Classification foundamental of Bacteria

Classificaton systems

- Bacteria my be groubed using many different

Typing schemes

Bacteria morphology

Staining properties

O2 growth requiremens

Biochemical tests

Enviromantal requirements

Vectors and means transmeissions

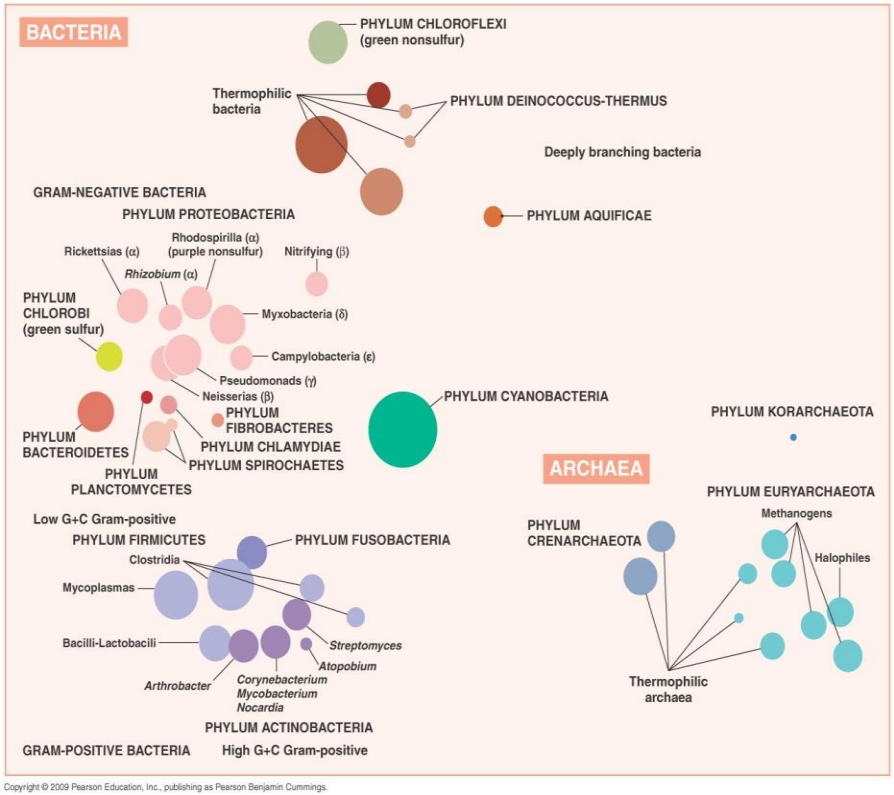
Modern Prokaryotic Classification

Eubacteria

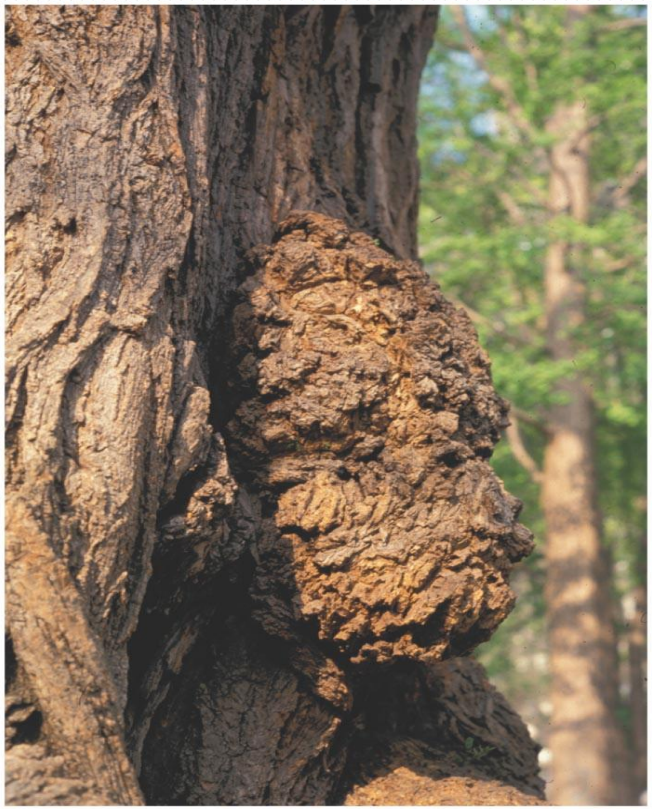
