright, laboratorians, now that you have identified your bacteria, the next step is to report your results to the doctor who ordered the test so they can treat the patient.

In addition to identifying organisms, the NCSLPH also does additional testing for disease surveillance and control (e.g., foodborne outbreak investigations).





Name That Microbe - Student Worksheet

Organism Letter (A,B,C,D)	Circle your answer	Result
Morphology	Cocci Rods Diplococci	
Gram Stain	Positive or negative	Gram Stain Reaction:
Oxidase	Blue or not blue	Oxidase: positive or negative
Catalase	Bubbles or no bubbles	Catalase: positive or negative
Growth of McConkey	Yes or no	
Growth on Blood Agar	Yes or no	
Use the decision tree to identify the organism		
Identify Organism:		

Name That Microbe Activity Set-Up Information

Reagents/Solutions	Materials	Instructions
Yeast/Cornstarch solution	250 mL or (≥ 8 oz) warm water 1 package of yeast 1 tbsp. of cornstarch yellow food coloring test tube or plastic container	Mix yeast and cornstarch into warm water. Add a few drops of food coloring. Mix. Note: Mix right before experiment and allow at least 5 minutes for yeast to activate. BE SURE TO MIX AGAIN BEFORE STUDENT USE
Catalase Reagent	Hydrogen peroxide Test tube or plastic container	Add 3-4 mL of Hydrogen peroxide to the test tube or plastic container. Label Catalase Reagent
Oxidase Reagent	Water Iodine Test tube or plastic container	Drop 3-4 drops of iodine into approx. 4mL of water into a test tube or plastic container. Label Oxidase Reagent
Bacterium A	Water Yellow food coloring Test tube or plastic container	Add 3-4mL of water and 3-4 drops of food coloring* into a test tube or plastic container. Label Bacterium A
Bacterium B	Yeast/cornstarch solution Test tube or plastic container	Add 3-4mL of yeast/cornstarch solution into a test tube or plastic container. Label Bacterium B
Bacterium C	Yeast/cornstarch solution Test tube or plastic container	Add 3-4mL of yeast/cornstarch solution into a test tube or plastic container. Label Bacterium C
Bacterium D	Yeast/cornstarch solution Test tube or plastic container	Add 3-4mL of yeast/cornstarch solution into a test tube or plastic container. Label Bacterium D

*Yellow food coloring should look consistent between the different samples.

Name That Microbe Cont.



Answer Key:

Catalase Reagent Reaction Results:

Positive: bubbling

Negative: no bubbling

Oxidase Reagent Reaction Results:

