

Babesia spp.

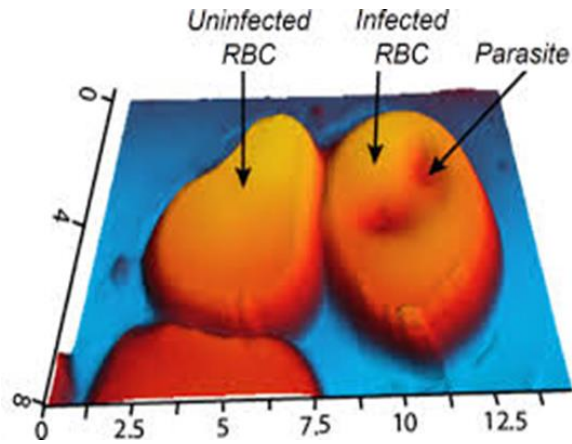
Phylum: *Apicomplexa*

Class: *Aconoidasida*

Order: *Piroplasmida*

Family: *Babesiidae*

Genus: *Babesia*



- Interaerthrocytic parasite and transmitted by ticks. (tick born disease)
- Originally discovered by the Romanian bacteriologist **Victor Babeş 1888**,
- The Babesia have a complex life cycle
- The *Babesia* spp. are important parasites of livestock and others. While more than 100 species have been reported, only a few have been identified as causing human infections, including *B. microti*, *B. divergens*, *B. duncani*.

The disease: Babesiosis

- Tick Fever, Cattle Fever,
- Texas Fever,
- Piroplasmosis,
- Redwater

Definitive host (DH): Tick (hard tick)[Sexual stages]

Boophilus spp. (One-host tick),

Dermacentor spp.

***Rhipicephalus* spp.**

Ixodes spp.

Intermediate host(IH): Asexual stages in the Erythrocytes (RBCs)

Cattle , buffalo, water buffalo:

Babesia bovis (1-3 microns, small size) world wide

Babesia bigemina (3 -5 microns, large size) world wide

B. divergens (Northern Europe) zoonotic

Babesia major

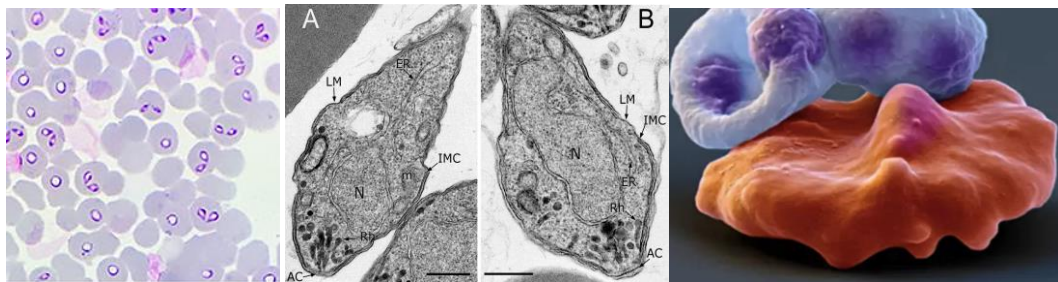
Sheep & Goats

Babesia ovis *Babesia motasi*

Deer:

Babesia odocoilei

Morphology



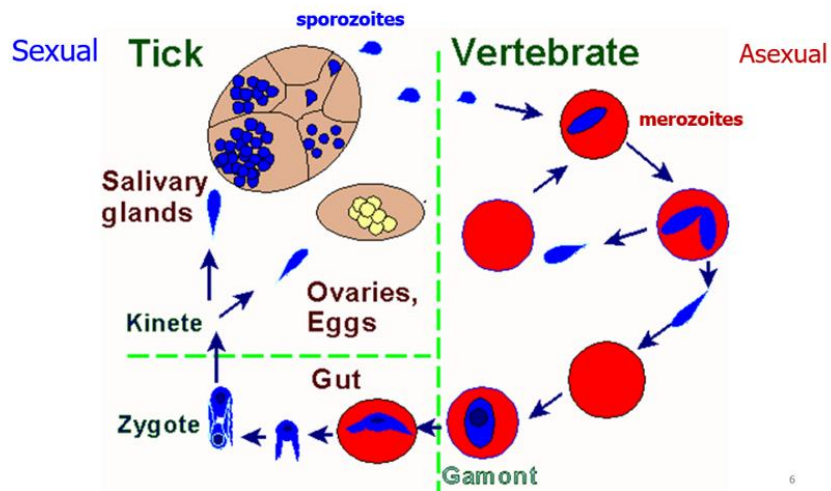
- Parasite that infects erythrocytes (Red Blood Cell), forming either ring form, pears (2 merozoites forming diagnostic angle) or tetrad (Maltese cross) in some *babesia* species.