Archeabacteria

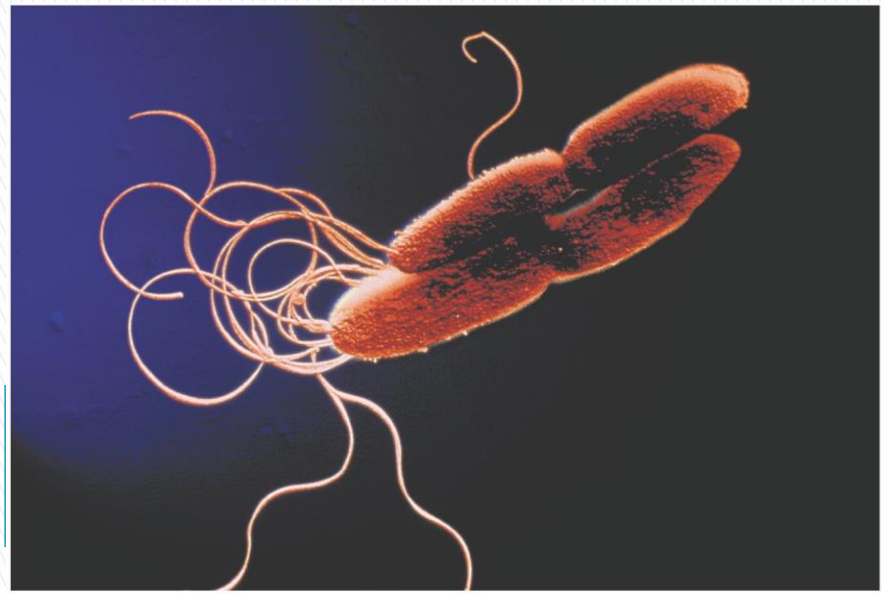
Cyanobacteria

Thermophiles



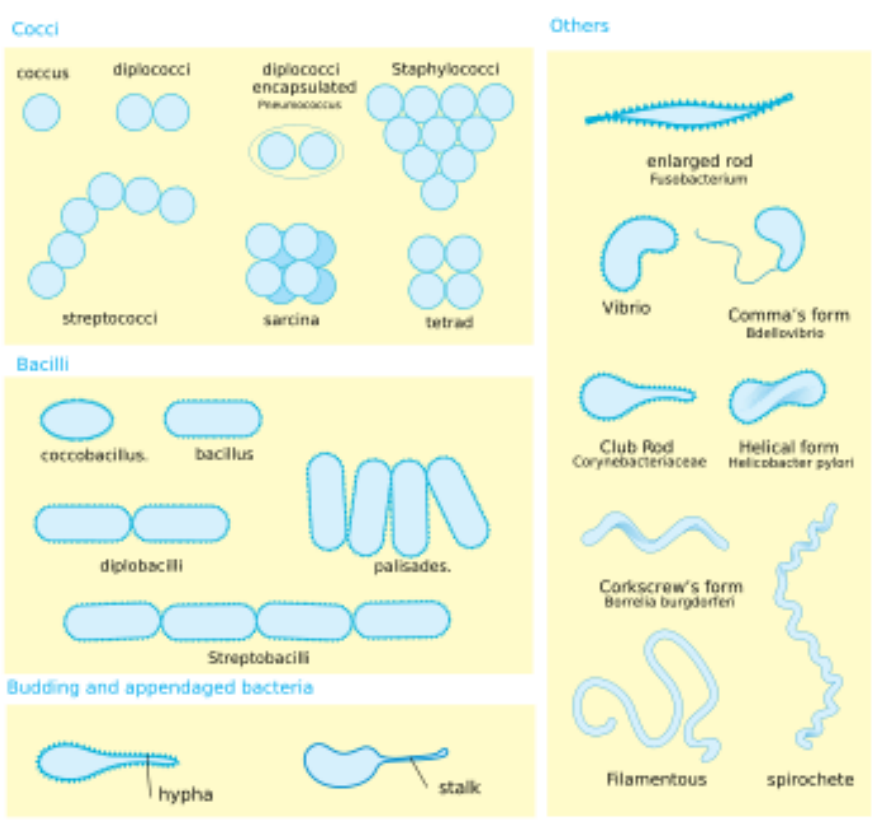
Diversity of Bacteria

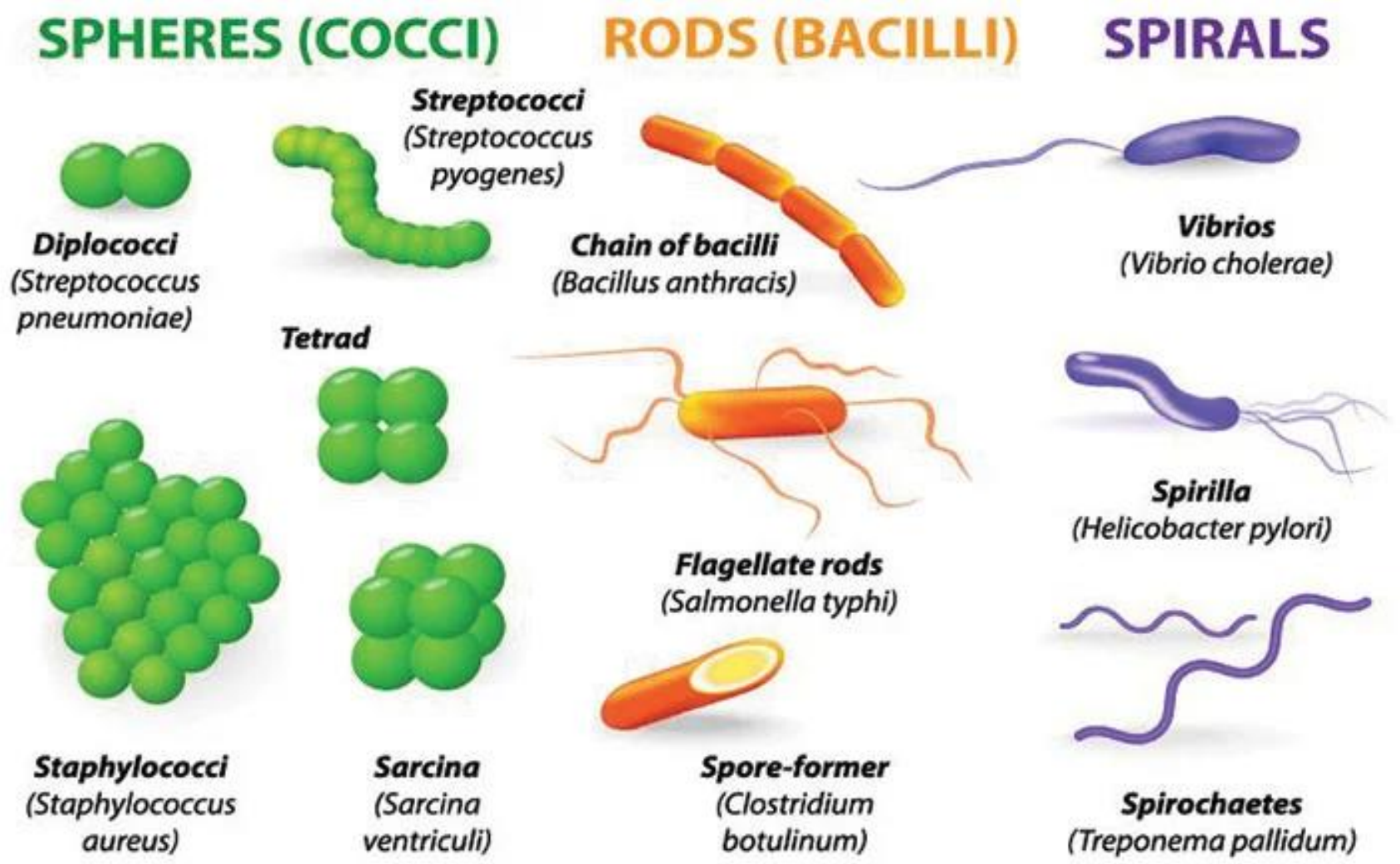




Classification of Bacteria

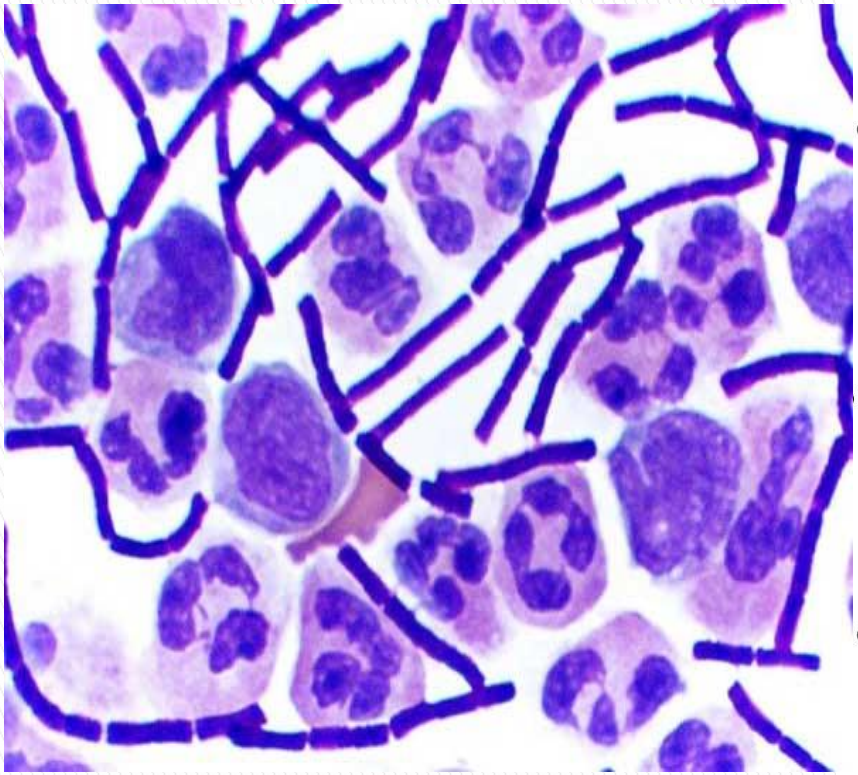
- *Kingdom
- Phylum
- Class
- Order
- Family
- *Genus (1st name)
- *Species (2nd name identifier)

