

Chlamydia and Rickettsia

1. Chlamydia and Rickettsia are 2 groups of Gram-negative bacteria

2. Both bacteria are

Small pleomorphic coccobacillary forms

Obligate intracellular parasites : they require host ATP to live

Chlamydia cannot make any ATP whatsoever

Rickettsia can make some (but not enough)

3. They cannot be cultured on non-living artificial media: instead, they are inoculated into living cells for culture about the size of large viruses (i.e. quite small). However, they are not viruses because they have both DNA and RNA, synthesize their own proteins- grown in yolk sac of embryonated eggs and cell culture media

4. sensitive to antibiotics

4. Important differences between the 2 groups include

	Chlamydia	Rickettsia
Transmission	Person-to-person	Arthropod vector
Site of replication	Endosomes	Cytoplasm
Type of cell attacked	Columnar epithelium	Endothelium
Metabolism	Anaerobic- no cytochromes	Aerobic- cytochromes
Multiplication	Single Development cycle	Binary Fission

Chlamydia

Obligate intracellular bacteria.

- Variable gram-negative cocci

- do not have peptidoglycan (muramic acid).

- Chlamydia infect a wide spectrum of hosts: birds, mammals, and humans.

- stain tissues with Giemsa or use a direct fluorescent antibody technique

Human infections include: trachoma, conjunctivitis, various urogenital tract infections

of males and females, infant pneumonia

There are two morphological forms:

1) Elementary body : attach and internalized by susceptible host cells

2) Reticulate body or initial body: (inside host cells). The chlamydias form dense initial (reticulate) bodies inside the host cell, then multiply. The new cells become elementary bodies that leave the cell after it dies and attack new cells.

- *Chlamydia trachomatis* (Genital tract infection- Trachoma may cause of blindness)
- Treatment: systemic tetracycline, erythromycin; long term therapy is necessary
- *Chlamydia psittaci* (Psittacosis): Parrot Fever or chlamydiosis- systemic disease
- *Chlamydia pneumoniae* (Humans are the only host)

Rickettsiae

Genera

(Obligate intracellular parasite); Rickettsia, Rochalimaea, Coxiella, Orientia, Ehrlichia. (not an obligate intracellular parasite); Bartonella

- Obligate intracellular
- Grow in cytoplasm of eukaryotic cells
- pleomorphic, small gram-negative rod to coccoid
- stain poorly with gram stain but can be visualized with Giemsa method.
- Reservoirs are animal and arthropod vector
- Zoonosis spread to human by arthropod
- Human are accidental hosts (infect human by bites)
- Cell wall; Peptidoglycan
- LPS (have weak endotoxic activity)
- Two cell types designated large and small cell variants (LCV and SCV).
- Both types are infectious.
- Grow in yolk sac of embryonated eggs, cell culture and laboratory animals.
- Inhibited by Tetracycline and Chloramphenicol

Ehrlichia

- Gram negative cocci
- cause (ehrlichiosis), a noncontagious disease known to be transmitted by a tick.
- Invade white blood cells; lymphocytes, neutrophils, monocytes

Bartonella (Bartonellosis)

- They range in shape from small coccoid and ring-shaped structures to long chains or clusters.
- Motile

- Facultative intracellular parasite.
- Parasites of the erythrocytes of human (adhered to RBCs) where they appear as short rods
- transmitted by insect vectors such as ticks, fleas
- Bartonella bacteria can be grown on artificial media, unlike rickettsiae

Disease

Endemic murine typhus	<i>R. typhi</i>
Endemic typhus/ Trench-flea/ lice	<i>Bartonella</i>
Spotted fever- tick transmitted	<i>Rickettsia rhipicehali</i>
Q fever- respiratory or contaminated milk or food	<i>Coxiella burnetii</i>
Rocky Mountain Spotted Fever- tick	<i>R. rickettsia</i>

Groups of Rickettsia

Group[Disease	Organism	Insect	Reservoir
1. Typhus Group	Epidemic typhus	R prowazekii R typhi	Lice Flea	Human
2. Spotted Fever Group	Rocky Mountain Spotted Fever	R. rickettsia	Tick	Rodent , Dog
3. Scrub Typhus		<i>Orientia tsutsugamushi</i>	Tick	Rodent
4. Q fever		<i>Coxiella burnetii</i>	Tick	Cattle, sheep, goat
5. Trench Fever		<i>Rochalimeae quintana</i>	Lice	HUman