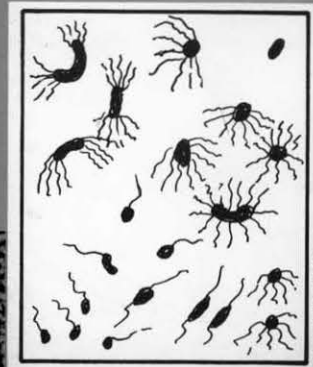
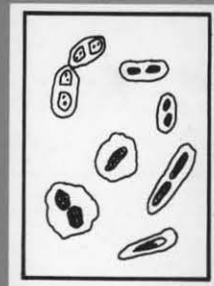
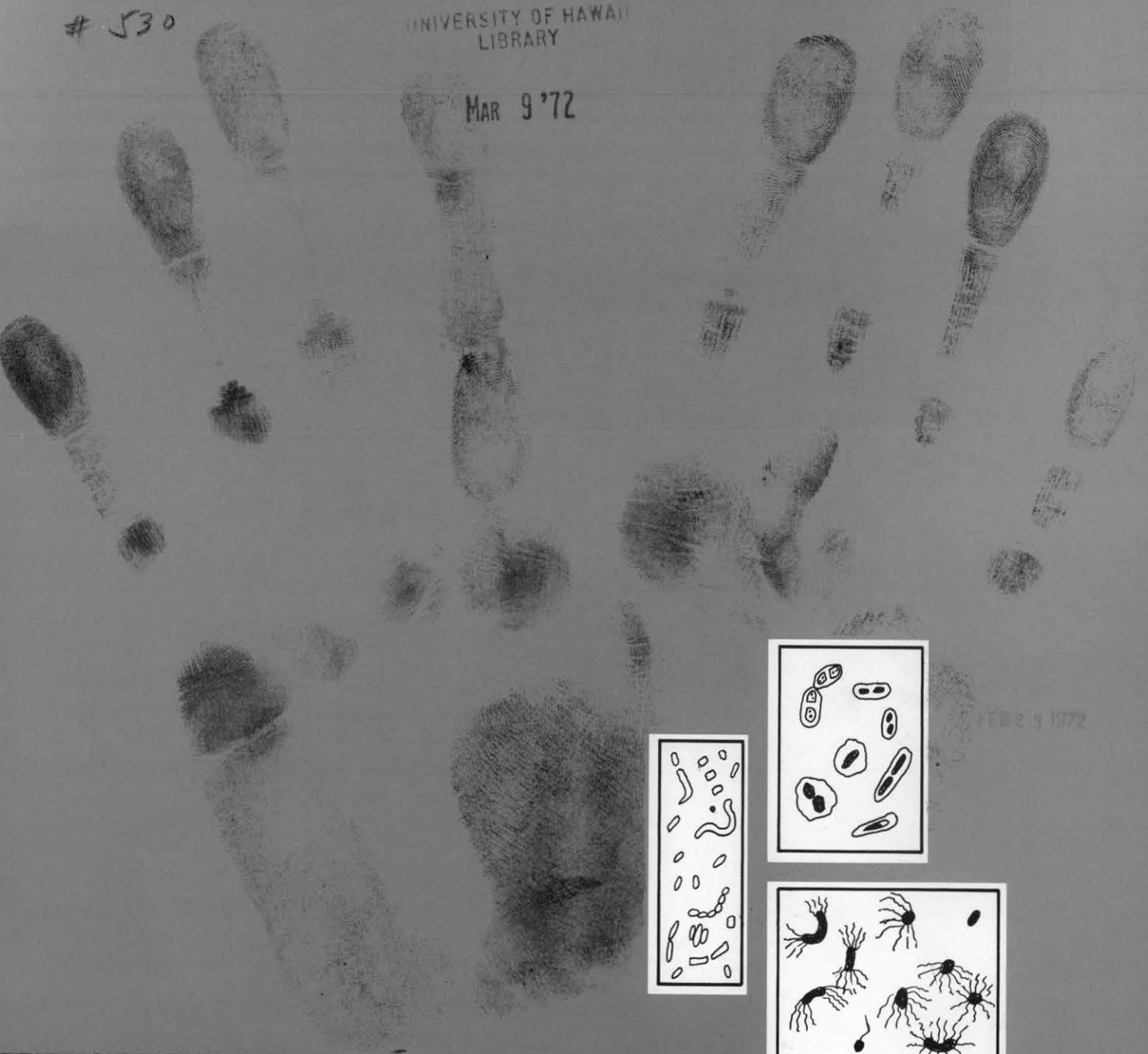