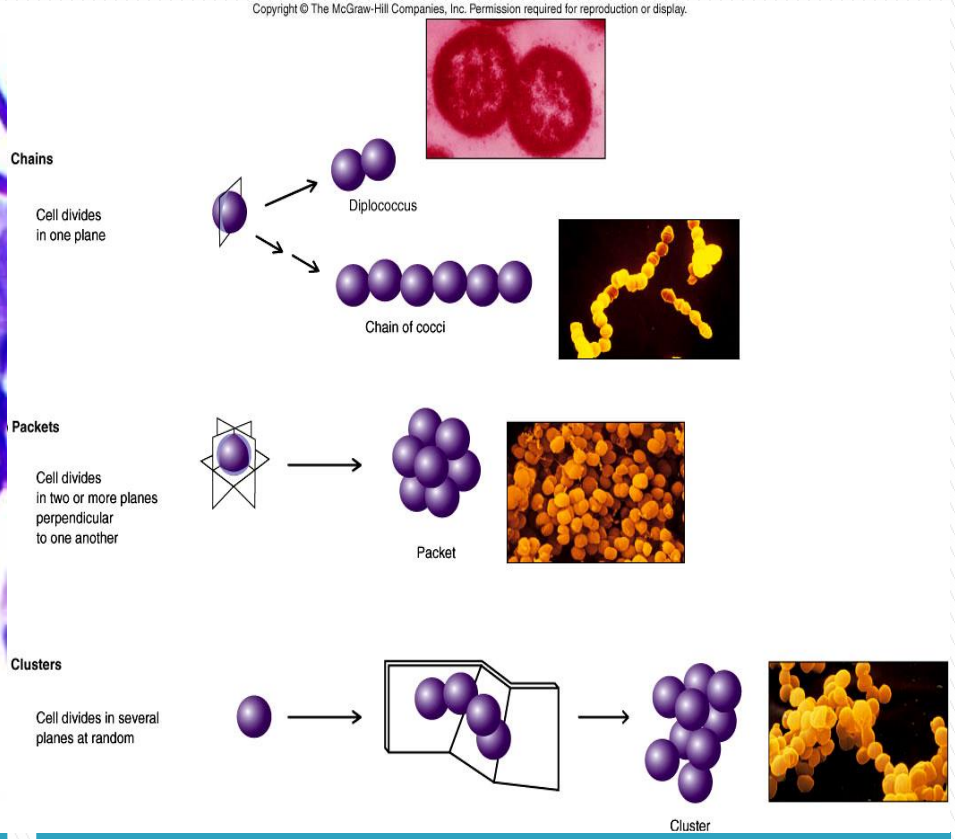


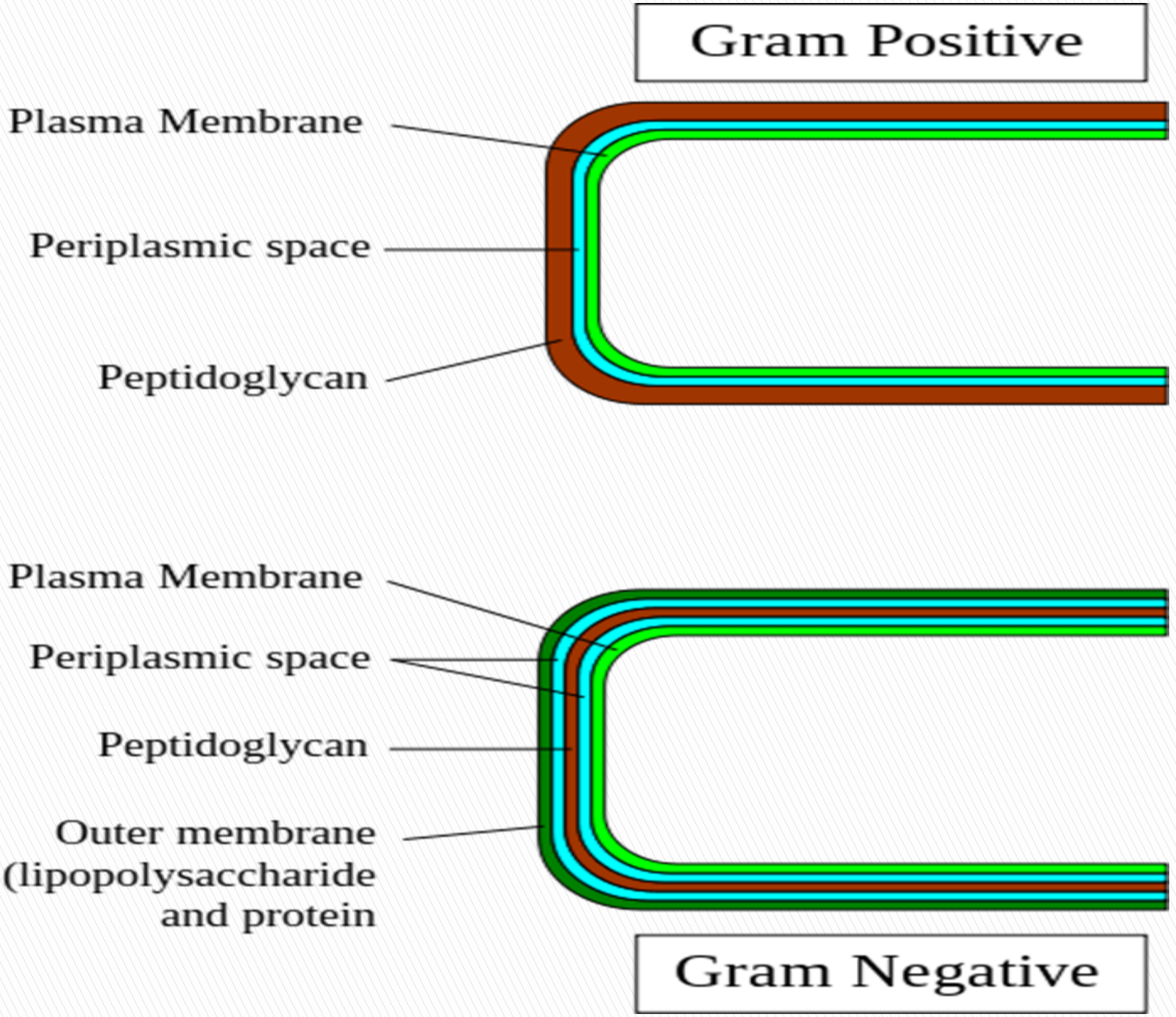

SPHERES (COCCI)
RODS (BACILLI)
SPIRALS
Streptococci
(Streptococcus pyogenes)
Diplococci
(Streptococcus pneumoniae)
Chain of bacilli
(Bacillus anthracis)
Vibrios
(Vibrio cholerae)
Tetrad
Spirilla
(Helicobacter pylori)
Flagellate rods
(Salmonella typhi)
Staphylococci
(Staphylococcus aureus)
Sarcina
(Sarcina ventriculi)
