RCVS KNOWLEDGE

Part 2
Infection control
Organisms of concern & modes of transmission

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Pam Mosedale BVetMed MRCVS

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We meet this mission by championing the use of an evidence-based approach to veterinary medicine, inspiring a culture of continuous quality improvement in practice, and making our resources available to the profession and wider public.

We are a separate organisation to RCVS.

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Infection control and biosecurity: Organisms of concern and modes of transport

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Chair of the RCVS Knowledge Quality Improvement Advisory Board

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Bella Moss Clinical Advisor

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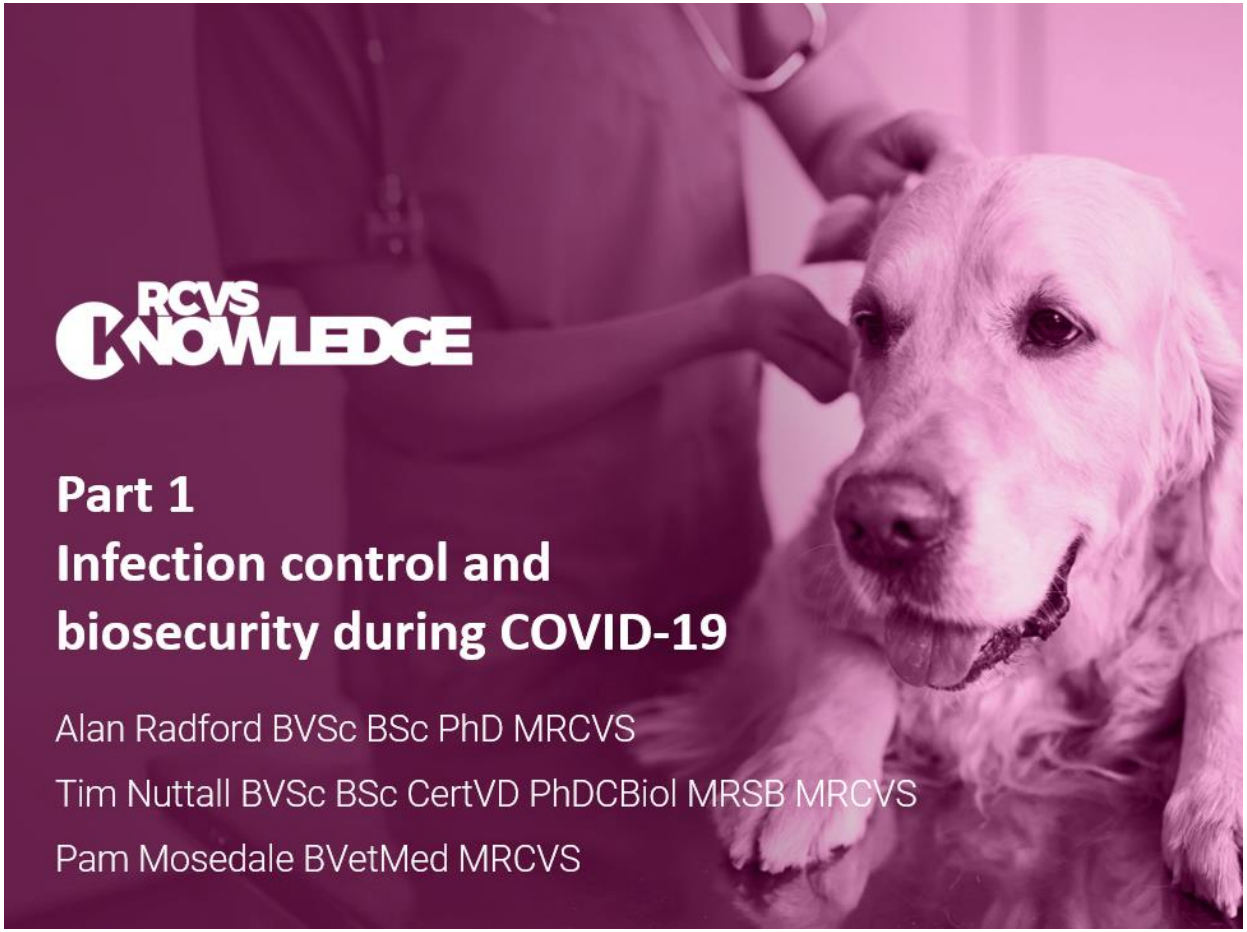


Infection control and biosecurity: Organisms of concern and modes of transport

Dr Tim Nuttall BVSc BSc CertVD PhD CBiol MRSB MRCVS

Royal (Dick) School of Veterinary Studies– University of Edinburgh

RCVS Knowledge Infection Control Advisor

Bella Moss Clinical Advisor

Session will cover

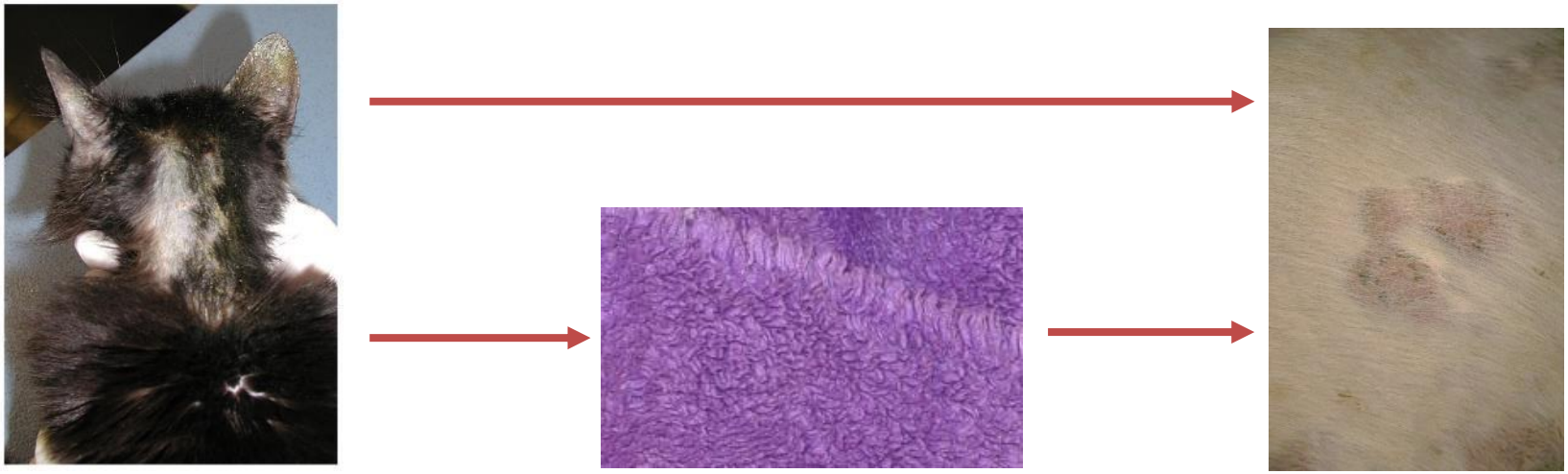
- Know your enemy – emerging infectious and antimicrobial resistant agents in veterinary practice
- Sources of infection
- Routes of transmission
- Your questions answered

