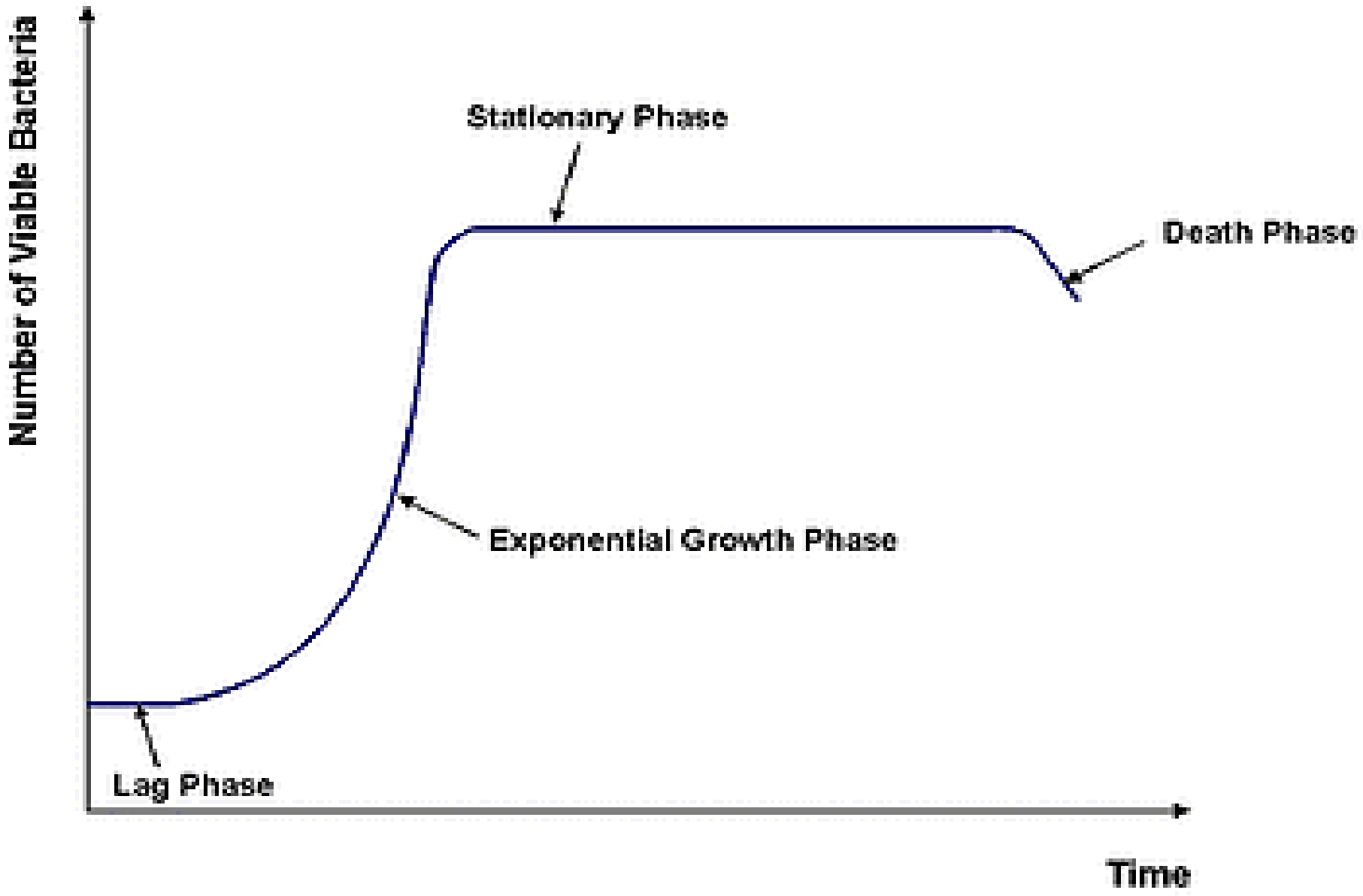
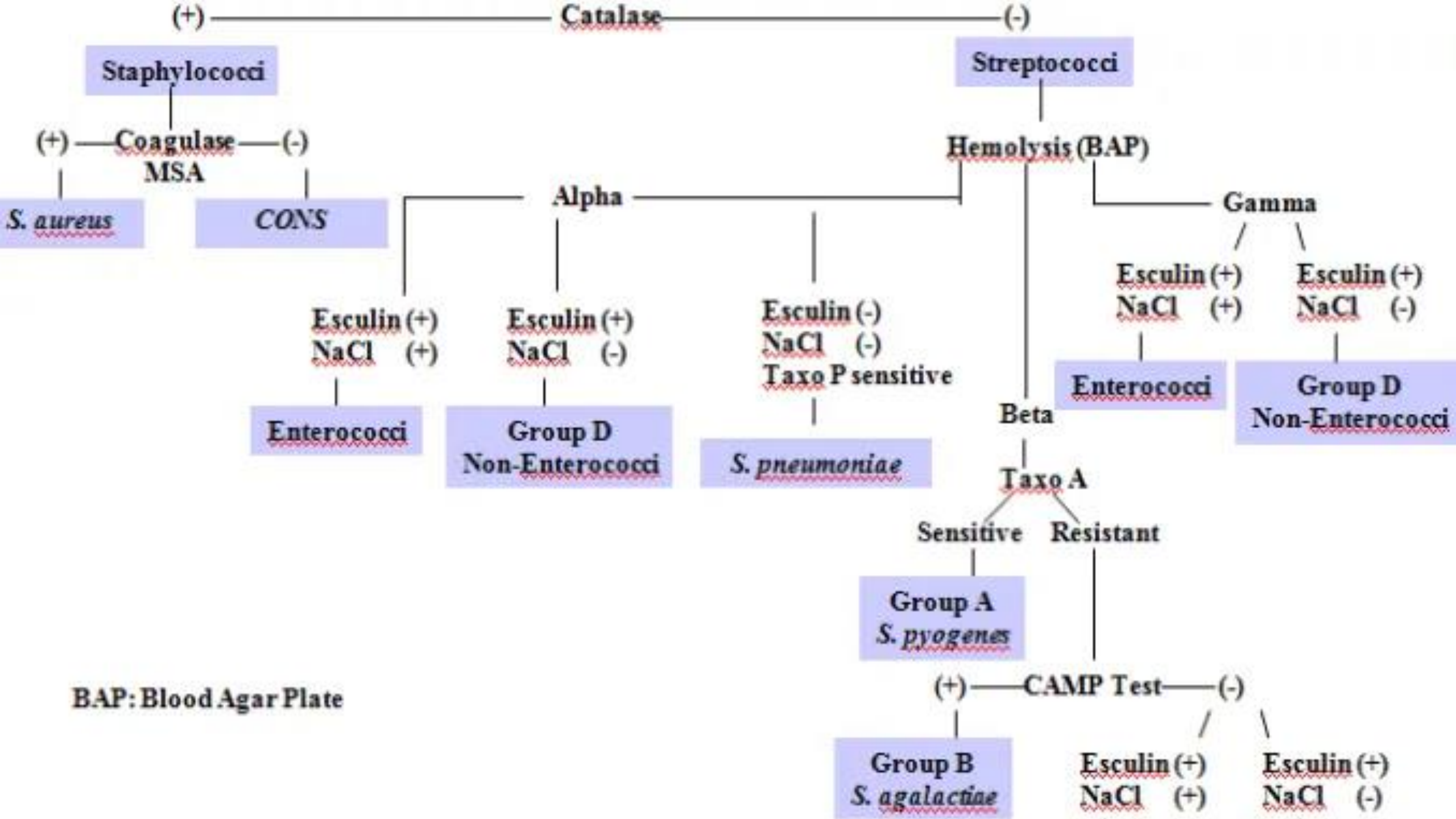
Bacterial growth curves

