

The Bugs On Our Skin



Topic

Study of the microorganisms found on skin

Introduction

We spend considerable time cleaning ourselves, but we cannot rid ourselves of all the microbes on our bodies. Forensic scientists can search for microbes at a crime scene and use any they find to track down suspects. In the first part of this experiment, you will prepare Petri dishes with a surface on which microbes can grow. In the second part of the experiment, you will look for microbes in various places on your skin (between your toes, on your teeth, under your fingernails), transfer them to a growing medium, and watch them grow.

Time required

Part A: 20 minutes plus 30 minutes setting time

Part B: day 1, 20 minutes; then 5 minutes each day for about 5 days

Materials

*For Part A:**

clean 200 ml beaker or Erlenmeyer flask

about 10 g plain gelatin (e.g., unflavored)

1 cup distilled water (alternatively use water from a kettle that has boiled and then cooled)

hot plate or other source of heat

4 × 80 mm clean Petri dishes

clean glass rod or spatula

safety glasses

access to a refrigerator

*Alternatively, you can use Petri dishes containing a thin layer of sterile agar prepared by the school laboratory technician or your teacher.

For Part B:

4 prepared Petri dishes from part A

3 cotton swabs

translucent tape

4 sticky labels

marker pen

pencil

Safety note



Dispose of the Petri dishes carefully at the end of the experiment without opening them. Try to keep the lids on the Petri dishes and avoid breathing in air that has been in contact with the surface of the growing medium. Wash your hands both before and after handling the Petri dishes.

Procedure

All equipment must be clean before starting the experiment to prevent contamination from other sources.

Part A: Preparing the Petri dishes



1. Put the gelatin in the beaker or flask and add the water.

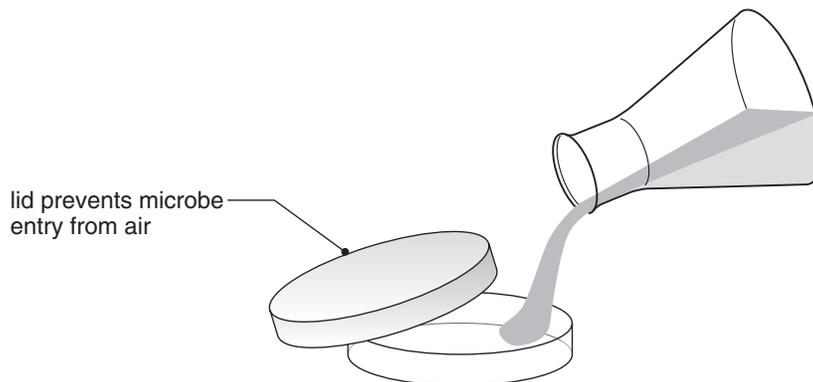


2. Stir the mixture and warm it on the hot plate until the gelatin dissolves.

3. Set out the Petri dishes on a flat surface. One at a time, lift the lid of a Petri dish and pour in the gelatin solution to a depth of about 0.5 – 1.0 cm (see diagram 1 below). Replace the lid and leave it until the liquid has set (about 30 minutes).

4. Store the prepared Petri dishes in a refrigerator until you are ready to use them.

1



Adding the gelatin solution to a Petri dish

Part B: Growing and observing the microbes

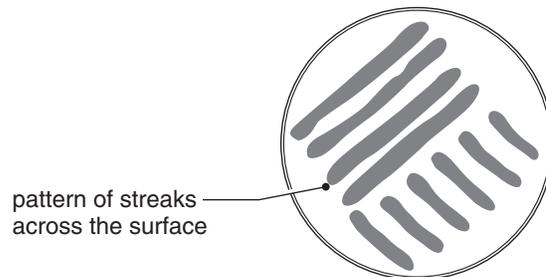
1. Write the date on the four sticky labels. Then write the appropriate letter and the source of microbes on each label according to Table 1.