Sources of infection

- Source of infection = anything that allows an infectious disease to contact a susceptible individual
  - Does not always result in infection or colonisation
- Potential sources
  - Natural habitat
    - Environment, human or animal
  - Inanimate reservoir
    - Fomite
  - Animate reservoir
    - Carrier
    - Fomite

Sources of infection

- Transmissible disease
  - Spreads horizontally or vertically
  - Direct or indirect contact
- Contagious disease
  - Can spread by direct contact
  - May also spread by indirect contact



Direct contact

- Physical contact
- Airborne aerosols (respiratory)
- Splashes & aerosols (urine & procedures)
- Secretions
- Vomiting & diarrhoea
- Urine
- Blood

Indirect contact - 1

- Organism can survive adverse conditions
- Environmental contamination
  - Consider aerosol, splash and other risks
- Fomites or vehicle carriage
  - Surfaces, hand touch sites & equipment
- Animate mechanical carriage
  - Most commonly hands

Indirect contact - 2

- Common source infection - from contaminated products
  - Soap, shampoo, diluted antiseptics & cleaning solutions, drugs, multidose vials, water, food & blood

- Vector borne disease
  - Fleas, flies, mosquito, ticks etc.

Biofilms

- Common and under diagnosed
- Facilitate adherence to surfaces
- Physically impede antimicrobials
- Altered physiological susceptibility
- Facilitate plasmid transfer

Nosocomial risks for infection

- Immunosuppression
- Major dental disease & procedures
- Surgery; esp. contaminated or clean-contaminated
- Airway interventions
  - Tracheostomy tubes, bronchoscopy, nebulizers & ventilation
- Urinary tract endoscopy
- Prolonged hospitalisation & ICU care
- Implants
  - IV & urinary catheters, drainage, orthopaedics, sutures
- Non-ambulatory & decubital ulcers
- Carriage of antimicrobial resistant organisms

Raw foods

- BSAVA Companion August 2019
- Expressed caution about raw feeding
- Microbiological risks to in-contact animals and humans
  - E. coli 0157
  - *Salmonella*
  - *Campylobacter*
  - *Listeria*
  - Mycobacteria
  - AMR bacteria

UPDATING YOUR KNOWLEDGE: RAW FEEDING

How to advise clients about raw feeding dogs and cats

Andrew Wales, Joanna Lawes and Robert Davies recently reviewed raw diets for canine and feline patients focusing on microbiological hazards for the *Journal of Small Animal Practice*,[1] here they summarize their findings including information to pass to clients when discussing this type of diet.

Feeding pet dogs and cats on raw, unprocessed food has recently become markedly more popular in the UK and elsewhere in the developed world. There is currently a lack of formal survey data to document this phenomenon, but conversations with clients and a proliferation of raw food marketing and sales outlets attest to growing numbers of pets being fed in this fashion. Sales in the commercial part of this sector may have generated around £90 million in 2018 according to an estimate by Natures Menu, one of the players in this field.[2]

Raw meat-based diets (RMBD), sometimes known as 'Biologically Appropriate Raw Food' or 'Bones and Raw Food' (BARF) diets, include uncooked ingredients from either livestock or wild animals, and may be home-prepared or commercial, with the latter being supplied as fresh, frozen or freeze-dried complete diets, or as premixes intended to be complemented by raw meat.[3] While pre-prepared raw diets are convenient, in the manner of traditional processed complete diets, many raw-feeding owners appear to opt for home preparation (Figure 1). A recent Italian study reported that over 80% of (self-selected) raw feeding owners formulated their own diets[4] while in 2016 a large formal survey in the USA found 3% of dog owners bought raw pet food but 17% bought raw or cooked human food for their dogs.[5]

Why do clients want to feed raw?

Raw feeding was encouraged by non-specialist publications in the 1990s and early 2000s that advanced the idea of a more 'natural' diet for pet dogs and cats.[6,7,8] Wide-ranging benefits have been claimed.

Available in the BSAVA Library: DOI: 10.22233/20412495.0819.10

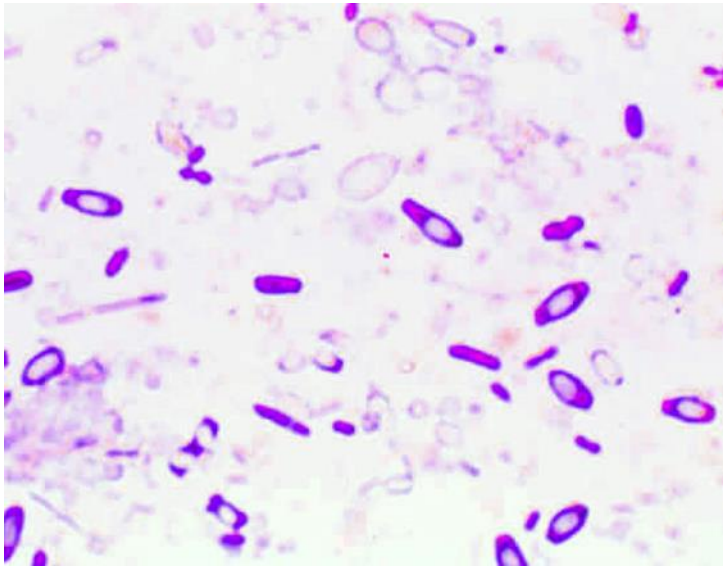
Bacterial infections

Gram-positive bacteria

- Commensals & opportunistic pathogens
  - Carriers important
  - Readily colonise healthcare environments
  - Mechanical carriage and hand touch sites
- Coagulase-positive staphylococci (CoPS)
  - MSSP & MSSP
  - MRSP, MRSA & MRSS
- Coagulase-negative staphylococci (CoNS)
  - Methicillin resistant common
- Streptococci
- *Enterococcus faecalis* & *E. faecium*
  - MDR common

