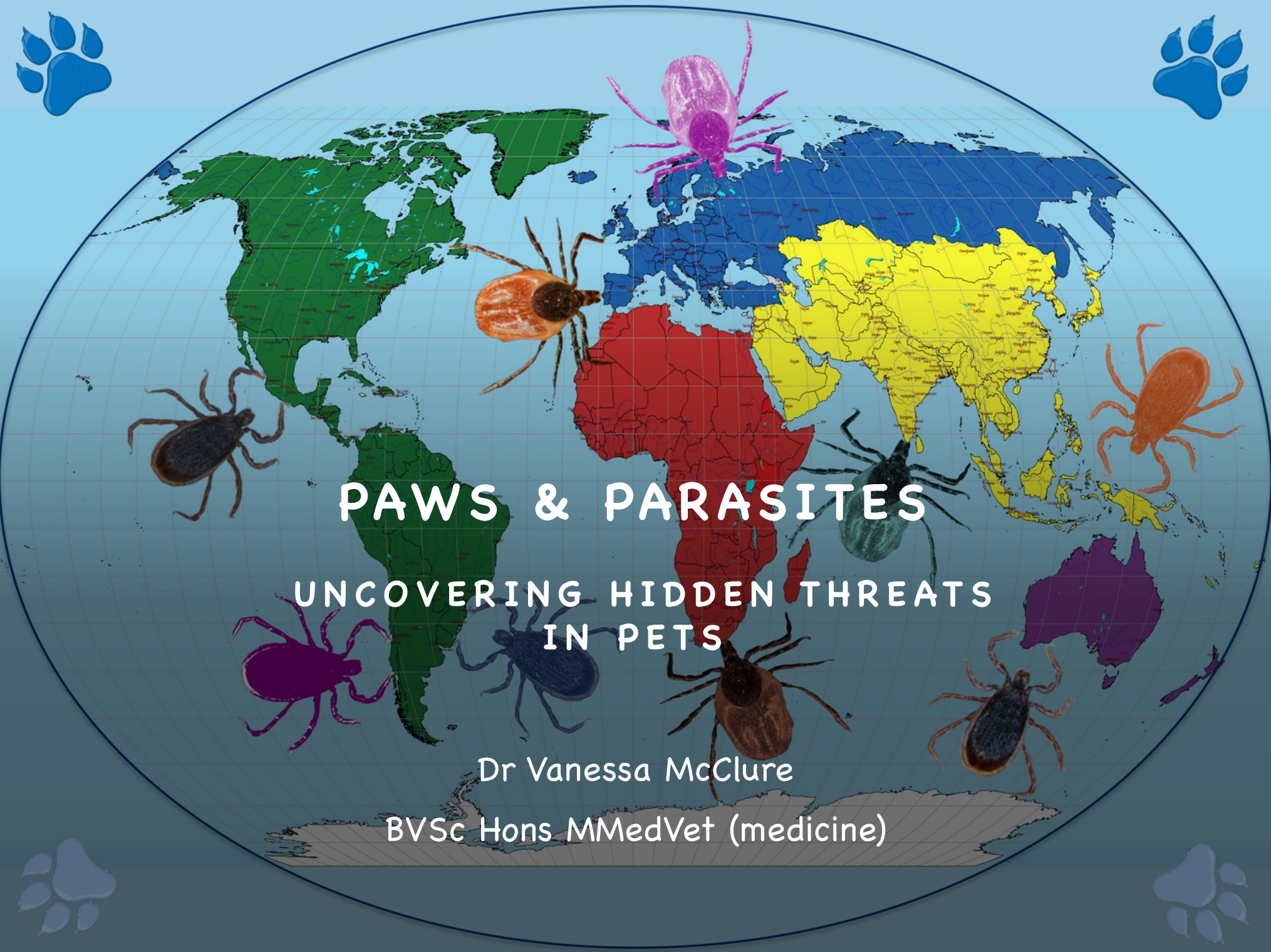
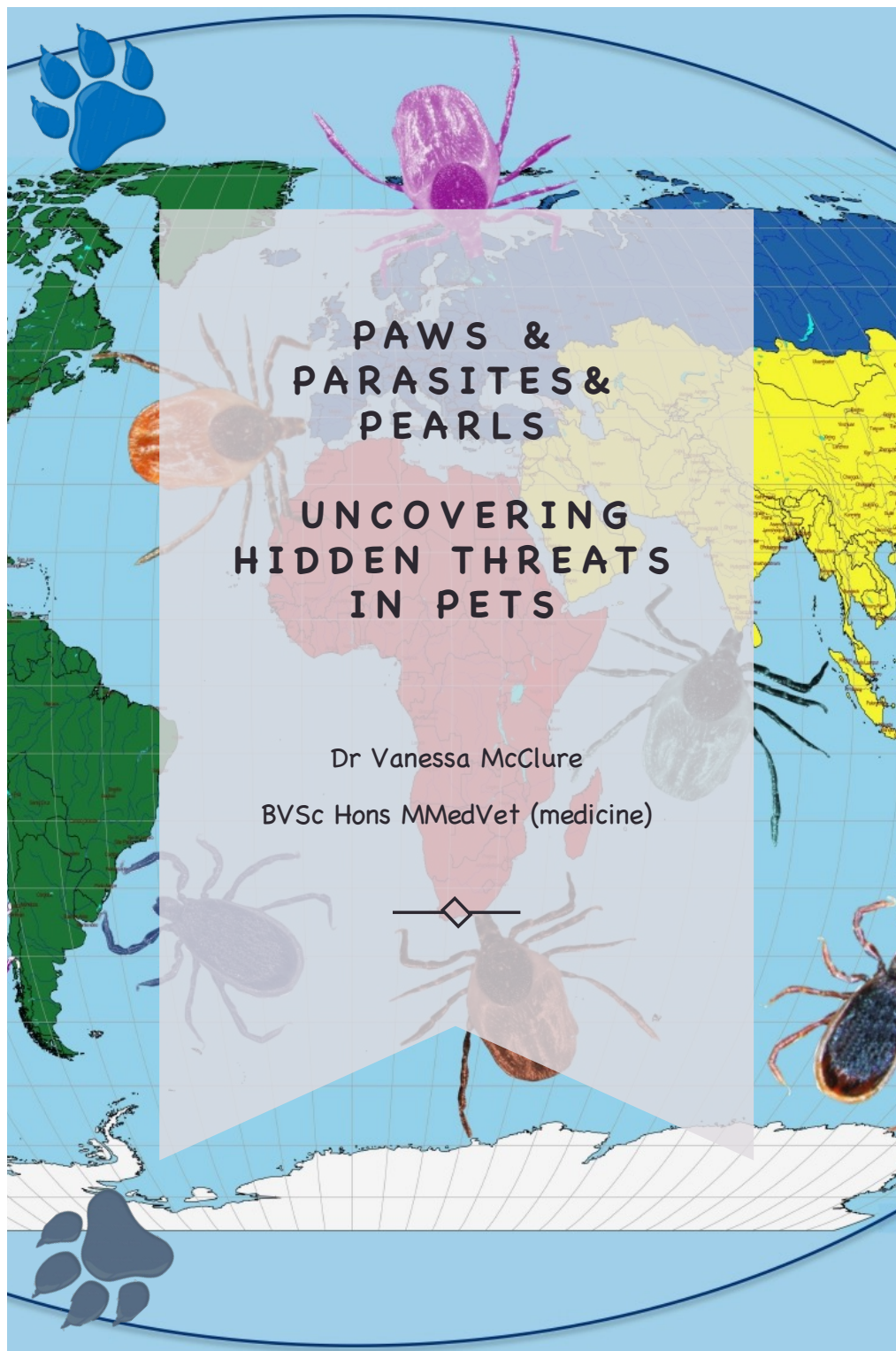




PAWS & PARASITES

UNCOVERING HIDDEN THREATS IN PETS

Dr Vanessa McClure
BVSc Hons MMedVet (medicine)



**PAWS &
PARASITES &
PEARLS**

**UNCOVERING
HIDDEN THREATS
IN PETS**

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Overview



Interesting/fun
facts



Emerging parasite
problems



Things to look out
for



Tips and pearls

Introduction



- $\mp$ 50% of people live with at least 1 pet
- Stray dogs and cats
- Endo & ectoparasites on pets' act as vectors of various diseases
- Implications:
 - health and welfare (pets)
 - zoonotic risks (owner)

Introduction

- Dramatic change in the geographic & host ranges of vector-borne pathogens & dx
- Establishment of vectors into non-endemic areas
- Rare diseases increase/ new dx found



PEOPLE TRAVELLING
WITH PETS



DESTRUCTION OF
WILD HABITATS



CLIMATE CHANGE



CATS $\neq$ SMALL DOGS!



AMERICAN
SOCIETY FOR
MICROBIOLOGY

Clinical Microbiology
Reviews®

REVIEW



Canine and Feline Parasitology: Analogies, Differences, and Relevance for Human Health

Dogs and cats are profoundly different under evolutionary, biological, ethological, behavioural, and immunological standpoints. These differences impact clinical features, diagnosis, and control of canine and feline parasites and transmission risk for humans.



Dogs

Want a stick?



Yeah!
Yeah!

Want a rock?



Yeah!
Yeah!

Want an old dirty sock?



Yeah!
Yeah!

Want some road kill?



Yeah!
Yeah!

Cats



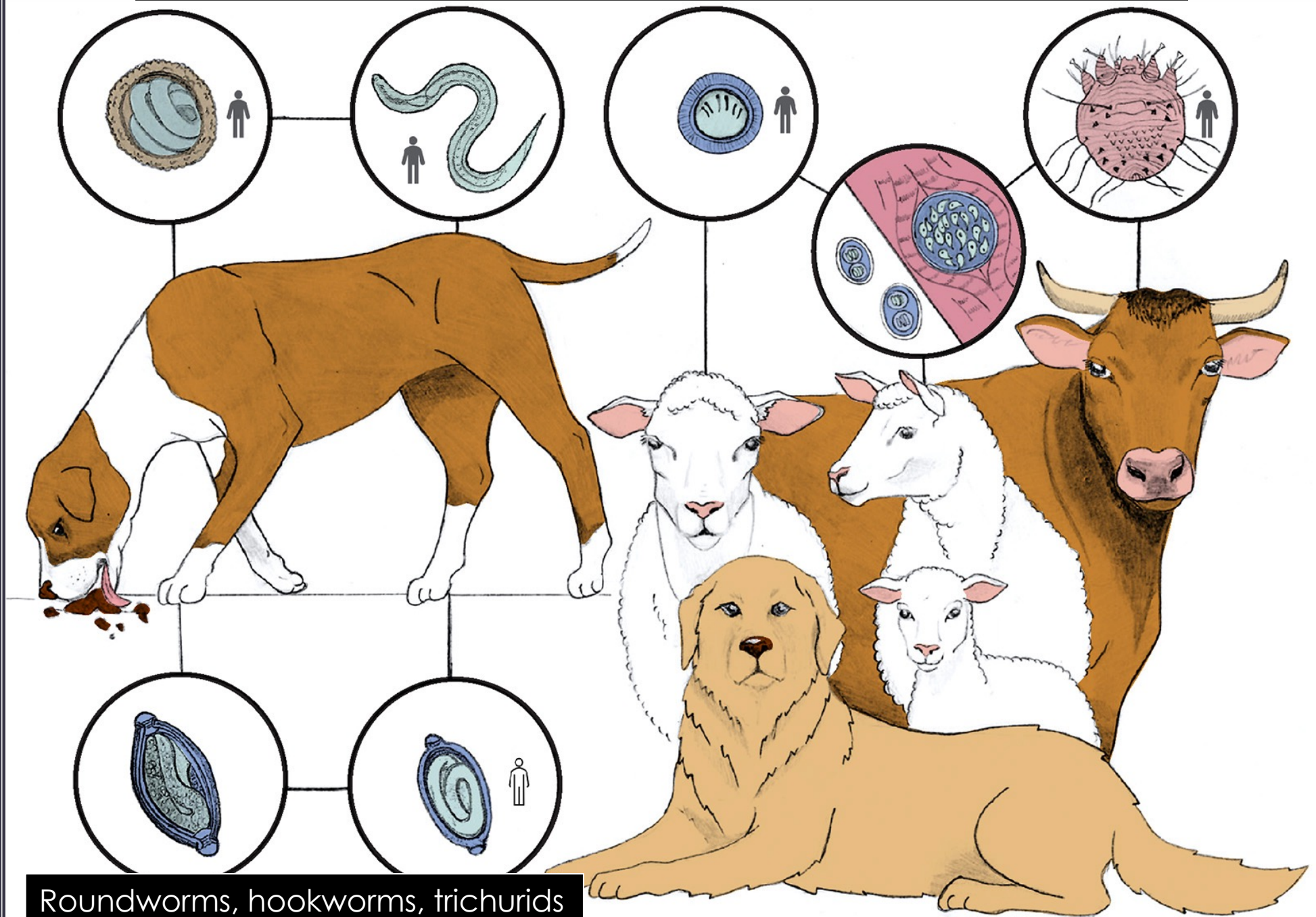
Want some imported
Gourmet creamed
salmon?



