

# Identifying Cultured Bacteria

Bacteria are unicellular microorganisms found in every habitat on Earth. Nearly all have cell walls composed of peptidoglycan and reproduce by binary fission (cloning of cells). Although many of these microbes are harmless or beneficial to humans, others are pathogenic, causing infectious diseases.

## Identification by Shape

Some of the first steps in identifying bacteria are to examine according to shape:

- bacillus (pl. bacilli) = rod-shaped
- coccus (pl. cocci sounds like cox-eye) = spherical
- spirillum (pl. spirilla) = spiral

Some bacteria have more unusual shapes:

- coccobacilli = elongated coccal form
- filamentous = bacilli that occur in long threads
- vibrios = short, slightly curved rods
- fusiform = bacilli with tapered ends

\* Prokaryote arrangement of cells \*Bacteria sometimes occur in groups, rather than singly, and the single cell's shape influences the cell arrangements that they form as the bacterial cells divide.

Bacteria grow tremendously fast when supplied with an abundance of nutrients. Different types of bacteria produce different-looking colonies, some colonies may be colored, some colonies are circular in shape, and others are irregular. A colony's characteristics (shape, size, pigmentation, etc.) are termed the colony morphology. Colony morphology is the way scientists identify bacteria. In fact, a book called *Bergey's Manual of Determinative Bacteriology* (commonly termed *Bergey's Manual*) describes most bacterial species identified by scientists so far. This manual provides descriptions for the colony morphologies of each bacterial species.

Although bacterial and fungi colonies have many characteristics and some are rare, a few basic elements enable you to identify for all colonies: (1)

- **Form:** What is the basic shape of the colony? For example, circular, filamentous, etc.
- **Elevation:** What is the cross sectional shape of the colony? Turn the Petri dish on end.
- **Margin:** What is the magnified shape of the edge of the colony?
- **Surface:** How does the surface of the colony appear? For example, smooth, glistening, rough, dull (opposite of glistening), rugose (wrinkled), etc.
- **Opacity:** For example, transparent (clear), opaque, translucent (almost clear, but distorted vision, like looking through frosted glass), iridescent (changing colors in reflected light), etc.
- **Chromogenesis** (pigmentation): For example, white, buff, red, purple, etc.

Please note that three additional elements of morphology should be examined only in a supervised laboratory setting: **consistency**, **emulsifiability** and **odor**.

Refer to the diagram below for illustrated examples of form, elevation and margin: (2)

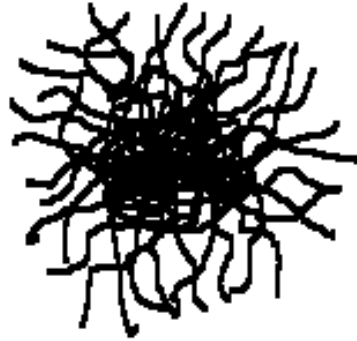
### Form



Circular



Irregular



Filamentous



Rhizoid

### Elevation



Raised

Convex

Flat

Umbonate

Crateriform

### Margin



Entire



Undulate



Filiform



Curled



Lobate

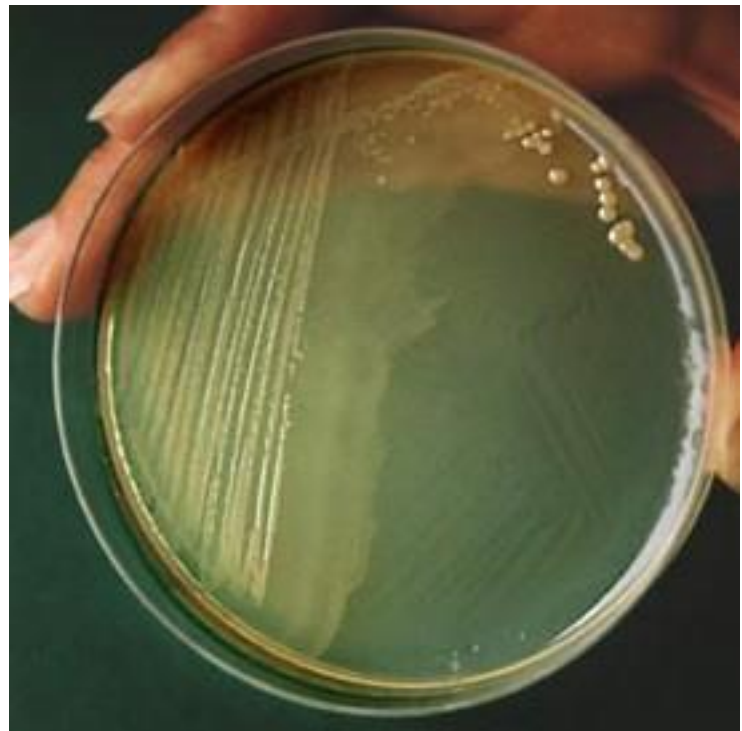
### What can grow on a nutrient agar plate?

