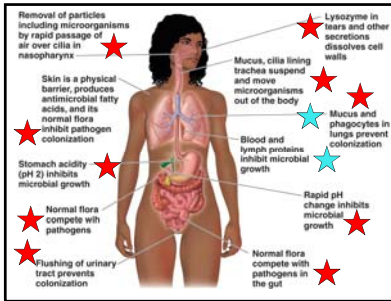


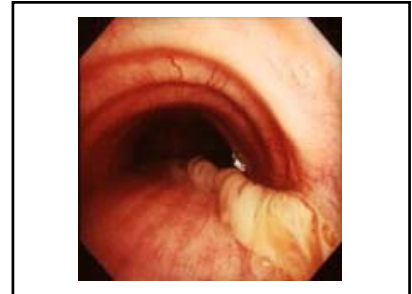
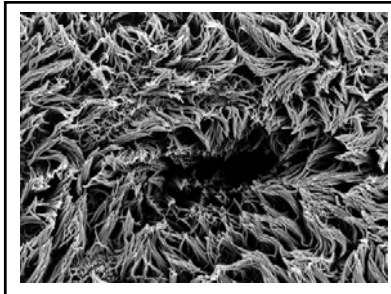
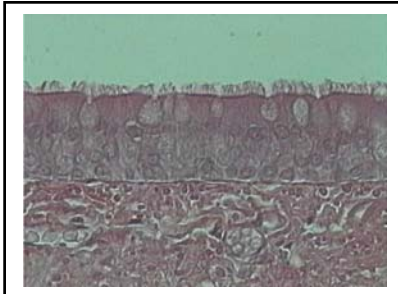
Biology 331
**Surface Control, Normal
 Flora, Nosocomials**



Surface Control - Skin, Mucosa

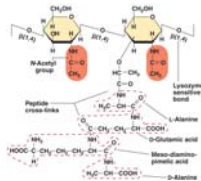
Physical Barriers

Skin presents a thick, dry, dead barrier
 Mucosa cilia beat out agents; mucus traps
 Regular flushing of systems removes agents
 Normal flora - more later today, some make...



Chemical Barriers

Acid - vaginal flora lactic acid, stomach HCl
 Digestive Enzymes - proteases, lipases...
 Lysozyme - antibacterial in secretions



The Ecology of You - Normal Flora
Good "infection" by age 1, part of DEFENSES!

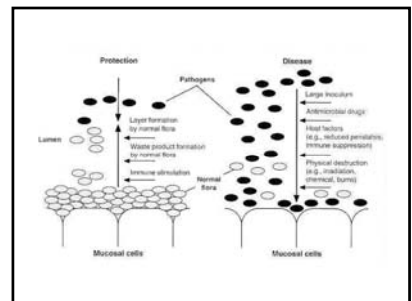
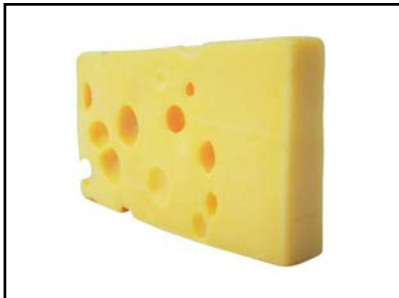
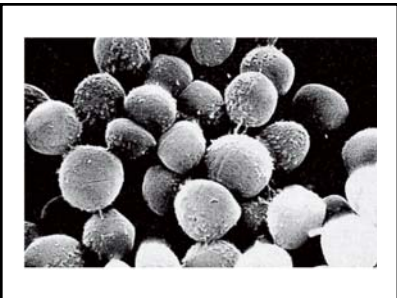
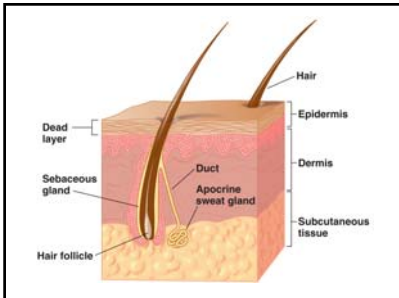
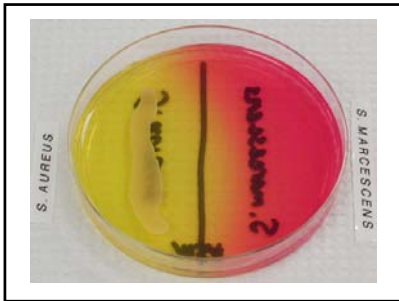


