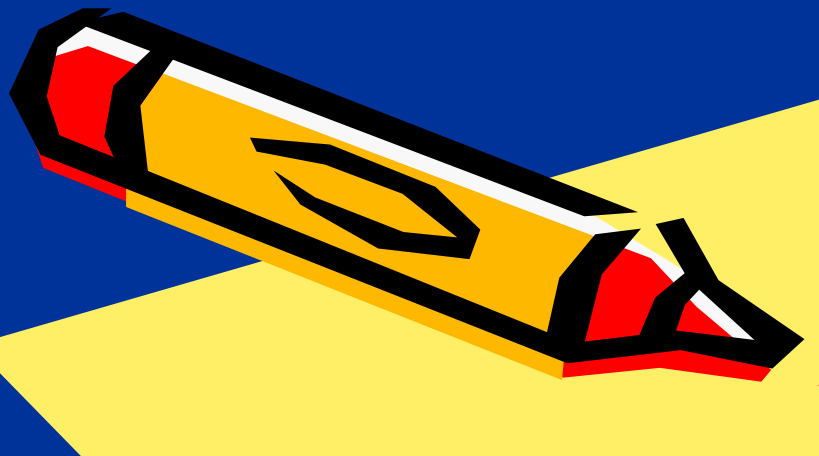
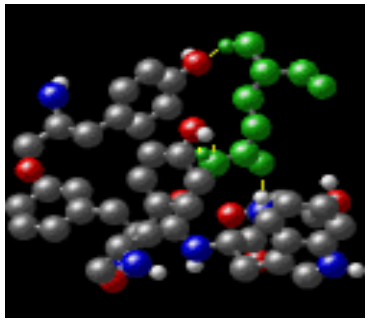


INFECTION

Dr. Bhavin K. Prajapati
Asst. Professor
N.H.L. Medical college

HOST

MICROBE

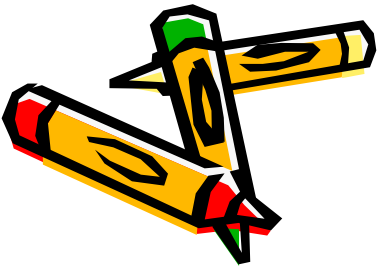


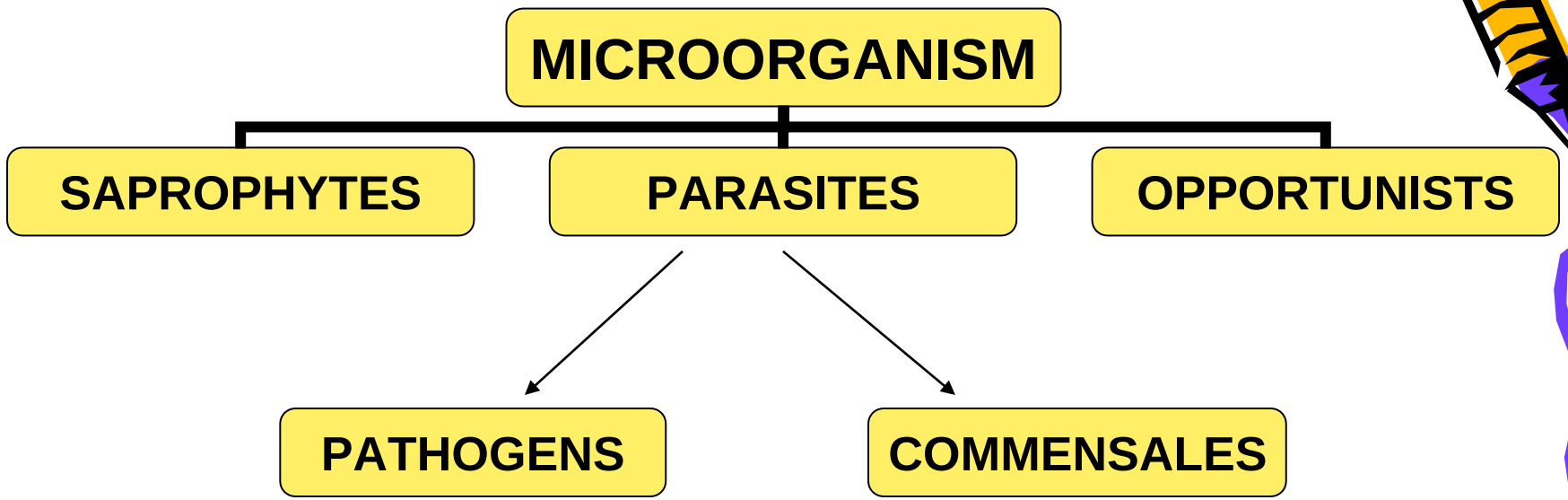
INFECTION

IMMUNITY

Relationship between microorganism & their host, microorganisms are classified as –