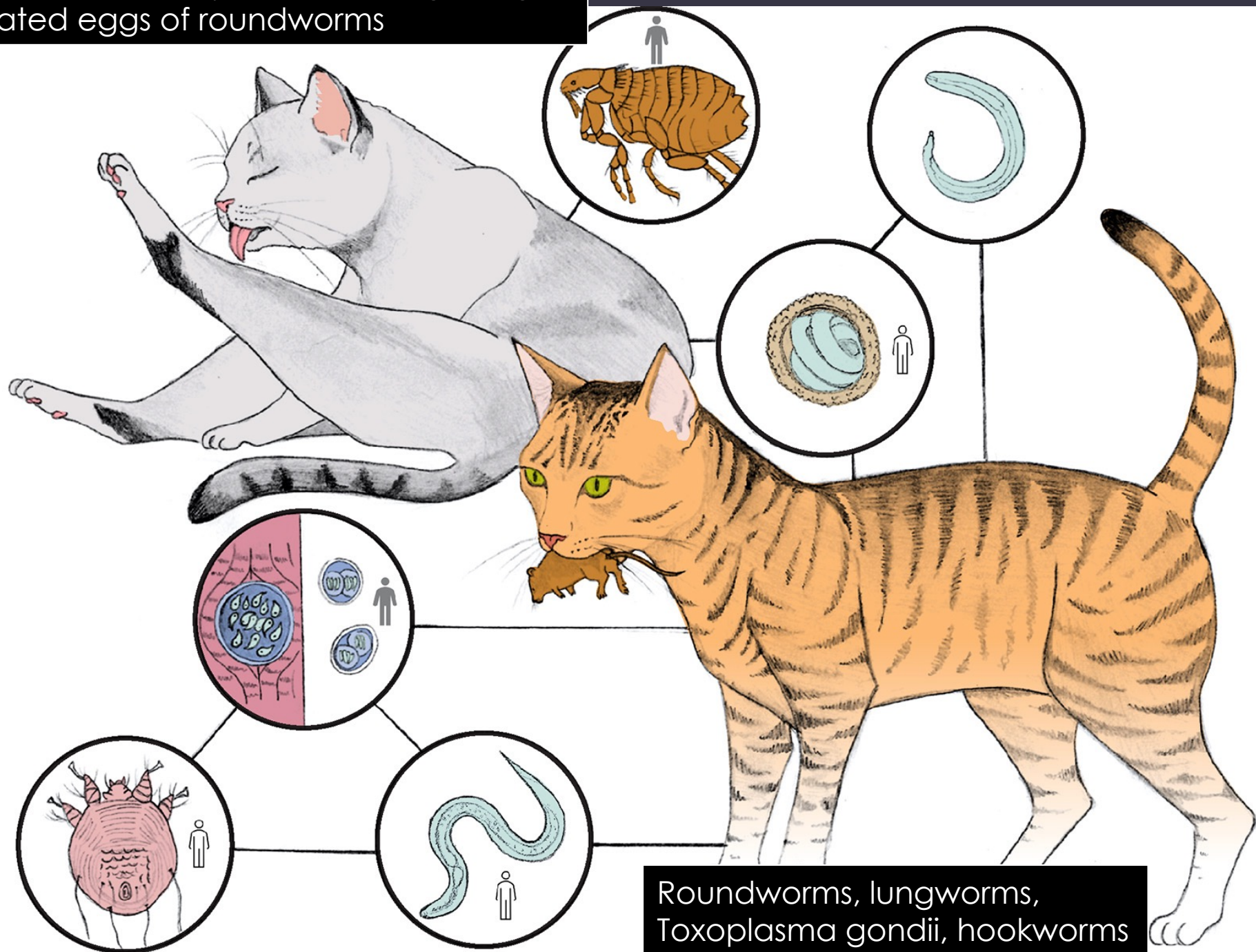
I'll let you know.

lingvistov.ru

Echinococcus granulosus, *Neospora caninum*, *Sarcoptes scabiei*



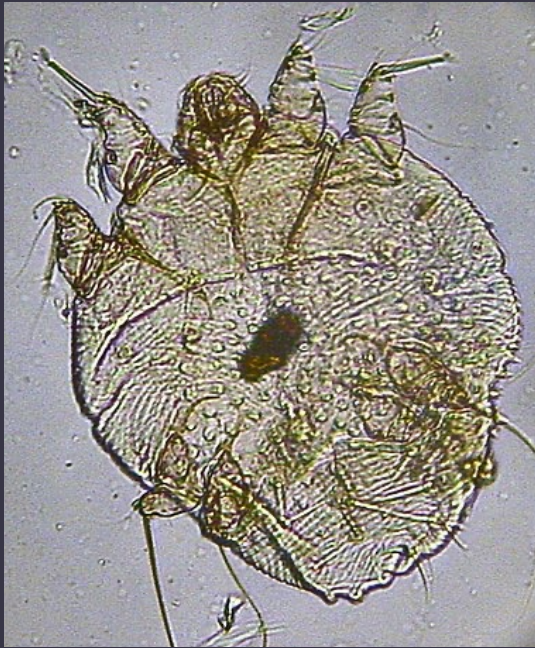
↓ flea infestations ↑ chance of ingesting
larvated eggs of roundworms





<https://www.metropolisindia.com/upgrade/blog/upload/24/02/Scabies1706882643.webp>

Mites



Sarcoptes scabiei var. *hominis*



Sarcoptes scabiei var. *canis*



Notoedres cati

Sarcoptes scabiei var. *hominis*



Wide host range



Mild, self-limiting - not contagious to other humans

Notoedres cati



Sarcoptes scabiei var. *canis*

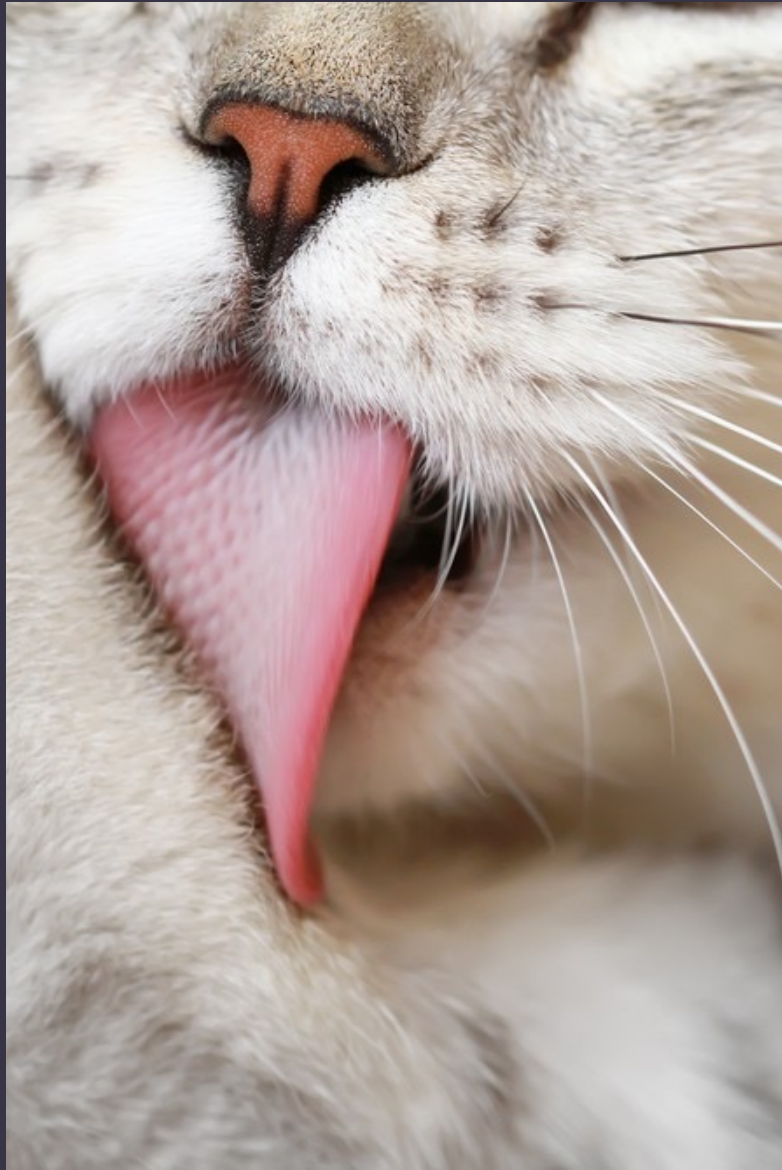
Small host range
(Rodents, bats, mongoose)







TICKS AND FLEAS

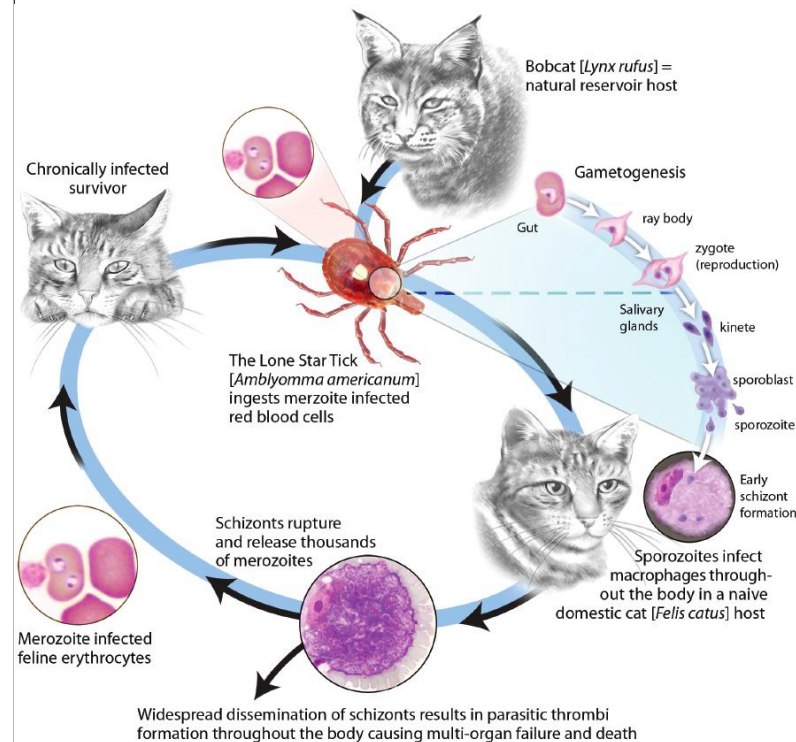


Ticks & fleas

- Cats spend $\pm 8\%$ of their nonsleeping time grooming
- Remove ticks promptly < susceptible to TBD
- Exception: susceptible to Hepatozoonosis –acquired by tick ingestion
 - Usually subclinical dx
 - A sign of immunosuppression

cytauxzoonosis

- *Cytauxzoon felis* is associated with a rapid course of disease
- High morbidity & mortality
- Outdoor adult cats (but any age can be affected)
- Diagnosis - PCR



Abnormal findings at presentation

MOST COMMON	COMMON	LESS COMMON
■ Fever (90% of cats) ■ Lethargy/depression ■ Icterus ■ Elevated nictitating membranes ■ Tachypnea ■ Dehydration	■ Tachycardia ■ Attached ticks ■ Pallor ■ Vocalization ■ Discomfort on abdominal palpation ■ Hepato/splenomegaly ■ Lymphadenomegaly	■ Murmur and/or gallop heart rhythm ■ Ataxia ■ Hemorrhagic panuveitis ■ Seizures ■ Obtundation/coma ■ Petechia ■ Hypothermia (poor prognostic indicator) ■ Respiratory distress

Hypothermia = poor prognostic sign

The entire disease course progresses rapidly,
and death within 36 hours of presentation

Treatment

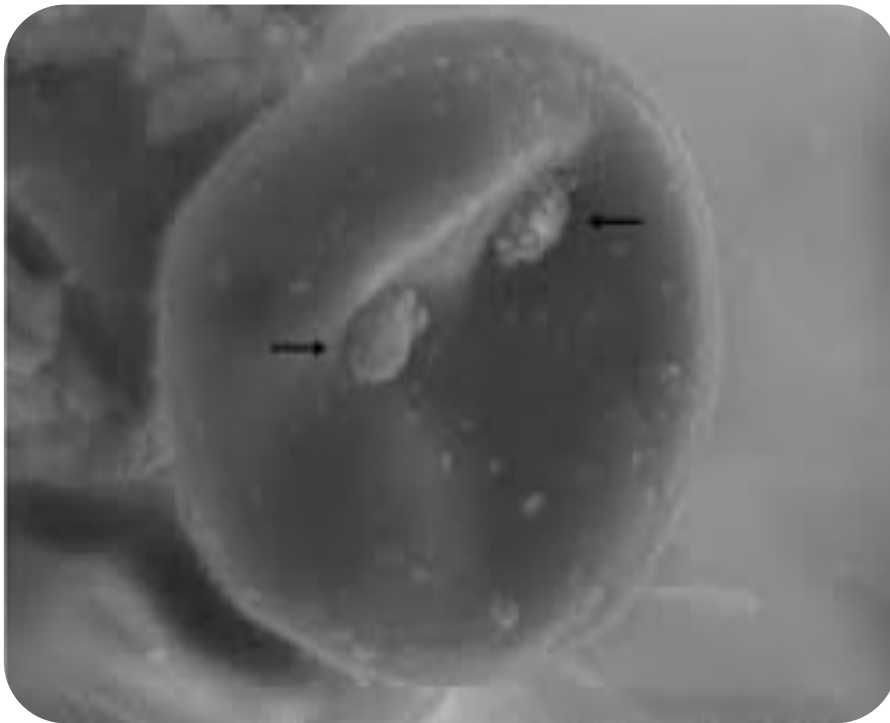
- There is no simple or inexpensive cure
- Current treatment of choice
 - Atovaquone 15 mg/kg PO q8h for 10 days
 - Azithromycin 10 mg/kg PO q24h for 10 days
 - Supportive care
- Without treatment the mortality rate is nearly 100%