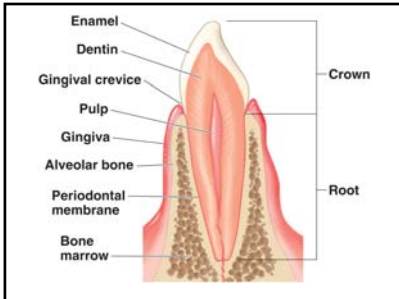
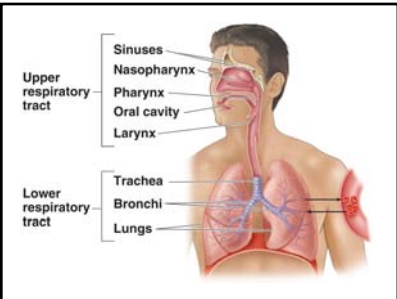
Table 29.1 Representative genera of microorganisms in the normal flora of humans

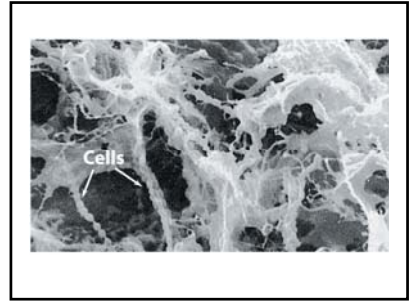
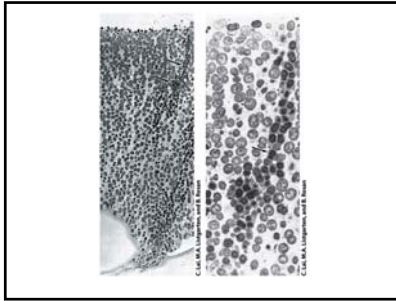
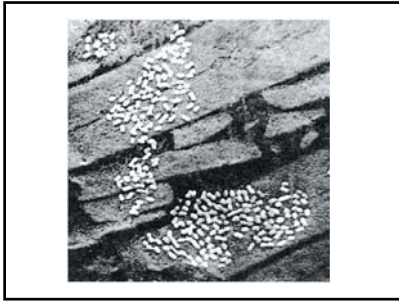
Anatomical site	Genera or major groups*
Skin	Actinomyces, Corynebacterium, Enterobacter, Klebsiella, Moraxella (f), Micrococcus, Propionibacterium (f), Proteus, Pseudomonas, Staphylococcus, Streptococcus
Mouth	Streptococcus, Lactobacillus, Fusobacterium, Veillonella, Capnocytophaga, Neisseria, Actinomyces, Gemmiferum (f), Candida (f), Capnocytophaga, Eikenella, Prevotella, Streptococcus (several genera)
Respiratory tract	Streptococcus, Staphylococcus, Corynebacterium, Neisseria, Haemophilus
Gastrointestinal tract	Lactobacillus, Streptococcus, Bacteroides, Bifidobacterium, Eubacterium, Peptostreptococcus, Peptococcus, Ruminococcus, Clostridium, Escherichia, Klebsiella, Proteus, Enterococcus, Staphylococcus, Moraxellaceae, Gram positive bacteria, Proteobacteria, Actinobacteria, Fusobacteria
Urogenital tract	Escherichia, Klebsiella, Proteus, Neisseria, Lactobacillus, Corynebacterium, Staphylococcus, Candida (f), Prevotella, Clostridium, Peptostreptococcus, Ureaplasma, Mycoplasma, Mycobacterium, Streptococcus, Torulopsis (f)

Prominent Skin Flora
Staphylococcus (G+) - prevalent, salt/dryness
Propionibacterium (G+) - BO and acne
 LAB - Pseudomonas (soil), Enterics (feces)

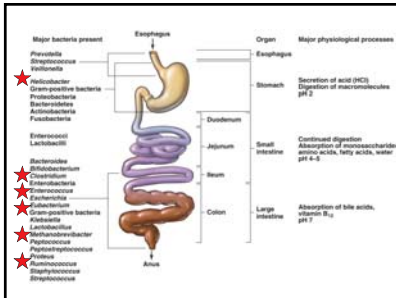


Prominent Upper Respiratory Tract Flora
Streptococcus (G+) - tooth plaque, acid/decay
Staphylococcus - more throat/nose
 Note - lower/lungs should be STERILE

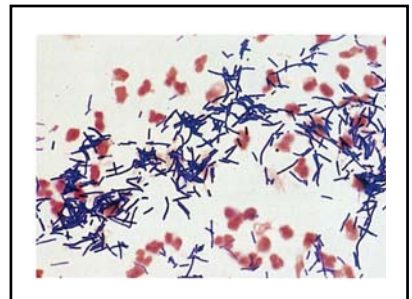
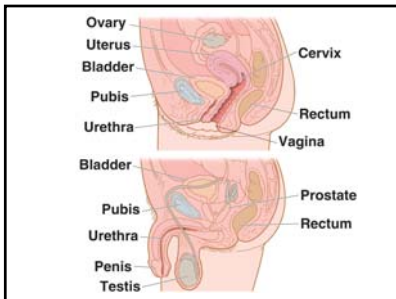