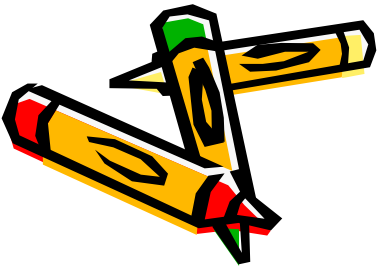
- Saprophytes – free living microbes that subsist on dead or decaying organic matter.
- Parasites – microbes that can establish themselves and multiply in the hosts.




MICROORGANISM
SAPROPHYTES
PARASITES
OPPORTUNISTS
PATHOGENS
COMMENSALES

Infection - Lodgment & Multiplication of parasite in or on the tissues of a host

Infectious disease - consequence of infection



Infection

- Primary infection - Initial infection with a parasite (microbe) in a host
- Reinfection - Subsequent infection with the same parasite (microbe) in the host
- Secondary infection - New infection in a host whose resistance is lowered by a preexisting infectious disease
- Focal infection-cond. where due to infection or sepsis at localized site generalized effects are produced

- Cross infection- when in a pt. already suffering from a disease a new infection is set up from another host or another external source

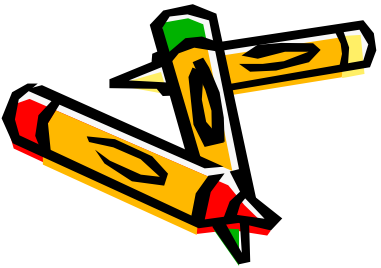
- Nosocomial infection- cross infection occurring in hospitals

- Iatrogenic infection- physician induced infections resulting from investigative, therapeutic or other procedures

- Endogenous infection- source of infection is pt.'s own body
- Exogenous infection- infection from external sources
- Inapparent or sub clinical infection- where the clinical effects are not apparent

- Atypical infection- the typical or characteristic clinical manifestations of particular disease are not apparent

- Latent infection- some parasites, following infection, may remain in a latent or hidden form, proliferating & producing clinical disease when host resistance is lowered

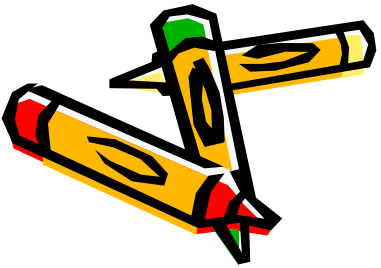


Sources of Infection

1.HUMANS

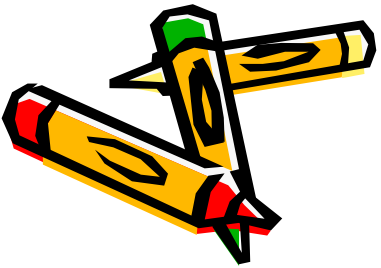
Patient – principle living reservoir of human disease

Carrier – person who harbor the pathogens and transmit them to others without exhibiting any sign of illness



