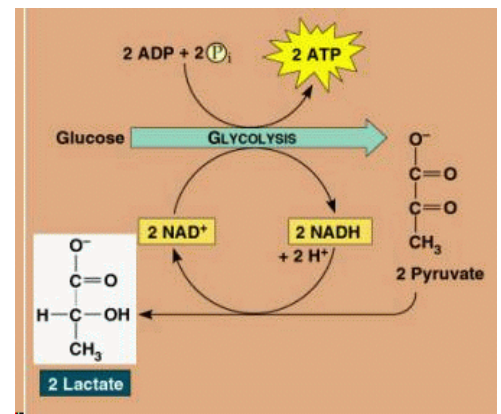


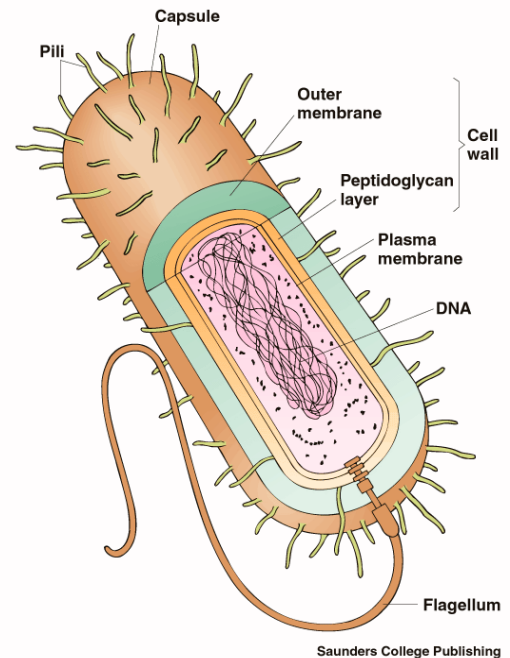
Microbial Metabolism

Enzymes

- p_____ – specific for a particular m_____ (substrate)
- c_____ of biochemical reactions, but do not get consumed in the reaction
- c_____ applications exists
 -
 -
 -
 -
 -
 -
- some non-p_____ molecules may be involved in enzyme catalyzed reactions:
 - co-factors or co-enzymes (e.g., nicotinamide adenine dinucleotide, NAD, NADH, also FAD, FADH)
 - may also act as e_____ carriers
- Six categories of enzymes:
 - oxidoreductases: involved in o_____ reduction reactions
 - transferases: transfer of constituents from one c_____ to another
 - hydrolases: responsible for h_____ of carbohydrates, proteins, and lipids
 - lyases: catalyze the a_____ or removal of constituents
 - isomerases: i_____ formation
 - ligases: join m_____, p_____ formation



Solomon: Biology, 5/e
Figure 23.9



Enzyme Kinetics enzymes are “catalysts” in biodegradation and metabolism



S = substrate

E = enzyme

ES = enzyme substrate complex

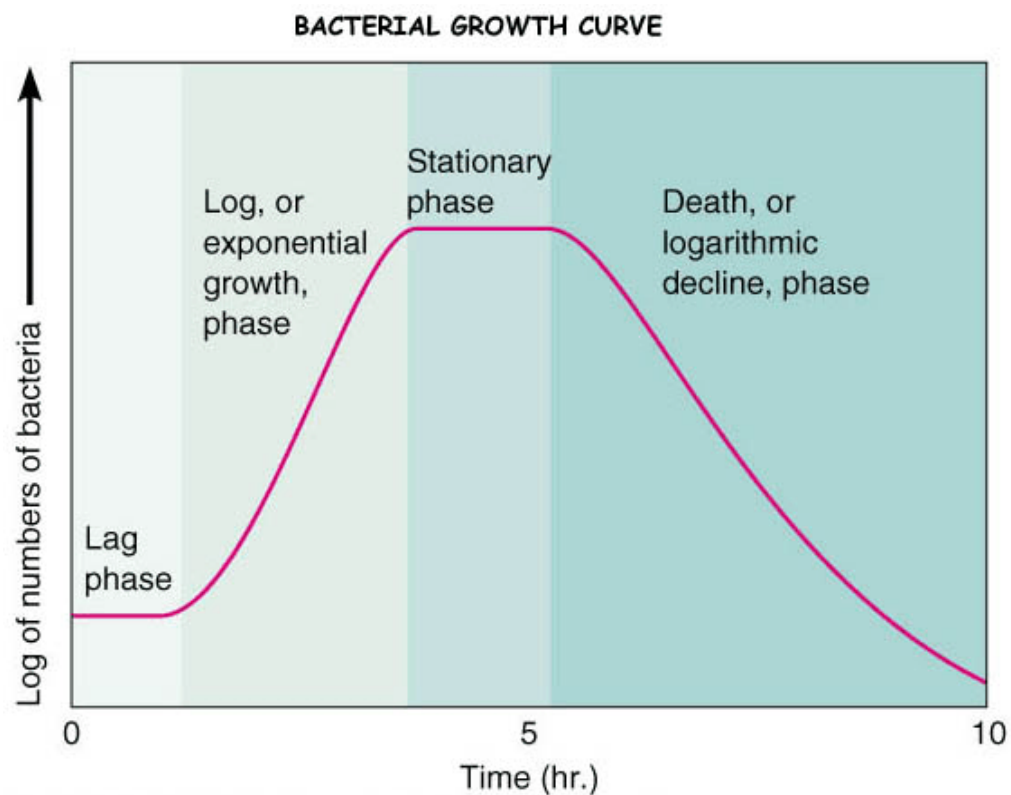
Microbial Growth Kinetics

Prokaryotic cells divide by b_____ fission: simple c_____ of DNA and cell division

- growth rate = increase in n_____ of microorganisms or increase in microbial m_____
- time required for microbial population to d_____ = generation time (doubling time) during unlimited growth conditions

- b _____ versus continuous culture
- growth curve:

- lag phase: result of a _____ or time needed to grow enough cells to see response or both
- exponential growth phase – cells growing at m _____ (unlimited) growth conditions



- stationary phase, $\frac{dN}{dt} = 0$
- death phase – how to distinguish bacterial death from non-reproductive death?

- Continuous Culture – m_____ b_____ on substrate:

METABOLISM

- catabolism – produce e_____ to drive cell machinery, exergonic
- anabolism – b_____ reactions, endogonic

- ADP – adenosine _____phosphate _____ cal/bond

- ATP – adenosine _____phosphate

-

– formed in 3 ways:

1. S_____l_____ phosphorylation (SLP): occurs during fermentation, e.g., glycolysis - breakdown of g_____ in EMP pathway to pyruvate produces 4 ATP, consumes 2 ATP, nets 2 ATP
2. O_____ phosphorylation: e_____ transport, p_____ motive force
3. P_____ phosphorylation