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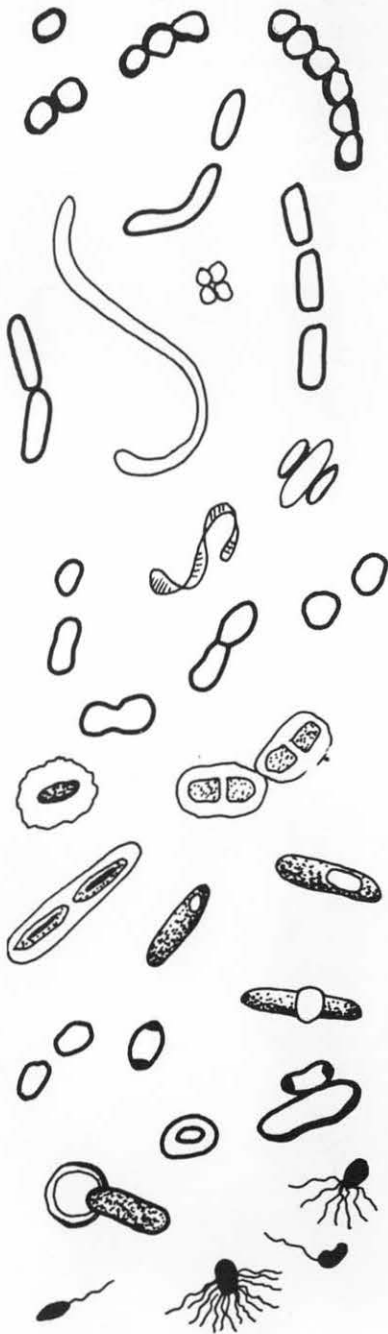
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FOOD HANDS and BACTERIA

Stop the Population Explosion: WASH YOUR HANDS!



Bacteria have their own population explosion going. They can reproduce every 20 minutes. There are so many of them that you now have on your body more bacteria than there are people in the United States.

Like people, bacteria may be good or bad, depending on what they do *to* you or *for* you. And like people, bacteria are here to stay. We can't get rid of them. So we must learn to live with them.

Some bacteria spend their lives in the small folds of the skin, on hair or under fingernails. Others cause body odor. Still others, called *pathogens*, cause disease.

The bacteria normally found on your skin we'll call *resident bacteria*. They exist on the skin of normal, healthy people, and are usually not harmful. They're always there, and can't be removed completely.

Other bacteria are transferred to your skin in one way or another. Let's call these *transient bacteria*. Think for a moment how many ways your hands have picked up bacteria today.

Your hands do all sorts of things for you. They write, pick up the telephone, handle money, fix meals, dress wounds. Your hands gather bacteria with each job they do. You can remove many of these bacteria by washing your hands and scrubbing your fingernails.

We can't see individual bacteria without using a microscope. But if they are allowed to grow and multiply on *agar*, we can see them. *Nutrient agar* is a special food used to grow bacteria in the laboratory. It contains everything bacteria need to grow and reproduce.

If we transfer bacteria to an agar plate and keep it warm (*incubate it*), the bacteria will reproduce rapidly. There will be so many that we can see them with the naked eye. These millions of bacteria, side by side, are called a *colony*. The pictures in this publication show this clearly.

Hands

We transferred bacteria to agar plates by touching them with our fingers. First, we touched a plate with dirty fingers. Then we rinsed the fingers in cold water for 20 seconds. Next, we washed them with soap and water for 20 seconds. The fingers were then washed for an additional 20 seconds. Finally, we dipped the fingers into a sanitizing solution containing *chlorine*. We could have obtained similar results with a *bromine* or *iodine* solution. The fingers touched an agar plate after each cleansing. The plates were incubated at 98°F. for 24 hours. The photos show what happened.



Dirty fingers touch agar.