Positive: dark blue/purple

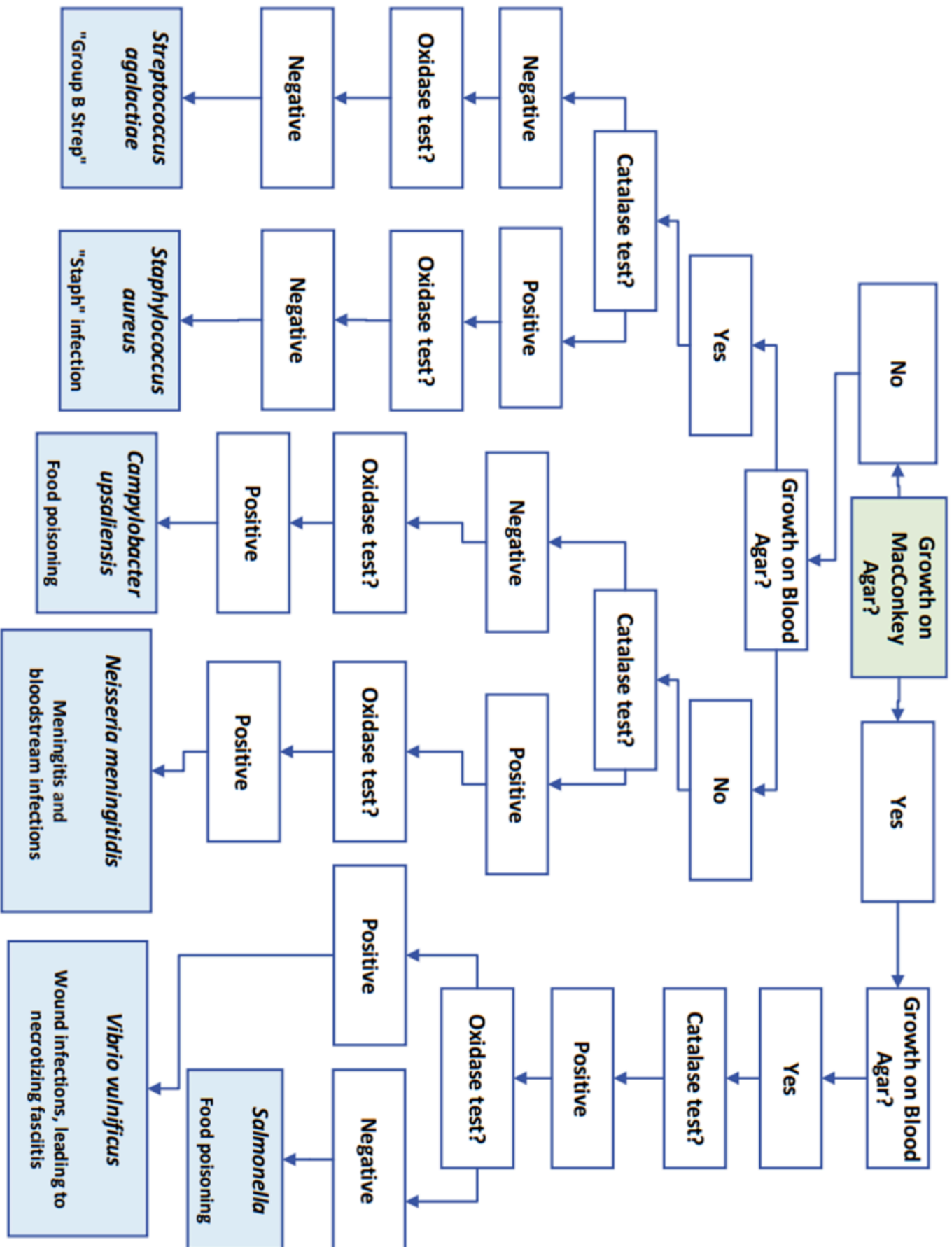
Negative: no color change

Gram Stain Reactions:

Gram Positive: purple

Gram Negative: red/pink

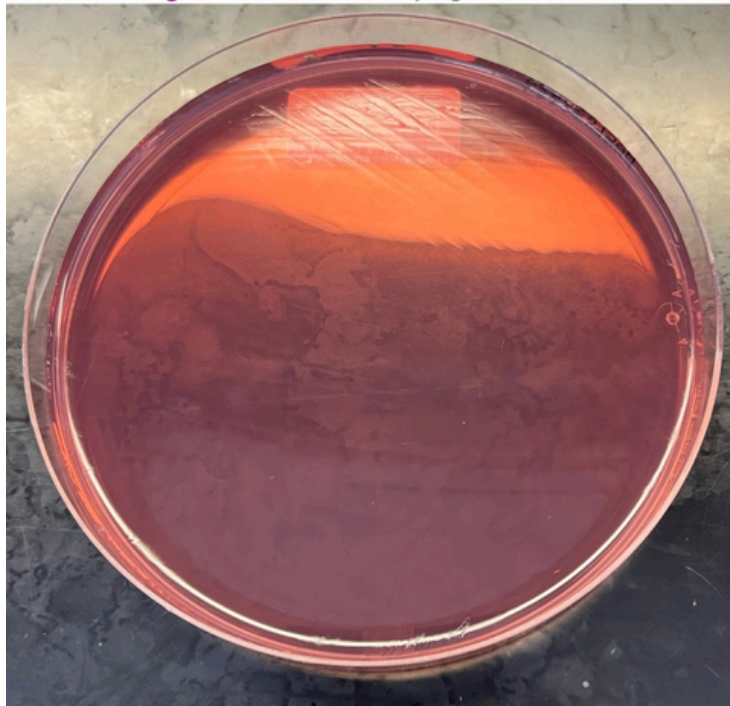
Step #	Test	Streptococcus agalactiae (Group B)	Neisseria meningitis	Salmonella species	Vibrio vulnificus
1	Morphology	Cocci in chains or pairs	Diplococcus- "coffee-bean" shape in pairs	bacillus	bacillus; large, slightly curved; comma shaped
2	Gram Stain	Gram positive	Gram Negative	Gram Negative	Gram Negative
3	Oxidase	Negative	Positive	Negative	Positive
4	Catalase	Negative	Positive	Positive	Positive
5	MacConkey Agar	No Growth	No Growth	Lactose Negative (clear) colonies	Lactose negative (clear) colonies
6	Blood Agar	Good Growth	No Growth	Good Growth	Large colonies; Beta- hemolytic (clear zone around colonies)
	Organism letter	A	B	C	D