Healthy – harbors the pathogen but never suffer from disease

Convalescent – recovered from the disease & continues to harbor the pathogen

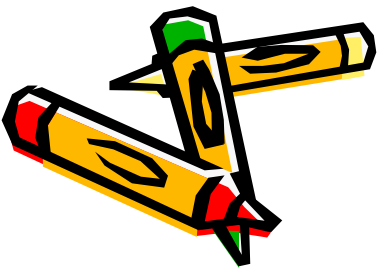


Temporary – carrier state < 6 months

Chronic – carrier state for several years

Contact – person who acquires the pathogen from a patient

Paradoxical – carrier who acquires the pathogen from another carrier

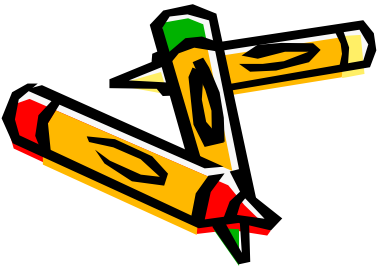


2. ANIMALS

- Reservoir host

- Zoonoses : infectious diseases transmitted from animals to human beings

- Zoonotic diseases – plague, toxoplasmosis, hydatid disease



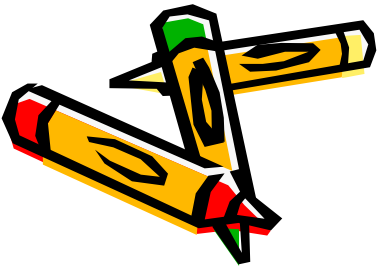
3. INSECTS

Vectors – insects who transmit infections

Mechanical vector – domestic fly

Biological vector – Anopheles mosquito in malaria
Aedes aegypti mosquito in yellow fever

Arthropod-borne diseases – Yellow fever
Malaria, Dengue

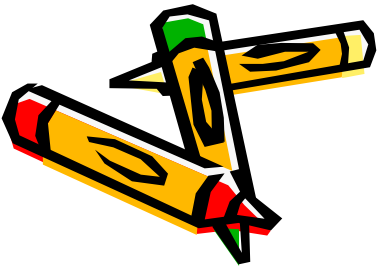


4. Soil & Water

Soil - Spores of tetanus,
Histoplasma capsulatum,
Round worm, hook worm

Water – contamination with pathogenic bacteria (cholera vibrio, hepatitis virus A,E)

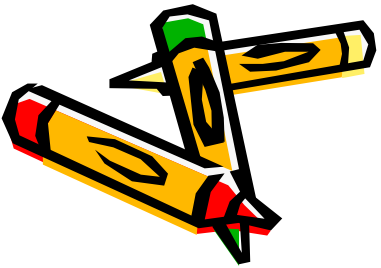
- ingestion of aquatic vectors (Cyclops in guinea worm)



5. Food

Food poisoning- external contamination (staphylococcal)

- preexisting infection (salmonellosis)