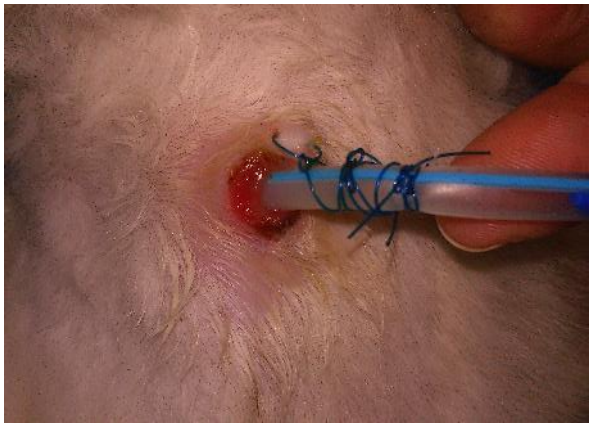
Gram positive anaerobes

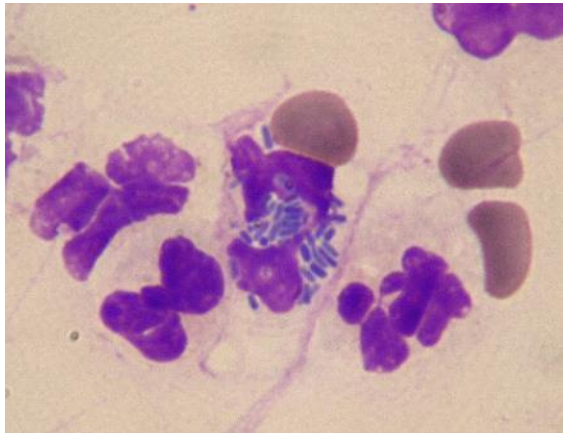
- *Clostridium* species
  - Gut carriage and environmental contamination
  - Potential zoonosis
  - *C. difficile* is difficult to eliminate
- *Bacillus anthracis*
  - Zoonotic potential
- Spores are resistant to disinfectants



Gram-negative bacteria

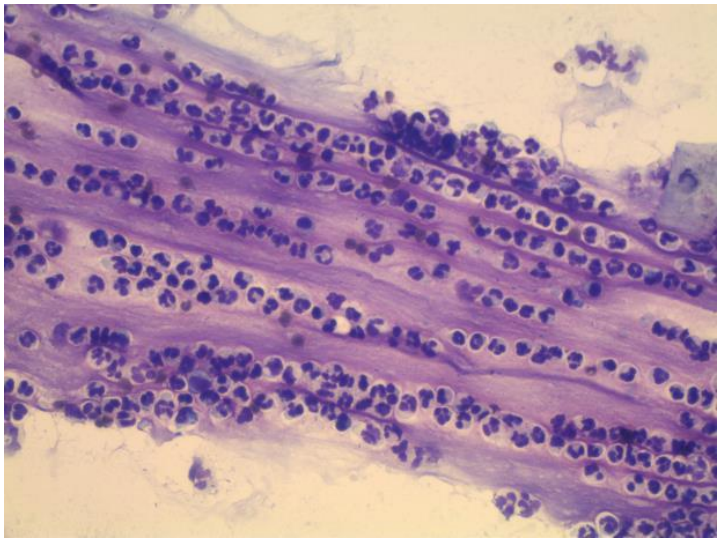
- Commensals & opportunistic pathogens
  - Carriers, fomites & environment
- Enterobacteriaceae
  - *E. coli*, *Klebsiella*, *Enterobacter*, *Citrobacter*
    - ESBL & AmpC producers
  - *Salmonella*
    - Raw food
    - Zoonosis





Gram-negative bacteria

- *Proteus*
  - Invasive & MDR
- *Pseudomonas & Burkholderia*
  - Love moist & wet conditions
  - Highly invasive & form biofilms
  - Limited treatment options
- *Campylobacter*
  - Faecal-oral transmission
  - Zoonosis
- *Bordetella bronchiseptica*
  - Aerosols and fomites
  - Zoonosis