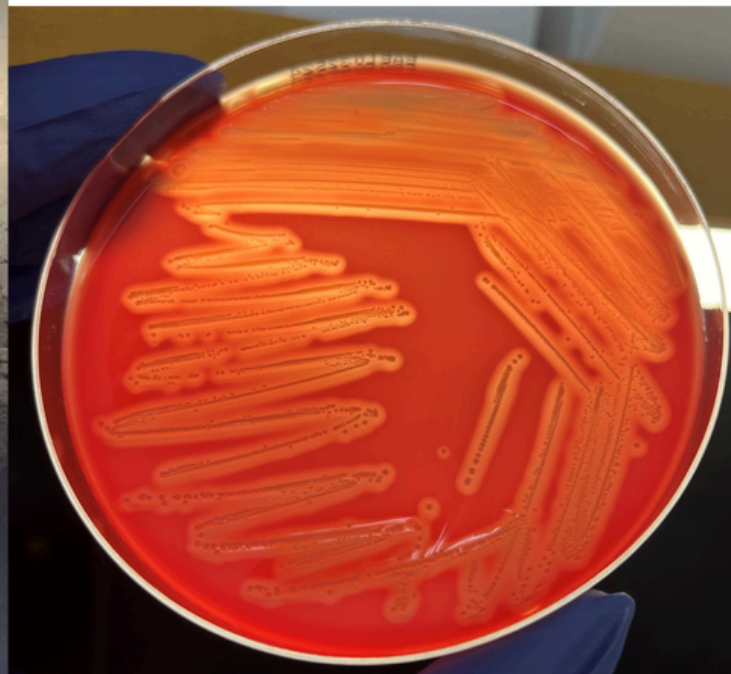


A

MacConkey Agar



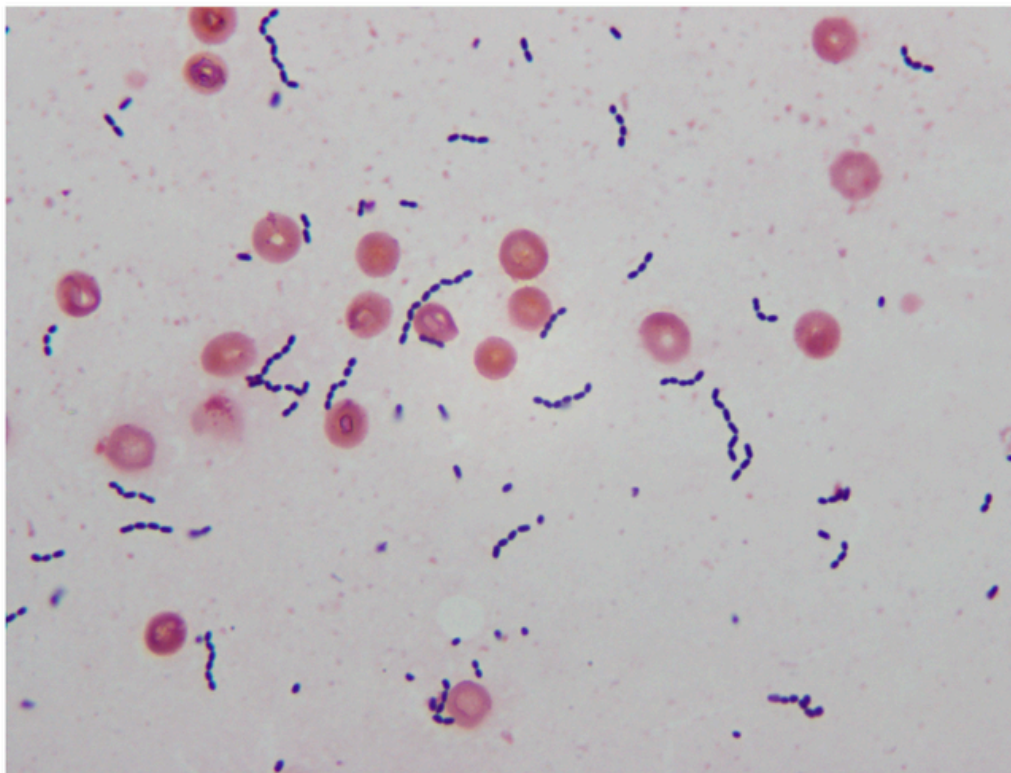
Blood Agar



Unknown A: *Streptococcus agalactiae* (Group B Strep)

A

Gram stain

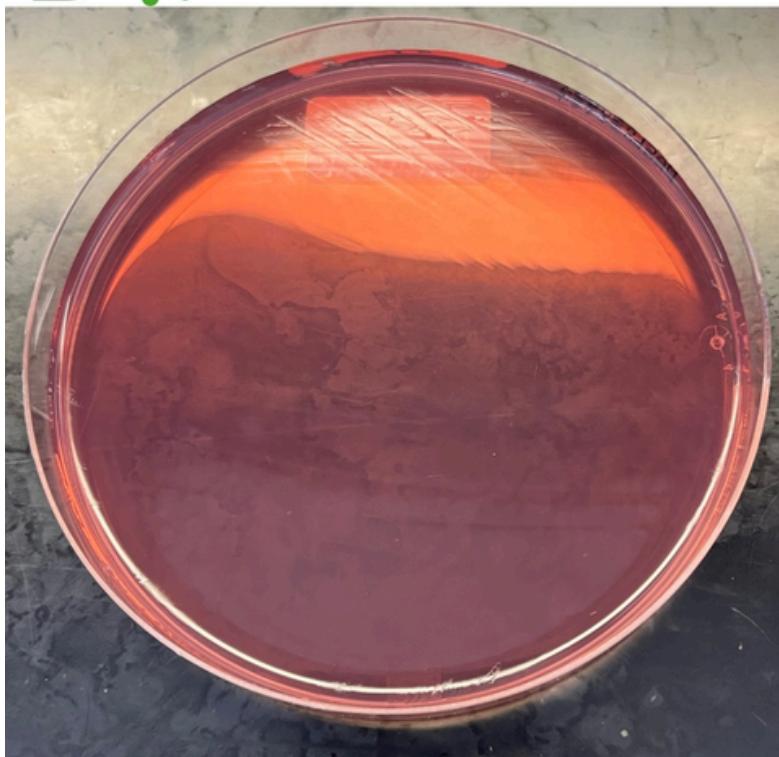


Unknown A: *Streptococcus agalactiae* (Group B Strep)