FELINE INFECTIOUS ANAEMIA

Mycoplasmosis



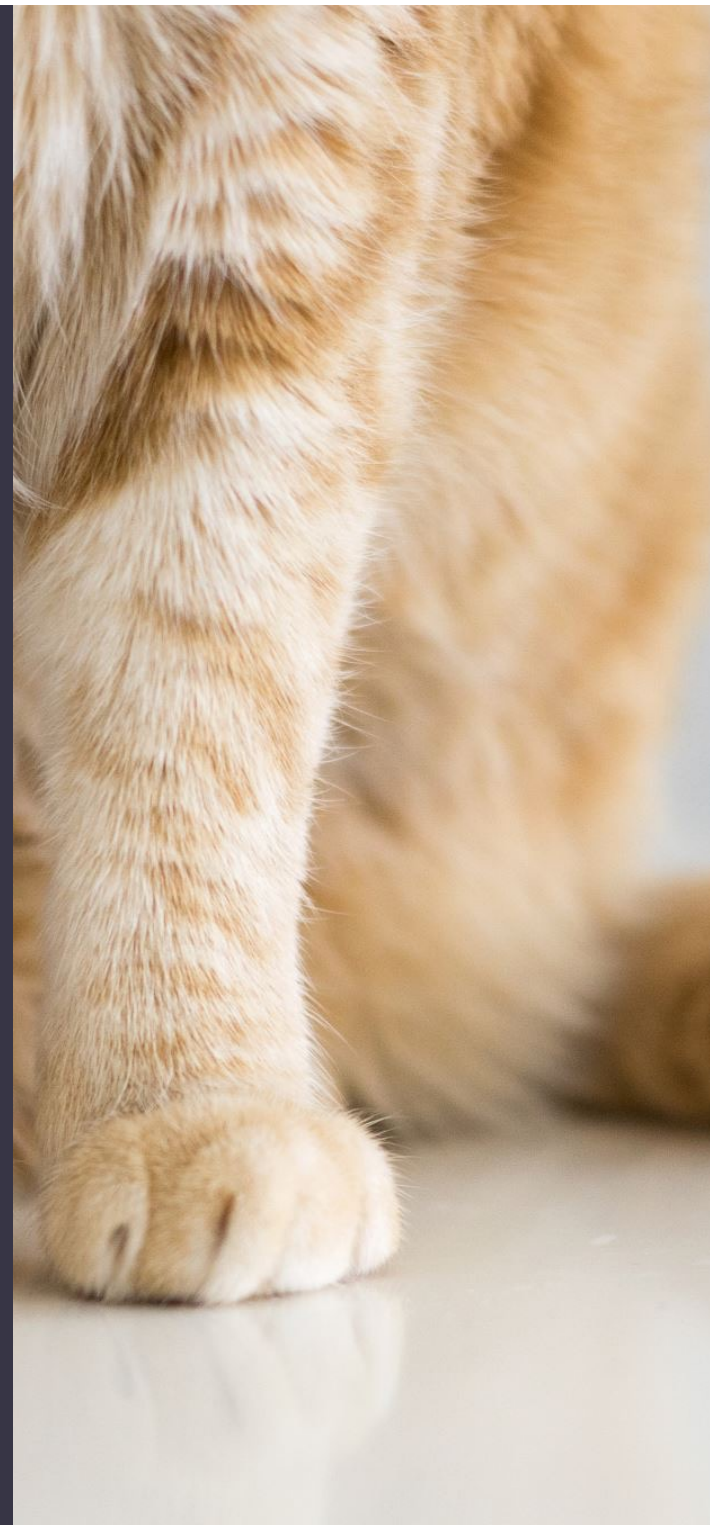
Pathogenesis

- ▶ Small unculturable bacteria of RBC
- ▶ Transmitted by biting arthropods?
Transplacental? Fighting?
- ▶ Attaches to surface of RBC
- ▶ Proliferation activated by stress/concurrent dx (FIV & FeLV)
- ▶ **Haemolytic anaemia**

Clinical signs

Not all cats develop disease

- Young cats seem to be more susceptible to infection & disease
- lethargy, anorexia, fever, weight loss, anaemia, splenomegaly, ±icterus



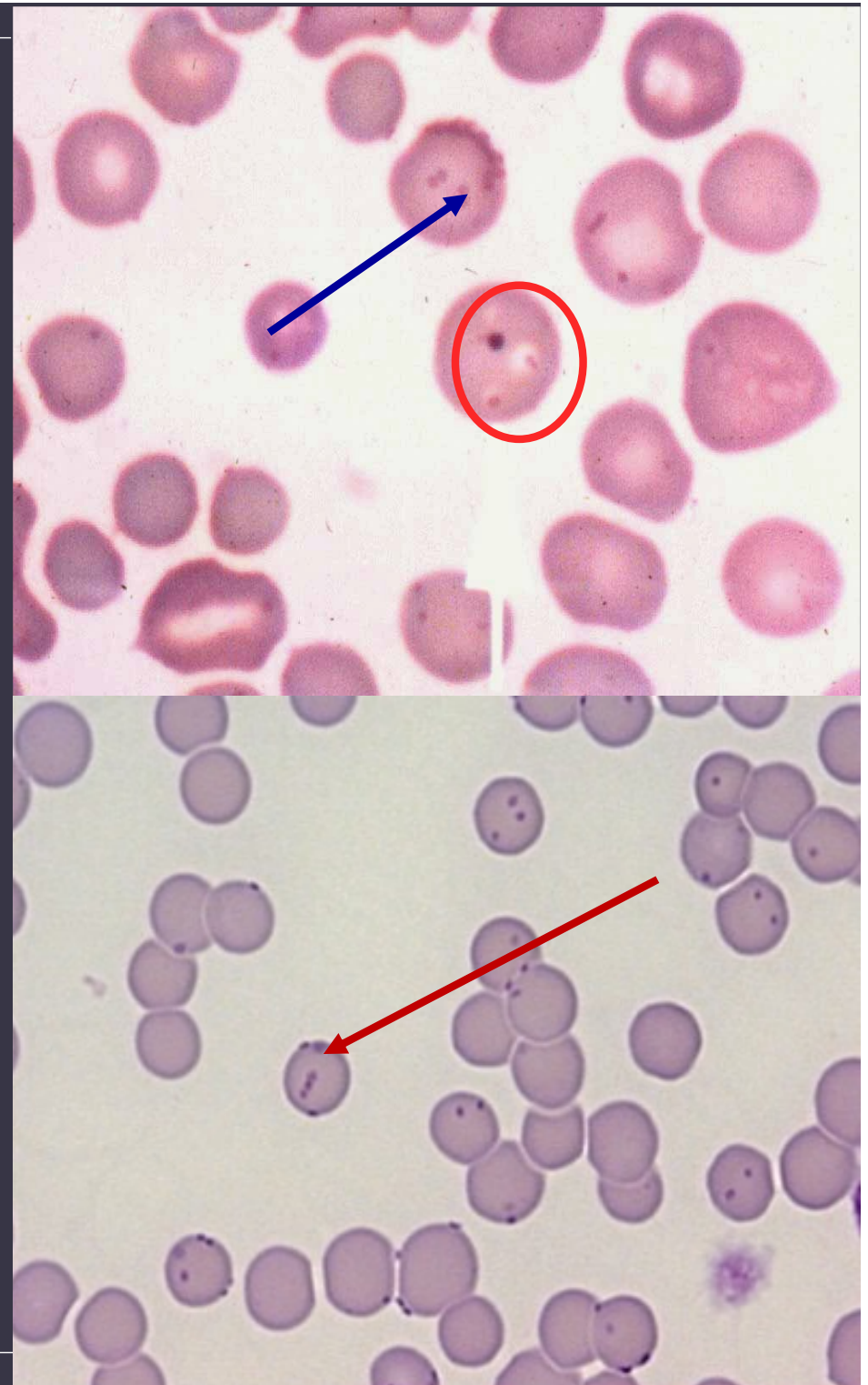


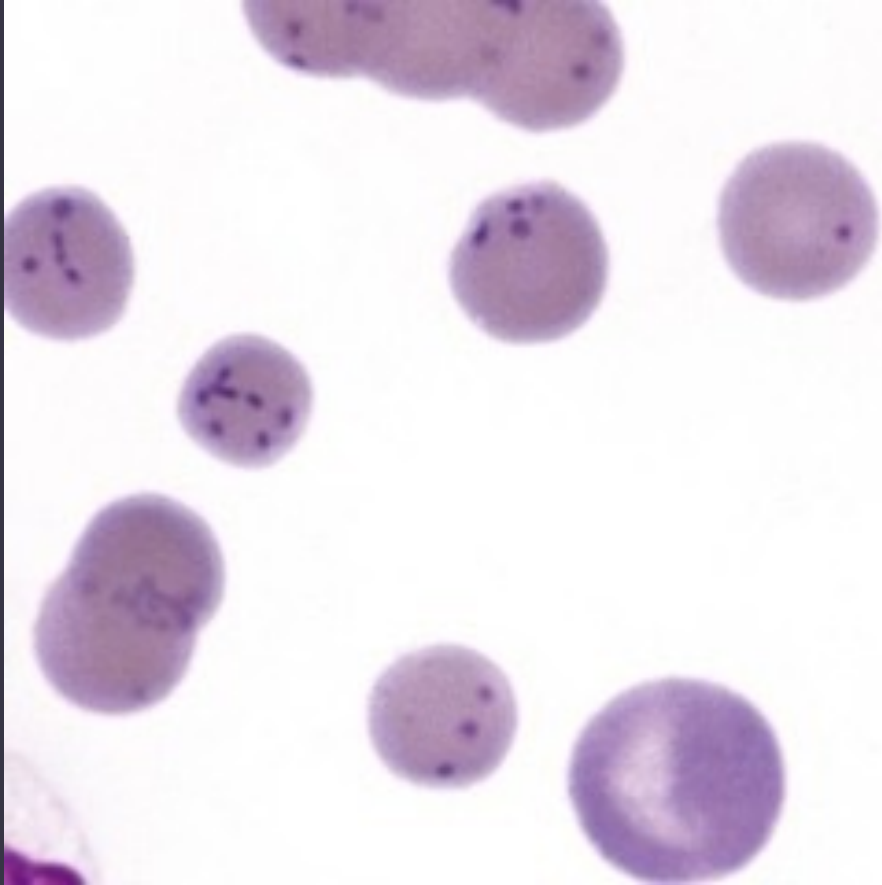
Anaemia

- Acute:
 - Mainly extravascular haemolysis
 - moderate – severe
 - Regenerative
 - Concurrent IMHA
- Chronic: subclinical carriers
 - Immune response to infection = $\uparrow$ Ht and $\downarrow$ organisms
 - Reactivation by stress

Diagnosis

- Blood smear:
 - Visible in <50%
 - False +
 - stain deposits
 - HJB
- PCR

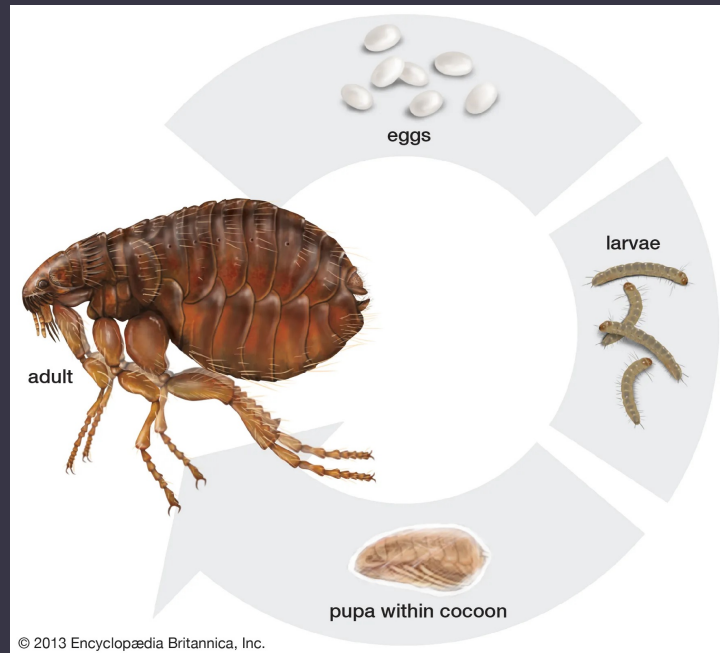




Treatment

- Treatment is indicated only for cats with clinical signs
- PCR positive but not anaemic – **Don't treat**
- Drugs:
 - Doxycycline (10mg/kg PO oid for 21 days, min 2 weeks)
 - Enrofloxacin (5 mg/kg PO oid for 14 days)
- Blood transfusions as needed
- Underlying diseases
- IMHA

Flea borne diseases (FBD)