Spore-former
(Clostridium botulinum)
Spirochaetes
(Treponema pallidum)

Phenotypic classification systems

Gram stain and bacterial morphology

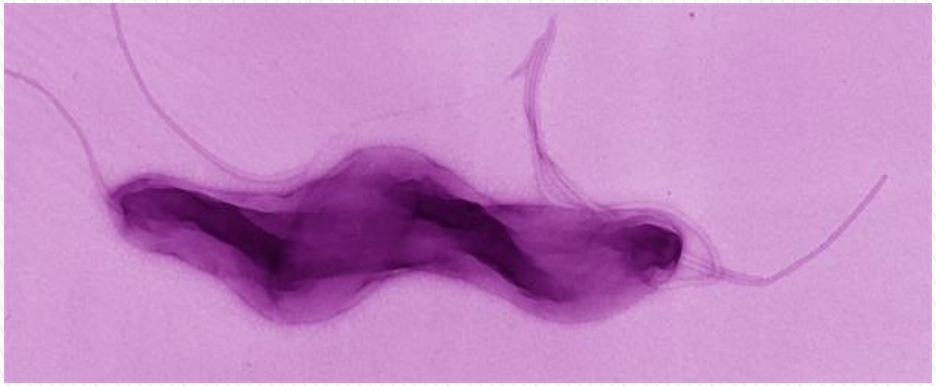


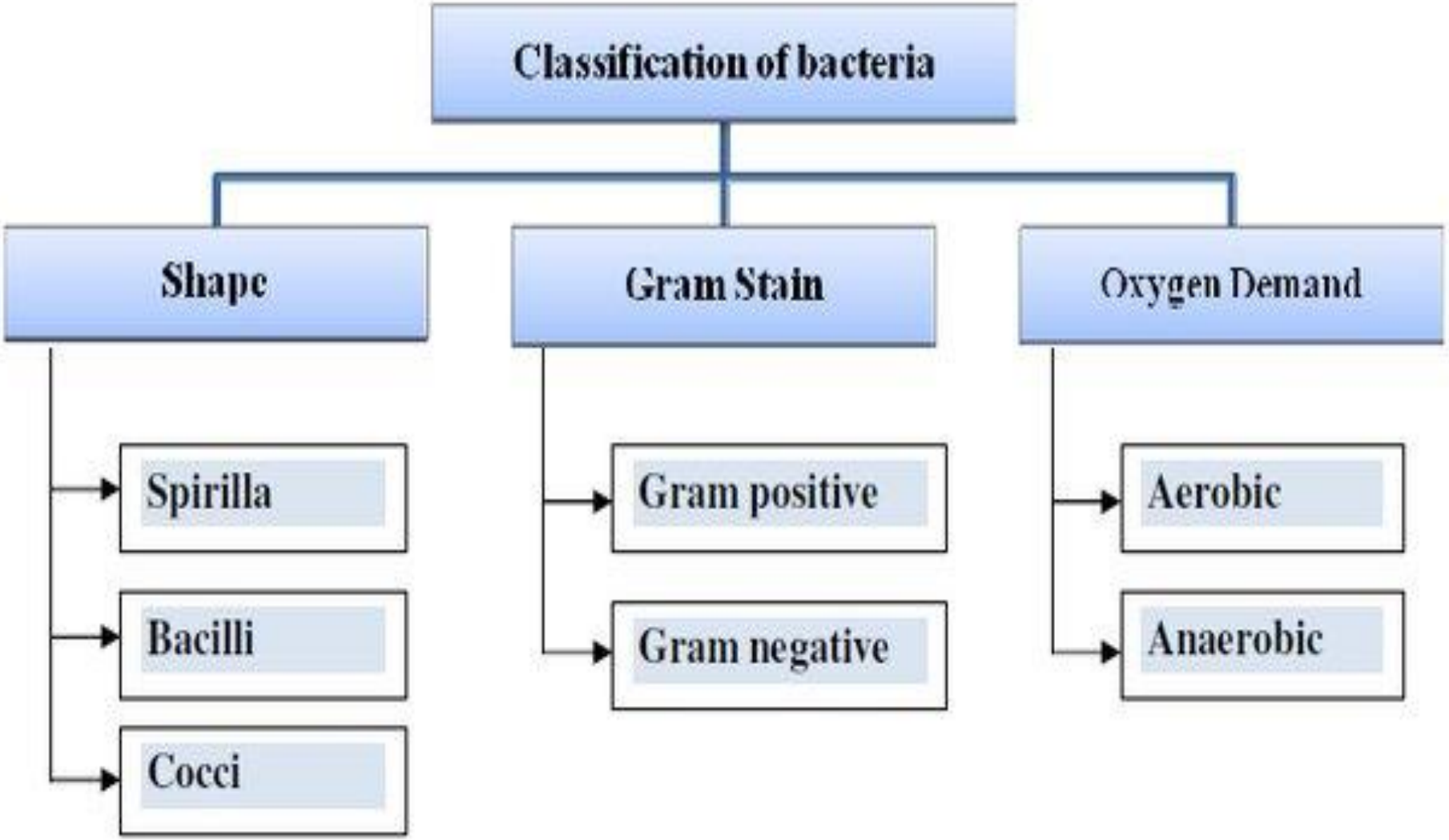



Gram Positive
Plasma Membrane
Periplasmic space
Peptidoglycan
Plasma Membrane
Periplasmic space
Peptidoglycan
Outer membrane
(lipopolysaccharide
and protein
Gram Negative