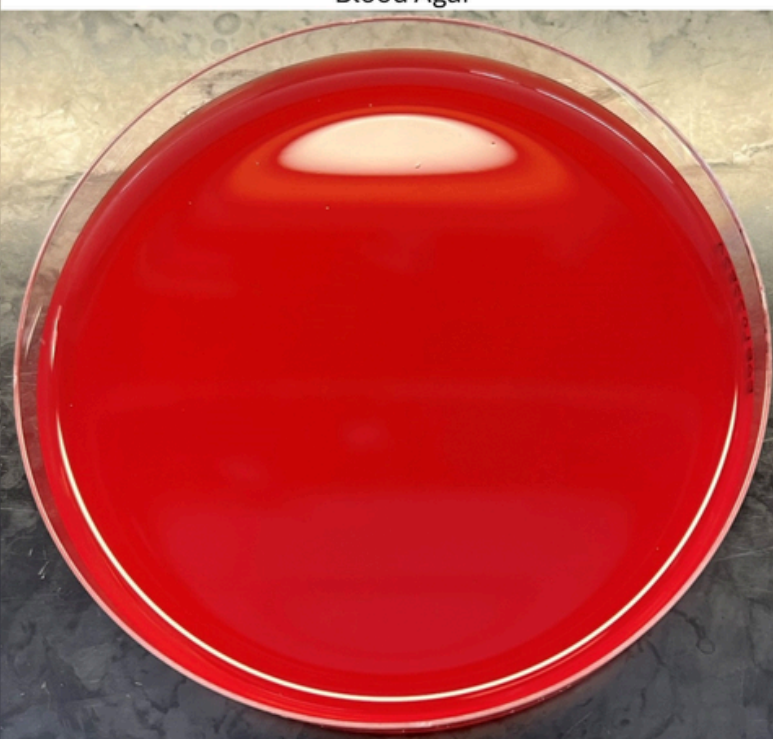
<https://labmedicineblog.com/tag/gbs/>



MacConkey Agar



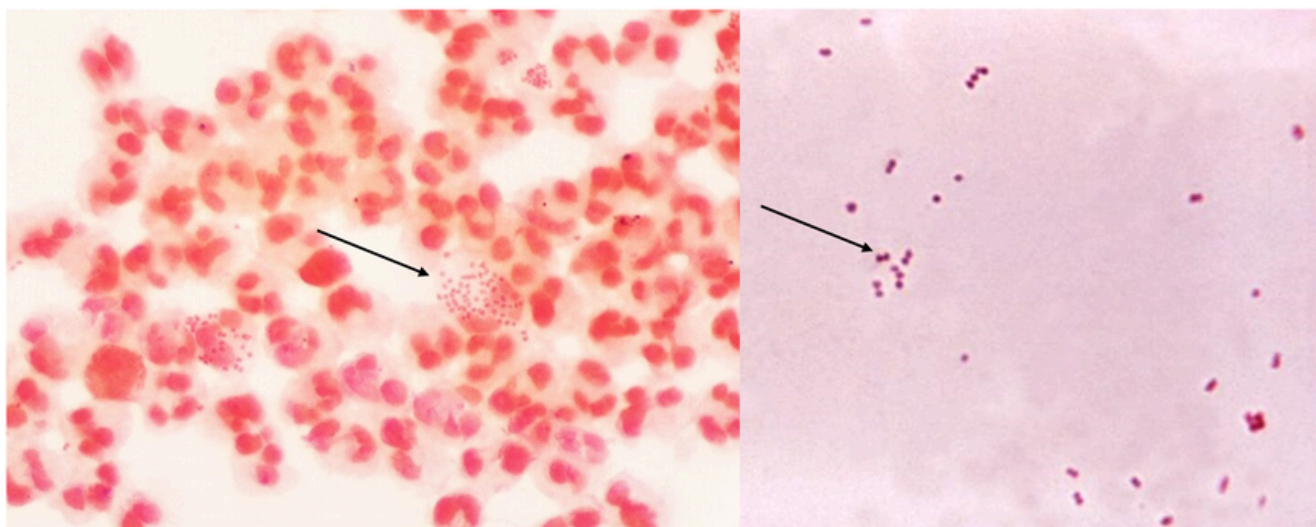
Blood Agar



Unknown B: *Haemophilus influenzae*



Gram stain

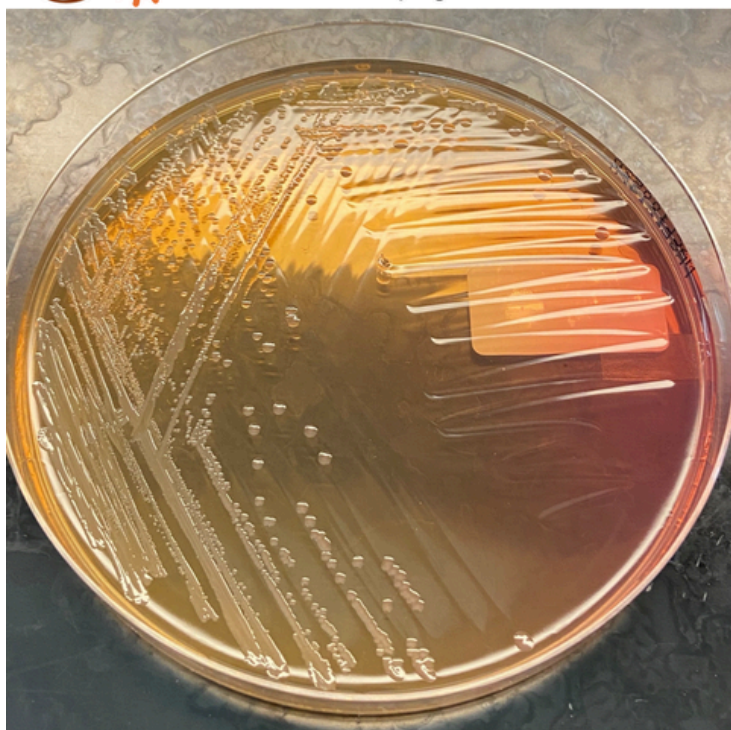