Methods of transmission of infection

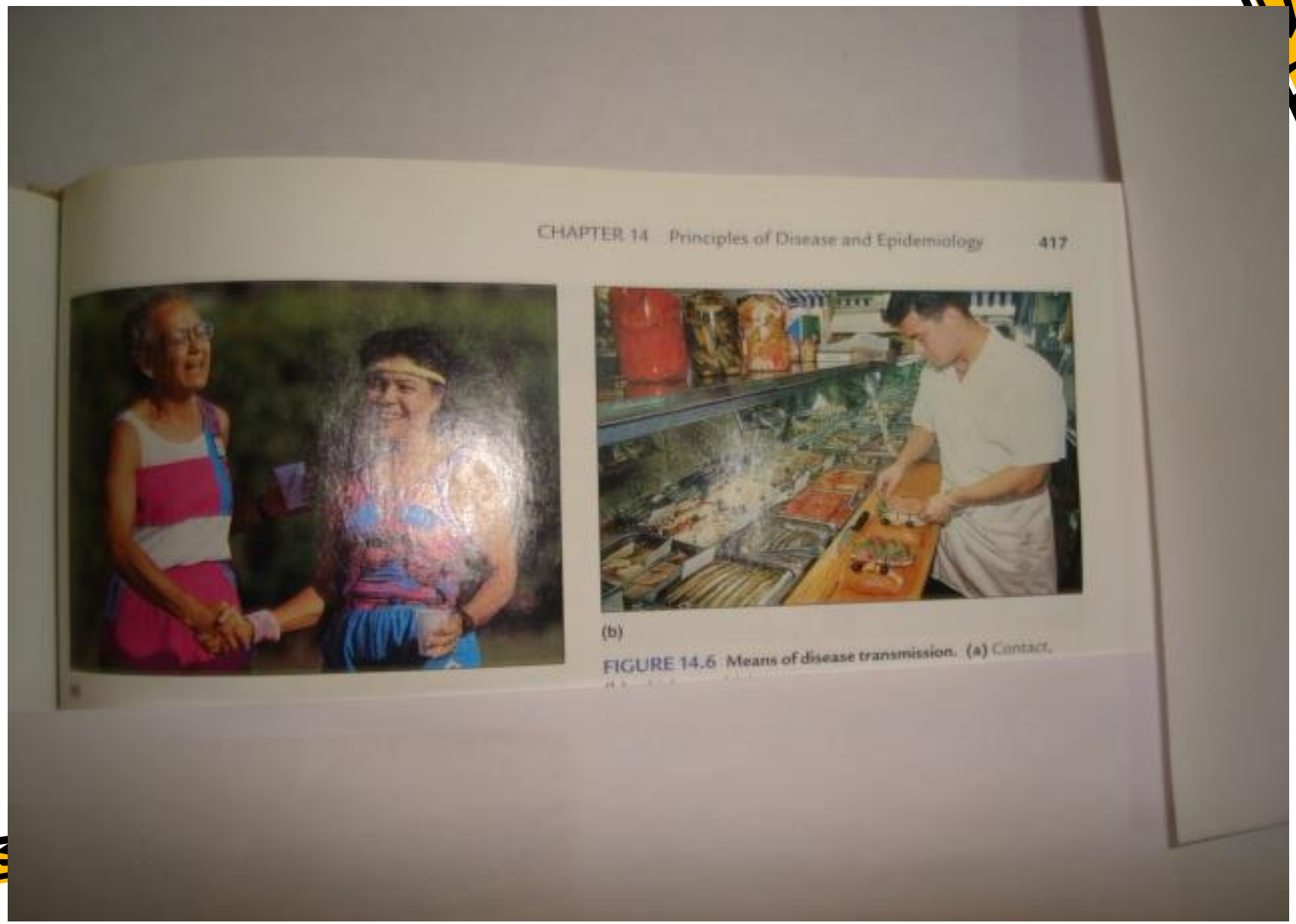
- Contact

  Direct – person to person transmission by physical contact between its source & susceptible host

  - no intermediate object is involved

  - spread by touching, kissing, sexual intercourse

  examples-common cold, influenza, measles, STD (syphilis, gonorrhoea, AIDS)



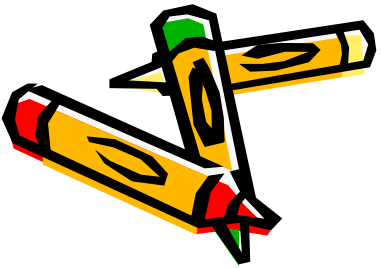
CHAPTER 14 Principles of Disease and Epidemiology 417

(b)

FIGURE 14.6 Means of disease transmission. (a) Contact,

Indirect – through the agency of fomites (inanimate objects, nonliving objects) such as cloths, handkerchiefs, towels, beddings, thermometers, pencils, toys etc.