Prominent GI Tract Flora - Over 400 General!
 Vitamins, essential amino acids, process fats
 LAB - Clostridium, Enterics...
 Methano-gens and -troths, Helicobacter (later)



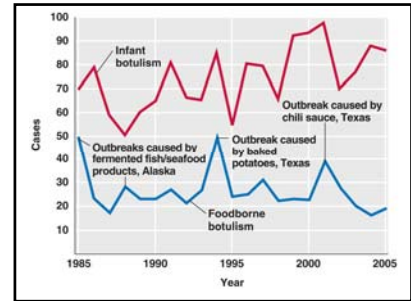
Prominent Urogenital Tract Flora
 Urethra - ANY GI or skin flora, usually transient
 Bladder - should be sterile in healthy people
 Vagina - Lactobacillus (G+) ferments lactic acid



Some Flora Relevant Diseases

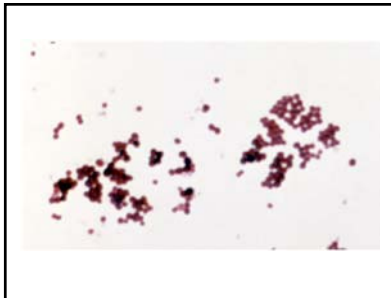
Infant Botulism - Same Agent As Adult

Infant eats spores on honey, produce, in soil...
 But low GI flora - spores germinate, neurotoxin
 Same fate as adults - but 10 times adult rate!



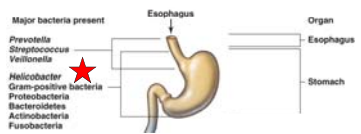
Food Poisoning - Staphylococcus aureus

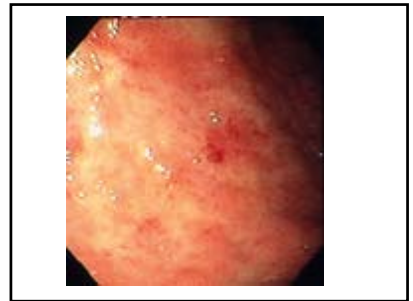
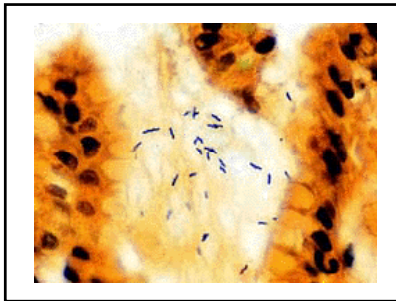
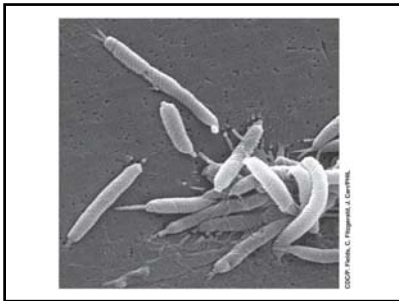
30-70% humans - nose normal flora
 Get in poorly chilled foods - makes GI toxin
 People ingest toxin, vomiting/diarrhea 1-6 hrs
 One of MANY different strains of S. aureus



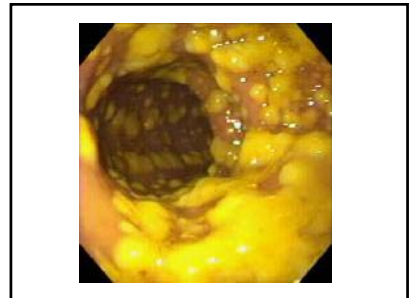
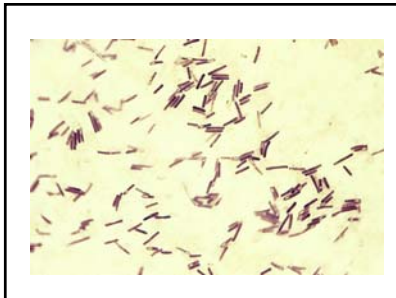
Ulcers - Helicobacter pylori (G- Spirilla)

Low level normal flora in many stomachs
 Genetics, diet, stress, age - exacerbate ulcers
 Treatable with antibiotics, untreated - cancer?