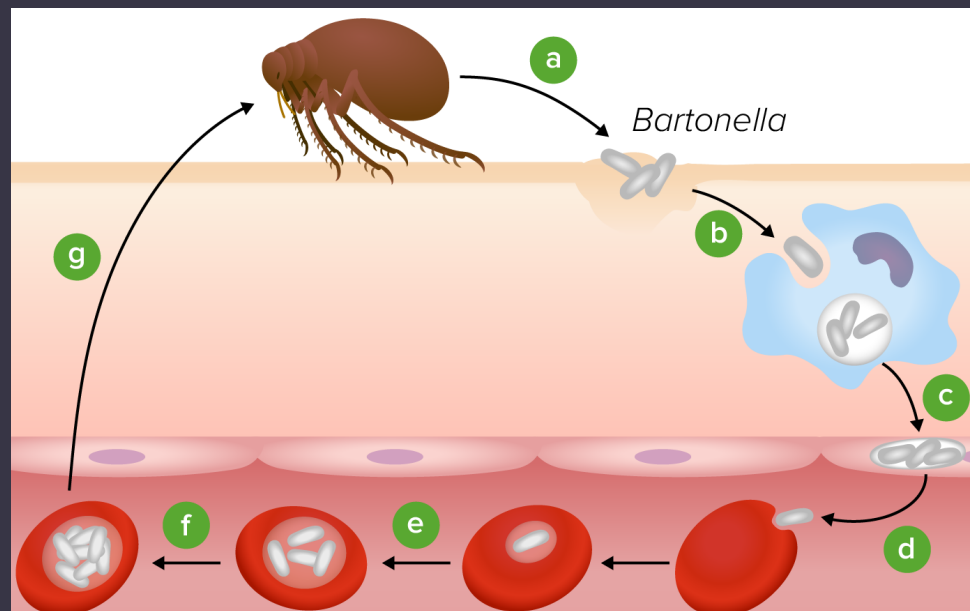


- *Y. pesti* - Plague (Rodents)
- *Bartonella*
- *Dipylidium caninum*
- Anaemia

Zoonosis

Bartonella (*B. henselae*)

- Gram-negative organisms
- Infected through:
 - Flea bites
 - Fighting
 - Blood transfusions
- Usually not ill

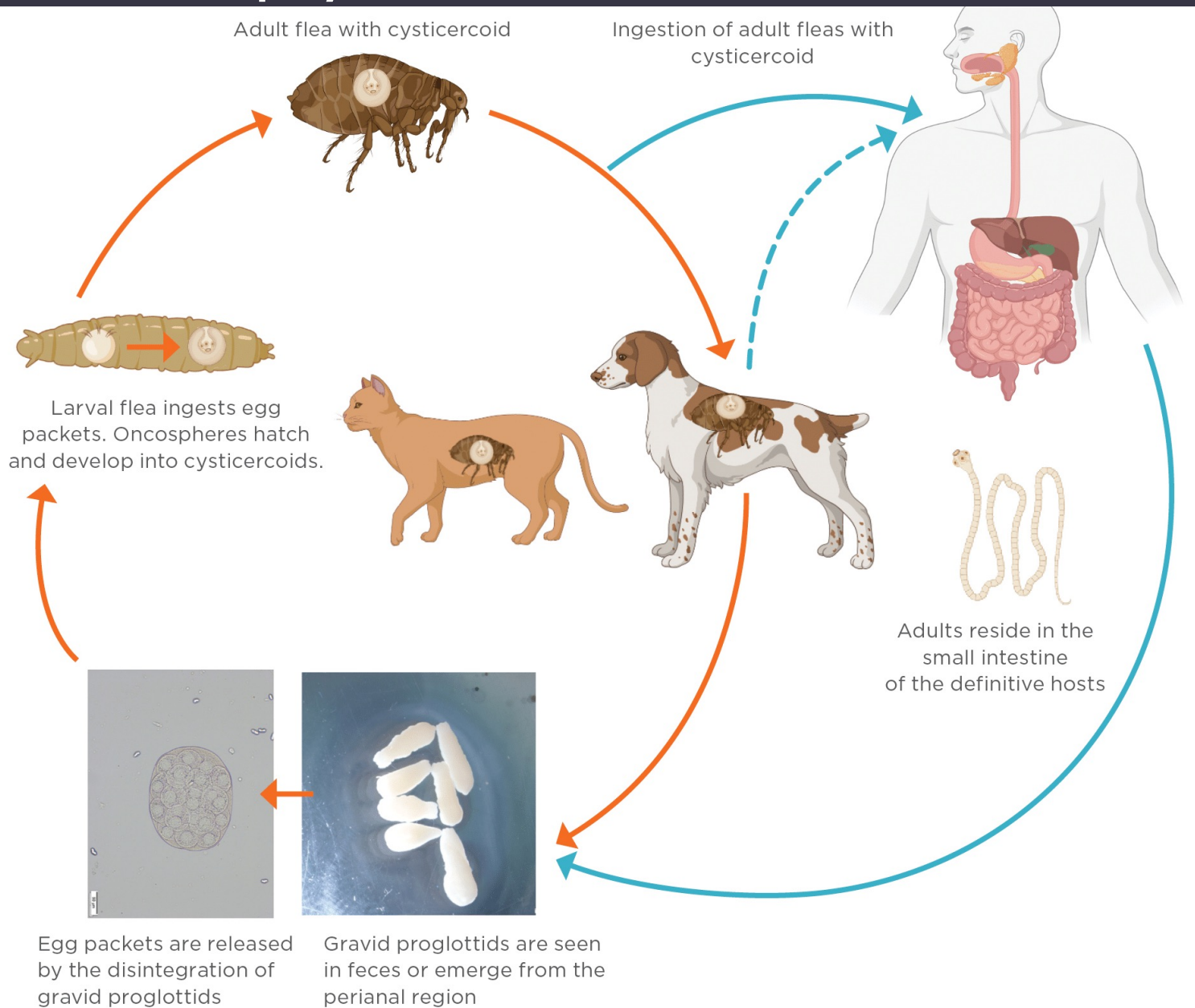


A close-up photograph of a cat's paw, showing the fur and the extended claws. The paw is positioned on the left side of the slide, with the claws pointing towards the bottom left. The background is a solid dark blue color.

Bartonella

- Significant zoonotic potential
- Cat scratch disease/fever
- Transmitted by inoculation of infectious flea faeces in an open wound

Dipylidium caninum



Have you ever been asked for:

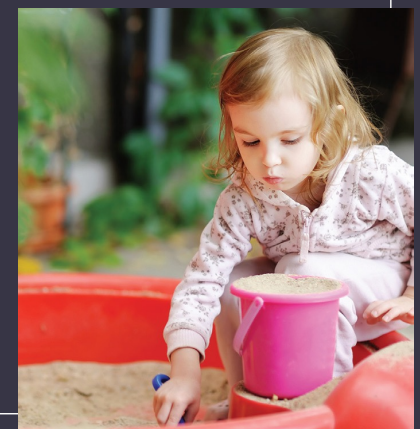
- vaccination book?
- health certificate ?

when taking your dog to the dog park?





- 80% - 90% of dog parks across the U.S. have parasites in faecal samples
- The most common intestinal parasites found :
 - Giardia
 - Whipworms
 - Hookworms
- Same for SA??
- Why The concern?
- ZOONOSIS



Hookworm

- Management of hookworm infection is challenging
 - Infective hookworm larvae abundant in the environment
 - Dogs are infected/ reinfected through multiple routes
 - “larval leak”



Hookworm Lifecycle

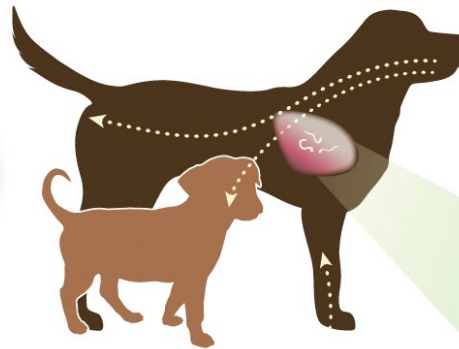
AFFECTS ➤  HUMANS  DOGS  CATS

Development to infective third-stage larvae in the environment takes approximately 2 to 9 days, depending upon temperature and humidity.

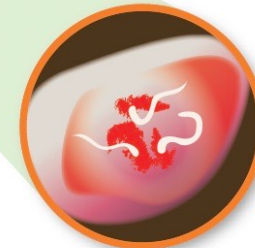


Infective larvae from the environment penetrate the skin or are ingested from a contaminated environment or infected host. Puppies and kittens may become infected through ingestion of larvae in the mother's milk.

Eggs are passed through the feces where they hatch and develop to infective larvae. Prepatent period (time from infection to egg passage in feces) is 16-28 days depending on the route of infection.

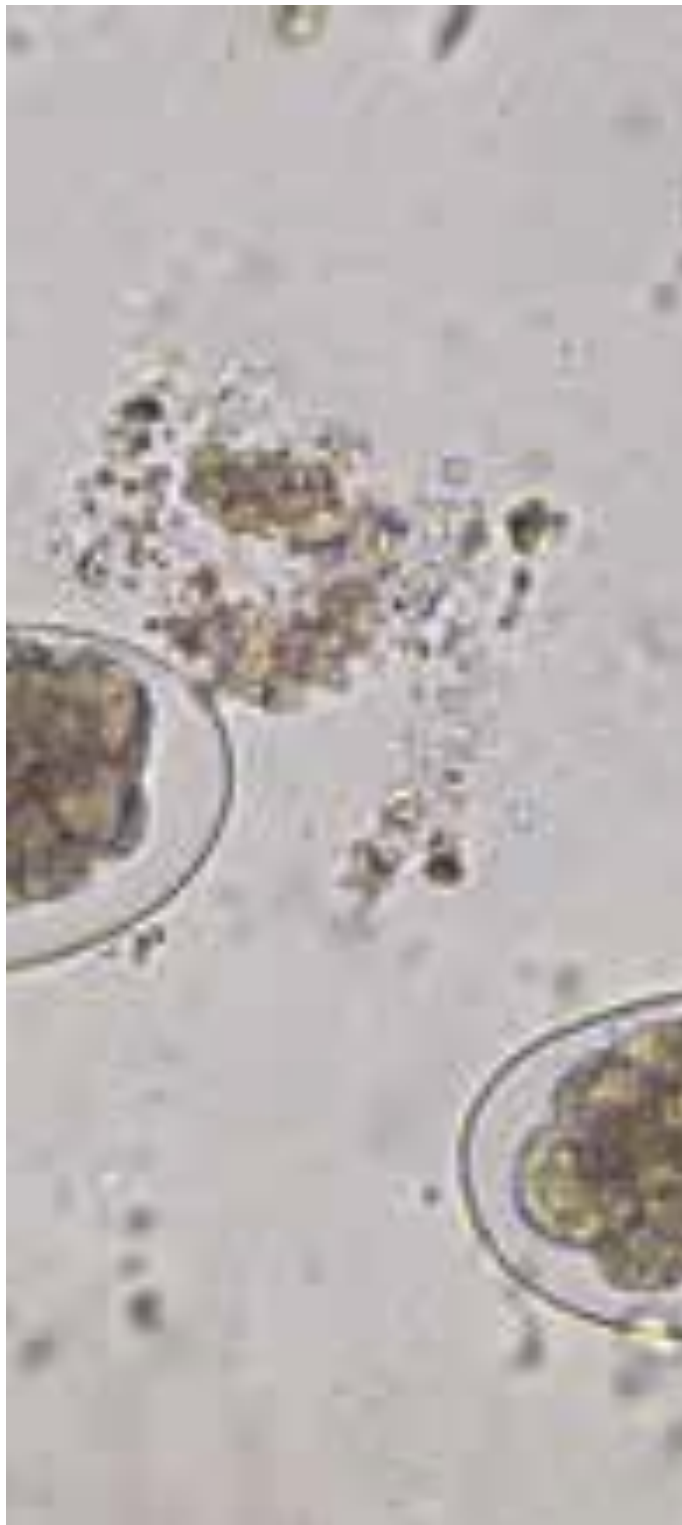


Larvae may also migrate through the lungs and cause respiratory distress or pneumonia.



Larvae migrate to the small intestine. In the small intestine, they mature to adults and lay eggs. Immature and adult worms can cause serious bleeding. Latent larvae hidden in muscle may be reactivated and mature to adult worms in the intestine "larval leak."