**Bacteria:** Each distinct circular colony should represent an individual bacterial cell or group that has divided repeatedly. Being kept in one place, the resulting cells have accumulated to form a visible patch. Most bacterial colonies appear white, cream, or yellow in color, and fairly circular in shape. For example:

*Bacillus subtilis* (3) →



*Proteus vulgaris* (4) →



*Staphylococcus aureus* (5) →



*Streptococcus pyogenes* (6) →



**Yeasts:** Yeast colonies generally look similar to bacterial colonies. Some species, such as *Candida*, can grow as white patches with a glossy surface. For example:

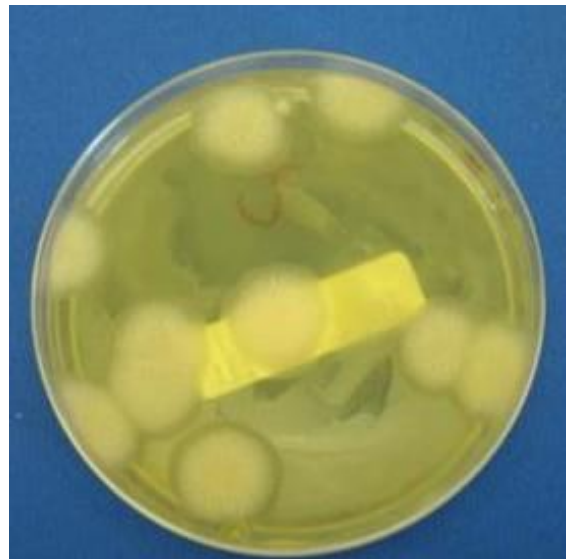
*Candida Albicans* is a type of yeast that can grow on the surface of skin (7) →



Round yeast colonies (8) →

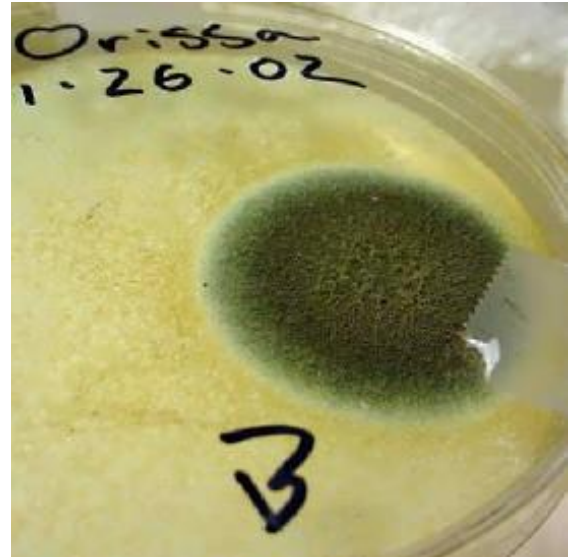


Pink yeast colonies (9) →

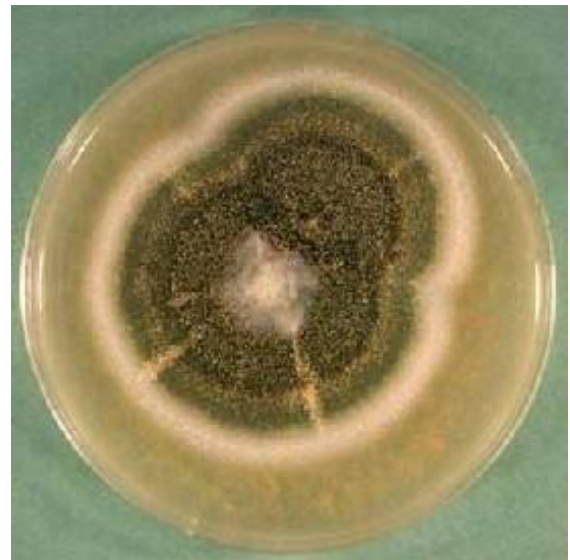


**Molds:** Molds are fungi, and they often appear whitish grey, with fuzzy edges. They usually turn into a different color, from the center outwards. Two examples of molds:

Green mold (*Trichoderma harzianum*) (10) →

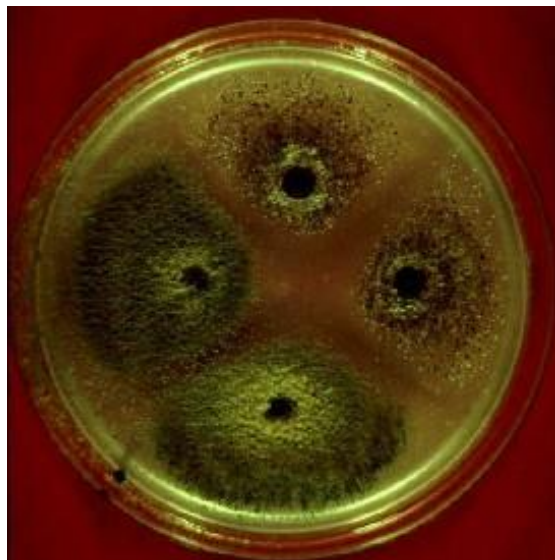


Black mold (*Aspergillus nidulaus*) (11) →



**Other Fungi:** Moss green colonies, a white cloud, or a ring of spores can be attributed to the growth of *Aspergillus*, which is common in such fungal infections as athlete's foot. Here is an example of what *Aspergillus* looks like: (12) ↘

Finally, whenever a thorough, visual identification is not possible, examples of additional tests are gram stains ([http://www.austincc.edu/microbugz/gram\\_stain.php](http://www.austincc.edu/microbugz/gram_stain.php)), growths on selective media, and enzymatic tests.



### References Cited

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- (12) ETH Life International. Accessed January 14, 2005. <http://www.ethlife.ethz.ch/images/aspergillus-l.jpg>

### Credits

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