Family Rickettsiaceae

*Rickettsia rickettsii* – vascular endothelium

- gram-negative (do not Gram-stain), small, obligate intracellular
- free in host cell cytoplasm

*Rickettsia rickettsii*

- Rocky Mountain Spotted Fever – Western hemisphere
- febrile disease of dogs and humans (only hosts to show signs)
- Ticks: *Dermacentor variabilis, D. andersonii*
  - small mammals, rodents reservoir
  - Seasonal April → Fall
  - Humans (800 +/- cases annually U.S.)

- Pathogenesis – vasculitis
  - vascular endothelial/Smooth muscle cells
- /Signs: subclinical to clinical
  - 1-2 weeks post tick: fever, hyperemia/edema (extremities, ears, lips, penile sheath, scrotum)
  - petechial/ecchymotic hemorrhages (epistaxis, melena, hematuria)
  - polyarthritis, myalgia, abdominal pain, CNS signs
  - Necrosis of extremities can occur
**Rickettsia rickettsii**

- Dx
  - Culture possible but
  - Serology (IFA): 4-fold increase to confirm
  - PCR (IDEXX/Zoologix)

- Txt
  - Doxycycline
  - Dermacentor spp.
  - recovery results in long term immunity

**Family Anaplasmataceae**

*Neorickettsia + Ehrlichia spp.*: Phagocytic, Endothelial

*Anaplasma spp.* – PMNs, RBC’s, platelets

- gram-negative, obligate intracellular
- Reside in cytoplasmic vacuoles: morula(e)
Neorickettsia risticii

- **Potomac Horse Fever (PHF) - 1983**: Potomac River, Canada,
- **Shasta River Crud**: Northern California
- **Canada (N.S., Ont., Alberta) Brazil, Uruguay**
  - Equine Monocytic Ehrlichiosis/Equine Ehrlichial Colitis/Abortion
  - Replicate in monocytes, macrophages, mast cells, intestinal epithelium
  - Seasonal disease (July, August, September), 70% Maryland, USA
  - Trematodes → development stage in insects (MayFly) ingestion of water /forage

- Signs: fever, ileus, colitis, diarrhea (60%), laminitis (20-30%: mortalities)
  - Course of infection (10 days), untreated fatality rate (5 – 30%)
  - 2 cases in N.S. 2004: fever, anorexia, tachycardia, ileus, diarrhea, laminitis (post mortem: ulcerative enterocolitis, hepatitis, nephritis)
  - Abortion – fetus can show colitis, hepatitis, myocarditis, lymphadenitis

- **Dx**
  - Hematology helpful (Neutropenia)
  - Blood smears: not used
  - Serology – IFA (problems)
    - Vaccination, pre- exposure?
    - Rapid ↑ before signs (4-fold for dx)
    - Titres high for 12 months
    - PCR (blood, feces): ZooLogix®, IDEXX
- **Oxytet (12 hr response)**, fluids
- Vaccines (available but lit says crap)
  - Field strain variation, incidence same
  - Don’t prevent infection/illness
  - Natural infection gives 2 years immunity
**N. helminthoeca: Salmon Poisoning**

- Pacific Northwest: sporadic fatal disease of dogs/wild carnivores
- Vector: Snail → fluke (*Nanophyetus salmincola*) → salmonids → eaten
  - K9: bacteremia → dissemination to L.N., liver, tonsils, brain
- Signs: fever spike, vomiting, diarrhea, lymphadenopathy – death 7-10 days
- Dx/Txt
  - Trematode eggs in feces,
  - Giemsa stain L.N. aspirate/biopsy
  - Oxytetracycline
  - contaminated fish (cook/freeze)

- Elokomin Fluke Fever (Elokomin River, Wash. State): *N. elokominica*
  - milder signs, less virulent strain of *N. helminthoeca*?