examples – diphtheria, trachoma

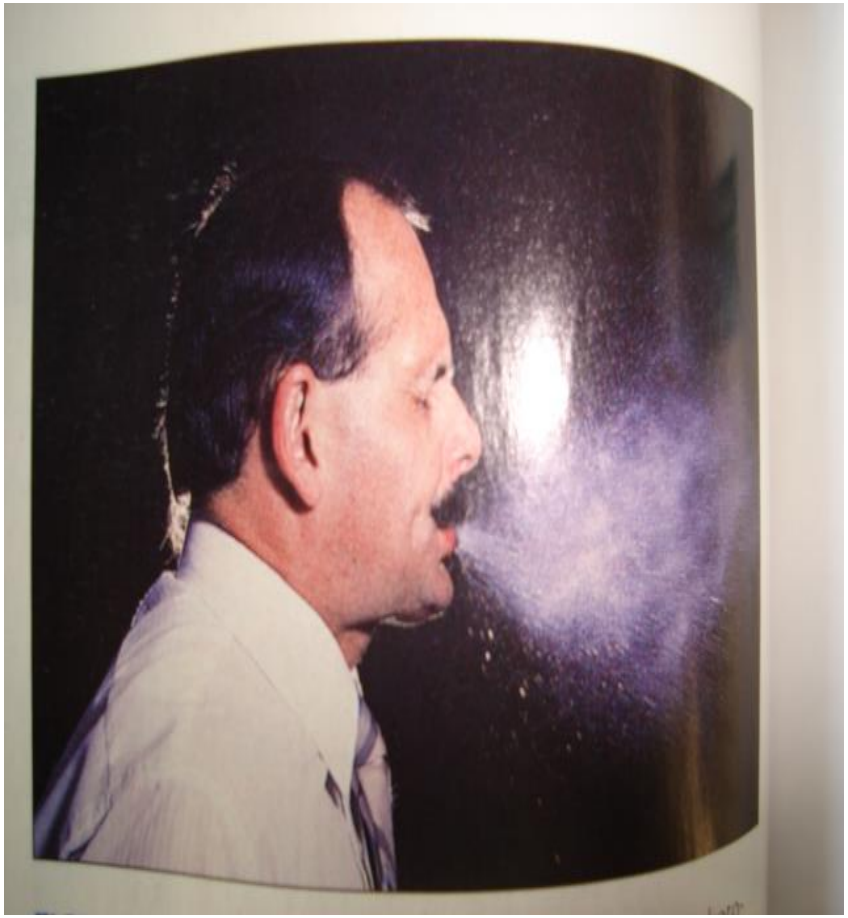


- Inhalation

Respiratory infections

- Tuberculosis
- Influenza

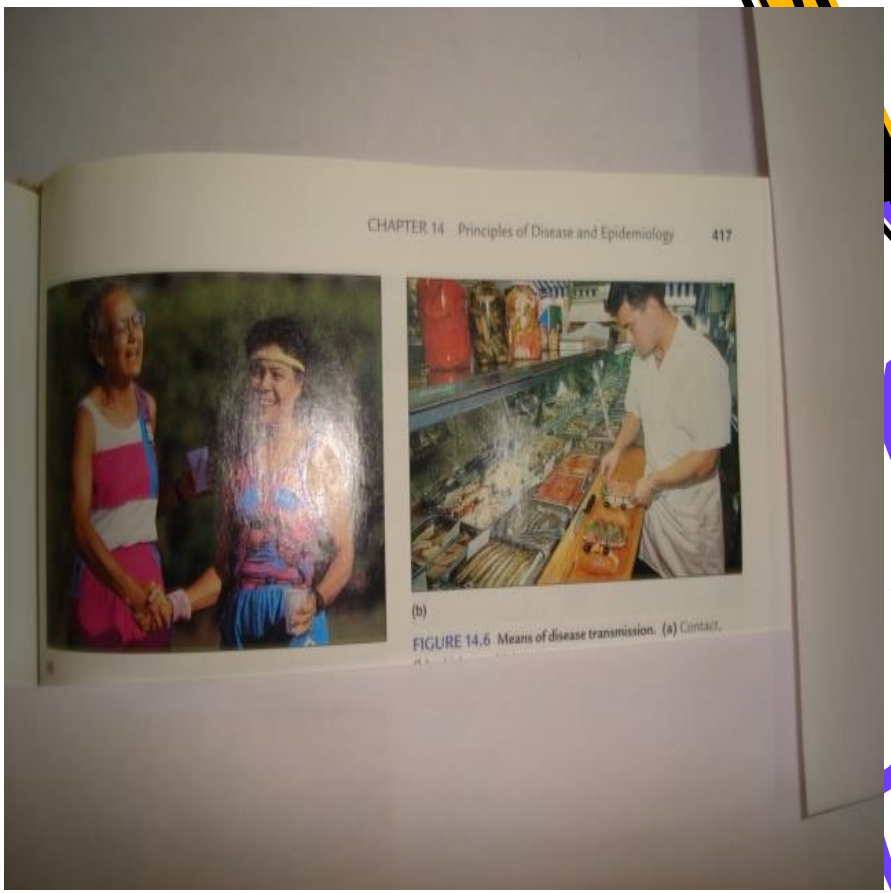
Coughing - Droplets



- Ingestion

  Gastrointestinal infections

  - water borne (cholera)
  - food borne (food poisoning)
  - hand borne (dysentery)