Table 1. *Source of microbes*

Dish	Source
A	feet (between your toes)
B	teeth
C	under your fingernail
D	control

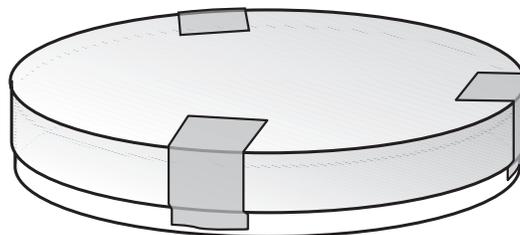
2. Stick one of the labels on the base of each Petri dish.
3. Take a clean cotton swab and rub it between your toes.
4. Carefully remove the lid from dish A and draw the cotton swab over the surface of the solid gelatin in the dish in a series of streaks as in diagram 2 below. Discard the cotton swab in an approved manner.
5. Replace the lid on the Petri dish and seal the top using three strips of masking tape (see diagram 3 below).
6. Repeat steps 4 and 5 for dish B using a different cotton swab and rubbing it over your teeth.
7. Repeat steps 4 and 5 for dish C using a different cotton swab with which you have cleaned under your fingernails.
8. Dish D is a control, so just tape the lid down without touching the surface of the gelatin.
9. Leave the dishes at room temperature and make observations each day. Draw what you see on the surface of the gelatin in the data table on the next page. Make your last observation no more than 5 days after the beginning of the experiment.

2



Pattern of streaks across the surface of the solid gelatin

3

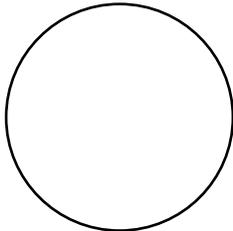
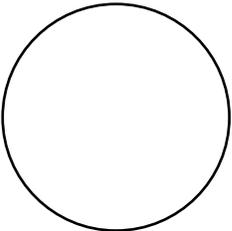
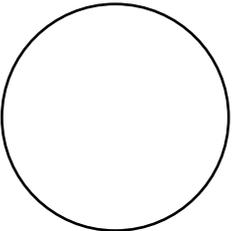
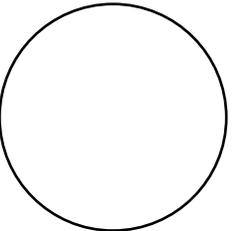
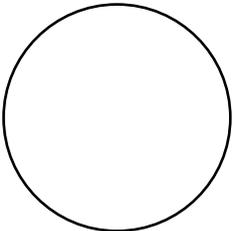
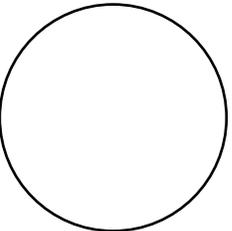
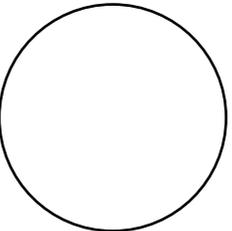
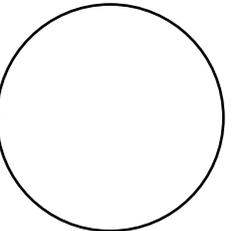
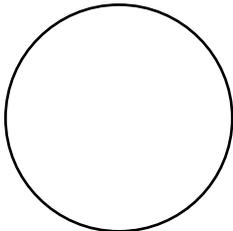
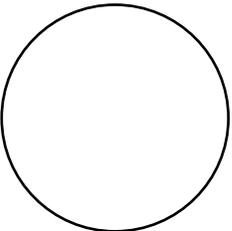
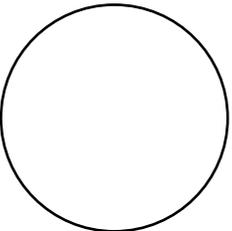
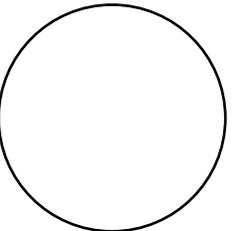
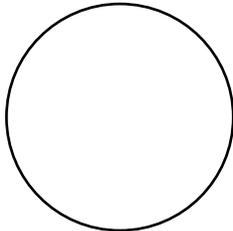
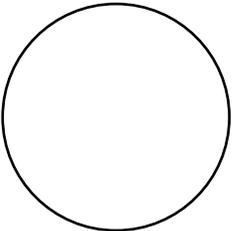
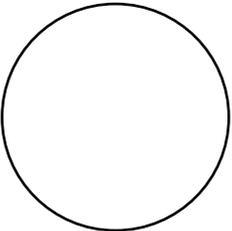
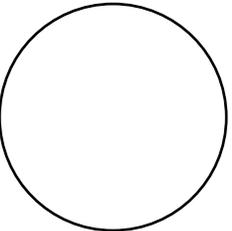
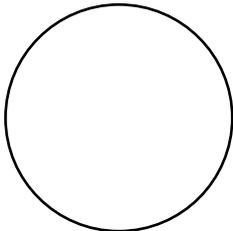
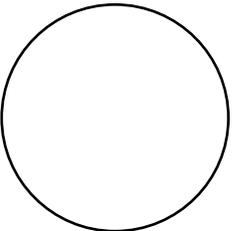
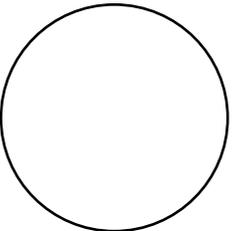
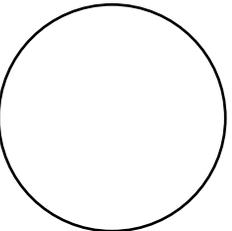