Unknown B: *Neisseria meningitidis*

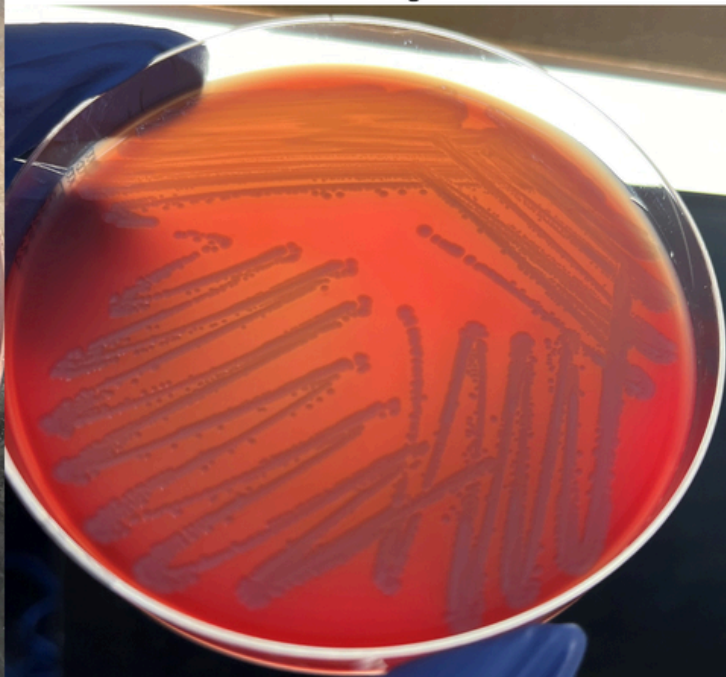
Citation: https://en.wikipedia.org/wiki/File:Neisseria_gonorrhoeae_and_pus_cells_Gram_stain.jpg
https://en.wikipedia.org/wiki/File:Neisseria_meningitidis.jpg#filelinks