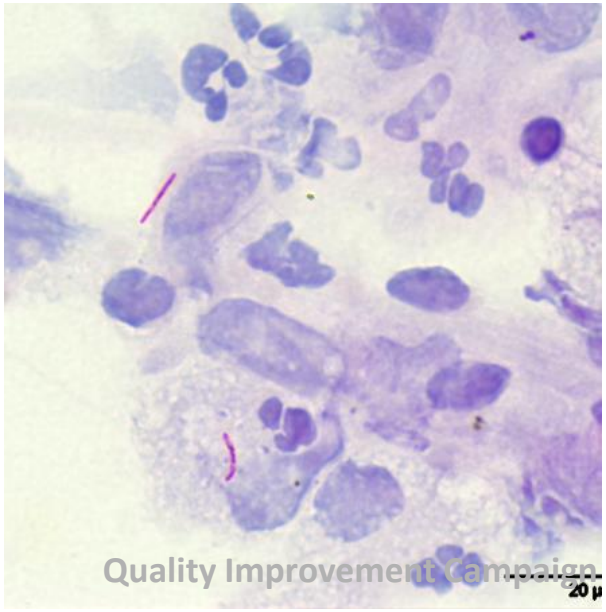


Gram-negative bacteria

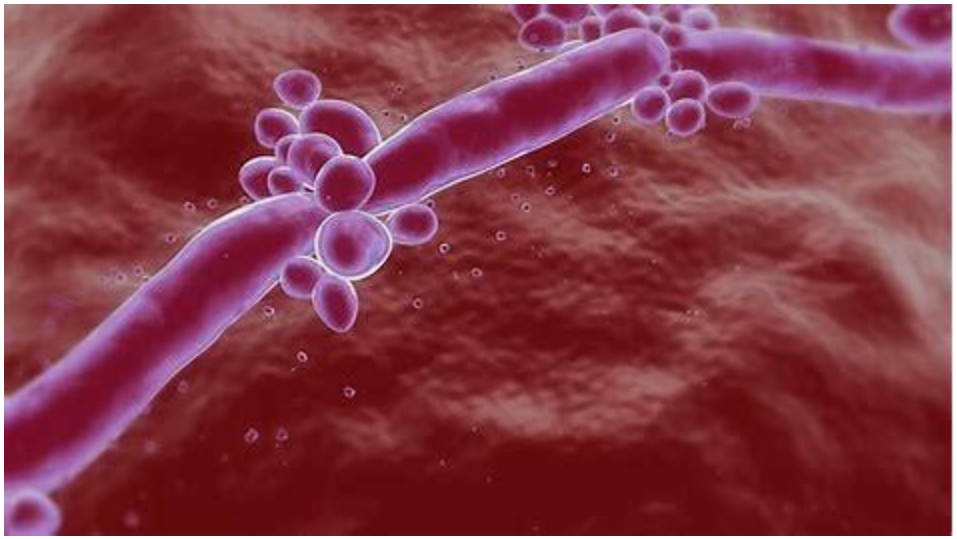
- *Leptospira*
  - Contagious and zoonotic
  - Direct contact with infected urine
  - Indirect contact via contaminated water
- *Serratia marcescens*, *Morganella morganii* & *Acinetobacter baumannii*
  - Nosocomial-adapted & highly invasive
  - Limited treatment options

Other bacteria

- *Mycobacterium tuberculosis* complex
  - Zoonotic potential through direct contact
- *Mycobacterium avium* complex
  - Usually acquired from environment
  - Zoonotic potential
- Rapid growing mycobacteria
  - Usually acquired from environment
- Mycoplasmas
  - Direct contact
  - Zoonosis?

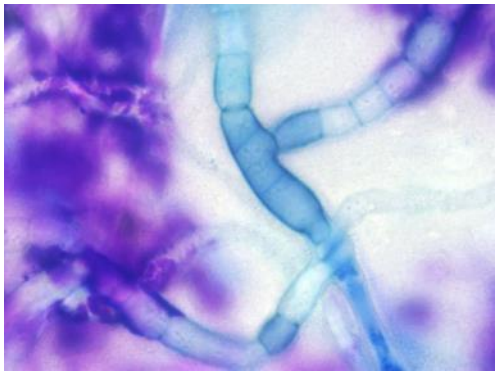


Fungal infections

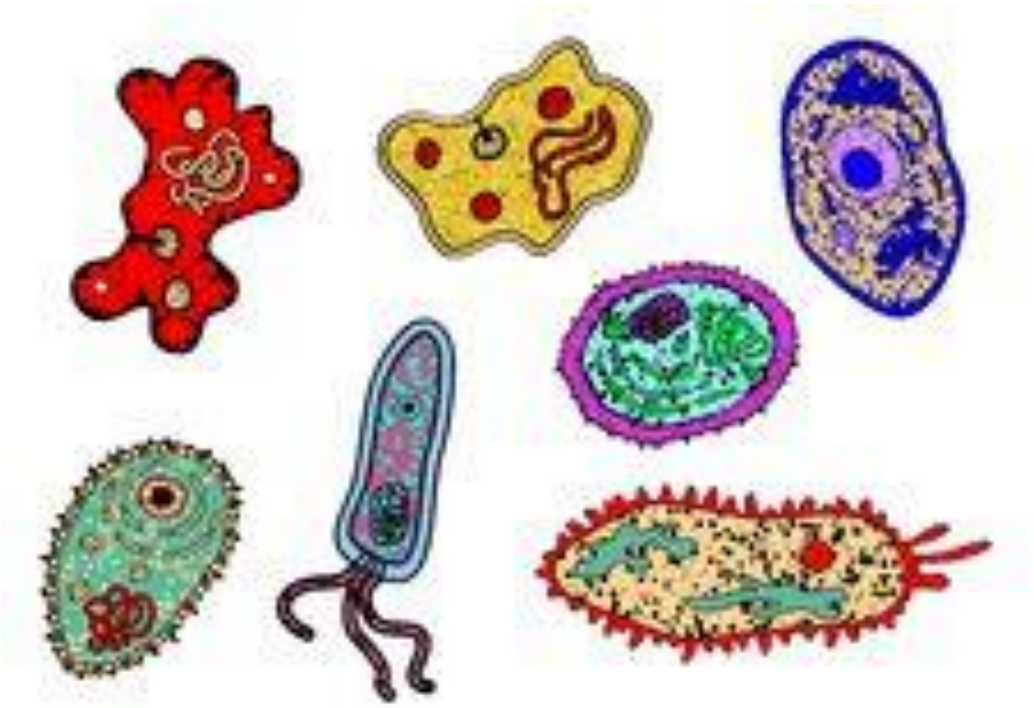


Fungal infections

- Dermatophytosis
  - Direct contact, fomites & environment
  - Zoonosis
- Other fungal infections
  - Environmental & not considered transmissible
  - *Sporothrix schenckii* complex transmissible & zoonotic
  - Limited in *Sporothrix pallida* complex
- *Encephalitozoon cuniculi*
  - Environmental spores
  - Potential zoonosis