Petri dish with lid taped down

Analysis

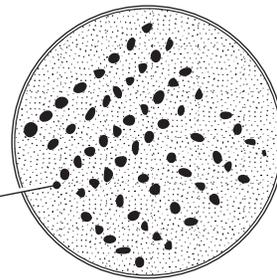
1. Why did you seal the tops of the Petri dishes?
2. What happened to the surface of the solid gelatin in the Petri dishes?
3. Were there differences between dishes A, B, and C?
4. What happened to dish D?

Want to know more?

DATA TABLE				
Date	Dish A	Dish B	Dish C	Dish D
				
				
				
				
				

Appearance after several days

growth of microbes



1. The dishes were sealed to prevent other, possibly harmful, microbes from entering the dish during the experiment.
2. Rows of small dots appeared in a pattern that was the same as that with which the surface was smeared (see the diagram on the previous page).
3. Dish A (between the toes) probably had the most pronounced pattern of dots, followed by dish B (teeth). Dish C (fingernails) probably had the fewest dots – although this would depend on the state of your fingernails!
4. The surface of dish D should remain unchanged. If it did not (e.g., it may show circular hollows), the equipment may not have been sterile prior to use. This may affect the other dishes, which may also have circular hollows.

Microbes are in the air around us. If you take a Petri dish prepared as in Part A, remove the lid, and stand it by an open door or window for 10 minutes before replacing the lid, a growth will appear on the surface of the gelatin after a couple of days.

Special Safety Note To Experimenters

Each experiment includes any special safety precautions that are relevant to that particular project. These do not include all of the basic safety precautions that are necessary whenever you are working on a scientific experiment. For this reason, it is absolutely essential that you read, copy, and remain mindful of the General Safety Precautions that follow this note. Experimental science can be dangerous, and good laboratory procedure always includes carefully following basic safety rules. Things can happen very quickly while you are performing an experiment. Things can spill, break, even catch fire. There will be no time after the fact to protect yourself. Be prepared for unexpected dangers by following basic safety guidelines the entire time you are performing the experiment, whether or not something seems dangerous to you at a given moment.

We have been quite sparing in prescribing safety precautions for the individual experiments. We made this choice for one reason: We want you to take very seriously every safety precaution that is printed in this book. If you see it written here, you can be sure that it is here because it is absolutely critical to your safety.

One further note: The book assumes that you will read the safety precautions that follow, as well as those in the box within each experiment you are preparing to perform, and that you will remember them. Except in rare instances, the general precautions listed below will not be repeated in the procedure itself. It is up to you to use your good judgment and pay attention when performing potentially dangerous parts of the procedure. Just because the book does not say **BE CAREFUL WITH HOT LIQUIDS** or **DON'T CUT YOURSELF WITH THE KNIFE** does not mean that you should be careless when boiling water or cutting a section of a stem for microscope work. It does mean that when you see a special note to be careful, it is extremely important that you pay attention to it. If you ever have a question about whether a procedure or material is dangerous, wait to perform it until you find out from a qualified adult that it is safe.