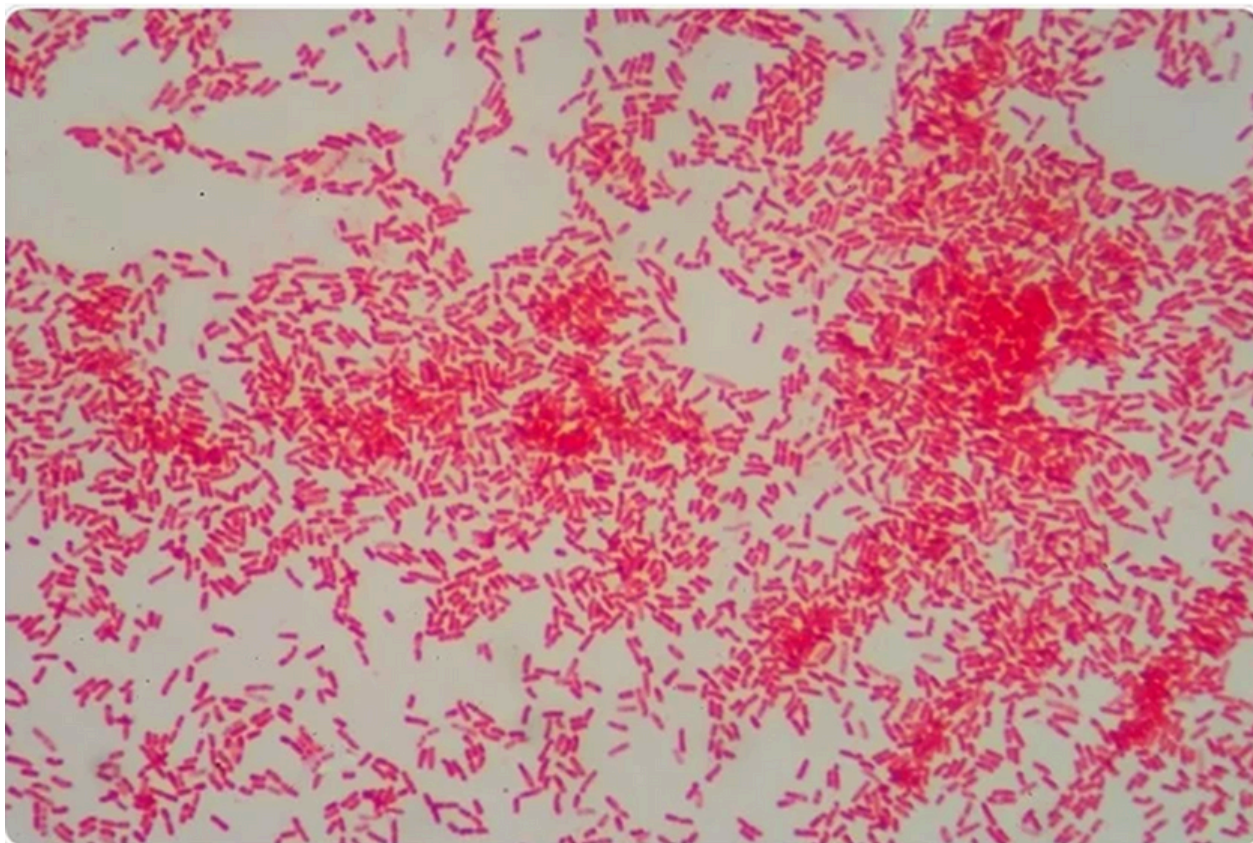
MacConkey Agar



Blood Agar



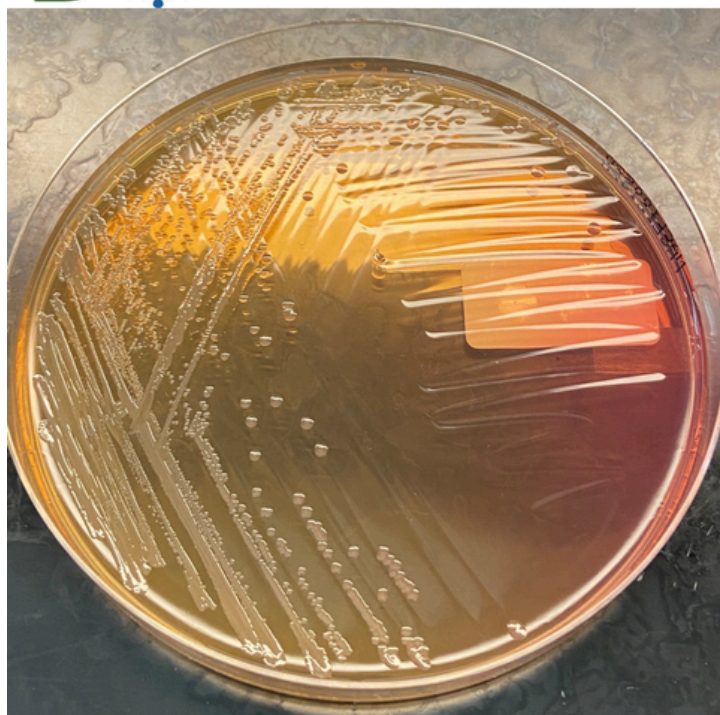
Unknown C: Salmonella



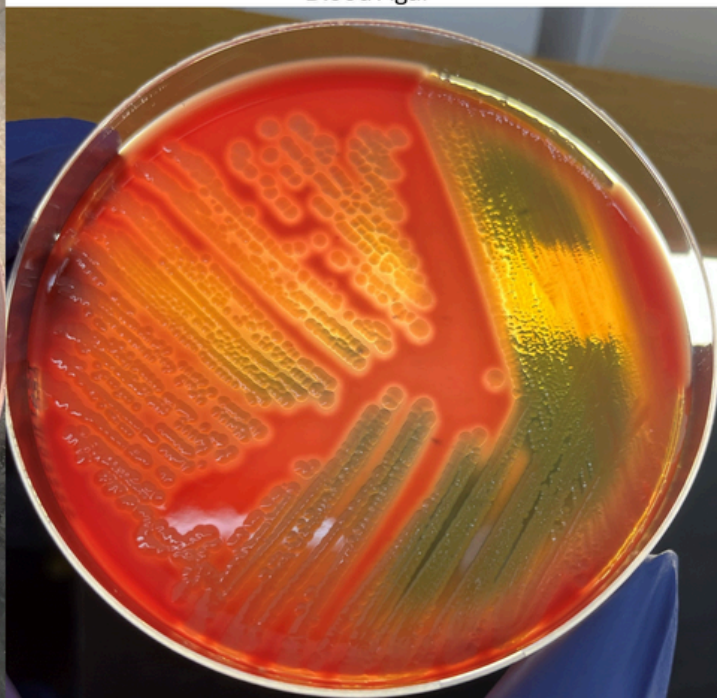
Unknown C: Salmonella



MacConkey Agar