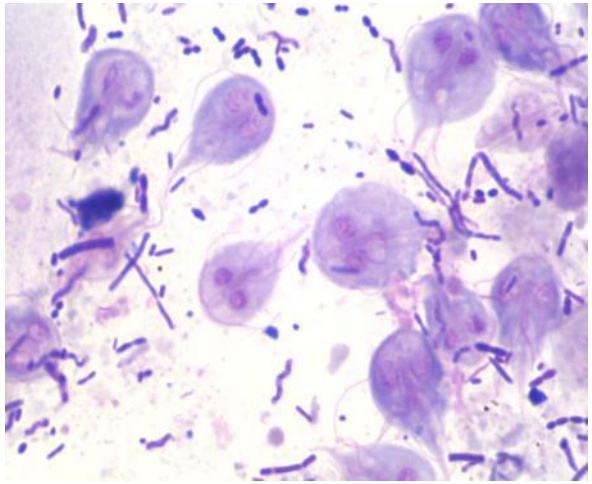


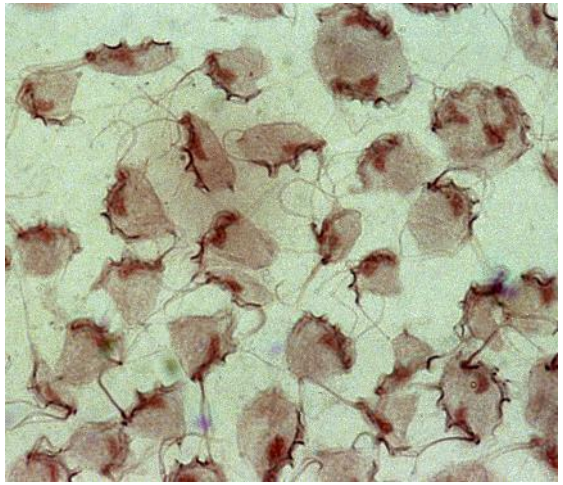
Protozoal infections

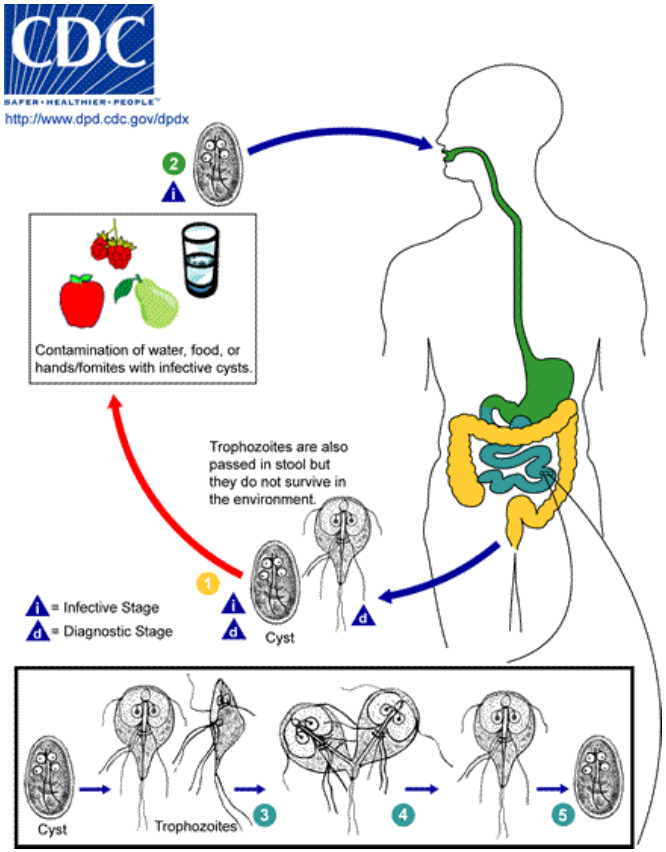


Protozoal infection

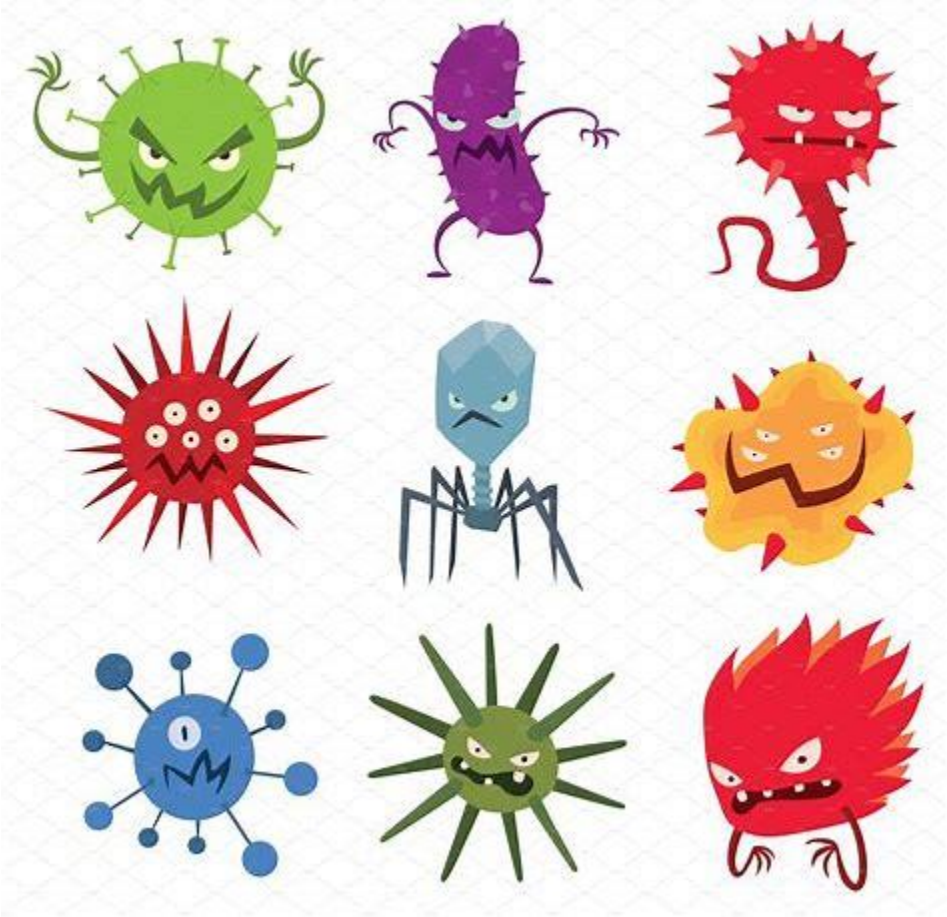
- *Tritrichomonas*, *Giardia* & *Cryptosporidium*
  - Zoonotic potential
  - Oocysts are resistant