- Characterized by intravascular hemolysis.
- The unique organelles comprise apical complex

life cycle and transmission of *Babesia spp.*

- During blood meal, tick (definitive host) introducing sporozoites into vertebrate host
- Sporozoites enter host red blood cells
- Inside the host (intermediate) RBCs, sporozoites differentiate into trophozoites
- The trophozoites asexually reproduce to produce 2-4 merozoites
- Merozoites exit while lysing from RBCs.
- Free merozoites invade other RBCs.
- Infected red blood cells are ingested by tick .
- Pre-gametocytes mature into gametocytes and then fuse to form zygotes (inside the tick host)
- Zygotes translocate across tick gut and become ookinetes
- Ookinetes enter tick hemolymph and migrate to salivary gland where they hypertrophy into sporoblasts
- Sporoblasts bud into thousands of sporozoites (sporogony) when nymph stage ticks attach to vertebrate mammals.

Babesia life cycle



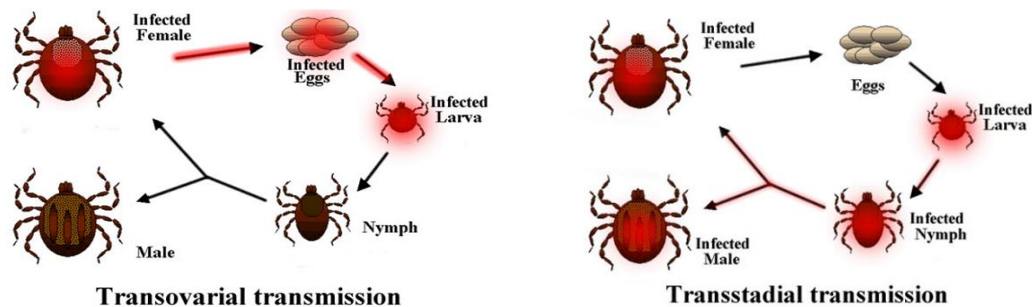
The *Babesia* spp. transmit either by :

Transovarail transmission

- A vertical transmission of parasite from the parent directly to the offspring.

Transstadial transmission

- A horizontal transmission occurs when a pathogen remains with the vector from one life stage to the next.



Clinical Signs of *Babesia* spp.

- The incubation period of clinical signs usually appear in 2-3 weeks after a bite from an infected tick but the incubation period can be as short as 4-5 days for *B. bigemina* and 10-12 days for *B. bovis*.
- Young animal are more resistance to the disease .

The main clinical symptom may develop are:

1. Fever
2. Hemolysis and anemia, pale mucous membranes
3. Decreased appetite and decrease in milk production .

4. Weakness, lethargy .
5. Abortion in the pregnant animals
6. Jaundice can develop with hemoglobinuria and hemoglobinemia

Babesia. bovis may cause more severe disease :

*Infected RBC can be sequestered in brain capillaries

Ischemia --- *Neurologic signs (Incoordination, teeth grinding),

*Cattle on ground with involuntary leg movement .

Vascular congestion ---hemolysis ---metabolic alkalosis-----Death.