- Inoculation

  -Tetanus spores implanted in deep wounds

  - Rabies virus deposited s.c. by dog bite

  - Arboviruses injected by insect vectors

  Iatrogenic infections

- Insects

- Congenital

Vertical transmission

-congenital syphilis

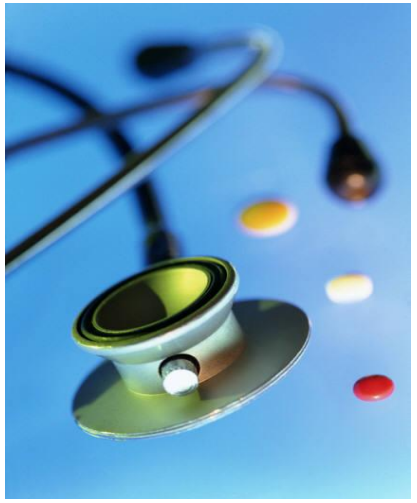
-toxoplasmosis

-rubella virus inf.

Teratogenic infections

- Iatrogenic & laboratory infections

-Investigative & therapeutic procedures



Factors predisposing to Microbial Pathogenicity

- Pathogenicity – ability of a microbial species to produce disease
- Virulence - ability of a microbial strain to produce disease

  - virulence of a strain is not constant & may undergo spontaneous or induced variation

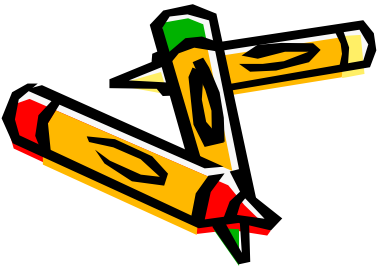
  - Exaltation – enhancement of virulence

  - Attenuation – reduction of virulence

Virulence determinants

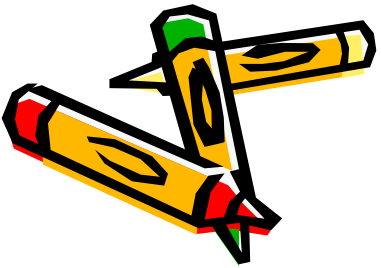
- Adhesion

  - Adhesin (fimbriae, fibrillae, pili, colonization factors)
  - Antigenic
  - Host specificity
  - Loss of adhesins renders the strain avirulent



