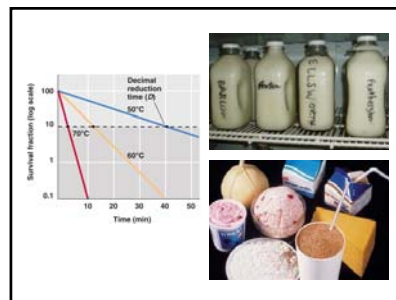
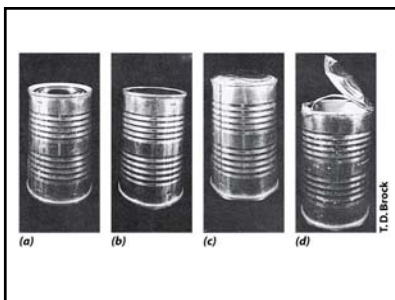
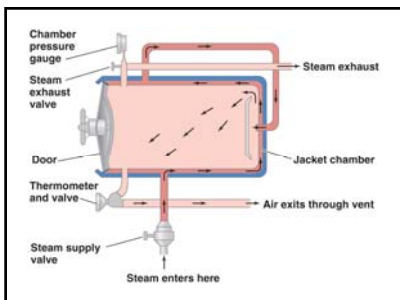




Kinds of Control - Physical, Chemical

Physical - Heat
 Primary target is proteins - denatures
 70° C kills mesophiles; 121° C kills spores
 Autoclave 15 min/121° C plus pressure sterilizes
 Canning essentially replicates autoclaving
 Pasteurization (15 sec/71° C) only sanitizes



Physical - Cold
 Inhibits mesophiles - generally slows spoilage
 But doesn't kill - so, warming up means growth



Physical - Radiation (UV/X/Gamma)

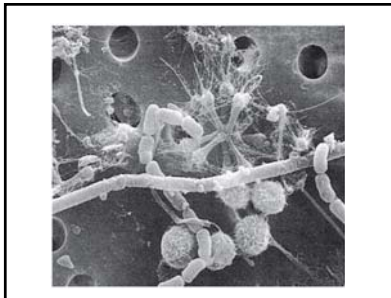
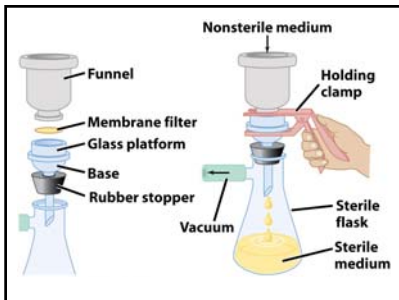
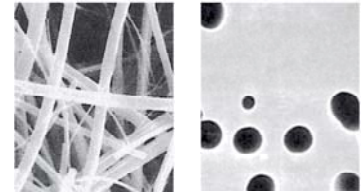
Damages DNA, doesn't make food radioactive
For food, mail - some devices use radioactivity

Food category	Dose* (kGy)	Purpose
Fresh meat: ground beef	4.50	Reduce bacterial pathogens
Herbs, spices, enzymes, and flavorings	30.00	Sterilize
Pork	1.00	Reduce <i>Trichinella spiralis</i> protist
Meats used in NASA [®] space flight program	44.0	Sterilize
Poultry	4.50	Reduce bacterial pathogens



Physical - Filtration

Pass through membrane/holes - does not kill!
0.45 um for bacteria; smaller for viruses



Chemical - Antiseptic Targets

Alcohol - denatures proteins
Detergents - disrupt membranes
H₂O₂ - oxidizes many targets, free radicals



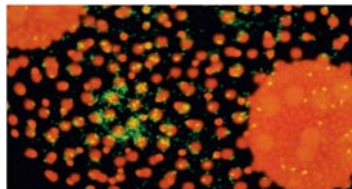
Chemical - Disinfectant Targets

Chlorine - oxidizer, free radicals
Formaldehyde - alkylating agent, many targets



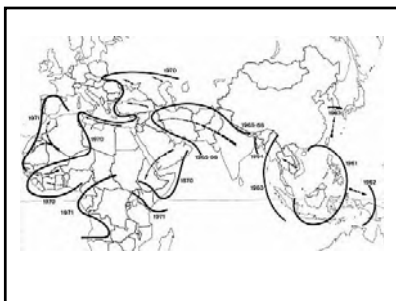
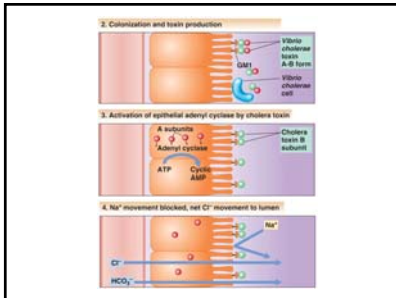
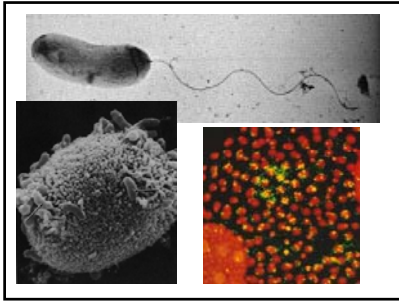
Some Environmental Pathogens