After 24 hours



After cold water rinse

The dirty fingers contained so many bacteria that the areas they touched on the agar plate were a mass of colonies.

The 20-second cold water rinse removed large particles of dirt and some bacteria. But there were still millions of colonies left. As you can see, rinsing your hands with cold water is not a good way to clean them.

Washing the hands with soap and water for 20 seconds reduced the number of bacteria. However, 20 seconds was not long enough. After the hands were washed again with soap and water for 20 seconds, the number of bacteria was reduced even more.

So hands should be washed at least 40 seconds with soap and water. It's even better to wash them a full minute.

The photos show that soap and water will reduce the number of bacteria on your hands. It's impossible to remove all bacteria with soap and water. The important thing is to reduce the number of *transient* bacteria on your hands. Just be sure to wash your hands thoroughly for at least 40 seconds before you handle food.

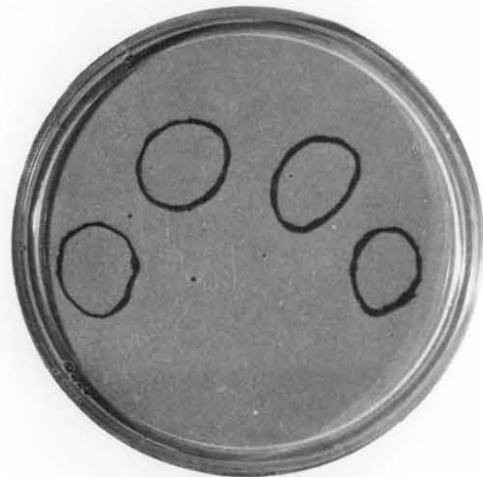
No bacteria grew on the agar plate after the fingers were dipped in a sanitizing solution. The bacteria may or may not have been killed, but the sanitizer stopped their growth. Of course, some people may not be able to use a sanitizing solution because it may irritate their skin.



After 20-second wash with soap and water



After additional 20-second wash with soap and water



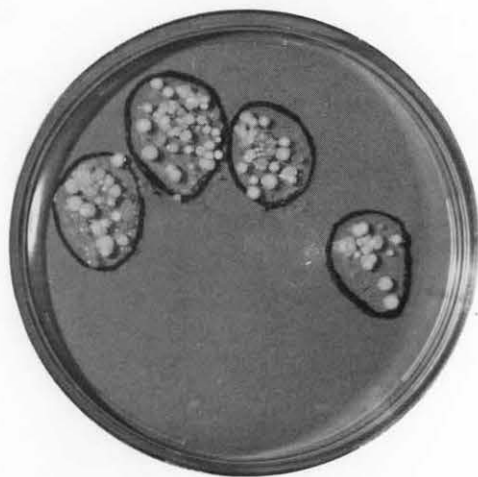
After using sanitizing solution



Effect of sanitizing solution on sneeze



Effect of dirty gloves after 24 hours



After 20-second cold water rinse

This photo dramatizes the effect of sanitizing agents on bacteria. An agar plate was sneezed on, then a drop of sanitizing solution put in the center of the plate. Bacteria grew in the areas not touched by the sanitizer.

The demonstration shows the importance of covering your mouth and nose when you sneeze. Your mouth, nose and throat contain millions of bacteria all the time. Unless you cover your mouth and nose when you sneeze, you spray bacteria around like a spray can.

Gloves

Like your hands, gloves also become dirty and covered with bacteria. In the next demonstration, a person wearing a dirty glove touched an agar plate. He then rinsed the glove in cold water for 20 seconds; washed it with soap and water for 20 seconds; then washed it again with soap and water for 20 seconds; and finally dipped it into a sanitizing solution. After each cleansing, he touched an agar plate. The photographs show how the plates looked after 24 hours.

The dirty glove contained many bacteria, as shown by the large number of colonies on the agar. The number of colonies was reduced after the glove was rinsed in water. As you can see, we can reduce the number of bacteria on gloves by just rinsing them in water.

The two 20-second washes with soap and water reduced the number of bacteria to a very low level.

So soap and water are better than a plain water rinse for removing bacteria from gloves.



After 20-second wash with soap and water



After additional 20-second wash with soap and water

The sanitizing solution stopped all bacteria from growing.

