## MODULE 1: Introduction to the Microbiology Laboratory

When you hear the term *microbe*, what comes to mind? Many students think of "germs" such as bacteria and viruses. However, microbiology encompasses many other organisms, including archaea, yeasts, molds, protozoa, algae, slime molds, and even parasites and vectors. It is also a science that studies acellular entities such as viruses, viroids, and prions. What is common to these microbes is the inability of scientists to observe them without the aid of a microscope.

The *Principles of Microbiology* laboratory exercises focus primarily on the observation, cultivation, and identification of bacteria and common eukaryotic microbes such as fungi and protozoa. Over the course of the semester, you will learn various techniques for the safe handling and cultivation of microorganisms, as well as the skills and good practices necessary for working confidently in any biology laboratory.

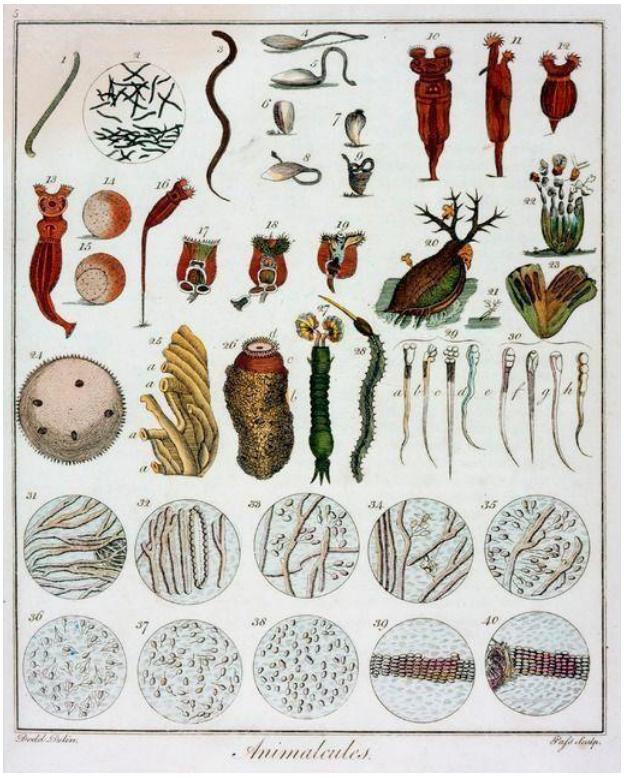


*Figure 1.1: An artistic rendering from 1795 of the first observations of microorganisms or "animalcules" by Antonie van Leeuwenhoek, a self-taught scientist and pioneer in microscopy.*

## Middlesex College Culture Code

All stock cultures at Middlesex College are assigned a unique number. These numbers are an easy way to label tubes and plates to identify the microorganisms used in lab exercises. When completing reports, scientific names rather than culture code numbers should be used.

Just as you have two names, scientists use *binomial nomenclature* when referring to organisms. These names are based on taxonomic hierarchy where the first name is the *genus* (plural, genera) and the second is the *species*. For example, the binomial name of humans is *Homo sapiens.*

Whenever a binomial name is first used, the genus and species names should be written out in full . After this, the genus may be abbreviated by a letter, but the species is never abbreviated.

| | |
|---|---|
| First use: | *Escherichia coli* |
| Subsequent use: | *E. coli* |

Since multiple species may exist within a given genus, microbiologists often only use the genus, e.g., *Pseudomonas,* or the genus followed by the abbreviation “sp.” or “spp.” to designate any species. For example, *Pseudomonas* sp. might refer to *Pseudomonas aeruginosa, Pseudomonas fluorescens,* or another species of *Pseudomonas* entirely.

Conventional rules exist for typing or handwriting a scientific name. When typing, both genus and species are italicized but not underlined. When handwritten, both names are underlined:

| | |
|---|---|
| When typing: | *Staphylococcus aureus* |
| When handwriting: | <u>Staphylococcus aureus</u> |

Correctly formatting names, whether in a report or on a patient’s chart, is good lab practice and avoids confusion that can lead to error. This may occur when a word that is used as a general descriptor is also a genus name (think of a person named Ms. Tall, who may or may not be tall). In microbiology, *Bacillus* is a good example. When written as a lower-case term, “bacillus” means a rod-shaped bacterial cell that is characteristic of *many* bacterial genera. Thus, while cells of the genera *Escherichia* and *Pseudomonas* are also rod-shaped bacteria, *Bacillus* refers to a <u>specific</u> genus of rod-shaped bacteria when formatted as such.

MICROBIOLOGICAL CULTURE CODE

The following is a list of the microorganisms used by the Biology Department at MCC. As a time saving device, the cultures have been assigned the following numbers:

*1. Escherichia coli*

*2. Staphylococcus aureus*

*3. Staphylococcus epidermidis*

*4. Bacillus subtilis*

*5. Bacillus megaterium*

*6. Serratia marcescens*

*7. Micrococcus luteus*

*8. Pseudomonas aeruginosa*

*9. Klebsiella aerogenes*

*10. Streptococcus salivarius*

*11. Enterococcus faecalis*

*12. Alcaligenes faecalis*

*13. Proteus vulgaris*

*14. Saccharomyces cerevisiae*

*15. Streptococcus agalactiae*

*16. Clostridium sporogenes*

*19. Mycobacterium smegmatis*

*20. Bacillus cereus*

*21. Morganella morganii*

*22. Proteus mirabilis*

*23. Rhodospirillum rubrum*

*24. Micrococcus roseus*

*25. Lactococcus lactis*

*26. Aspergillus niger*

*27. Penicillium notatum*

*28. Agrobacterium tumefaciens*

*29A. Rhizopus stolonifer +*

*29B. Rhizopus stolonifer –*

*30. Chromobacterium violaceum*

*31. Moraxella catarrhalis*

*32. Escherichia coli* MM294

*33. Klebsiella pneumoniae*

*34. Enterococcus faecium*

*35. Geobacillus stearothermophilus*

*36. Salmonella typhimurium (Ames Strain)*

*37. Citrobacter freundii*

*38. Acinetobacter calcoaceticus*

*39. Halobacterium salinarum*

*40. Escherichia coli* B

*41. Pseudomonas fluorescens*

*42. Streptomyces griseus*

*43. Streptomyces epidermidis*

*44. Streptomyces venezuelae*

*47. Neisseria perflava*