- Bacteria are as interesting as they are diverse.
- Though tiny, these unicellular life forms make huge contributions to many systems and cycles.
- From helping break down food in your intestine; to making the molecular assist in all three of the carbon, phosphorus, and nitrogen cycles -- these little bacteria can accomplish big things.
- Unsurprisingly, bacteria are model organisms for research.
- Not only because of their diversity, but also because they are easily contained and reproduce quickly.
- When using bacteria for research, it is important to understand and track rates of bacterial growth within a sample.
- Inoculant bacteria in a typical laboratory setting tend to proceed through four distinct growth phases:


Number of Viable Bacteria
Stationary Phase
Death Phase
Exponential Growth Phase
Lag Phase
Time

Overview of Biochemical tests used to identify bacteria in Microbiology laboratory



BAP: Blood Agar Plate

- **Beta-glucuronidase test (MUG Test)** : To identify Escherichia coli. Escherichia coli produces the enzyme β-D-glucuronidase, which hydrolyzes β-D-glucopyranosid-uronic derivatives to aglycons and D-glucuronic acid.
- **Bacitracin Sensitivity Test:** Bacitracin sensitivity test differentiates Streptococcus pyogenes (positive) from other beta hemolytic streptococci (resistant).
- **Bile solubility test** : To differentiate Streptococcus pneumoniae from other alpha hemolytic streptococci. Bile or a solution of a bile salt, such as sodium desoxycholate rapidly lyses pneumococcal colonies.

- **CAMP Test:** Certain organisms such as Streptococcus agalactiae (Group B streptococci), produce a diffusible extracellular protein (CAMP) factor that acts synergistically with the beta-lysin of Staphylococcus aureus and causes enhanced lysis of RBCs.
- **Catalase test**: To differentiate Staphylococci (catalase positive) from Streptococci (catalase test negative)
- **Citrate utilization test:** To differentiate members of Enterobacteriaceae family.

- **Coagulase test:** Coagualse test is used to identify Staphylococcus aureus. Coagulase test differentiates Staphylococcus aureus (positive) from coagulase negative staphylococci (CONS), such as S. epidermidis, S. saprophyticus.
- **DNase test**: This test is used to determine the ability of an organism to hydrolyze DNA. It is primarlly used to identify Staphylococcus aureus
- **Indole test:** This test is used to determine the ability of an organism to split tryptophan to form the compound indole. It is used differentiate gram negative rods particularly E. coli in microbiology laboratory.

- **Litmus milk decolorization test:** To help identify Enterococcus and some Clostridia which have ability to metabolize litmus milk.
- **Lysine Decarboxylase test:** To assist in the identification of Salmonella and Shigella
- **Oxidase test:** To help identify Neisseria, Pasteurella, Vibrio, and Pseudomonas. This test is used to determine the presence of bacterial cytochrome oxidase.
- **Urease test:** Urease test is used to determine the ability of an organism to produce urease (an enzyme) which hydrolyzes urea. This test is done to help identify Proteus, Morganella, Yersinia enterocolitica, and Helicobacter pylor