

Chlamydiaceae

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- **The family Chlamydiaceae includes obligate, intracellular pathogenic bacteria that can only survive and multiply inside a host cell.**
- **They also have a cell wall like most other Gram-negative organisms, respond to antibiotics (tetracyclines and chloramphenicol).**
- **Possess ribosomes, DNA, and RNA.**

- **Members of the order Chlamydiales are transmitted primarily by inhalation of dust particles and droplets all of which containing chlamydial organisms (known as the elementary bodies).**
- **These microorganisms infect the host epithelial cells and mucous membranes.**
- **The cell tropism of Chlamydiales to epithelium is similar to that by several *Mycoplasma* species; therefore, the infections caused by *Chlamydia* and *Mycoplasma* are very similar**

Taxonomy

Members of Chlamydiales are classified in the

- Order: Chlamydiales
- One family: Chlamydiaceae
- Two genera: *Chlamydophila* and *Chlamydia*.
- Four known species : *Chlamydophila psittaci*, *Chlamydophila pecorum*, *Chlamydia trachomatis*, and *Chlamydophila pneumoniae*.
 - C. psittaci* has been reclassified into two species: *C. psittaci* and *C. abortus*.

Morphology and Staining

Members of Chlamydiales are

- short cocci bacteria with a size of the organisms ranging from 0.2 to 1.0 μm that is similar to Rickettsiales.**
- Giemsa or other polychromatic stains are used to stain these organisms.**

Life Cycle

- 1-Infectious organisms called elementary bodies(EB), 0.2–0.4 μm in size,**
- 2-Noninfectious and replicating form that is metabolically active is called reticulate body (RB)which**

3-EB enter susceptible cells by receptor-mediated endocytosis.

4-The phagosome containing the EB is not fused with lysosomes, and EB changes into RB .Which is larger in size (0.6–1.0 μm) compared to EB.