It was easier to remove bacteria from the glove than it was from the hands. Gloves have no *resident* bacteria; only *transient* bacteria. Gloves have no ridges or crevices in which bacteria can hide. It's possible to remove all bacteria from gloves, although we can't remove all of them from our hands.



After using sanitizing solution

Other Sources

Well kept hair is attractive, but let's keep it out of our food. Nobody likes to see hair in what they are about to eat. It's a good sign that someone didn't follow sanitation rules when the food was processed or prepared. So always wear a hair net or a hat when you work with food.

To demonstrate the importance of this, we placed some human hair on an agar plate and incubated it for 24 hours. Look at the number of bacteria that grew around the hair.

Like hands, it's impossible to completely remove bacteria from your hair. Although you may have just washed it, it still contains many bacteria.

We can also transfer bacteria from dirty aprons to food. We touched a dirty apron to an agar plate and incubated it for 24 hours. The photo shows that the apron contained many bacteria. These bacteria could easily have been transferred to food. This points out the need for wearing clean clothes and clean aprons every day. If your clothes or apron get dirty during the day, change them.

Cutting boards are another source of bacteria, and should be washed thoroughly after each use. Do not use *wooden* cutting boards. Bacteria can hide in the wood fiber, making it impossible to remove all of them. If you use cutting boards or utensils on raw food, don't use them to hold, serve, prepare or carve *cooked* food before they are thoroughly cleansed and sanitized.

Flies, roaches and rats leave bacteria on everything they touch. To illustrate this, we let a cockroach walk on an agar plate. The photo, made after 24 hours, shows the number of bacteria the cockroach left on the plate.



Human hair after 24 hours



Effect of dirty apron after 24 hours



Cockroach after 24 hours

Rats, flies, roaches and other insects leave bacteria as they crawl on food, garbage and people. So we must all work to keep these pests out of our homes, restaurants and food processing plants. The time you spend cleaning and sanitizing your food handling equipment is wasted if you allow insects and rats to walk on them after they're cleaned.

Even the best homes, restaurants and food processing plants have flies, roaches and other insects from time to time. But these pests should not be allowed to live in these places for long.

Ashes from tobacco contain very few bacteria. But, foreign material of any kind should not be tolerated in food. So do not smoke and do not allow others to smoke where food is being processed, stored, prepared or served.

Cuts, bruises and sores on our hands also carry millions of bacteria. If the skin on your hands is

broken anywhere, cover the wound completely before handling food.

Bacteria carried on hands may cause food to spoil. They may also cause food poisoning and food infection. As bacteria increase, the food develops an odd smell or taste when it is cooked. It just doesn't taste as good as it should. If the bacteria continue to multiply, the uncooked food develops a peculiar smell. As the bacteria develop further, the food becomes slimy. It will be slippery to the touch, like a bar of wet soap.

So if you handle or start to eat food with an objectionable smell, taste or feel, throw it away. Never taste food to see if it's spoiled—it may be.

Bacteria are everywhere and on everything. So we have to learn to live with them. But we must try to keep the number of bacteria in our food as low as possible. We can do this by following the simple rules below.

- Keep food handling areas spotlessly clean.
- Wash your hands often with soap and water. Be sure you wash them thoroughly after using the restroom, dressing a wound and before handling any food. This will help get rid of transient bacteria which can cause disease.
- Don't handle food with hands that have cuts, bruises or sores on them.
- Don't sneeze or cough on food or in areas where food is being prepared.
- Keep your body and clothes clean.
- Wear a hair net or a hat when handling food.
- Keep rats, cockroaches, flies and other insects out of areas where food is processed, stored, prepared or served.
- Don't use wooden cutting boards—they can't be cleaned properly.
- Be sure cutting tools used on raw food are sanitized before you use them on cooked food.
- Don't smoke and don't allow anyone else to smoke in areas where food is processed, stored, prepared or served.

3 C's for Wholesome Food: Keep it Clean, Cold, Covered

Grateful appreciation is expressed to the individuals and organizations who contributed to this publication. Prepared by GEORGE A. SCHULER, JAMES A. CHRISTIAN and ARTHUR F. BADENHOP, *Extension Food Scientists*, University of Georgia.

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