Invasiveness

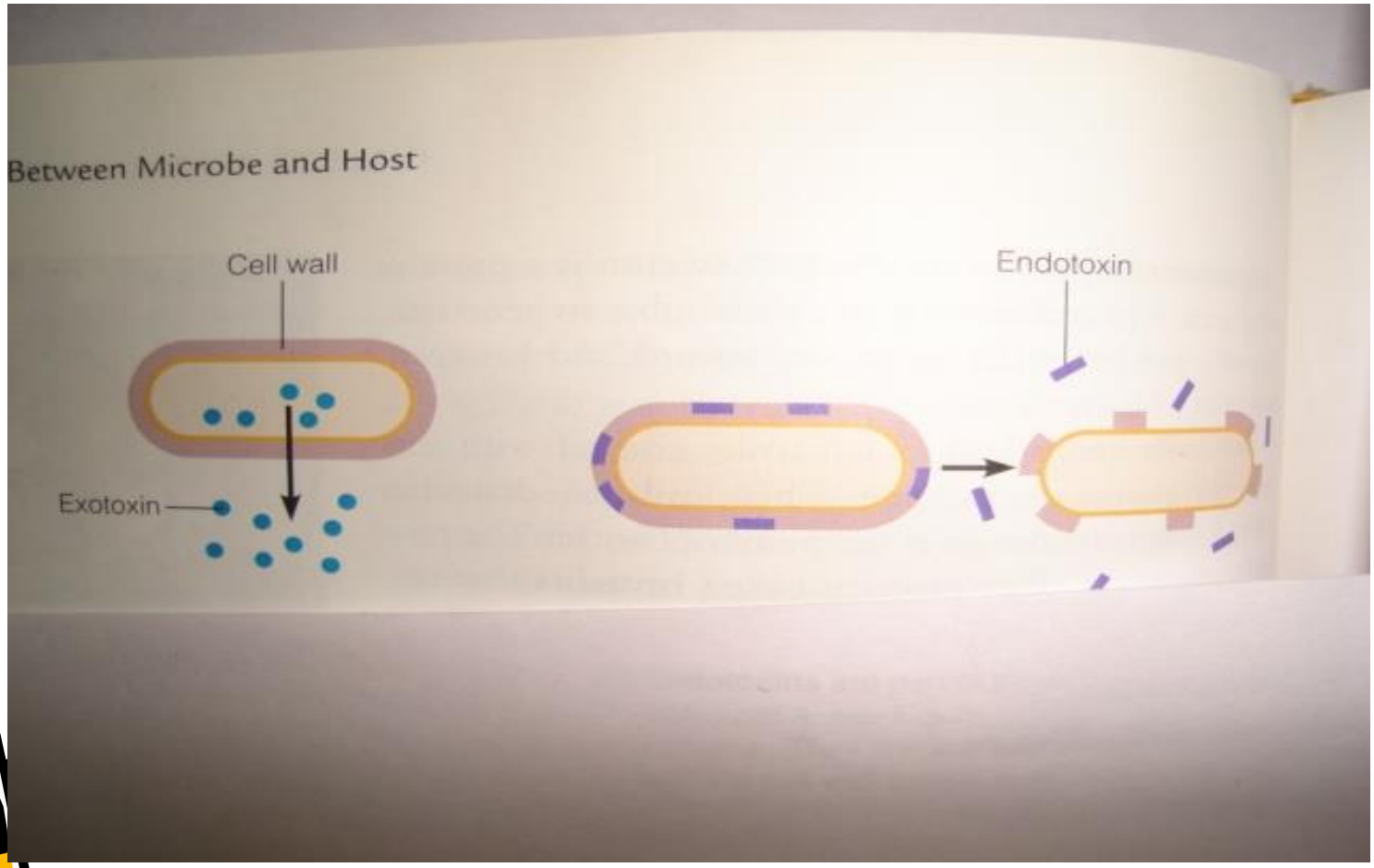
- Ability of a pathogen to spread in the host after establishing infection
- Highly invasive pathogens – produce spreading or generalised lesions – streptococcal septicemia following wound infection
- Less invasive pathogens – cause more localised lesions – staphylococcal abscess



Toxigenicity

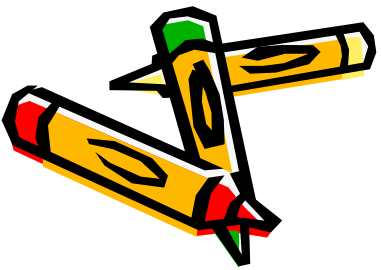
Endotoxin

Exotoxin



- Exotoxin

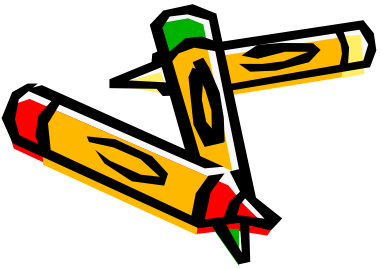
  - heat labile protein
  - secreted & diffused in surrounding medium
  - produced by GP bacteria
  - also produced by some GN bacteria such as Sh.dysenteriae, V. cholerae, ETEC



- Highly potent in minute amounts
- Can be toxoided

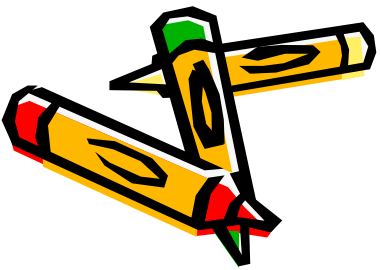
  Toxoid – nontoxic but retain the ability to induce antibodies (antitoxin)

- Have specific tissue affinities & pharmacological activities

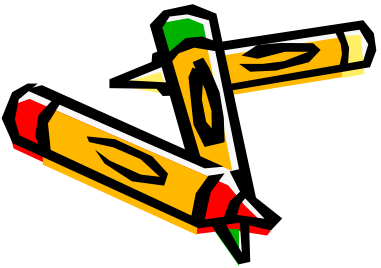


Endotoxin

- Heat stable LPS which form integral part of the cell wall of GN bacteria
- Toxicity depends on Lipid A
- Not secreted, but released only by the disintegration of the cell wall
- Can not be toxoided
- poor antigens
- Active only in relatively large doses



