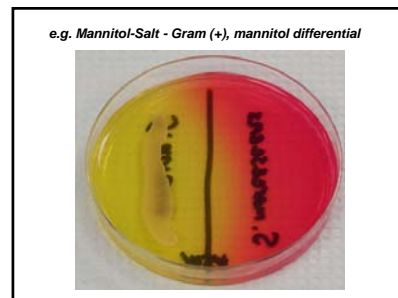
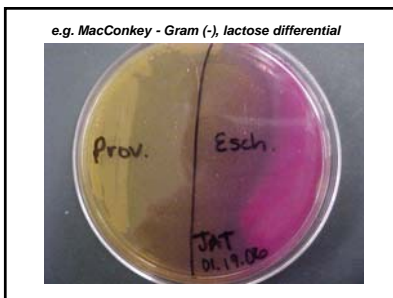
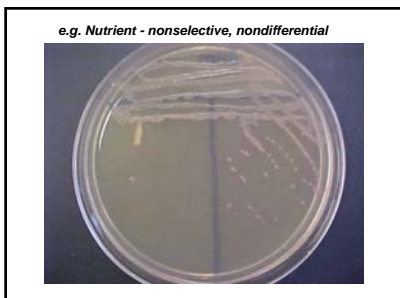


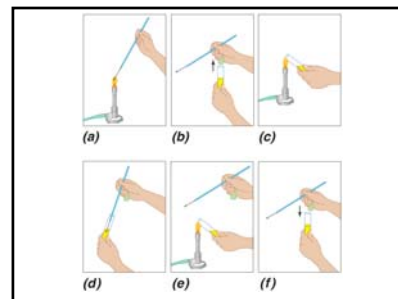
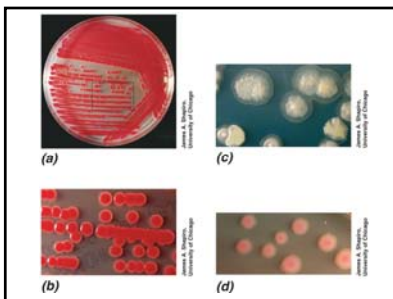
**Lab Project
Basic Methods, Media,
Enumeration**

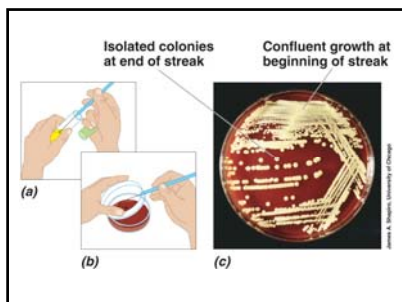
Culture/Growth Media
 Defined - precise recipe of chemicals
 Complex - extracts (beef, yeast, milk, blood...)
 Selective - inhibit some microbes, not others
 Differential - shows different phenotypes

Element	Usual form found in the environment
Carbon (C)	CO ₂ , organic compounds
Hydrogen (H)	H ₂ O, organic compounds
Oxygen (O)	H ₂ O, O ₂ , organic compounds
Nitrogen (N)	NH ₃ , NO ₃ ⁻ , N ₂ , organic nitrogen compounds
Phosphorus (P)	PO ₄ ³⁻
Sulfur (S)	H ₂ S, SO ₄ ²⁻ , organic S compounds, metal sulfides (FeS, CuS, ZnS, NiS, and so on)
Potassium (K)	K ⁺ in solution or as various K salts
Magnesium (Mg)	Mg ²⁺ in solution or as various Mg salts
Sodium (Na)	Na ⁺ in solution or as NaCl or other Na salts
Calcium (Ca)	Ca ²⁺ in solution or as CaSO ₄ or other Ca salts
Iron (Fe)	Fe ²⁺ or Fe ³⁺ in solution or as FeS, Fe(OH) ₃ , or many other Fe salts

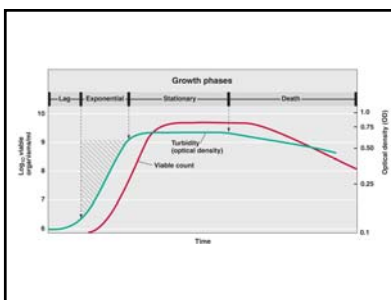
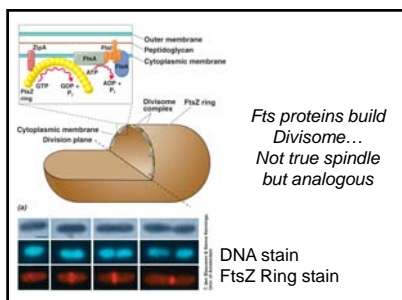
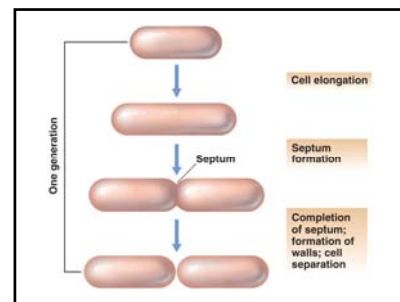


Culturing Microbes
 Pure Culture - single kind of microorganism
 Solid/agar media immobilizes cells - colonies
 Aseptic Technique - methods to keep sterile
 Many rules for tools - loop, tubes, plates...

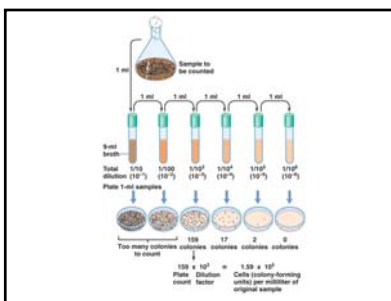
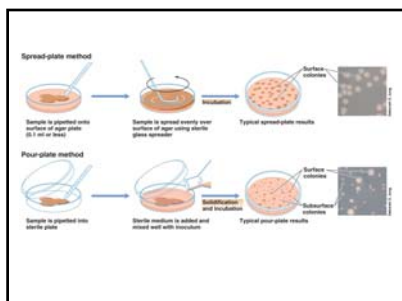




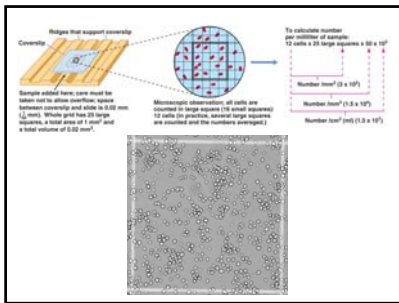
Microbial Growth
 Growth rate = change in cell # over time
 Binary fission – mediated by divisome, Fts
 Growth cycle in closed system media...
 Understand Lag, Log, Stationary, Death



Viable Count – Plate-Based
 1 colony = 1 starting bacterium
 Unknown samples - dilute/plate; target 30-300
 Pros - only counts live cells
 Cons - not rapid, selective (right media?)



Total Cell or Direct Microscopic Count
 Uses microscope plus counting chamber...
 Allows putting a defined, small volume on slide
 Pros – relatively rapid, nonselective
 Cons - dead=alive, clumps or small cells difficult



Activities
 Loop Transfer & Using Test Tubes - Individual
 Streak-Plating and Pure Cultures - Individual
 Dilution/Viable Counting – Pairs
 Total Cell Counting – dry lab homework