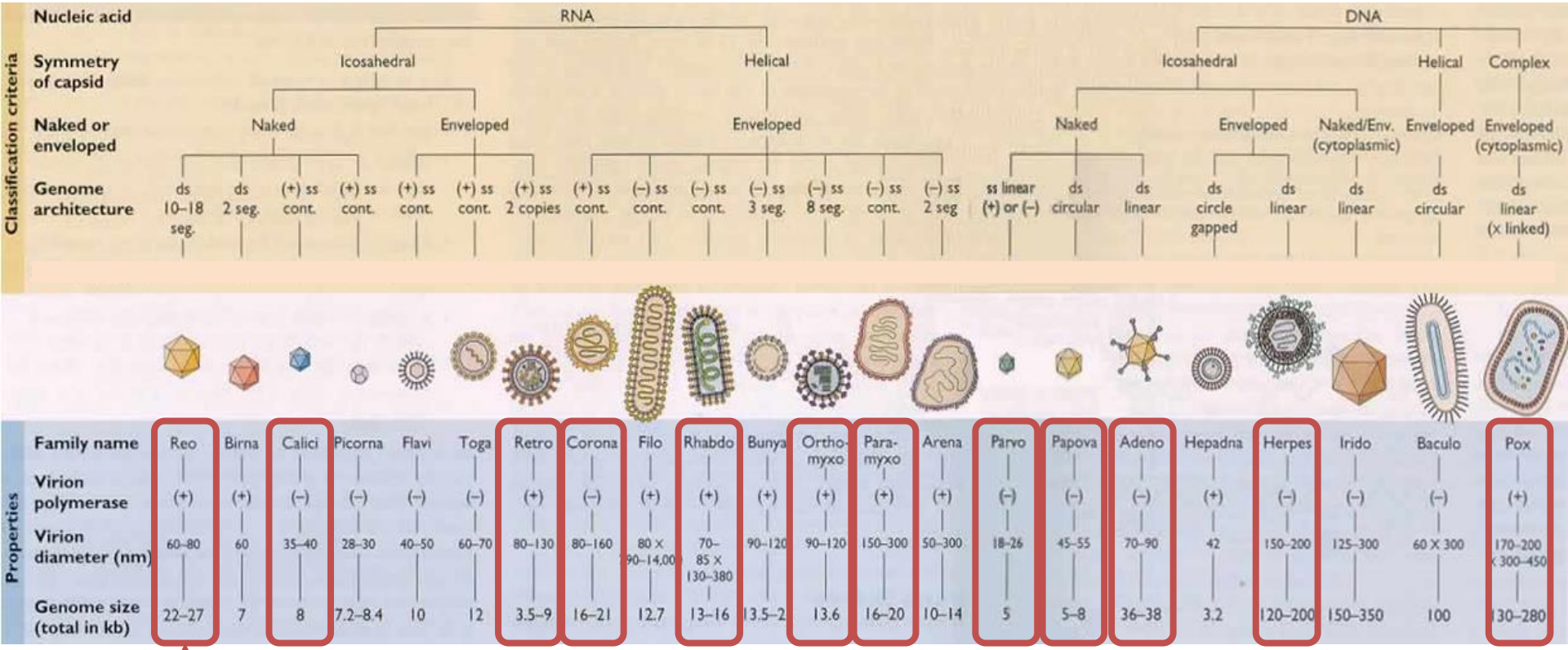






Viral infections




Classification criteria
Nucleic acid
RNA
DNA
Symmetry of capsid
Icosahedral
Helical
Icosahedral
Helical
Complex
Naked or enveloped
Naked
Enveloped
Enveloped
Naked
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Naked/Env. (cytoplasmic)
Enveloped
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Genome architecture
ds 10–18 seg.
ds 2 seg.
(+) ss cont.
(+) ss cont.
(+) ss cont.
(+) ss cont.
(+) ss 2 copies
(+) ss cont.
(–) ss cont.
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(–) ss 3 seg.
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ss linear (+) or (–)
ds circular
ds linear
