Symbiotic Relationships
Interspecific interaction in which one species, the symbiont, lives in or on another species, the host

- Mutualism
- Parasitism

Mutualism
Symbiosis that benefits both partners
Parasitism

Symbiotic relationship in which one organism benefits while the other is harmed

Vocabulary

- Host: The animal the parasite lives on/in
  - There can be more than one host during a life cycle
  - Often life cycle include larval stages and adult stages in different hosts

- Vector: an animal that carries a parasite to the host

- Reservoir: Usually a non-human "host" where the parasite can live without harming the reservoir
  - This term is only applied when the parasite can infect humans

Reservoirs of Infection

- humans
- animals
- inanimate objects
Human reservoirs

- Clinical
- Subclinical: "carriers"

Zoonoses

<table>
<thead>
<tr>
<th>Bacterial Diseases</th>
<th>Animals Infected</th>
<th>Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Domestic animals</td>
<td>Direct contact, contaminated soil &amp; hides, inhalation of spores</td>
</tr>
<tr>
<td>Bubonic plague</td>
<td>Rodents</td>
<td>Fleas</td>
</tr>
<tr>
<td>Lyme disease</td>
<td>Deer, field mice</td>
<td>Ticks</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Dogs, pigs, cows, sheep, rodents, others</td>
<td>Direct contact with urine, infected tissues, contaminated water</td>
</tr>
<tr>
<td>Rocky Mountain spotted fever</td>
<td>Dogs, rodents, other wild animals</td>
<td>Ticks</td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>Dogs, cats, turtles, poultry, rats</td>
<td>Ingestion of contaminated food/water</td>
</tr>
</tbody>
</table>

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Nonliving Reservoirs

- Water
- Soil
- Dairy
- Vegetables
- Meats

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Disease transmission

- Contact transmission
  - direct
  - indirect
    - fomites
    - droplets

Vehicle transmission

- Water-borne
- Food-borne

Vector transmission

- Biological
- Mechanical
### Bases for disease classification

<table>
<thead>
<tr>
<th>Basis</th>
<th>Examples of terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body system affected</td>
<td>Respiratory disease</td>
</tr>
<tr>
<td>Longevity/severity</td>
<td>Acute, chronic, subacute, latent</td>
</tr>
<tr>
<td>Transmission</td>
<td>Communicable, noncommunicable</td>
</tr>
<tr>
<td>Extent of body affected</td>
<td>Local, systemic</td>
</tr>
<tr>
<td>State of host when infected</td>
<td>Primary, secondary</td>
</tr>
</tbody>
</table>

### Propagated vs. common-source epidemics

- Common-source outbreak (e.g., food poisoning)
- Propagated epidemic (e.g., common cold)

### Epidemiology

- Incidence
- Prevalence

![Graph of incidence and prevalence over weeks]

*after Black, J.G. (2002) Microbiology: Principles & Explorations 5th Ed. Fig. 15.1*
Disease occurrence

- endemic
- sporadic
- epidemic
- pandemic

Reported cases per 100,000 people

Incidence rate of chicken pox in the U.S.

Year

Endemic

Time

Expected
disease A
disease B

1999 2000 2001

Epidemic 1 Epidemic 2
Nosocomial infections

Transmission of nosocomial infection

(exogenous shown)