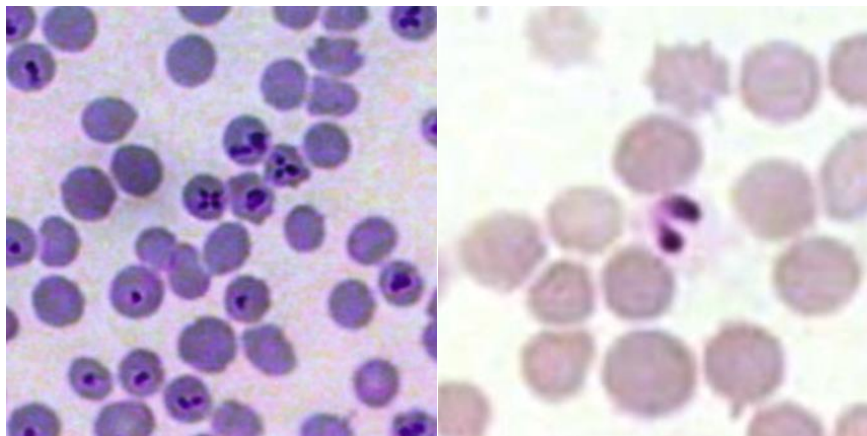
Equine Piroplasmosis (EP)

The disease in the Equine

- Worldwide distribution
- Its endemic in Africa, the Middle East, Asia, Central and South America

The causative agents are:

- *Babesia caballi*
- *Theileria equi* (previously *B. equi*)



B. equi (small)

B. caballi (large)

DH : Hard Tick [Sexual stages].

Dermacentor spp.

Hyalomma spp.

Rhipicephalus spp.

Amblyomma spp.

IH: Equine [Asexual stages] in the Erythrocytes RBCs.

Clinical signs :

1. Generally clinical signs follow a variable incubation period of 5 to 21 days.
2. Foals can become infected, but do not have clinical symptoms.

3. The adults animals that acquire infection are more severely affected clinically than young animals.
4. *Theileria equi* : More pathogenic, greater incidence of hemoglobinuria and death.
5. *B. caballi* can be transmitted transtadially and transovarially by its vectors, thus allowing the infected horse and the tick to serve as a source of infection
6. Many factors must be considered for transmission, including : season, climate, host-specificity.

(Canine Babesiosis)

The disease in the Canidae (dogs) :

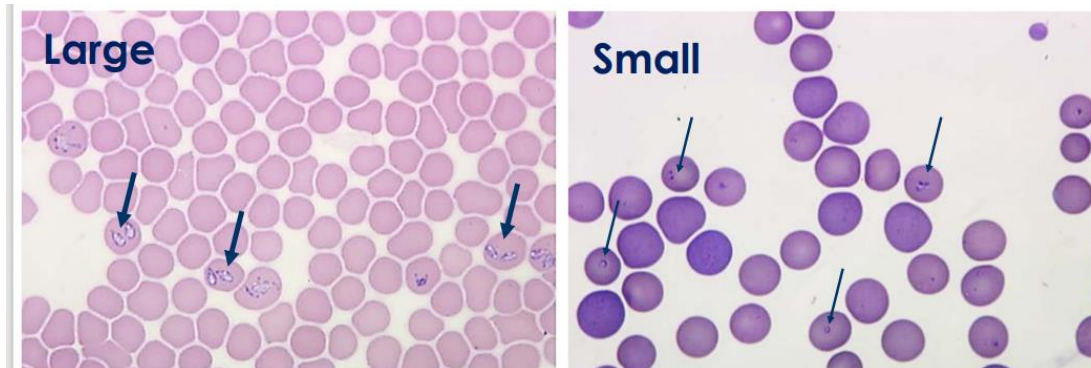
Causative agents:

- *Babesia canis* (large size).
- *Babesia gibsoni* (small size).

DH: Hard Tick [Sexual stages]

IH : Canidae (dogs)

- *B. canis canis* *Dermacentor reticulatus* in Europe
- *Babesia gibsoni* *Rhipicephalus sanguineus* Asia, North America



Diagnosis

1. **Stained blood smears** (Giemsa), may be hard to differentiate between close related species.
2. **Serological**, including indirect fluorescent antibody test, IFAT, and enzyme-linked immunosorbent assays, **ELISA**.
3. **PCR amplification**, and sequencing are the updated techniques to be used but, required more specialized equipment with high cost.

Control

Management & Vector control

- limiting contact between susceptible stock and the disease(infected animals)
- The vector are active during the spring and summer

Immunization

No approved Vaccines against babesia are among the few vaccines available for protozoal diseases of animals and under a continuous

Treatment

The common treatment protocol used :

- Dimimidocarb dipropionate (Imizol; dogs)
- Dinazene acetate (Ganaseg, Berenil)

Also the supportive therapy and treat clinical symptoms are recommended.

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