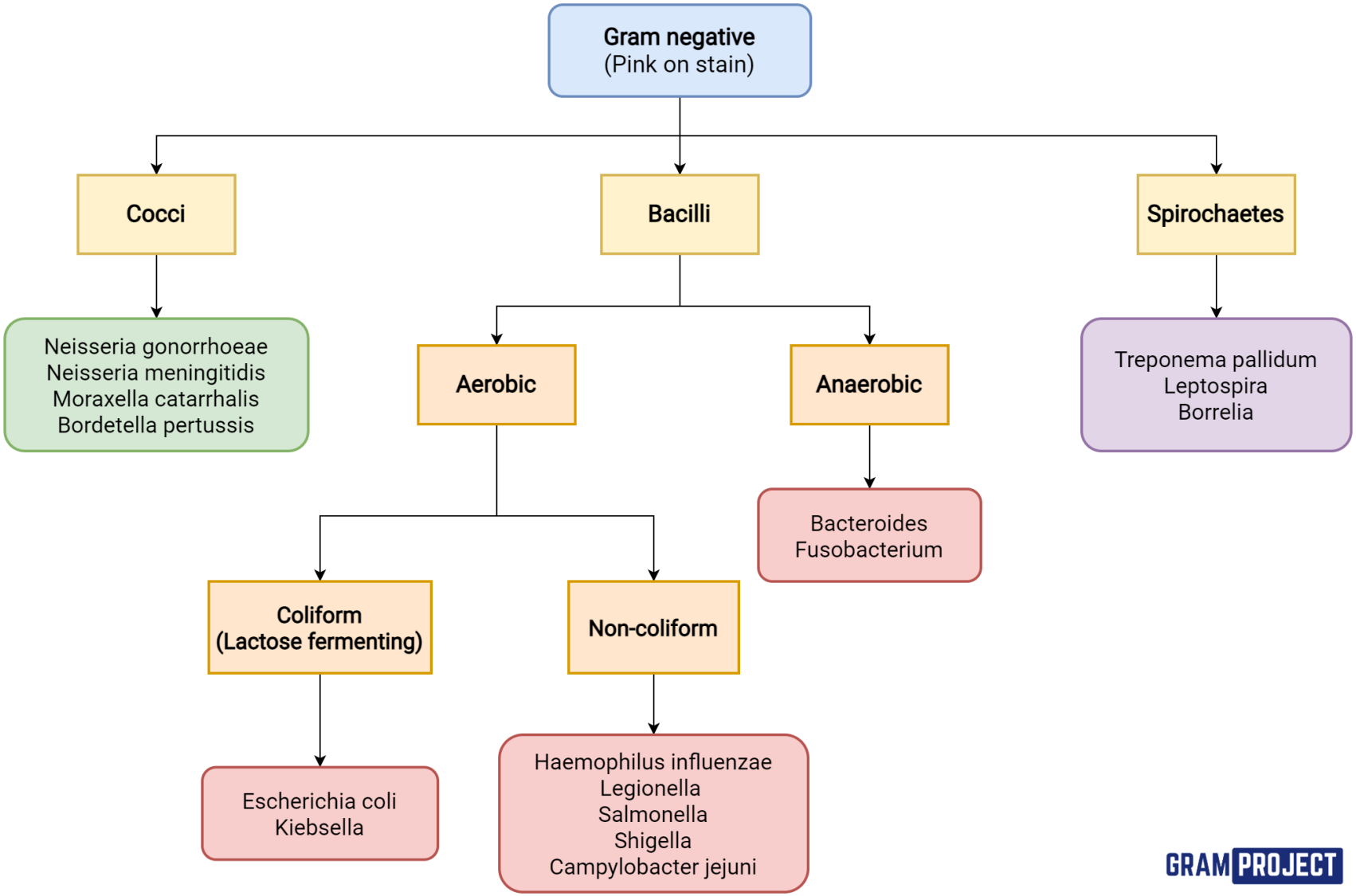
1 Gram Negative Spiral Bacteria

- Slender and flexible, come in a lot of different shapes
- More rigid than spirochetes
- Ex. – *Campylobacter jejuni*
  - Symptom – tenesmus: the sensation of desire to defecate, which is common and occurs frequently , with out the production of significant amounts of feces (often small amounts of mucous or blood are alone passed).




Classification of bacteria
Shape
Gram Stain
Oxygen Demand
Spirilla
Bacilli
Cocci
Gram positive
Gram negative
Aerobic
Anaerobic

Gram Negative Bacteria



GRAM PROJECT

Growth Requirments

Requirements for Growth

Bacteria must obtain or synthesize amino acid, carbohydrates and lipids build up the cell.