ds circle gapped
ds linear
ds linear
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ds linear (x linked)
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Family name
Reo
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Picorna
Flavi
Toga
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Corona
Filo
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Para-myxo
Arena
Parvo
Papova
Adeno
Hepadna
Herpes
Irido
Baculo
Pox
Virion polymerase
(+)
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(–)
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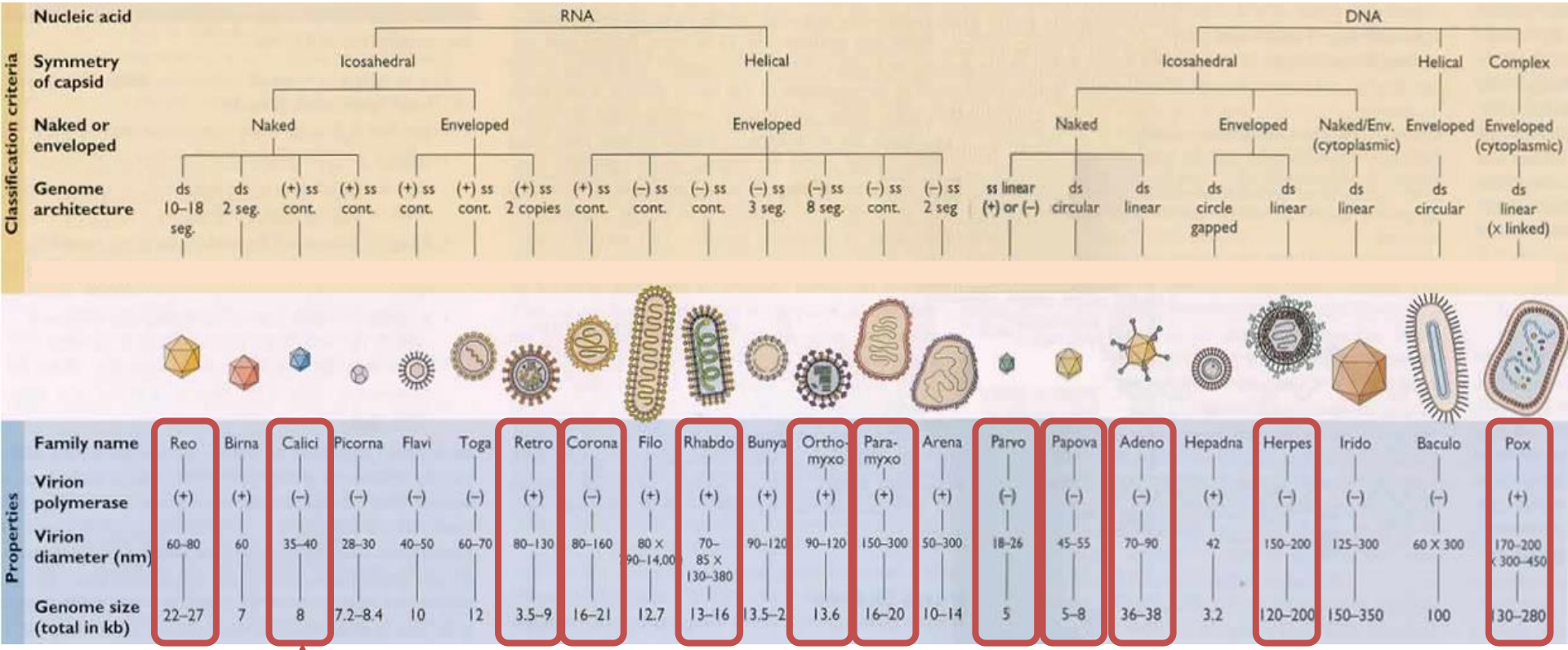
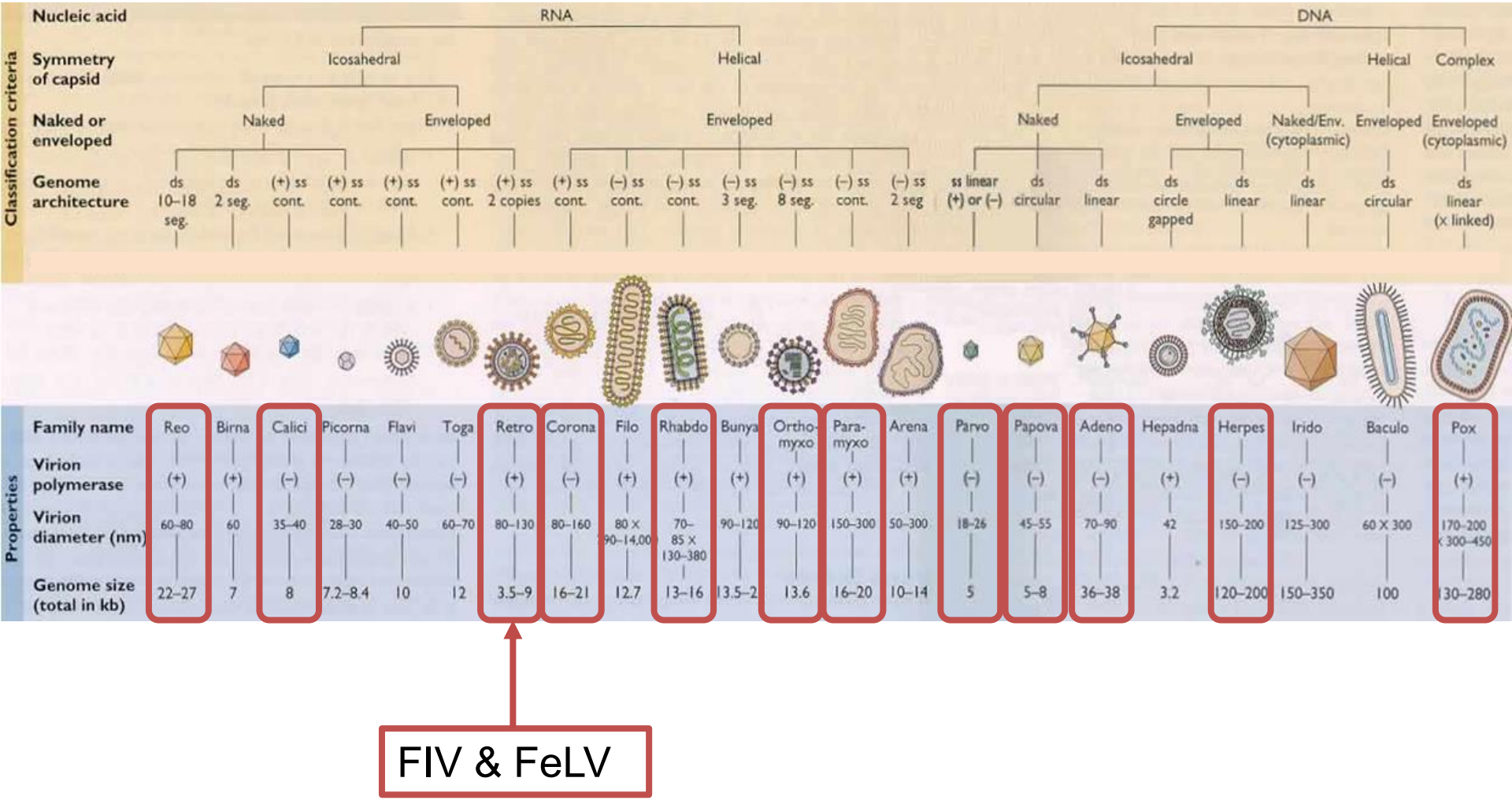
Rotavirus