GENERAL SAFETY PRECAUTIONS

Accidents caused by carelessness, haste, insufficient knowledge, or taking unnecessary risks can be avoided by practicing safety procedures and being alert while conducting experiments. Be sure to check the individual experiments in this book for additional safety regulations and adult supervision requirements. If you will be working in a lab, do not work alone.

PREPARING:

- Clear all surfaces before beginning experiments
- Read the instructions before you start
- Know the hazards of the experiments and anticipate dangers

PROTECTING YOURSELF:

- Follow the directions step-by-step; only do one experiment at a time
- Locate exits, fire blanket and extinguisher, gas and electricity shut-offs, eyewash, and first-aid kit
- Make sure there is adequate ventilation
- Act sensibly at all times
- Wear an apron and safety glasses
- Do not wear open shoes, loose clothing, or loose hair
- Keep floor and workspace neat, clean, and dry
- Clean up spills immediately, being careful to follow the recommended procedure for dealing with the spilt substance
- Never eat, drink, or smoke in the laboratory or workspace
- Do not eat or drink any substances tested unless expressly permitted to do so by a knowledgeable adult

USING EQUIPMENT WITH CARE:

- Set up apparatus far from the edge of the desk
- Use knives and other sharp or pointed instruments with caution
- Pull plugs, not cords, when removing electrical plugs

- Don't use your mouth to pipette liquids; use a suction bulb
- Check glassware is clean and dry before use
- Check glassware for scratches, cracks, and sharp edges
- Report broken glassware immediately so that it can be cleaned up by a responsible person
- Do not use reflected sunlight to illuminate your microscope
- Use only low voltage and current materials such as lantern batteries
- Be careful when using stepstools, chairs, and ladders

USING CHEMICALS AND BIOLOGICAL MATERIALS:

- Never taste or inhale chemicals
- Label all bottles and apparatus containing chemicals
- Read labels carefully
- Avoid chemical contact with skin and eyes (wear safety glasses, lab apron, and gloves)
- Do not touch chemical solutions
- Wash hands before and after using solutions
- Wipe up spills thoroughly
- Use sterile procedures when handling even common and harmless microorganisms
- Avoid contact with human blood
- Treat all living organisms with appropriate respect

HEATING SUBSTANCES:

- Wear safety glasses, apron, and gloves when boiling water
- Keep your face away from test tubes and beakers
- Use test tubes, beakers, and other glassware made of Pyrex™ or borosilicate glass
- Use alcohol-filled thermometers (do not use mercury-filled thermometers)
- Never leave apparatus unattended
- Use safety tongs and heat-resistant mittens
- If your laboratory does not have heat-proof workbenches, put your Bunsen burner on a heat-proof mat before lighting it
- Take care when lighting your Bunsen burner; use a Bunsen burner lighter in preference to wooden matches
- Turn off hot plates, Bunsen burners, and gas when you are done
- Keep flammable substances away from heat
- Keep sheets of paper and other flammable objects away from your Bunsen burner
- Have a fire extinguisher on hand

FIELDWORK:

- Be aware of environmental dangers (e.g., do not carry out fieldwork near dangerous roads, cliffs, or water)
- Remember that strong sunlight can be dangerous – pack sunscreen and a good supply of drinking water if you will be outside all day
- Never carry out fieldwork in areas where you cannot find your way to safety easily and quickly and never wander off on your own in search of new areas to study

FINISHING UP:

- Clean your work area and glassware (follow any instructions given by a supervising adult)
- Be careful not to return chemicals or contaminated reagents to the wrong containers
- Don't dispose of materials in the sink unless instructed to do so
- Wash your hands
- Clean up all residues and put in proper containers for disposal
- Dispose of all chemicals according to all local, state, and federal laws
- Dispose of all microbiological cultures by treatment with an appropriate disinfectant

BE SAFETY CONSCIOUS AT ALL TIMES