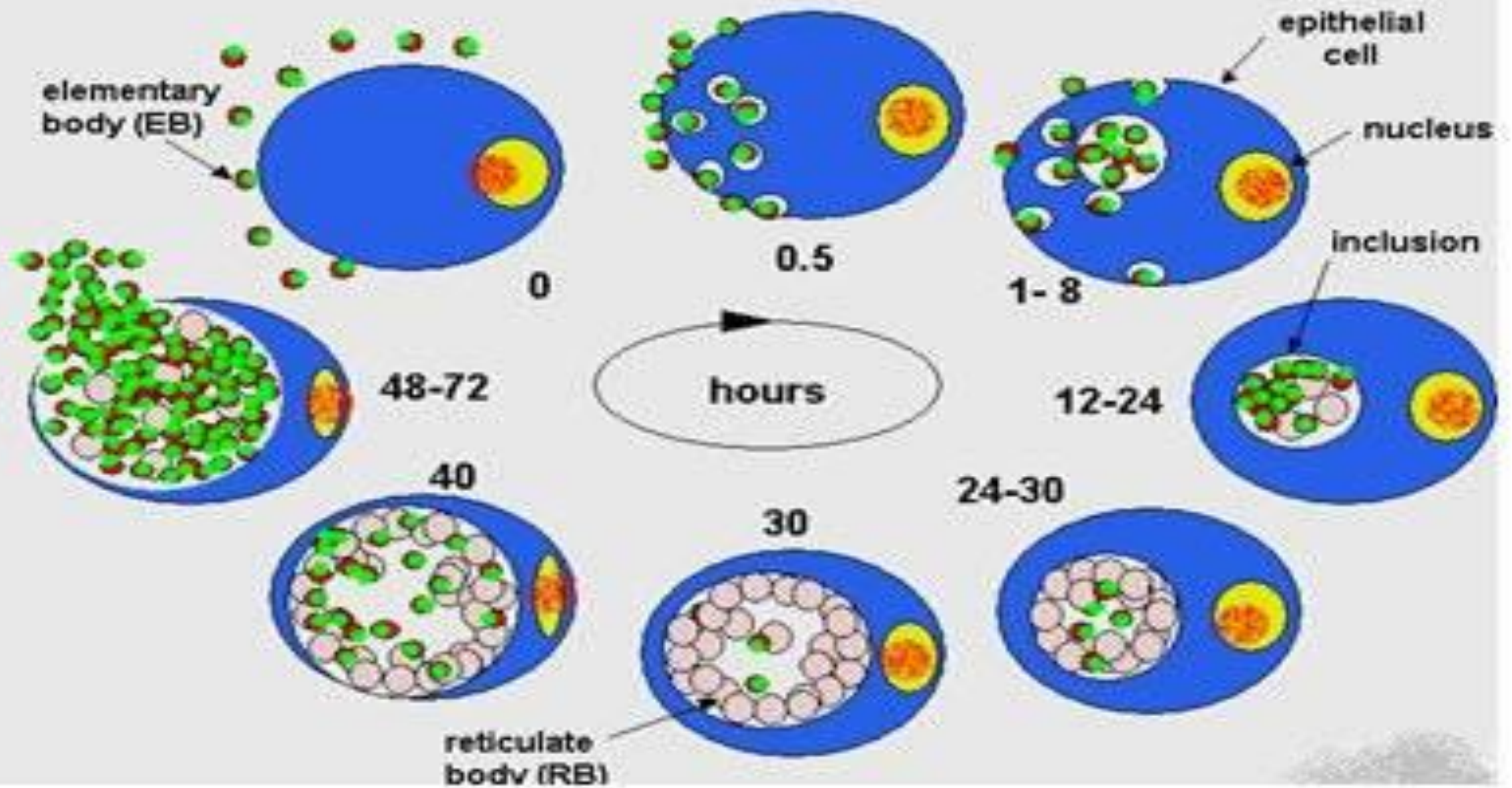
5-The RB replicate by binary fission, which later transform to EB, and are released upon complete lysis of the infected host cell or by exocytosis.

Diseases Caused by Chlamydiales

- *C. abortus* is the causative agent of abortions in sheep, goats, cattle and women.
- *C. psittaci* is responsible for the majority of infections in various vertebrate animals. This species infects birds, goats, sheep, pigs, cattle, and humans.

C. psittaci infections in birds are referred to as avian chlamydiosis (AC), psittacosis, and parrot fever in parrots, and ornithosis in all other bird species.

- Chlamydial infections are primarily in the epithelium, they infect the respiratory tract, eyes, urogenital tracts, and joints



Growth Characteristics

1-Members of the order Chlamydiales do not grow in standard bacteriological media or on media plates.

2-They require eukaryotic cells or yolk sacs of chicken embryos for their growth.

3-Members of Chlamydiales undergo replication inside a phagosome of a host cell by binary fission