1- Nutrient

2- Temperature

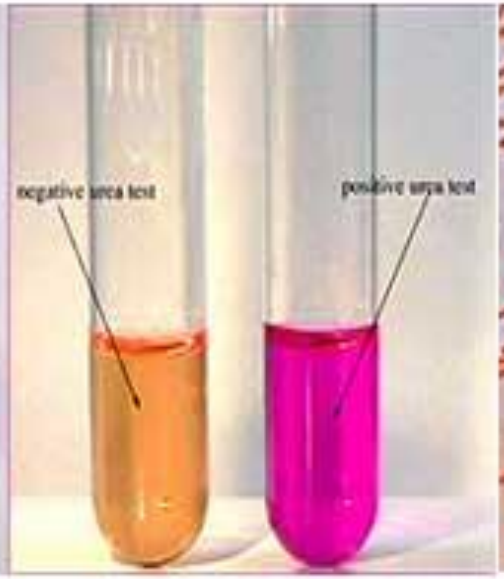
3- Oxygen

4- pH

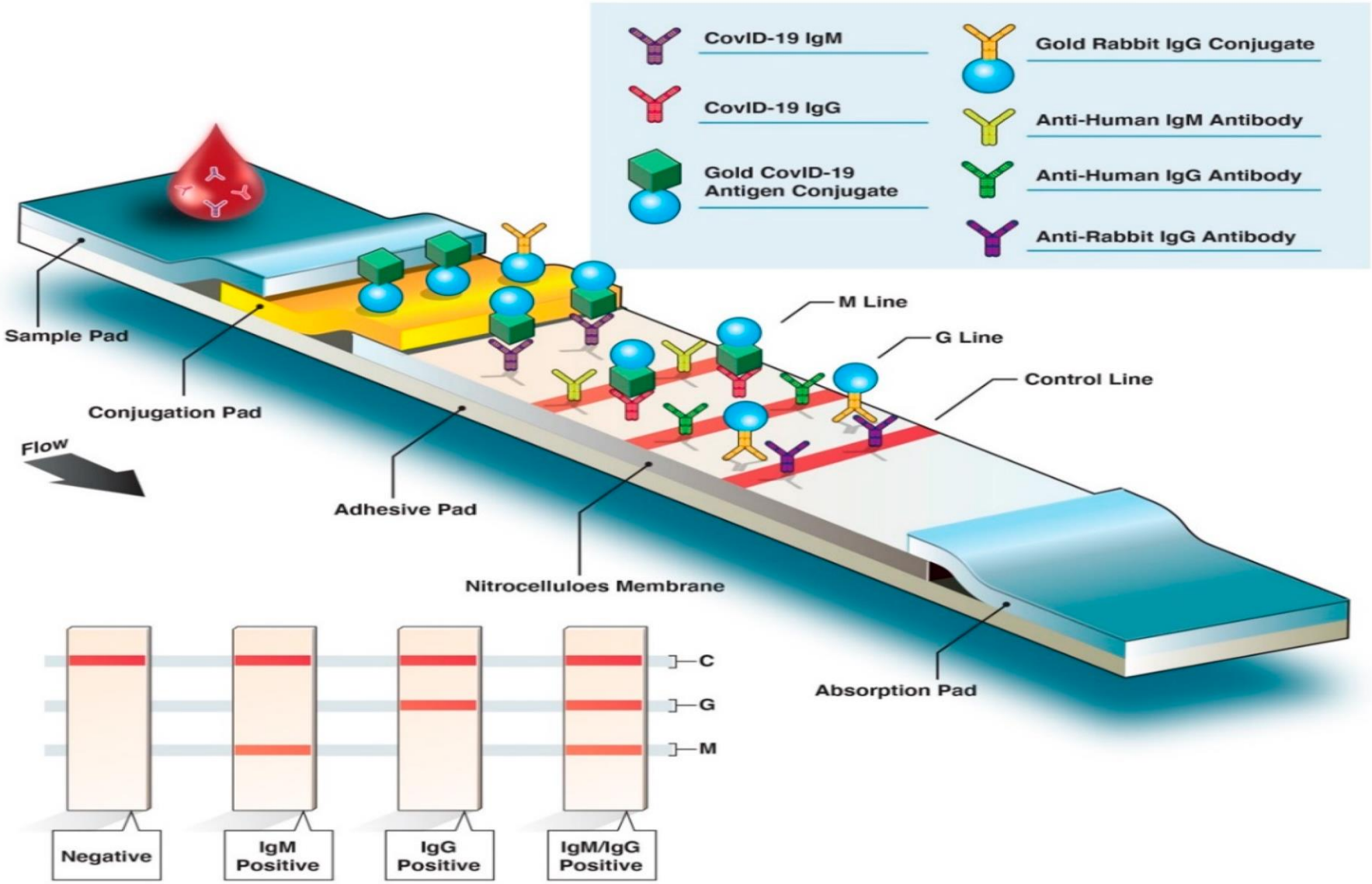
Biochemical reaction

- Biochemical reactions **can reveal the vital information necessary for accurately identifying the genera of various bacteria within a sample**. By their nature, bacteria produce large volumes of enzymes, and it is these enzymes that allow for their identification via biochemical methods.