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**Ehrlichia canis and E. ewingii**

- *E. canis* – Canine Monocytic Ehrlichiosis (CME): Global, tropic/subtropic: tick
- Pathogenesis/Signs:
  - monocytes, bacteremia, vasculitis + edema
  - Acute: fever, anorexia, dyspnea, nervous signs
  - Chronic: edema, epistaxis, L.N/hepato/splenomegaly, uveitis
- Dx/Txt:
  - Giemsa buffy coat (cytoplasmic morulae)
  - Serology (IFA), Ag detection or PCR (IDEXX)
  - Doxycycline, Tick control *Rhipicephalus sanguineus*

- *E. ewingii* - Canine Granulocytic Ehrlichiosis (CGE)
- Central America, S. W. Coast N.A: Lone Star Tick – *A. americanum*
- Pathogenesis/Signs:
  - As per *E. canis* (more arthropathy/arthritis)
- Dx (PCR) and Txt:
  - Doxycycline, Tick control
**Ehrlichia (prev. Cowdria) ruminantium**

- Heartwater (Hydropericardium): Notifiable in Canada
- Ruminants, endemic - Central S. Africa, Caribbean
  - stock losses significant
- Ticks – Amblyomma spp.
- Pathogenesis/Signs: mortality 10-80%
  - Replicates in **vascular endothelium**
  - Peracute to chronic
  - **Acute** most common: fever, nervous signs, death
  - listless, circling, stiff gait, paddling, opisthotonus, nystagmus
  - Necropsy: hydropericardium, hydrothorax, edema lungs
- Dx and TxT:
  - Organisms in cerebral capillaries (Giemsa)
  - Serology: serum Abs, PCR
  - Oxytetracycline (Prophylactically or therapeutically)
  - vaccines available, tick control

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**Anaplasma marginale/caudatum**

- Bovine Anaplasmosis (Gall Sickness): Reportable in Canada (Not U.S.)
  - Worldwide, tropical and subtropical (U.S.)
  - Economically impt. (up to 50% mortality in adults): < 12 months subclinical
  - Multiple hard ticks genera: (Dermacentor, Rhipicephalus, Boophilus, Ixodes)
- Pathogenesis and Signs:
  - Replicates in RBC’s
  - Signs depend on extent of anemia:
  - fever, drop in body condition, tachycardia/ tachypnea, pale mucous membr., icterus,
  - Hemolytic anemia, hepato/splenomegaly
  - Carrier state common
- Dx and TxT
  - Morulae in RBC’s (Giemsa: blood smear)
  - Serology ( ), PCR available
  - Tick control, Tetracyclines, carrier cull, vaccination
  - Used less virulent *A. centrale*
Anaplasma phagocytophilum

- Equine Granulocytic Ehrlichiosis (EGE), dogs, humans (HE)
  - Europe primarily ruminants (Tick Borne Fever), South America
  - combines former E. equi and E. phagocytophila
- Northern California (1960), more widely, incl. Canada
  - seasonal (fall, winter, spring)
  - Ticks - *Ixodes spp.*
- Pathogenesis/Signs: typically subclinical/self-limiting
  - Infects PMN’s
  - Acutely: fever +/- limb edema
  - rarely cardiac arrhythmias (myocardial vasculitis)
- Dx and Ttx:
  - Morulae in PMNs, Serology, PCR
  - Oxtetracycline
  - No vaccine, tick control

Anaplasma (Ehrlichia) platys

- Canine Infectious Cyclic Thrombocytopenia in dogs
- U.S./Europe,
  - probably *Rhipicephalus* tick
- Pathogenesis/Signs: rarely clinical (Mild fever, anorexia,
  - Replication on platelets
  - 10-14 day cyclical thrombocytopenia
  - rarely bleeding abnormalities: epistaxis, mucosal hemorrhage
- Dx/TxT:
  - Morulae on platelets (difficult due to low numbers)
  - Serology IFA (indirect Immunofluorescent Ab)
  - Doxycycline, Tick control
Family Bartonellaceae

- *Bartonella henselae*: Cat-Scratch Disease (infection in humans)
- Thin Gram negative rod, can grow on BA (3-4 wks)

- Cat Infections (Not!):
  - Most animals carry this organism, with no signs
  - 10-50% are bacteremic at any given time
  - Cat-to-cat trans. believed to occur by flea

- Human Infections: uncommon
  - Signs 1-3 wks after scratch/bite, usually mild (dermatitis, fever)
  - Typically resolves spontaneously
  - Immunocompromised people can develop a disseminated infection
  - Erythromycin, doxycycline several months
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  - *B. vinsonii* – canine endocarditis (20% of endocarditis cases?)
  - Blood culture, Erythromycin

Thanks and Good Luck !!