

## II. Basic Principles, Chapter 2 (BLY 459, 2008)

### A. ZOONOSES

1. Diseases that are naturally transferable between vertebrates and humans
2. Domestic dog carries the most zoonotic diseases
3. Examples
  - a. Dog tapeworm
  - b. Lyme disease

### B. Parasite types

1. Location
  - a. Ecto- = outside/on
  - b. Endo- = inside
2. Lifestyle
  - a. OBLIGATE parasite
    - (1) At least part of lifecycle MUST be parasite for lifecycle to be completed
    - (2) There may be a free-living stage in the lifecycle
  - b. FACULTATIVE
    - (1) Organism is normally free-living
    - (2) Can be parasitic if it accidentally invades host
3. Terms
  - a. DEFINITIVE or FINAL HOST: Contains sexually reproducing (= adult) stages of parasite
  - b. INTERMEDIATE HOST
    - (1) Contains asexual stage of parasite
    - (2) Parasite may (or may not) reproduce, if reproduction occurs, it is asexual
  - c. VECTOR
    - (1) Agent of transmission
    - (2) Usually used with organisms, but inanimate agents also occur.
      - (a). Air
      - (b). Water
4. Methods of transmission
  - a. Lifecycle
    - (1). DIRECT: No intermediate host
    - (2). INDIRECT: Intermediate host required
  - b. Ecological
    - (1) HORIZONTAL TRANSMISSION
      - (a) Parasite transmitted among members of a population
      - (b) Examples
        - 1) Mosquitoes carry blood parasites between vertebrate hosts
        - 2) Vector containing infective stage is eaten by predator

Slide: Parasitology in *The Far Side*, wolves discussing trichinosis

#### (2) VERTICAL TRANSMISSION

- (a) Parasite transmitted from parent (= mother) to



- because they & their hosts live longer
  - d. Important exceptions
    - (1) Parasites not killed when intermediate hosts consumed by next host of life-cycle
    - (2) Virulent parasites such as malaria “recently” (in evolutionary time) switched to human hosts, *i.e* not well-adapted yet.
- 3. New hypothesis: Intense host exploitation occurs if negative effects on parasite (= shorter lifespan) have minor effect upon transmission
  - a. Does transmission of parasite require host movement?
    - (1) If yes, then benign strains have more offspring
      - (a) Common cold virus
      - (b) Malaria in mosquitoes
    - (2) If no, parasites that reproduce fastest in host will have more offspring
      - (a) Parasites spread by insects
      - (b) Malaria in humans
      - (c) Intermediate hosts
  - b. Vertical transmission
    - (1) Host exploitation reduces survival chances of offspring of both host & parasite
    - (2) Benign parasites predicted
- 4. Experimental tests of evolutionary principles
  - a. Natural Field Experiments: Repeated appearance of drug resistant parasites
  - b. Virulence of parasitic organisms over generations is affected by lab maintenance procedures
    - (1) Artificial infection of hosts in lab (= w/o using the vector) when old lab hosts get sick results in ...
      - (a) Virulence increasing in lab hosts
      - (b) Decrease in ability of parasite to live in the vector
    - (2) If parasites are maintained *in vitro* or in hosts not encountered in the wild, parasites lose ability to infect wild-type hosts.

Slide: Virulence & Attenuation of Parasites Maintained in the Lab