4-Members of Chlamydiales also have a broad host preference

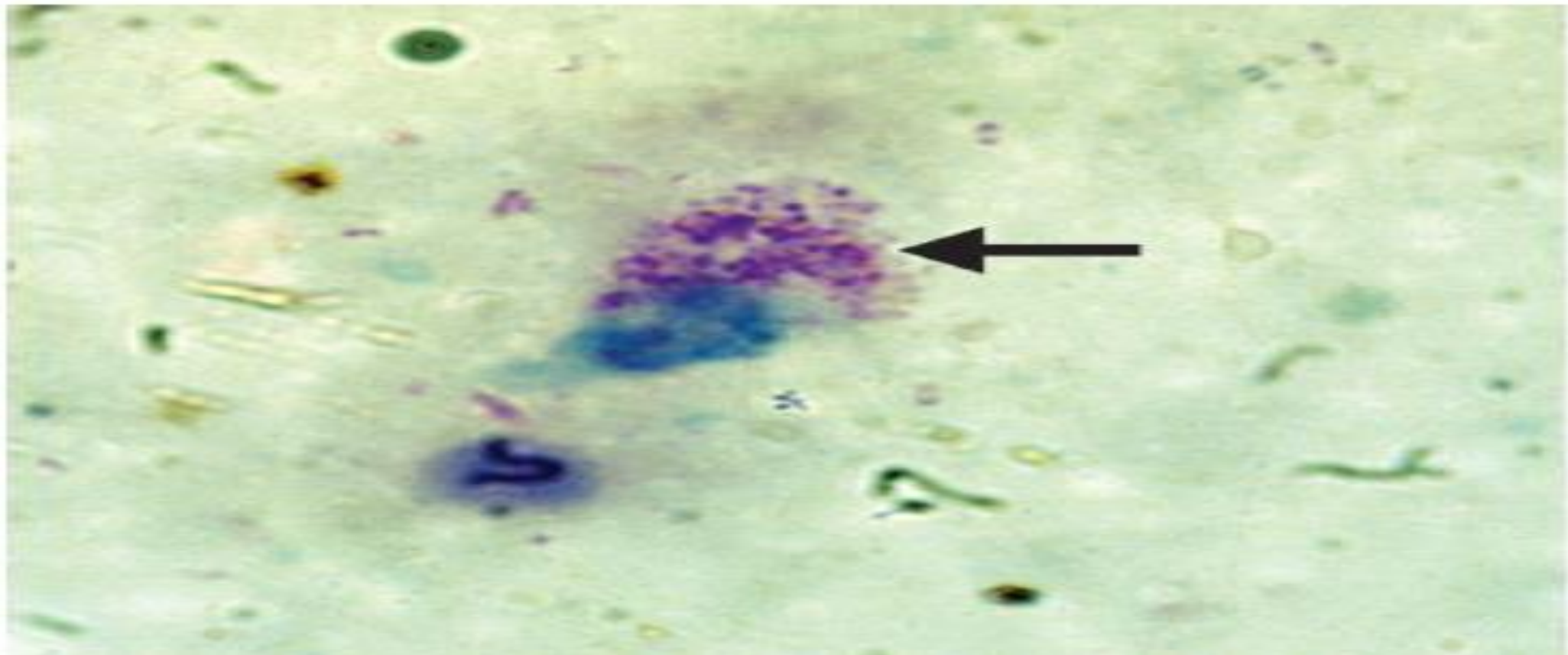
Pathogenicity and Toxins

- **Members of the order Chlamydiales infect epithelial cells and mucous membranes.**
- **These bacteria possess hemagglutinin that facilitates attachment to cells.**
- **The cell mediated immune response is largely responsible for tissue damage during inflammation.**
- **Chlamydial cell wall lipopolysaccharides and low-density lipoprotein oxidation by chlamydial heat shock proteins are associated with pathogenicity.**

Diagnosis

- **Diagnosis is almost always established by serological methods to detect chlamydial antibodies including complement fixation and ELISA to detect antibodies in the serum of an infected animal.**
- **Diagnosis is also based on clinical signs and demonstration of the organism by Giemsa or other polychromatic-stained impression smears of an infected animal tissue ,e.g. Diff-Quick stain (Figure 38.1).**

FIGURE 38.1. *C. abortus* inclusions identified from an impression smear sample prepared from an aborted placenta collected from an infected sheep. The smear is stained with Diff-Quick stain (magnification, 1000 \times). (The slide prepared by Dr Jerome C. Nietfeld, Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University.)



- **Immunological assays, using enzyme-linked immunoadsorbent assay (ELISA) technique is used to detect chlamydial antigens from a sample.**
- **Molecular techniques are also available to detect nucleic acids derived from chlamydial organisms.**
 - Many sensitive molecular methods have been developed *in vitro* to amplify a target of chlamydial nucleic acids, mostly representing the 16S and 23S ribosomal DNA or ribosomal RNA.**