- Their toxicity is not completely neutralised by the homologous antibodies
- Do not exhibit specific pharmacological activities
- All endotoxins, whether isolated from pathogenic or nonpathogenic bacteria, produce similar effects
- Pyrogenic
- Endotoxic shock

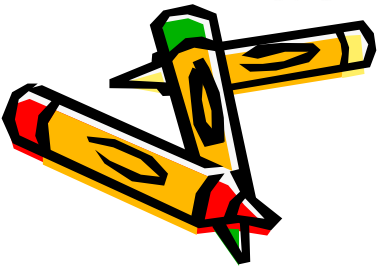


Plasmids

- Extra chromosomal DNA
- Carry genes coding for some virulence like colonisation factor, enterotoxin production, drug resistance

Bacteriophages

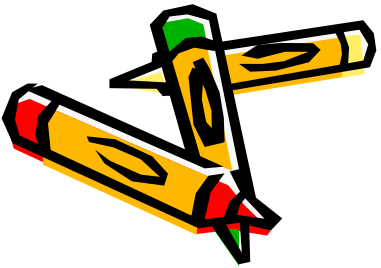
- phage directed virulence in diphtheria bacilli



Communicability

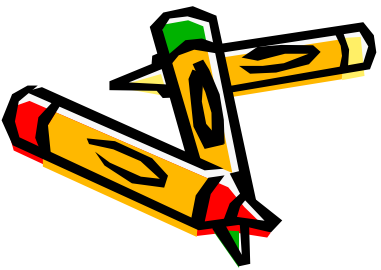
- Ability of parasite to spread from one host to another

- Does not influence the production of disease in an individual host but determines the survival and distribution of a parasite in a community



- A correlation need not exist between virulence & communicability

- Development of epidemic & pandemic requires the strain of a pathogen to possess high degrees of virulence & communicability

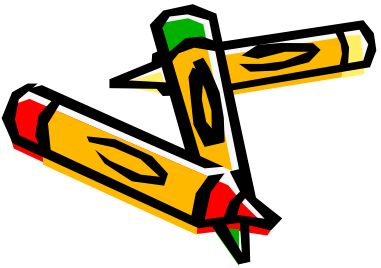


Other bacterial products

- Enzyme
  - Coagulase
    - Hyaluronidase
- Leucocidins
- Hemolysins

Capsule

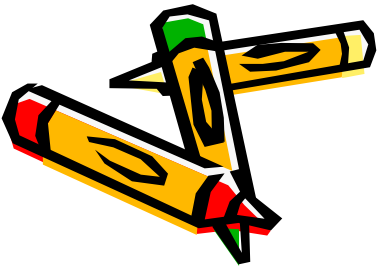
- Prevent phagocytosis & complement mediated lysis



Infecting dose

- Minimum infecting dose – minimum number of bacteria required to produce clinical evidence of infection, in a susceptible animal under standard cond.

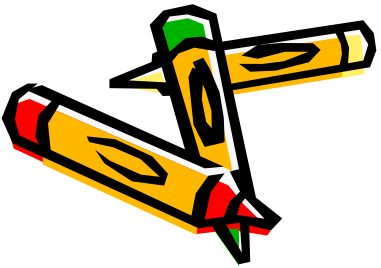
- Minimum lethal dose – minimum number of bacteria required to produce death in a susceptible animal under standard cond.



Types infectious diseases

1. Localised – Superficial
   - Deep
2. Generalised

- spread from site of entry - contiguity
  - lymphatic
  - blood stream



- Bacteremia - circulation of bacteria in blood
- Septicemia - bacteria circulate & multiply in the blood, form toxic products and cause high, swinging type of fever
- Pyemia – pyogenic bacteria produce septicemia with multiple abscesses in the internal organs such as spleen, liver, kidney

- Endemic diseases – constantly present in a particular area
- Epidemic disease – spreads rapidly, involving many persons at the same time.
- Pandemic – epidemic that spreads through many areas of the world involving very large number of people within a short period
- Prosodemic disease (Creeping or smouldering epidemic) – spread by person to person contact – evolve slowly


THANK YOU