Biochemical Test and Identification of *Salmonella* Typhi

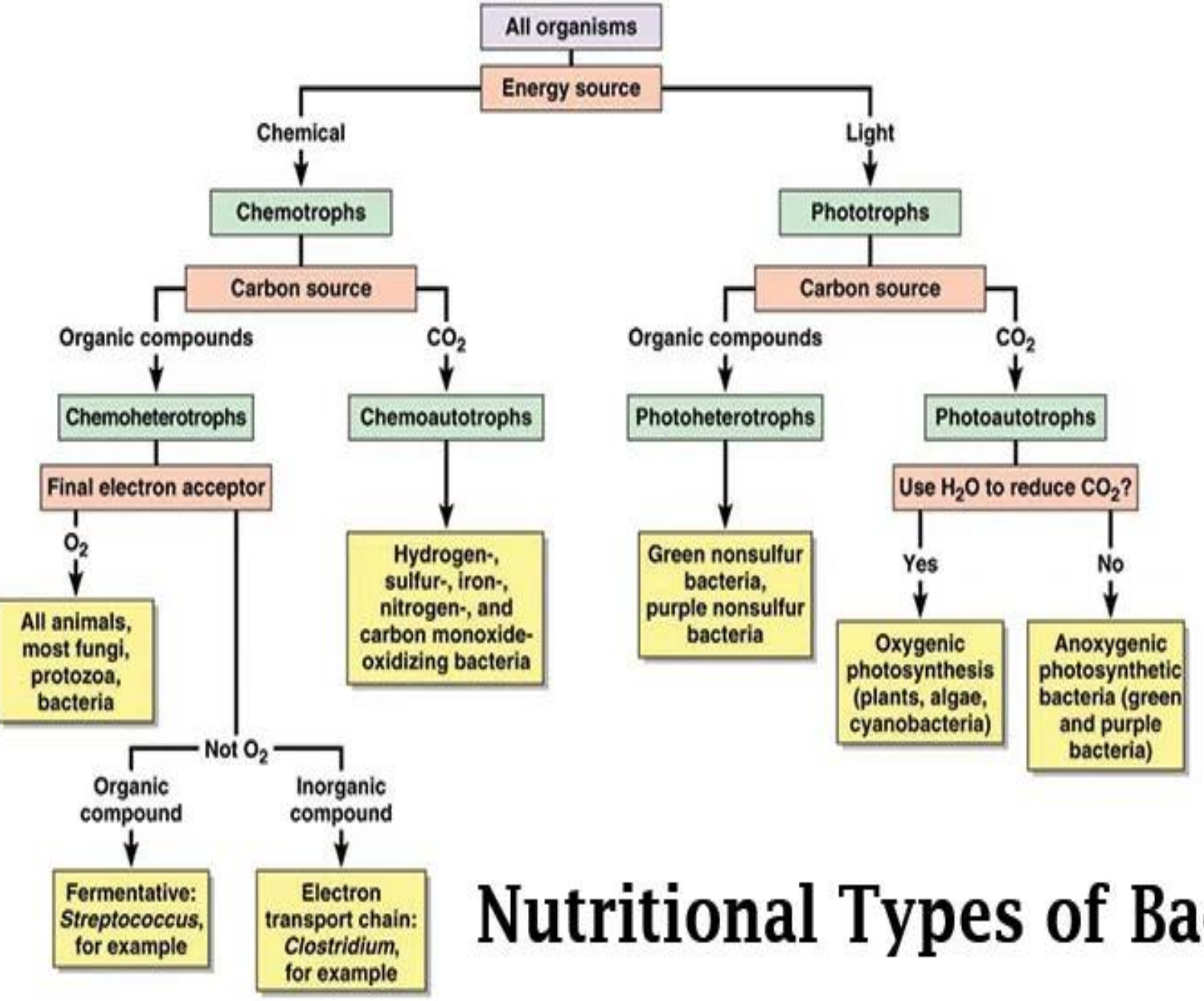


Serologic systems



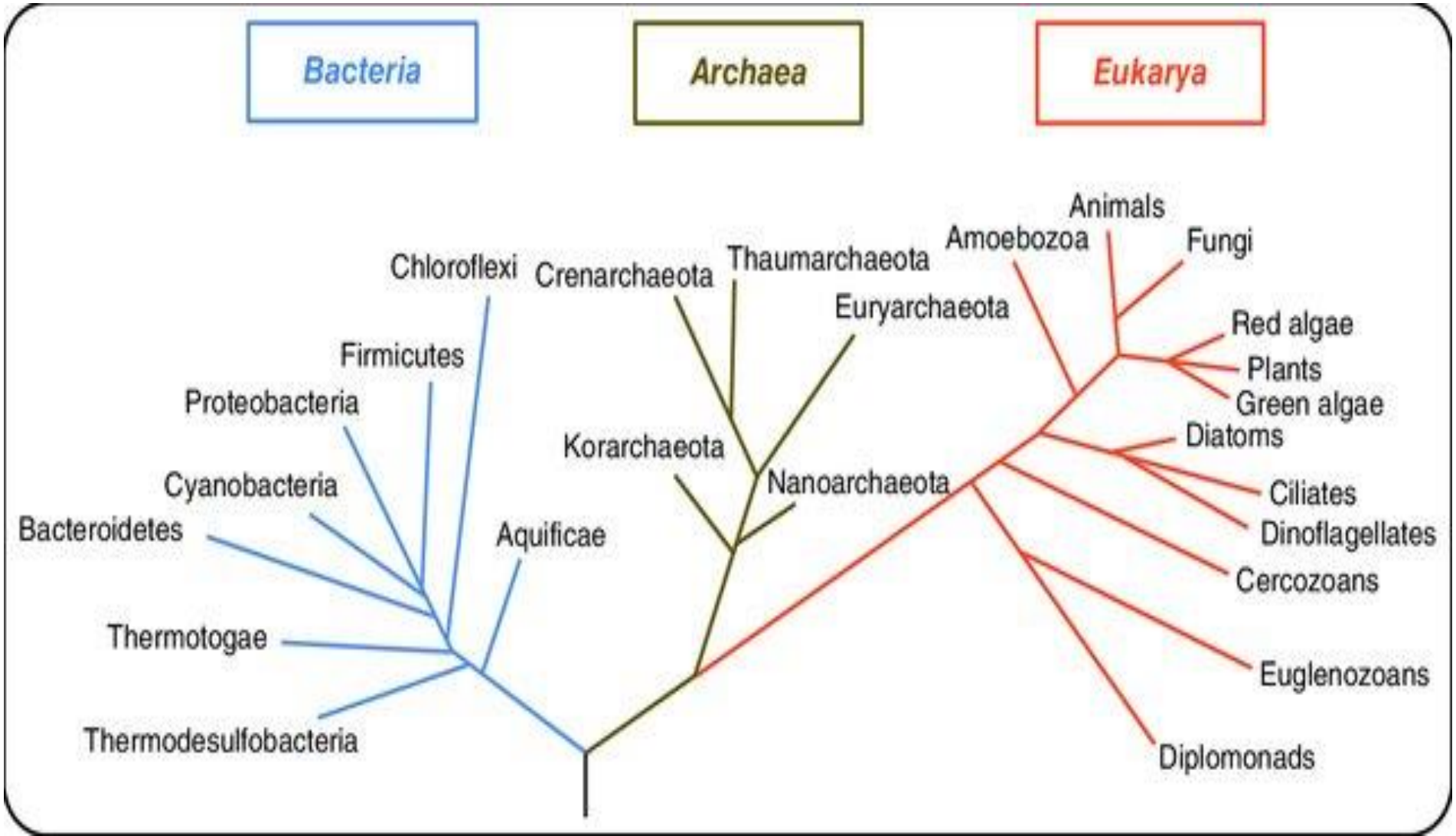
Environmental Reservoirs

- Environmental Microbiology is the field of science that examines the relationship between microorganisms and their biotic and abiotic environments. Microorganisms in the environment are diverse in origin and ubiquitous. Environmental Microbiology involves the study of the applied effects of microorganisms on the environment and on human activity, health and welfare.