- Recent rise in hookworm (*Ancylostoma caninum*) **anthelmintic drug resistance**
- Predominantly from dog parks (USA)
- Spreading rapidly

JAVMA



Multiple anthelmintic drug resistance in hookworms (*Ancylostoma caninum*) in a Labrador breeding and training kennel in Georgia, USA

JAVMA MARCH 2023 VOL 261 NO. 3



Toxocara cati

- The most common nematode of cats
- Zoonotic
- Prolific egg-layers - Few worms = large numbers of eggs
- Eggs can survive for long periods in the environment
- Faecal flotation may fail to reveal the presence of eggs
- To increase detection
 - Faecal flotation by centrifugation
 - Use adequate sample size

Take home message

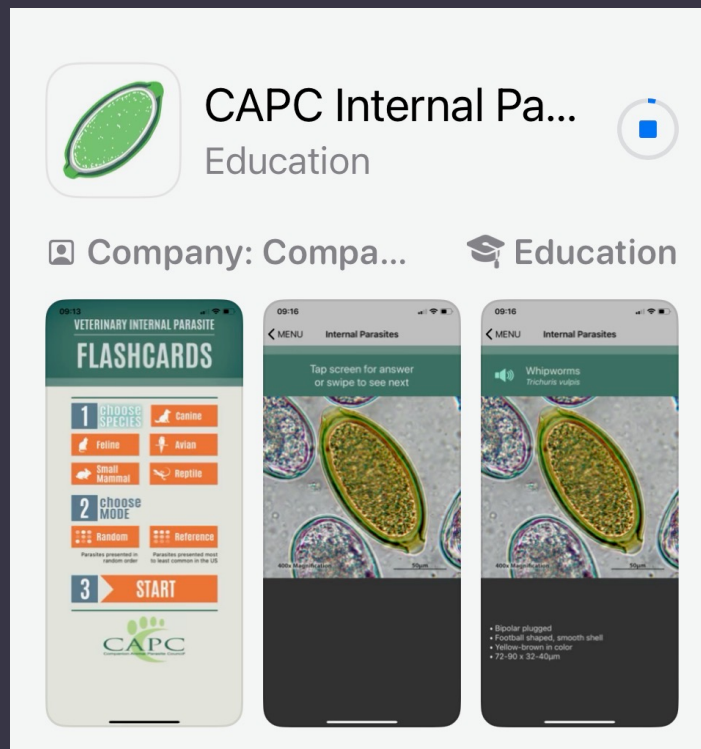


- Hookworms and round worms are zoonotic
- Prevention of worm infection is essential
- Endoparasite control should not rely solely on pharmacology
- Multifactorial approach - Client communication!
 - remove canine faeces by 'bagging and binning'
 - Good standards of food and hand hygiene
 - Covering up children's sand pits when not needed
- Multi-anthelmintic drug resistance has implications for human treatment

www.esccap.org



CAPC Parasite ID App



VETERINARY INTERNAL PARASITE FLASHCARDS

1 CHOOSE SPECIES

 Canine

 Feline

 Avian

 Small Mammal

 Reptile

2 CHOOSE MODE

 Random

Parasites presented in random order

 Reference

Parasites presented most to least common in the US

3 START





Tick borne
diseases
(TBD)

**GET YOUR
THINKING
CAP ON**



Case

- 4-year-old cross breed
- Not eating for 3 days
- Lethargic

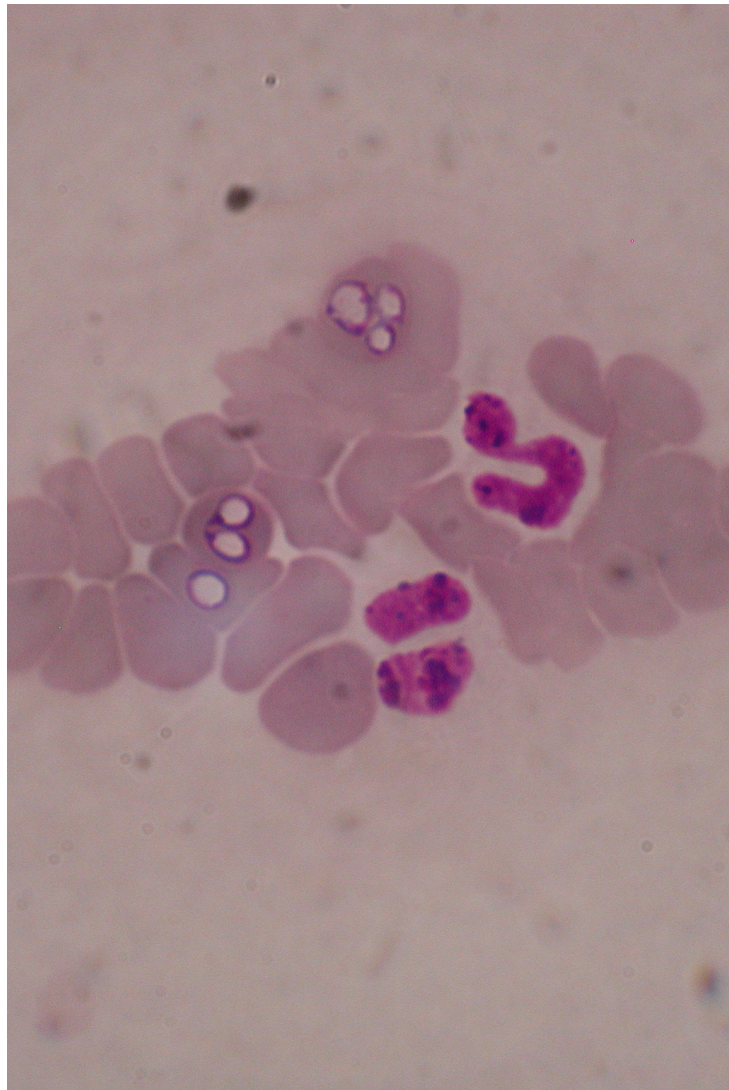
Clinical examination

- Depressed
- $T^{\circ} = 39.9$
- Pulse = 145bpm
- RR = 50bpm
- MM = Pale with slight yellow tinge and petechiation
- Generalised mild/moderate lymphadenopathy



Problem list

- Anorexia
- Lethargy/depression
- Pyrexia
- Icterus
- Moderate to severe tachycardia
- Moderate to severe tachypnoea
- Lymphadenopathy
- Petechiation



MDB

- Blood smear
 - 2+ anisocytosis
 - 2+ spherocytosis
 - Severe thrombocytopaenia
- Urine SG = 1.035
- Faecal float = neg

complete the MDB

Haematocrit

TSP

Always check K in
icteric and/or very
sick patients

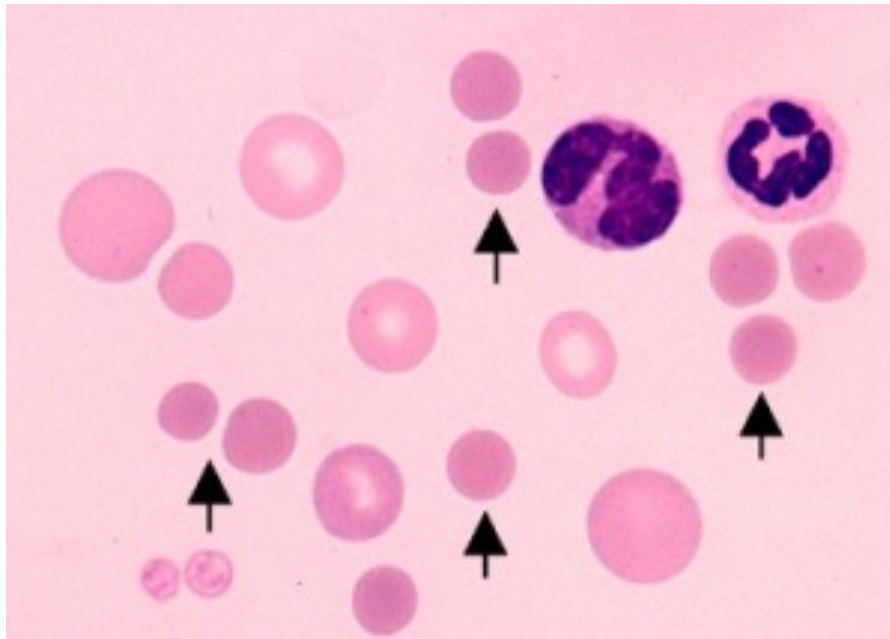
Glucose

Potassium

complete the MDB

- Haematocrit = 12%
- TSP = 76 g/l
- ISA + ve
- Glucose = 4.8 mmol/l
- Potassium = 3.2 mmol/l





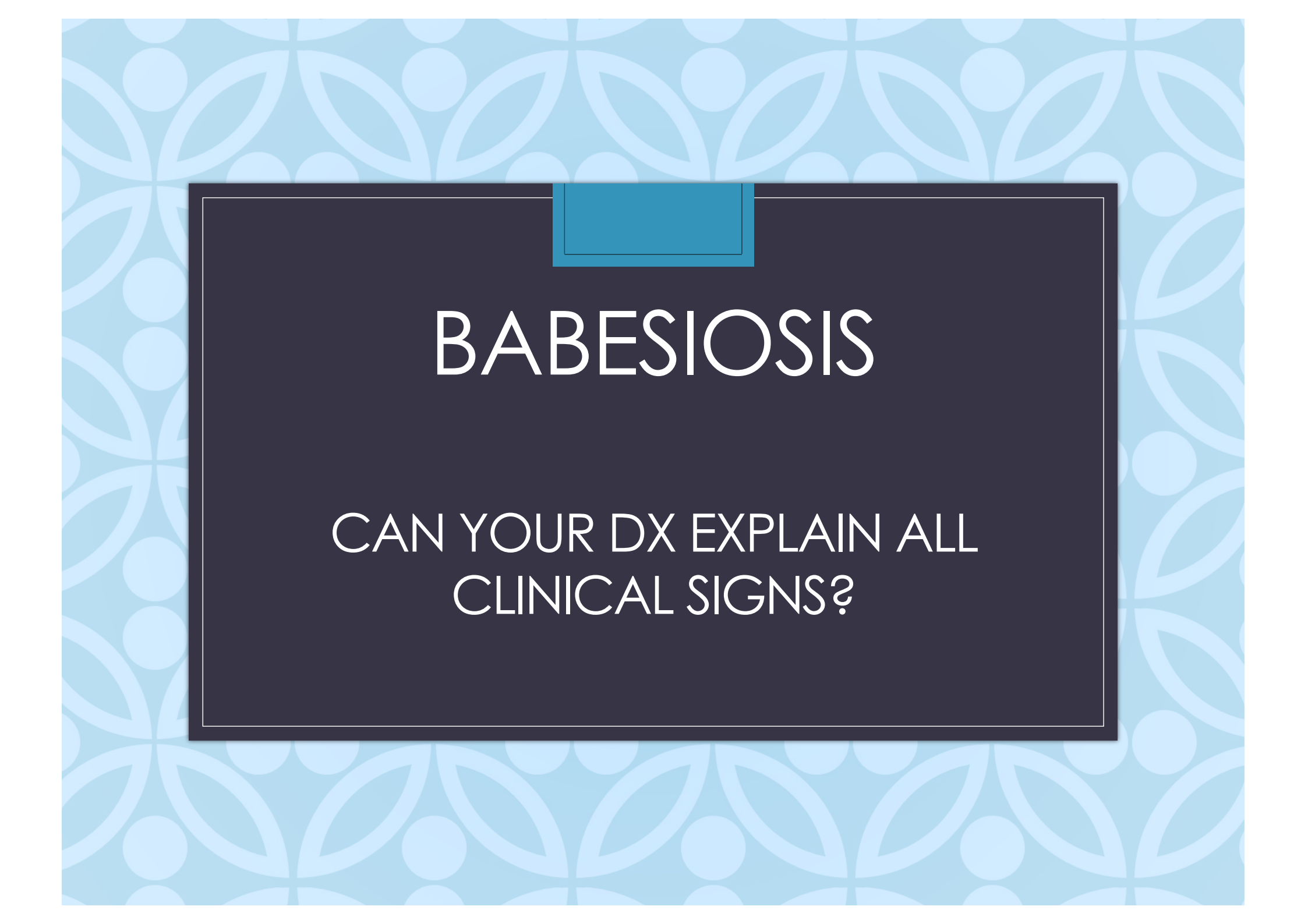
IMHA

- Diagnosis
 - In saline agglutination (ISA)+
 - Spherocytosis
 - Haemolytic serum
 - Falling haematocrit despite treatment
 - Coombs
- Need **not** have all
- **Negative ISA does not exclude IMHA**



IMHA

- Intravascular haemolysis (Rare)
 - Complement mediated erythrolysis
 - Haemoglobinaemia / haemoglobinuria
- Extravascular haemolysis (Common)
 - Splenic immunoglobulin mediated phagocytosis



BABESIOSIS

CAN YOUR DX EXPLAIN ALL
CLINICAL SIGNS?

Problem list

Anorexia

Icterus

Lethargy/depression

Pyrexia

Moderate to severe tachycardia

Moderate to severe tachypnoea

Lymphadenopathy

Petechiation

Problem list

Anorexia

Icterus

Lethargy/depression

Pyrexia

Moderate to severe tachycardia

Moderate to severe tachypnoea

Lymphadenopathy?

Petechiation?

What could explain the other signs?