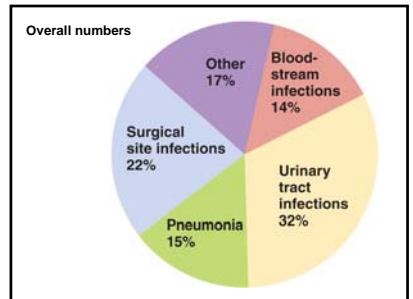
Colitis - Clostridium difficile
 Long-term antibiotics kill all GI flora but spores
 These then germinate, become dominant genus
 Mild toxin - chronic diarrhea to fatal colitis



Nosocomial Infections
 Hospital-acquired, largely opportunistic flora

Nosocomial Infections - ICU Data Only
 Most are opportunistic flora in wrong place
 2 million/year (5% patients) - 100,000 die
 Added cost = \$4.5 billion; stay = 2-4 weeks
 Antibacterial drug overuse - 70% agents resistant

Why? Failure to follow guidelines, more IC patients/drugs, temporary/uneducated staff...



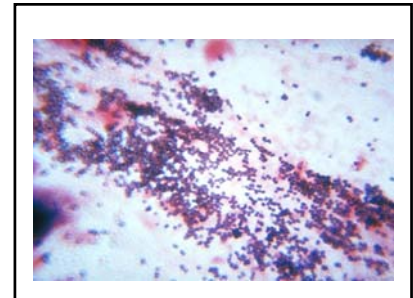
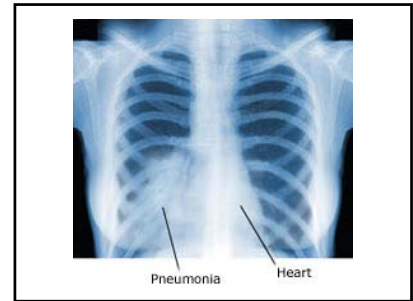
ICU Only

Table 33.4 Number of intensive care unit nosocomial infections in the United States, by site and organism

Pathogen	Bloodstream	Pneumonia	Urinary Tract
Enterobacter spp.	1,083	4,444	1,560
Escherichia coli	914	3,725	5,393
Klebsiella pneumoniae	735	2,865	1,891
Haemophilus influenzae		1,738	
Pseudomonas aeruginosa	841	4,752	3,365
Staphylococcus aureus	2,758	7,205	497
Staphylococcus spp.	8,181		838
Enterococcus spp.	2,967	682	4,226
Candida albicans	1,090	1,862	4,856
Other pathogens	3,774	12,537	8,075
Total number*	21,443	39,810	30,791
Total %	23.7	43.1	33.2

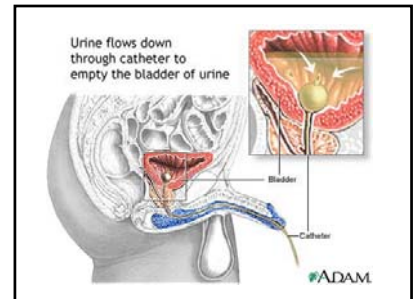
Nosocomial Pneumonia - 40,000 die/year
 Lungs/alveoli; crowding, respirators, nebulizers
 Roughly Equal - S. aureus, Pseudomonas

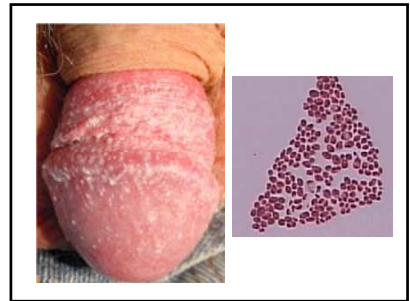
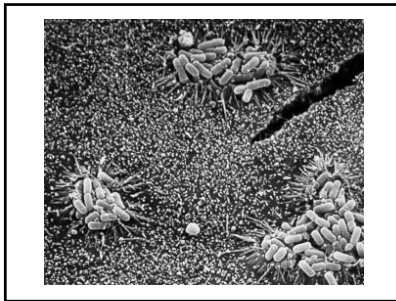
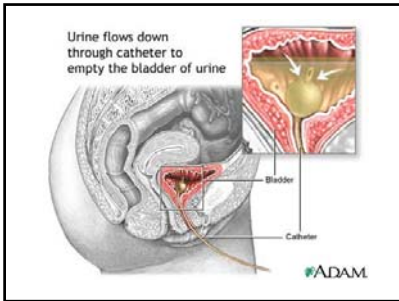
These DO NOT cause high levels pneumonia in general community... other agents - next unit.



Nosocomial UTI - 30,000 die/year
 Bladder/kidney; poorly handled catheters
 Roughly Equal - Enterics, Fungi

SAME agents cause high levels UTI in general community - but higher in women, often STD.





Nosocomial Septicemia - 20,000 die/year
 Invasive agents, mishandled needles, surgery...
Staphylococcus epidermidis - MRSE
 High affinity for plastics - shunts, valves, joints