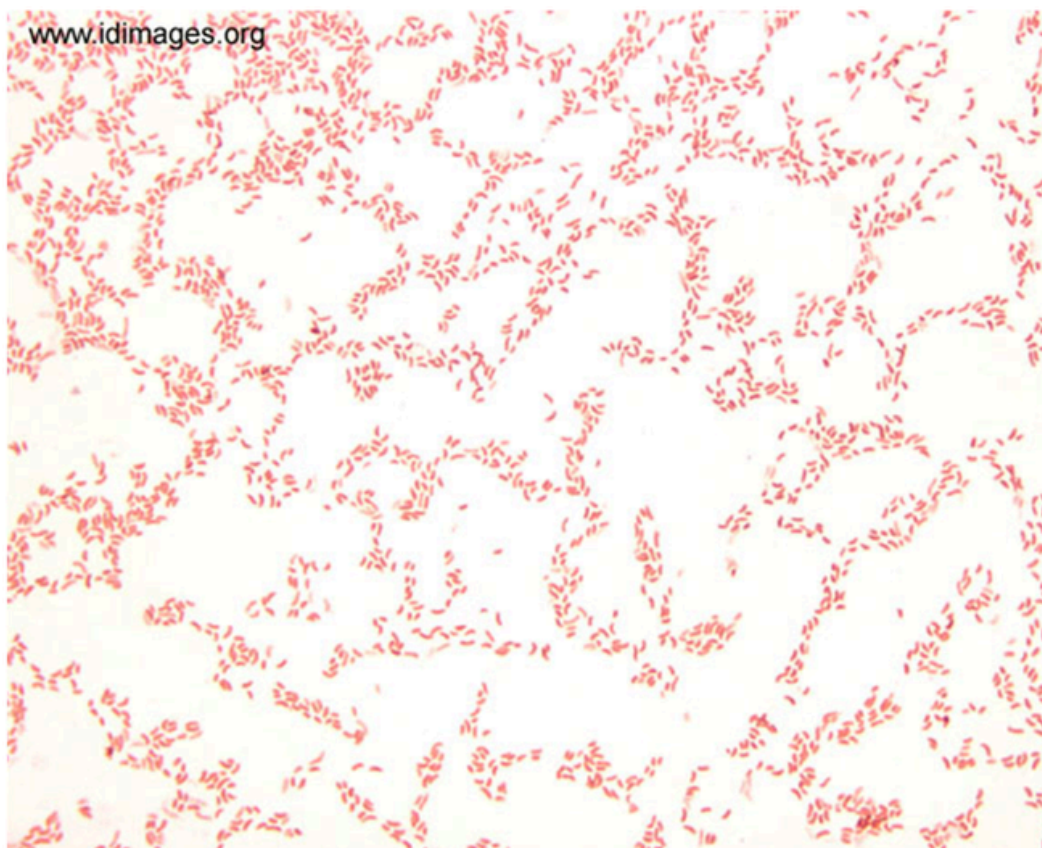
Blood Agar



Unknown D: *Vibrio vulnificus*



Gram stain



Unknown D: *Vibrio vulnificus*

<https://www.idimages.org/images/organismdetail/?imageid=1748&altimageid=294>