Concurrent ehrlichiosis infection

Lymphadenopathy

Petechiation

A single tick species can:

- act as a vector for multiple pathogens
- have simultaneous infection with different organisms



Haemaphysalis elliptica

Vector for *B. rossi*



Rhipicephalus sanguineus

Vector for *B. vogeli* and *E. canis*

- Overlapping distribution pattern
- Same host
- But the prevalence of *Babesia* spp. & *Ehrlichia* spp co-infection in studies = only 2%

Prevalence of canine *Babesia* and *Ehrlichia* co-infection and the predictive value of haematology



Veterinary Clinical Pathology

An International Journal of Laboratory Medicine

Brief Communication

Platelet indices in dogs with *Babesia rossi* infection

Severe thrombocytopenia is seen with canine babesiosis

BUT clinical bleeding is **uncommon**

- marked platelet activation
- hyperfibrinogenaemia

Excessive bleeding seen in cases with **concomitant** *Ehrlichia* spp. infections



Veterinary Parasitology

Volume 141, Issues 1–2, 10 October 2006, Pages 18–29



Capillary and venous *Babesia canis rossi* parasitaemias and their association with outcome of infection and circulatory compromise

Marlies Böhm ^a  , Andrew L. Leisewitz ^b, Peter N. Thompson ^c, Johannes P. Schoeman ^a

Capillary
parasitaemias
higher than venous
parasitaemias

Thus, capillary
samples are the
most appropriate
diagnostic samples

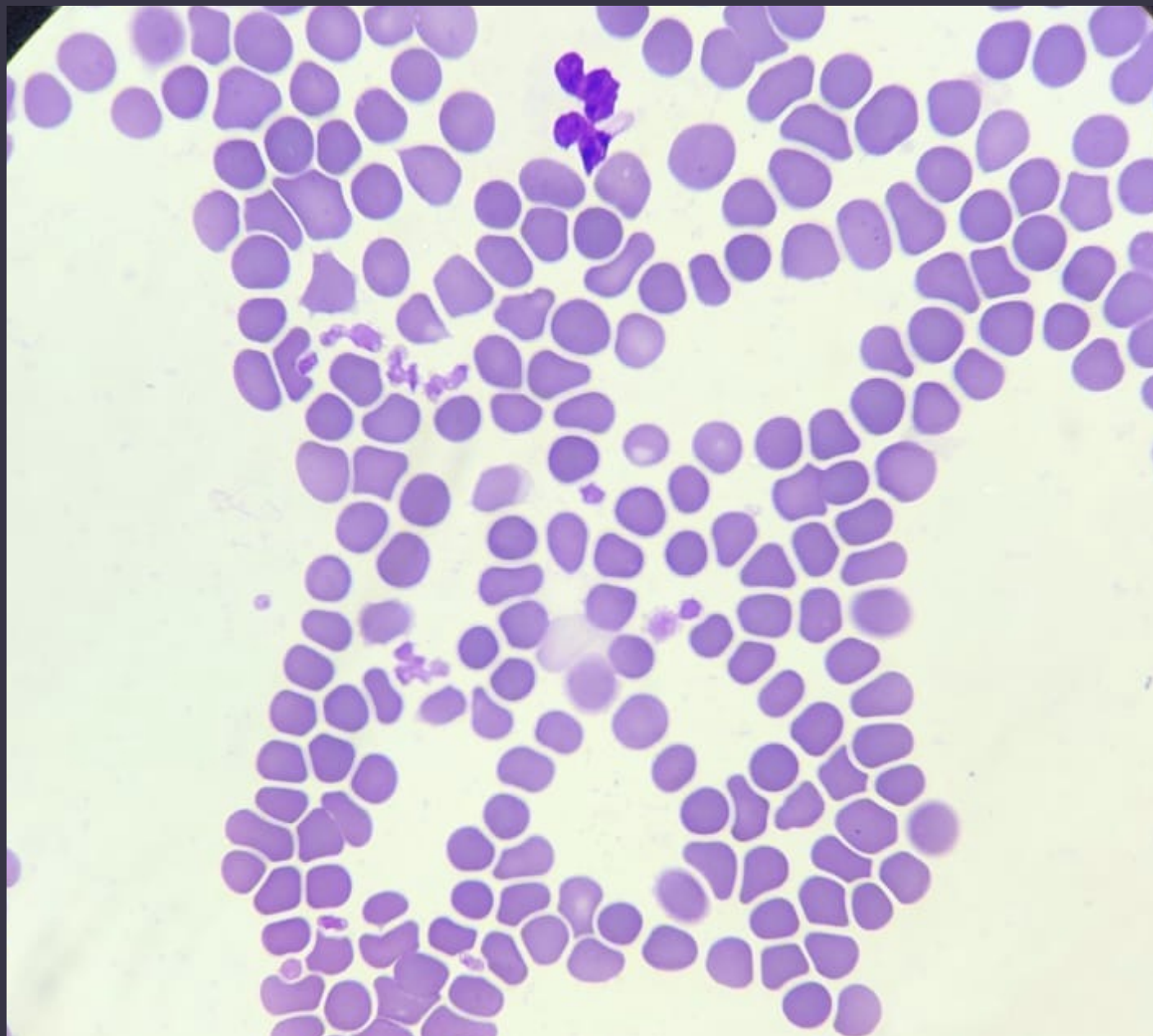
A close-up, microscopic view of several red blood cells. The cells are biconcave discs, appearing as reddish-orange, slightly flattened spheres with a darker center. They are set against a dark, almost black background, which makes the cells stand out. The lighting creates a sense of depth, highlighting the edges and the central indentation of the cells.

Examine the following blood smears
then identify the blood smear from the
patient with:

1. IMTP
2. Babesia
3. Normal blood smear
4. Regenerative anaemia

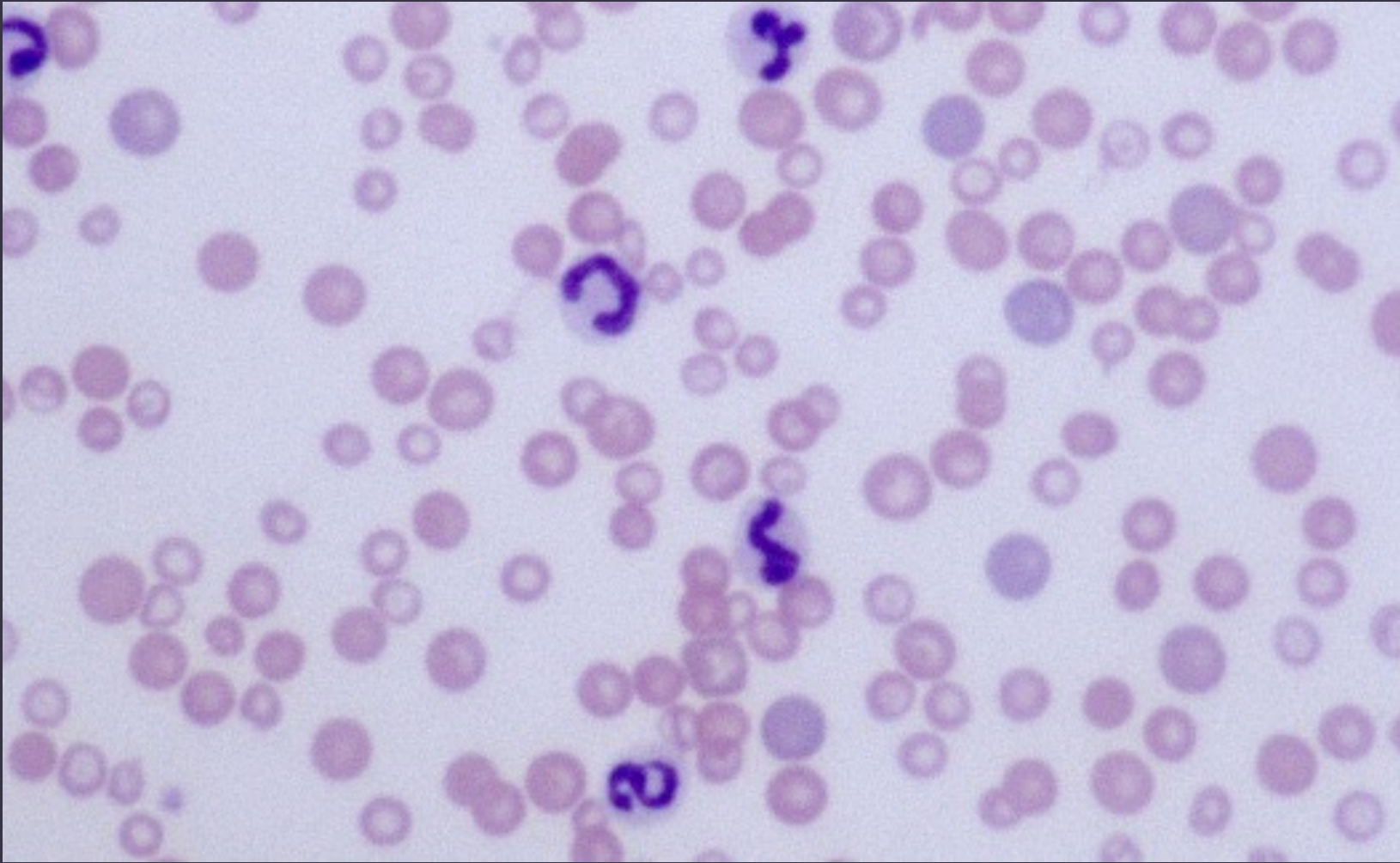
A



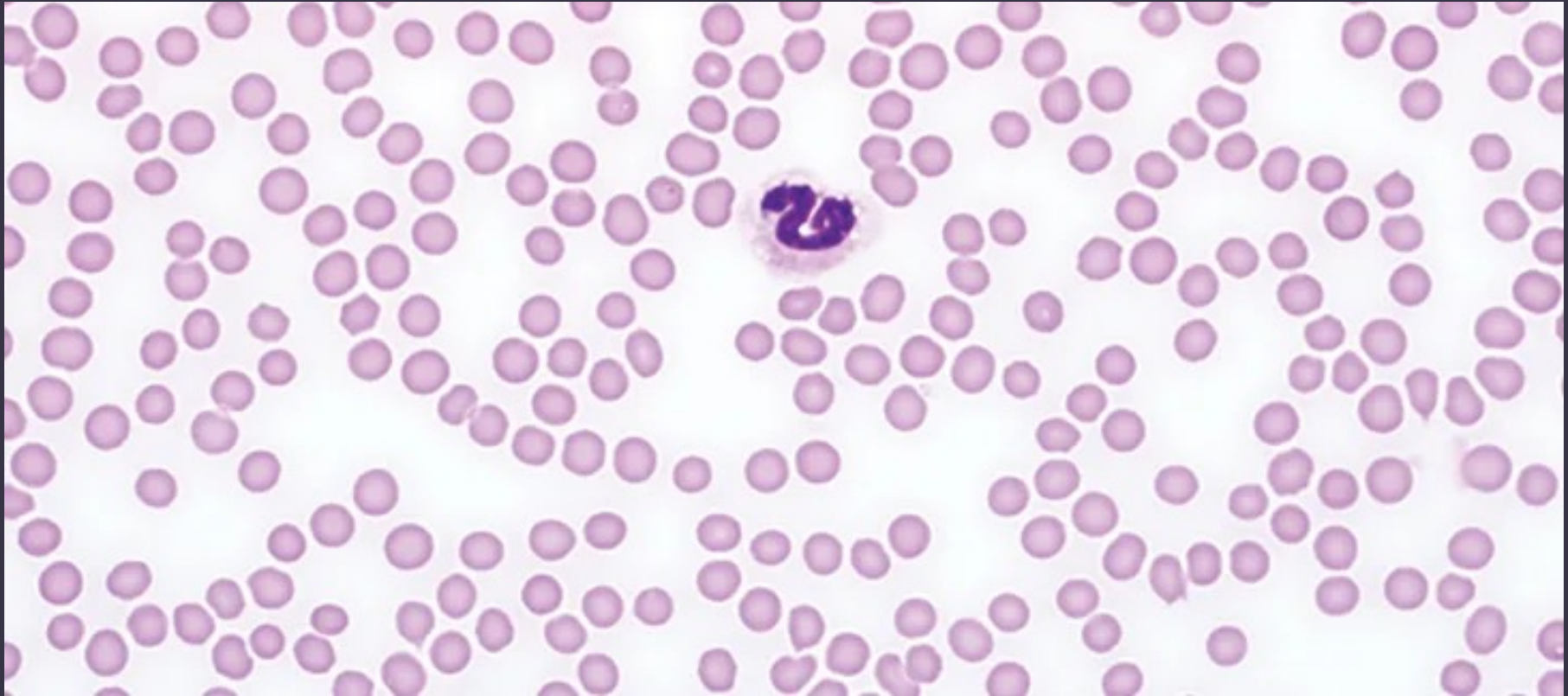


B

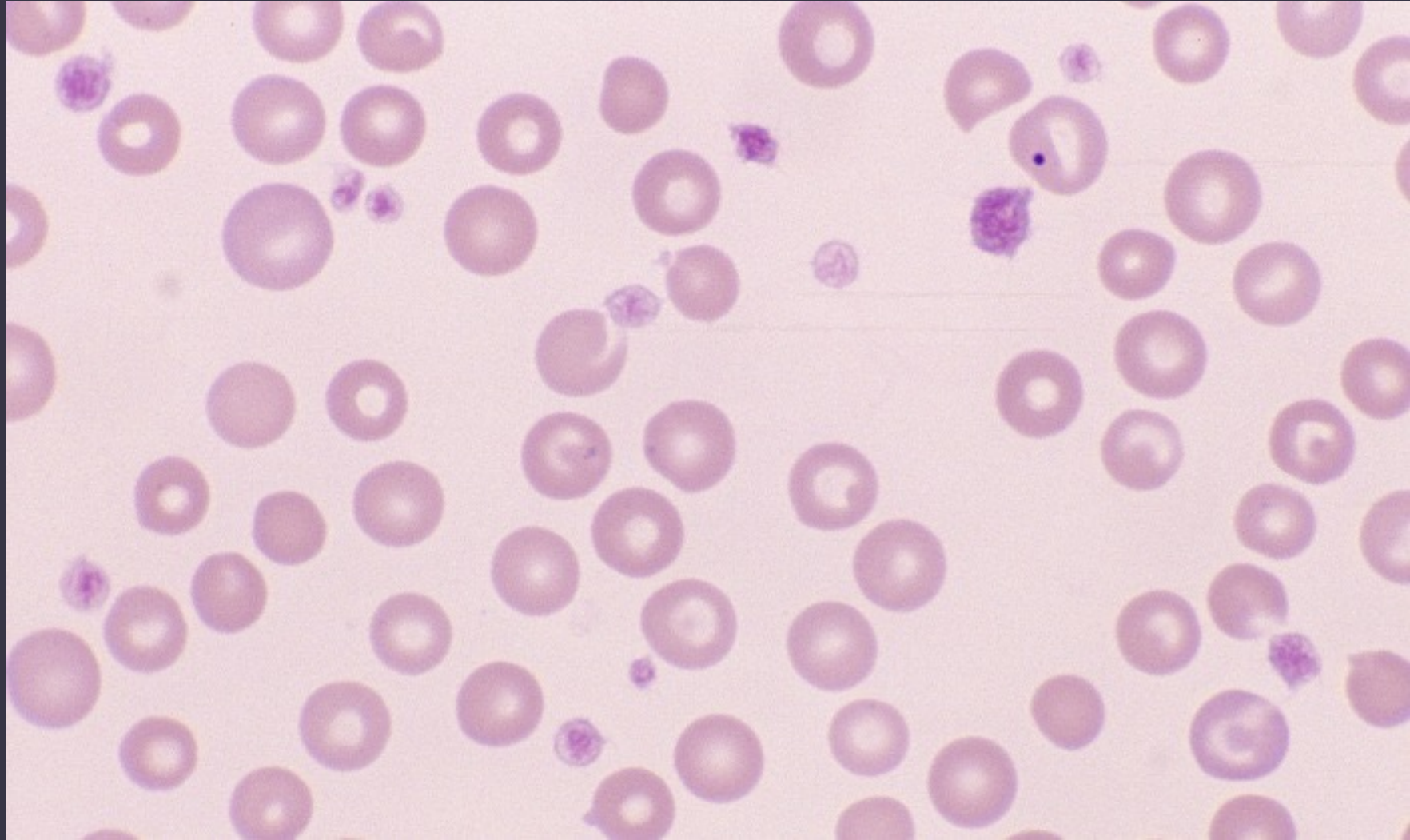
C



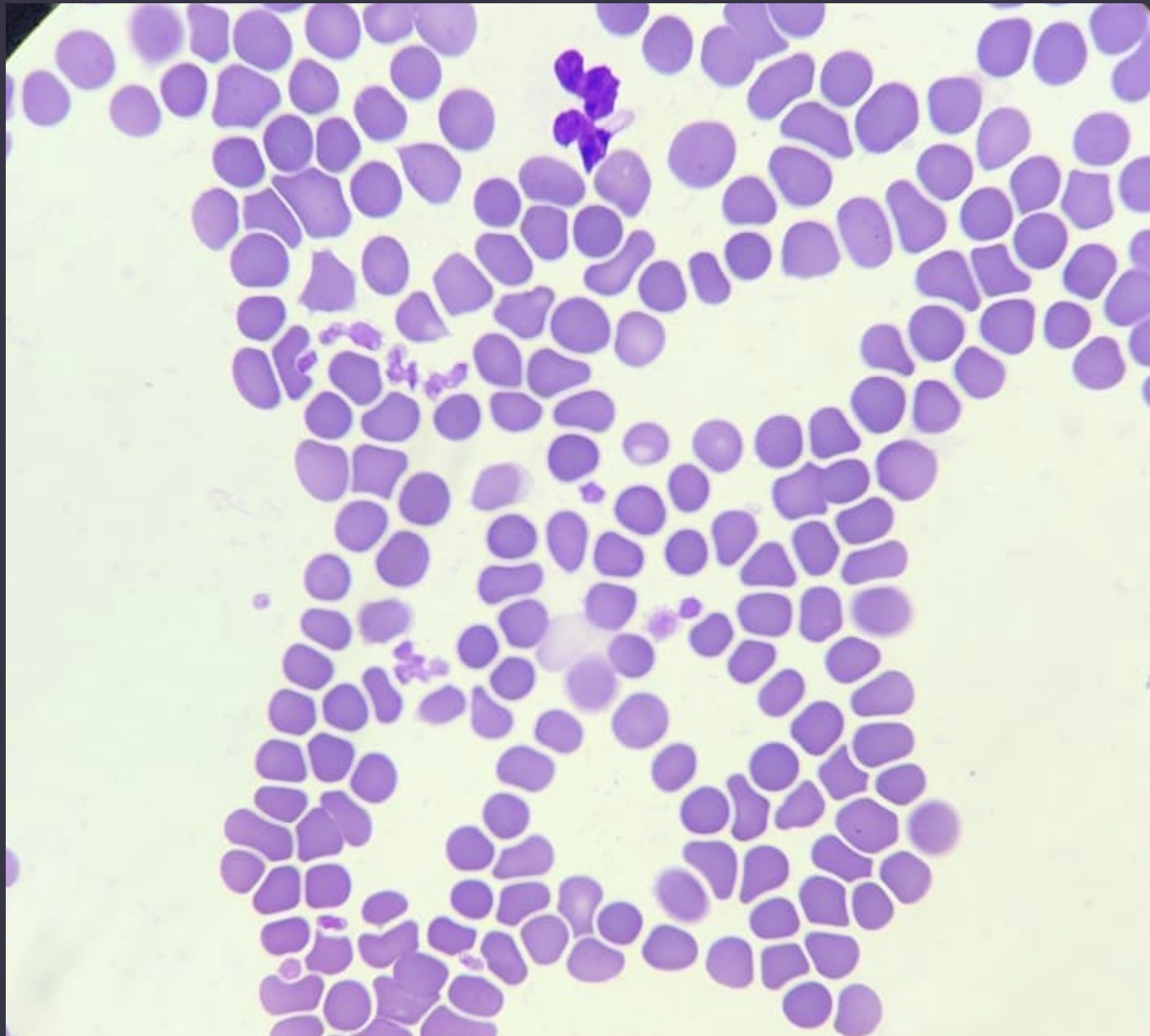
D



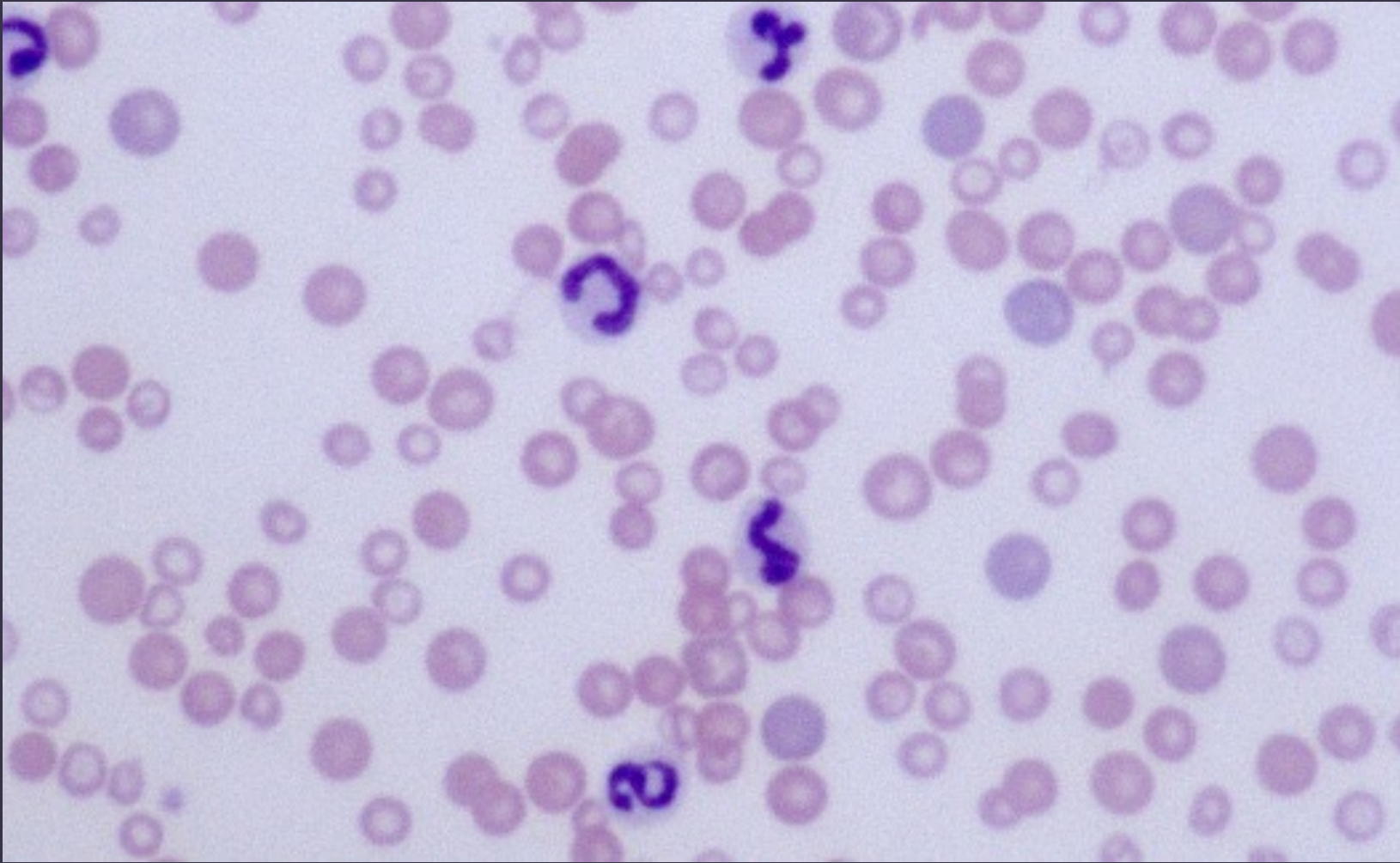
A - Anaemia



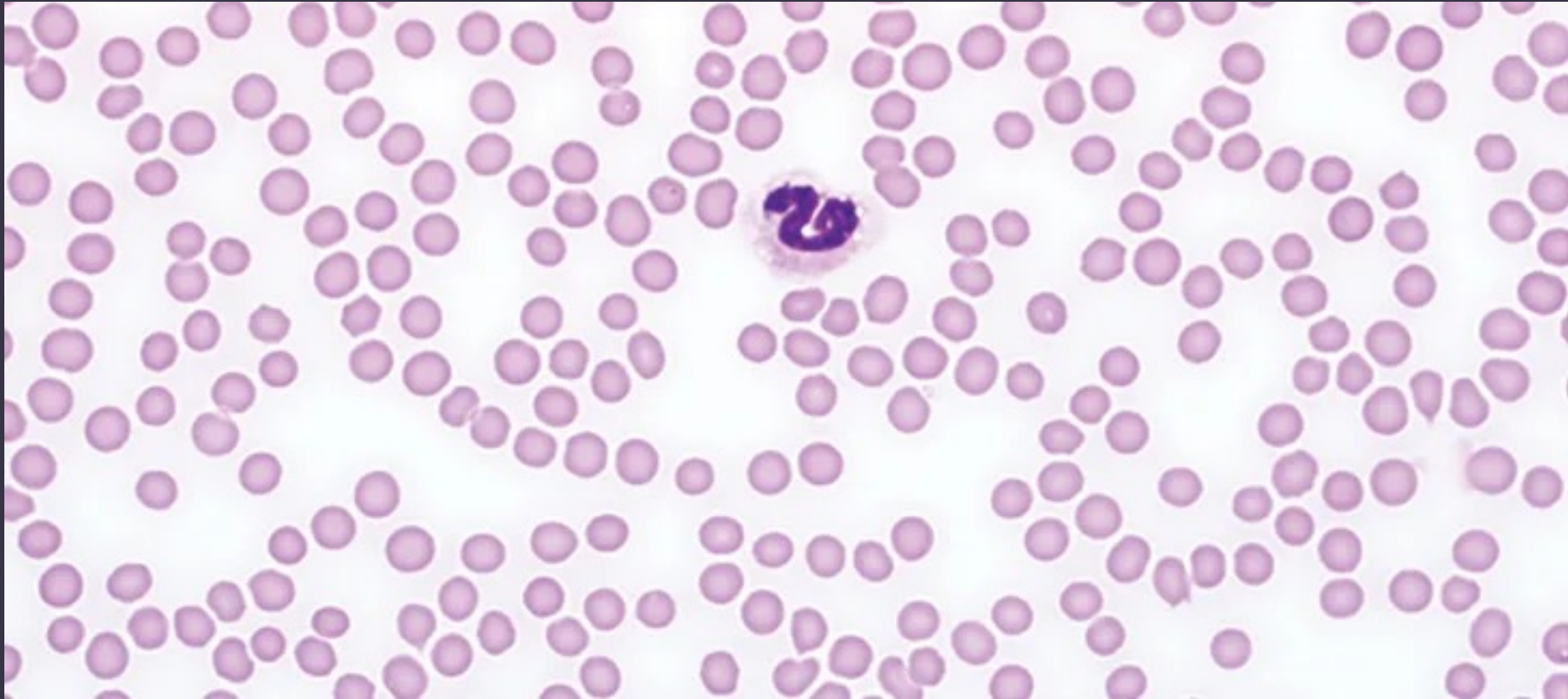
B - normal



C- Babesia



D - IMTP



Thrombocytopaenia in canine babesiosis and its clinical usefulness

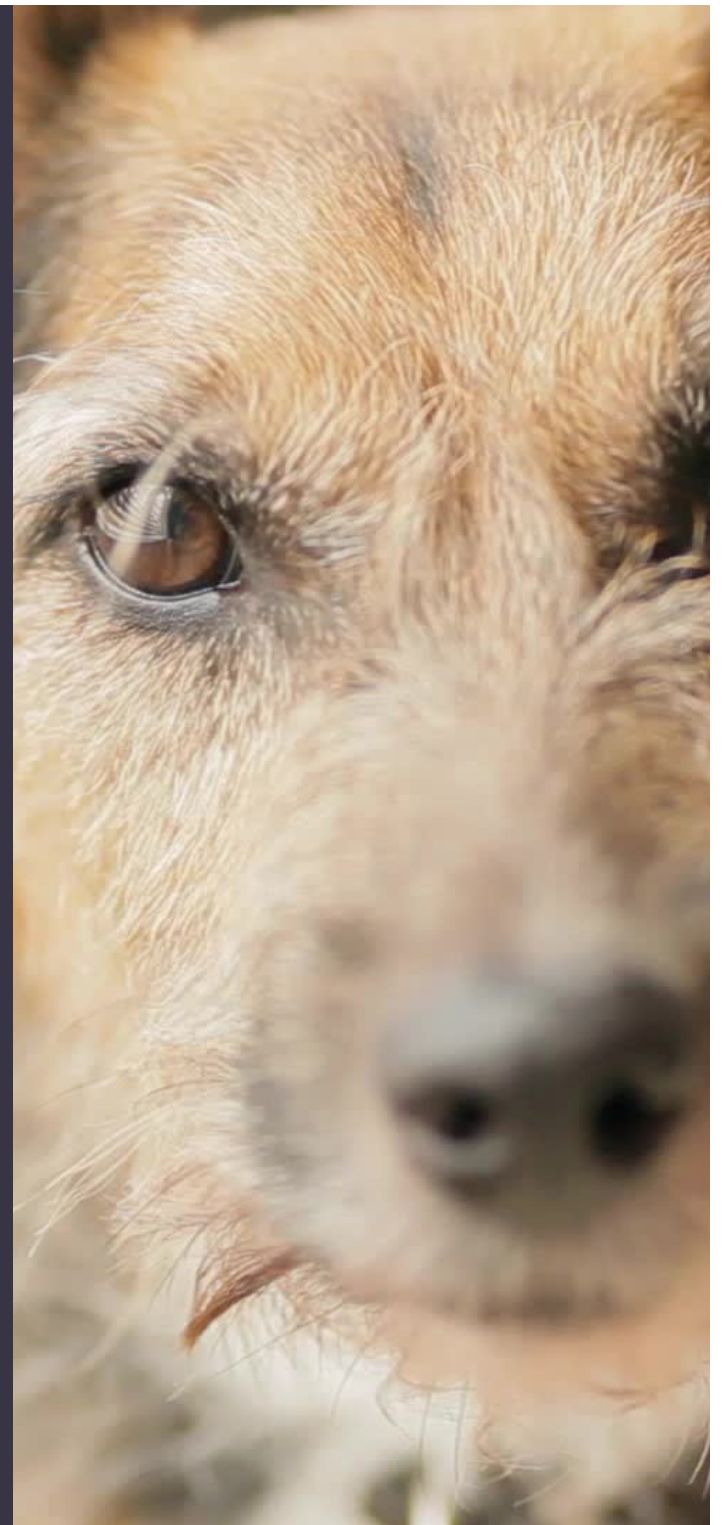
J.S.Afr.vet.Ass. (2003) 74(3): 63–68

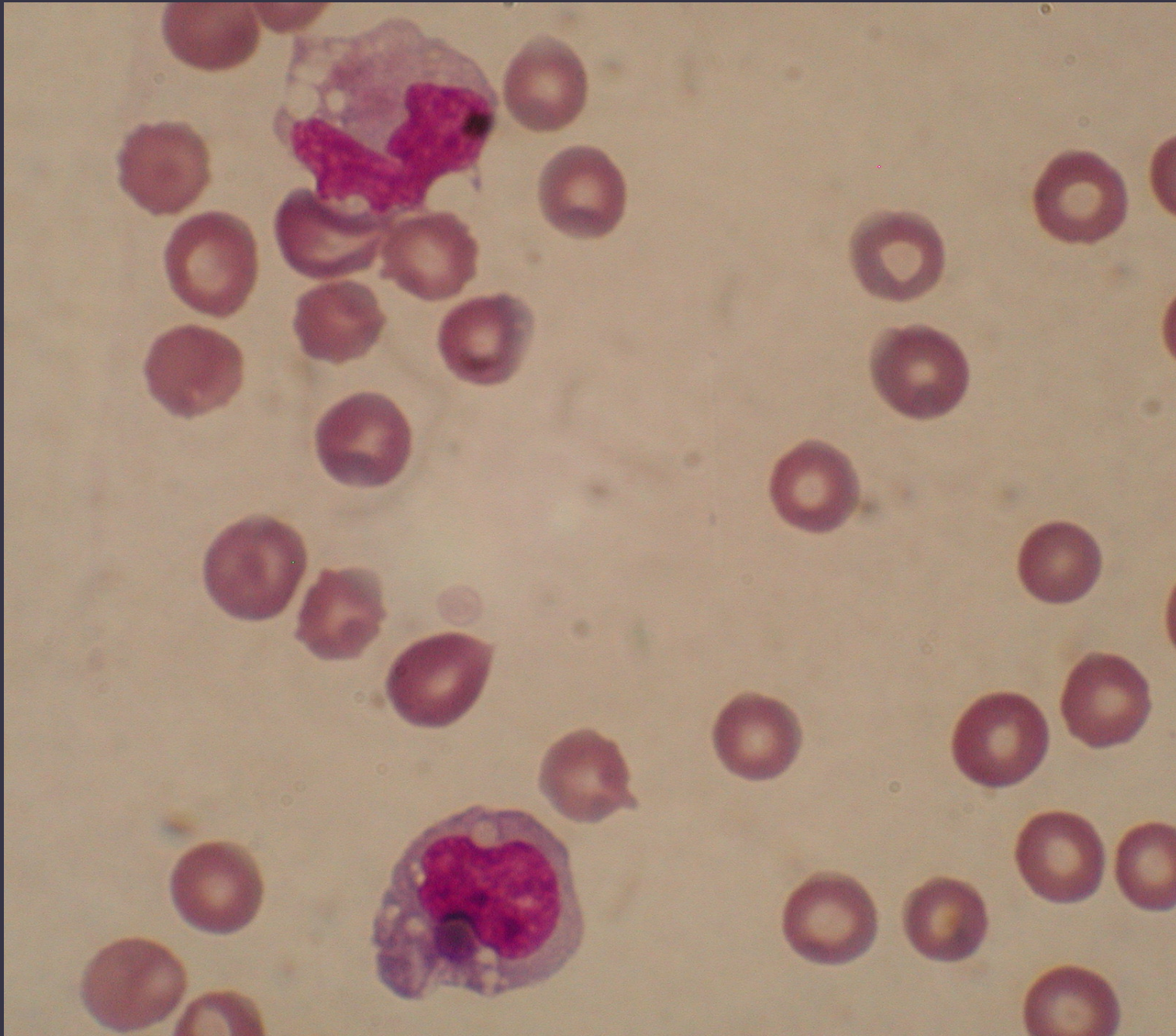
F Kettner^a, F Reyers^a and D Miller^b

Babesiosis in the South African canine population is associated with **thrombocytopaenia** in **nearly all** patients and is severe in the majority of them. In the **absence of thrombocytopaenia**, **babesiosis is an unlikely diagnosis**



Which blood smear is
most likely from a dog
with Ehrlichia?





A

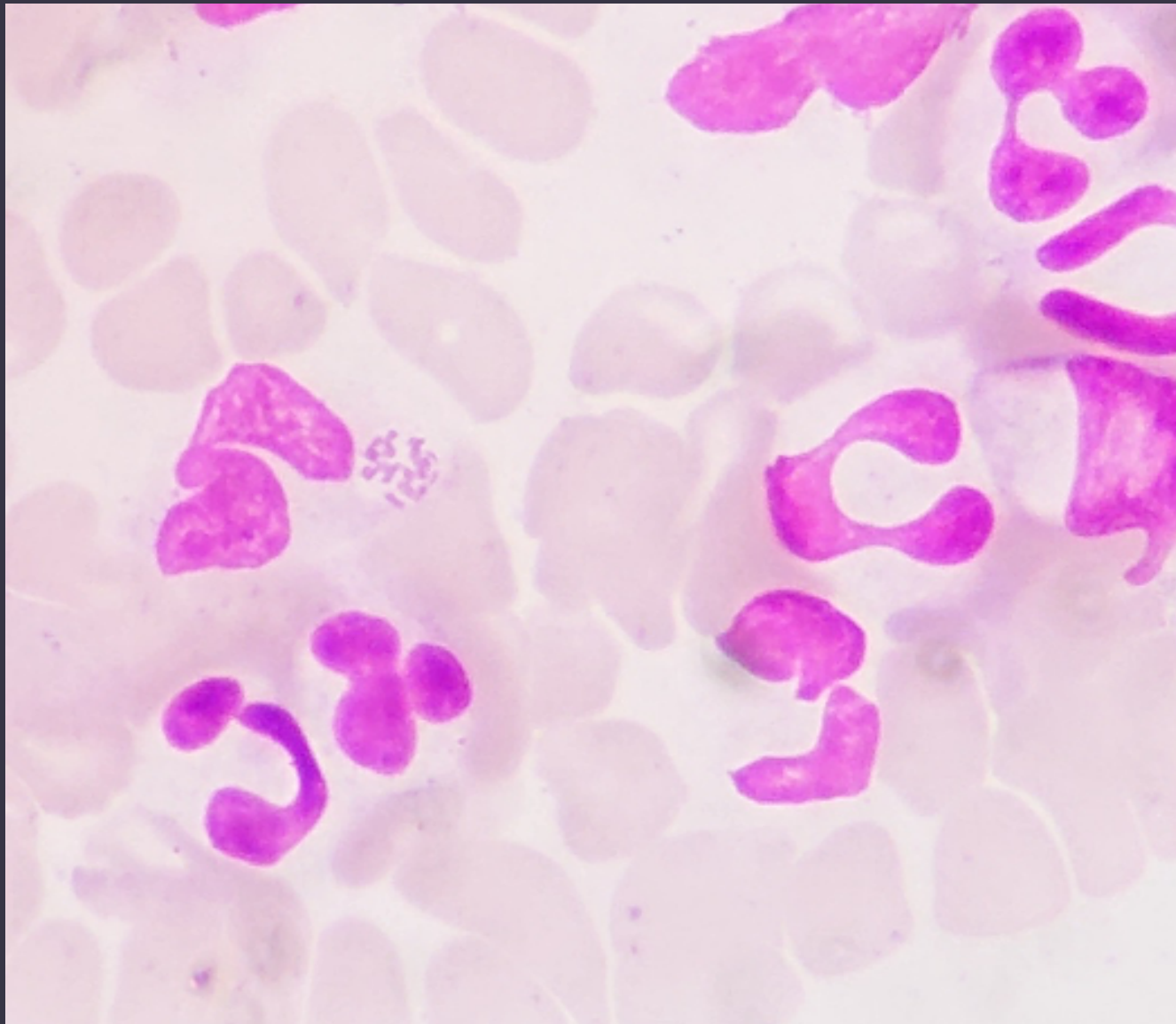
B



C



D





Contents lists available at [ScienceDirect](#)

The Veterinary Journal

journal homepage: www.elsevier.com/locate/tvjl



Review

Diagnosis of canine monocytotropic ehrlichiosis (*Ehrlichia canis*): An overview

The Veterinary Journal 187 (2011) 292–296

- Finding morulae is successful in only about 4% of cases
- Examination of multiple buffy coat smears ↑ chances of detecting *E. canis*-morulae
- **Platelets, lymphocytic azurophilic granules, and phagocytosed nuclear material can all be confused with ehrlichial inclusions**

A close-up photograph of a dog's face, focusing on its eye and fur. The dog has brown and black fur, and its eye is dark and looking towards the camera. The background is blurred.

Take home message

- Not every dog with babesia will have concurrent Ehrlichia
- Beware of macrophages phagocytosing RBC mimicking Ehrlichia
- If a dog with Babesiosis shows bleeding tendencies, consider a co infection with ehrlichiosis
- If you suspect a patient has babesia and you have done at least 3 good blood smears with no parasites but there are a normal number of platelets – it is unlikely to be babesia
- Peripheral vs central blood



Conclusion

- Parasite infections should be controlled through endoparasite and ectoparasite management and treatment
- Products specific for the species (dog/cat)
- Few parasite infections are strictly age-related; the risk continues as the animal ages and so consideration
- All year round



Questions?

