

Chapter 01: Microbial Taxonomy

Title: Bailey and Scott's Diagnostic Microbiology, 15th Edition

MULTIPLE CHOICE

1. Taxonomy can be described as a system that:
 - a. classifies, names, and identifies microorganisms in a consistent manner.
 - b. classifies microorganisms, based on their genetic makeup.
 - c. classifies microorganisms, based on their phenotypic makeup.
 - d. classifies microorganisms, based on their cellular and colonial traits.

ANS: A

Taxonomy is a system that consistently classifies, names, and identifies microorganisms. Although organisms have genotypic and phenotypic characteristics, as well as cellular and colonial characteristics, answer A best describes the term *taxonomy*.

2. The most basic taxonomic group that can be defined as a collection of bacterial strains that share many common physiologic and genetic features is:
 - a. genus.
 - b. species.
 - c. class.
 - d. kingdom.

ANS: B

Bacteria are classified into the same species, based on their physiologic and genetic similarities and their differences from bacteria in other species.

3. Colonial and microscopic morphologic properties, along with the pigmentation of colonies, would belong to a microorganism group of _____ characteristics.
 - a. genotypic
 - b. taxonomic
 - c. phenotypic
 - d. subspecies

ANS: C

Phenotypic characteristics are the observable properties of the subject.

4. Which binomial name is correctly written?
 - a. *Escherichia coli*
 - b. Escherichia coli
 - c. *Escherichia coli*
 - d. *Escherichia Coli*

ANS: A

The genus should be capitalized, and the species should be in lowercase. The entire name is either italicized or underlined.

5. The use of a double genus in a microorganism's label, such as *Burkholderia* (*Pseudomonas*), indicates that the bacterium:
 - a. does not fit well in either group but has some characteristics of both groups.

- b. is a genetic cross between the two groups.
- c. has been moved from one genus (*Pseudomonas*) to another genus (*Burkholderia*).
- d. has been moved from one genus (*Burkholderia*) to another genus (*Pseudomonas*).

ANS: C

A name of an organism may change as scientists learn more about the organism. An older name is often included in parentheses next to the current name to alleviate confusion about the identity of the organism.

6. A bacterium that has been moved from one genus (*Pseudomonas*) to another genus (*Burkholderia*) would be correctly noted as which one of the following?
- a. *Pseudomonas* (*Burkholderia*)
 - b. *Burkholderia* (*Pseudomonas*)
 - c. *Pseudomonas*, formerly *Burkholderia*
 - d. *Burkholderia*, formerly *Pseudomonas*

ANS: B

The name of an organism may change as scientists learn more about the organism. An older name is often included in parentheses next to the current name to alleviate confusion about the identity of the organism.

7. The taxon that is composed of similar species that have several important features in common but differ sufficiently to still maintain their status as individual species is which one of the following?
- a. Class
 - b. Order
 - c. Family
 - d. Genus

ANS: D

The genus is composed of similar species.

8. Which binomial name is correctly written?
- a. *Staphylococcus Aureus*
 - b. staphylococcus aureus
 - c. *Staphylococcus aureus*
 - d. *Staphylococcus aureus*

ANS: C

The genus should be capitalized, and the species should be in lowercase. The entire name is either italicized or underlined.

9. An example of an organism's genotypic characteristic is its:
- a. macroscopic morphologic structure.
 - b. microscopic morphologic structure.
 - c. nucleic acid composition.
 - d. antigenic properties.

ANS: C

The organism's nucleic acid composition—deoxyribonucleic acid (DNA) and ribonucleic acid (RNA)—is a genotypic characteristic. All of the other choices are phenotypic characteristics.

10. An organism is serologically identified in the clinical laboratory. This is an example of which phenotypic property?
- Subcellular properties
 - Antigenic properties
 - Resistant profiles
 - Nucleic acid sequence analysis

ANS: B

Serologic methods examine the organism's antigenic properties.

11. Species identification is based on all of the following *except*:
- DNA-DNA hybridization.
 - 16s rRNA (DNA) sequencing.
 - cell wall composition.
 - colonial pigmentation.

ANS: D

Species identification is based on consistent, reproducible traits that are linked to specific traits that can be used to classify the organisms as related. Although pigment is a phenotypic trait, it is not sufficient to use to specifically delineate species as various genes are responsible for pigmentation in a variety of organisms.

12. The difference between a subspecies and biotype is:
- a subspecies has the same genetic makeup.
 - a subspecies has a differential expression of the same genes.
 - a subspecies is genetically different than the type species.
 - a biotype and subspecies are the same.

ANS: A

A subspecies has the same genetic makeup as the species but due to other factors can display some variation in physiologic characteristics. A biotype is a designation that further group organisms based on relatively minor characteristics.

13. The suffix -aceae is added to the root word of the _____, to designate the family of bacteria.
- type-species
 - most common organism
 - type-genus
 - specific epithet

ANS: C

The type-genus is generally the most important or the first one to be named in a family of bacteria. The root name of the genus is then used with the suffix -ceae for the name of the family. One exception to this is the *Enterobacteriales*, which include the enteric genera and is not named after the type genus *Escherichia*.

14. Polyphasic taxonomy:
- uses proteins or polypeptides to separate and classify microorganisms.
 - uses the different growth phases of organisms for the classification and identification of species.

- c. uses both genotypic and phenotypic characteristics for the classification and identification of microorganisms.
- d. uses all information including genotypic, phenotypic and phylogenetic information in an attempt to accurately classify and identify microorganisms.

ANS: D

Polyphasic taxonomy does take into account all of the genotypic and phenotypic characteristics, however it also considers the phylogeny or historical relevance and ordering of organisms. This is to not only assist in the classification and identification but provides a mechanism to monitor evolutionary relationships and changes in organisms over time.

15. This chemotaxonomic method uses the analysis and separation of proteins and peptides that are present in significant numbers to classify and identify microorganisms.
- a. Cultivation
 - b. Microscopy
 - c. Mass spectroscopy
 - d. Matrix-assisted laser desorption ionization time-of-flight mass spectroscopy

ANS: D

Mass spectroscopy is the overall chemical technique used to separate molecules based on their mass and electrical charge. However, in the microbiology laboratory matrix-assisted laser desorption ionization time-of-flight mass spectroscopy separates the high abundant proteins and peptides to create a spectrum that can be used for the classification and identification of microorganisms.