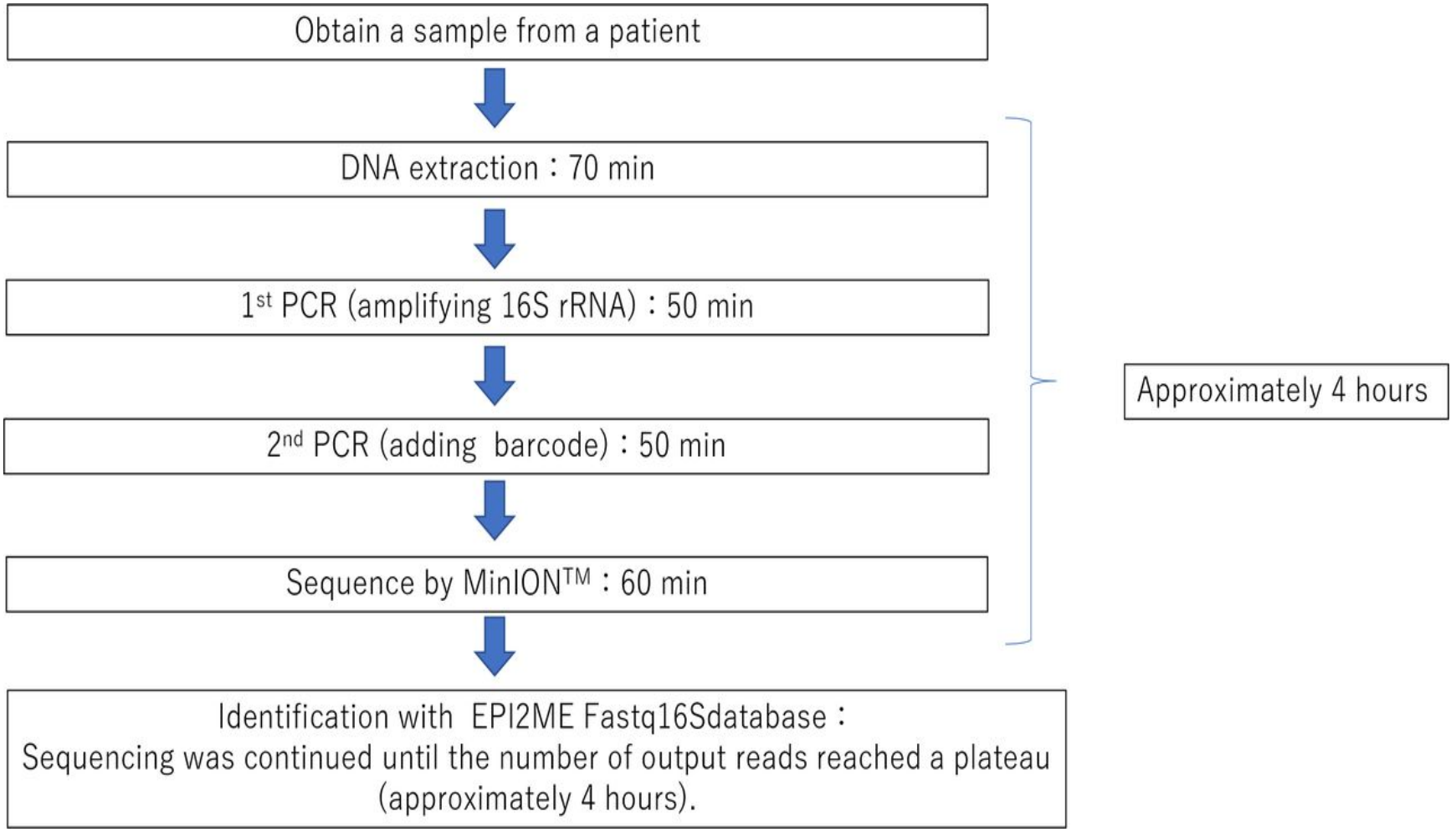


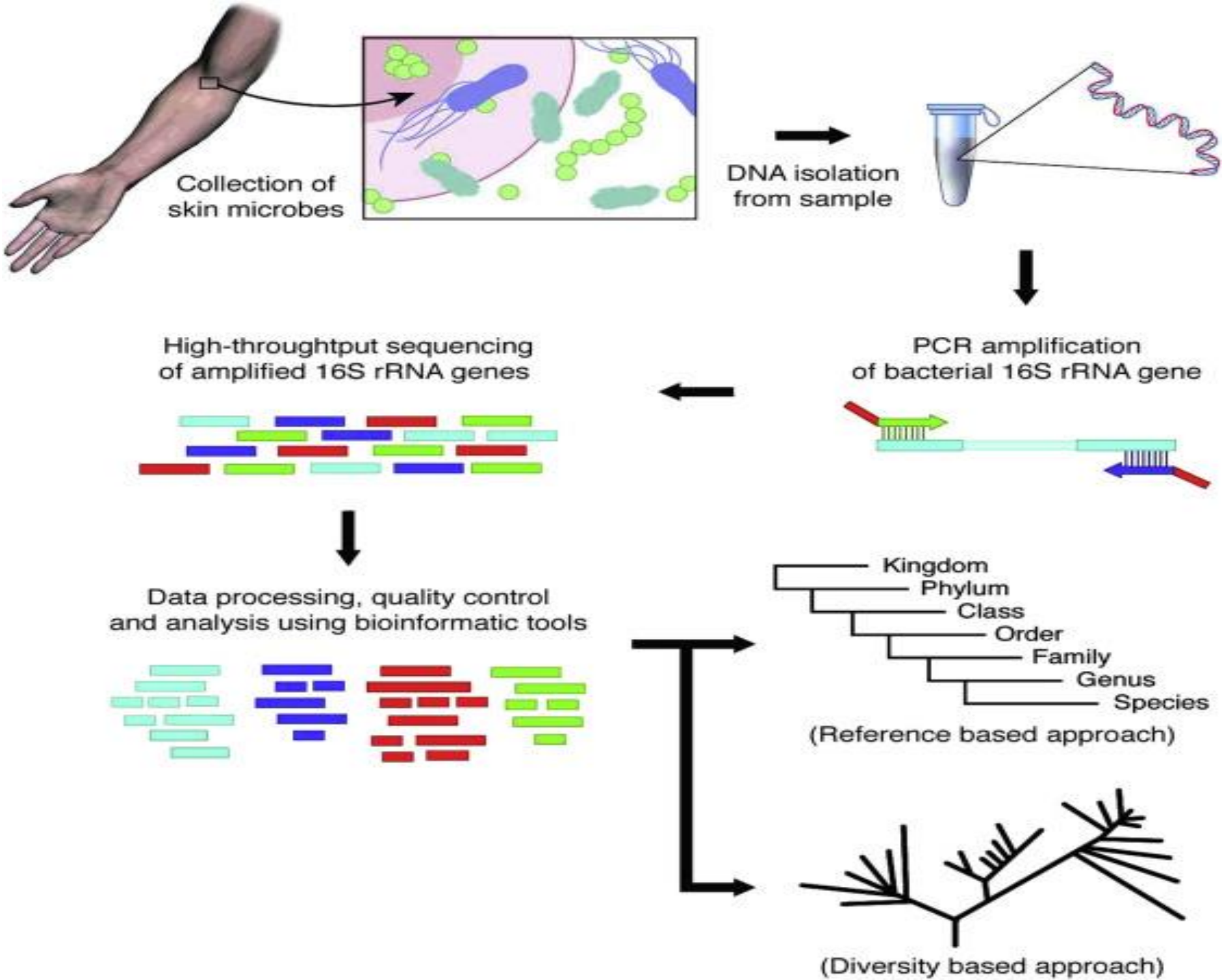
Nutritional Types of Bacteria

Genotypic systems
Universal phylogenetic tree



Ribosomal RNA(Rrna) Sequence analysis




Collection of
skin microbes
DNA isolation
from sample
PCR amplification
of bacterial 16S rRNA gene
High-throughtput sequencing
of amplified 16S rRNA genes
Data processing, quality control
and analysis using bioinformatic tools
Kingdom
Phylum
Class
Order
Family
Genus
Species
(Reference based approach)
(Diversity based approach)

Molecular supbtyping

- Molecular Typing
- Subtyping methods are frequently used for epidemiologic purposes to differentiate strains of common *Salmonella* serotypes. Phenotyping methods may be useful for characterizing outbreak-associated strains and sporadic multidrug-resistant isolates, and include bacteriophage typing, plasmid profile analysis, antimicrobial susceptibility, and biotyping. More discriminative genotyping techniques, including ribotyping, pulsed-field gel electrophoresis, insertion sequences analysis, PCR-based fingerprinting, and multilocus sequence typing, have been used in epidemiologic studies to differentiate strains within a given serotype.[142] Genomic DNA analysis using microarrays may complement the other genotyping methods.[143] However, lack of standardization and time requirement limit the widespread use of these genotyping techniques.