Most contaminate food, evade control!

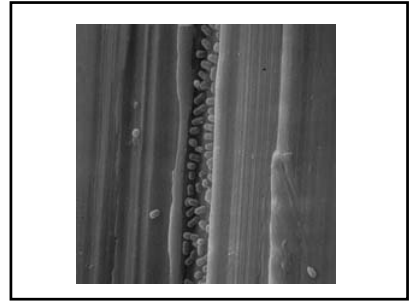
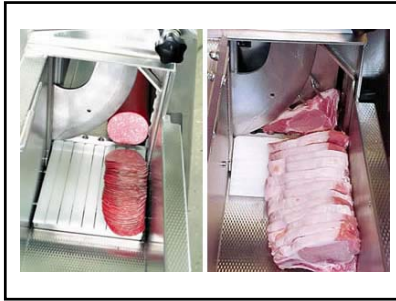
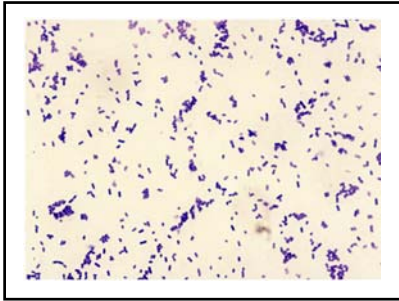


Vibrio cholera - Cholera

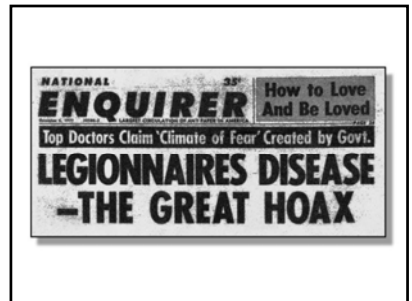
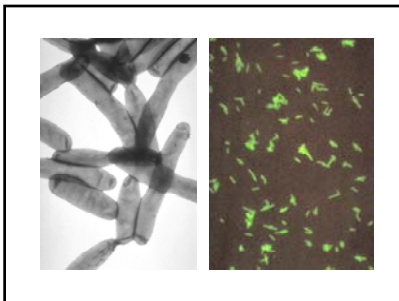
Proteobacteria, HALOPHILE - marine...
Algae symbiont, shellfish, carried in ship bilges
Developing - feces/water, major pandemics
Developed - usually raw, undercooked seafood
GI toxin - salt loss, 1-2 days rice water stool

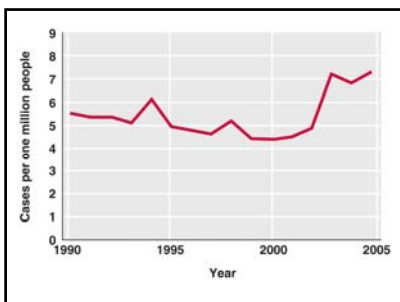


Listeria monocytogenes - Listeriosis
 Gram (+), PSYCHROPHILE - soil, water
 Sources - processed meat, unpasteurized dairy
 GI to blood, brain in immune-compromised
 Elderly, infants, HIV/AIDS - sepsis, meningitis
 Pregnant women - spontaneous abortions



Legionella pneumophila - Legionnaires
 Proteobacteria, THERMOPHILE (60° C) - water
 Sources - air conditioners, hot water tanks...
 Inhaled as aerosol, enters blood - flu-like, fever
 Elderly, infants, HIV/AIDS - fatal pneumonia
 Emerged at 1976 American Legion Convention





Clostridium botulinum - Botulism
 Gram (+), ANAEROBIC, SPORES - soil
 Sources - improperly canned foods (too low T°)
 Spores germinate in cans - make neurotoxin...
 Easily denatured by heating to 80° C, if not...
 Adults - ingest toxin, blocks Ach/contraction
 1-2 days - fatal paralysis, heart/lung failure

Infant botulism (same agent) next lecture!