Feline calicivirus
Rabbit haemorrhagic disease
Norovirus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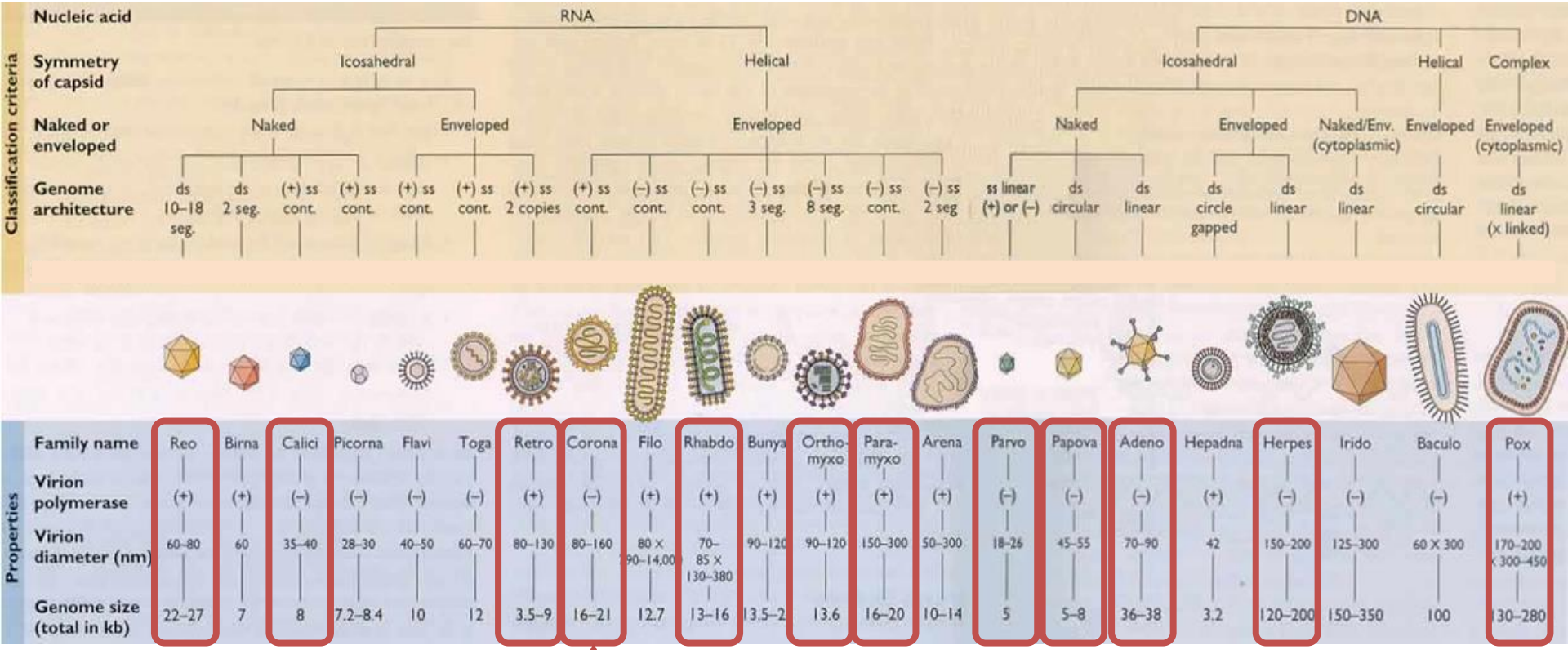
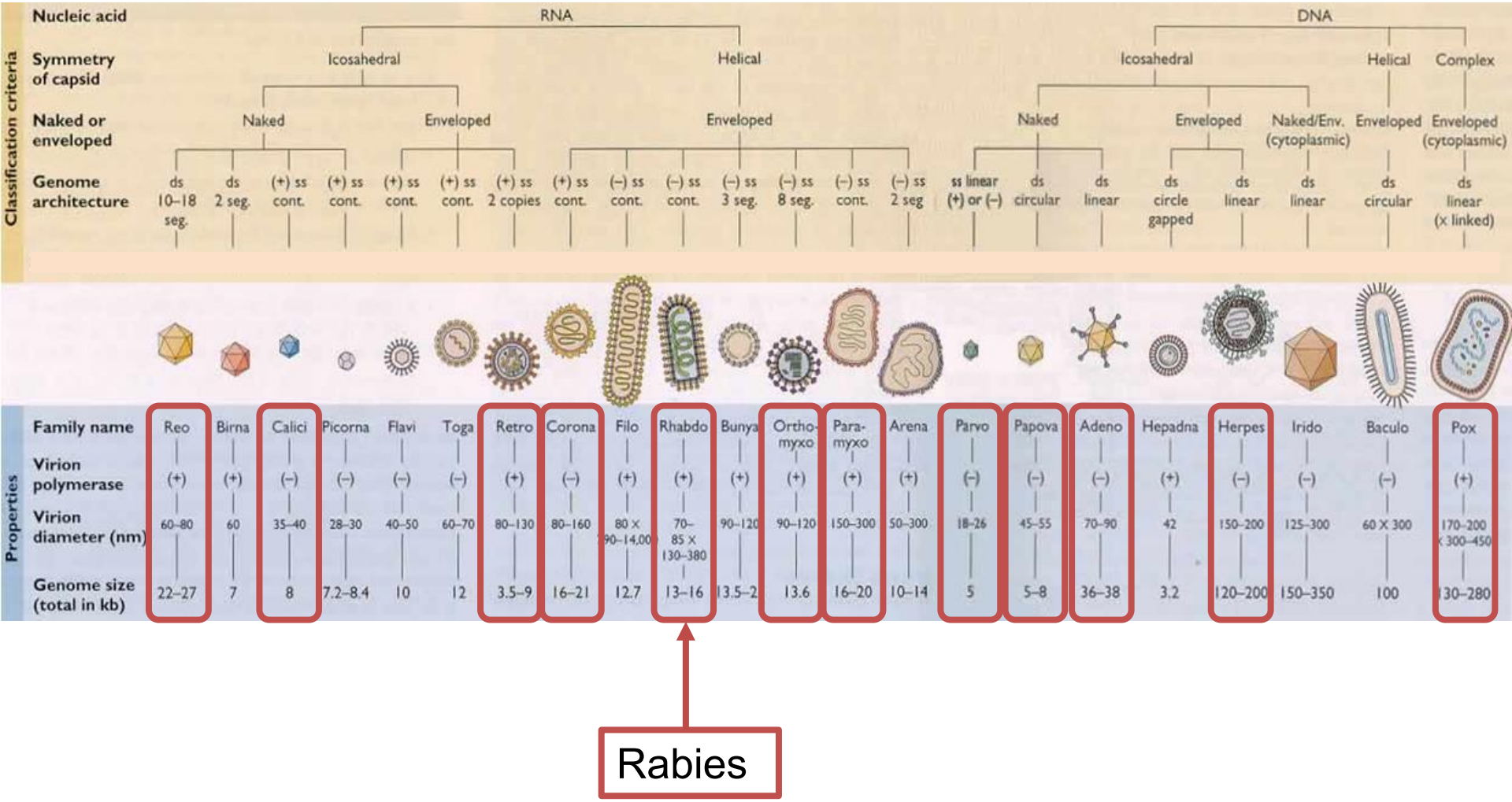
FIV & FeLV



Feline coronavirus
Canine coronavirus
Many other human and animal coronaviruses
SARS, MERS & Covid-19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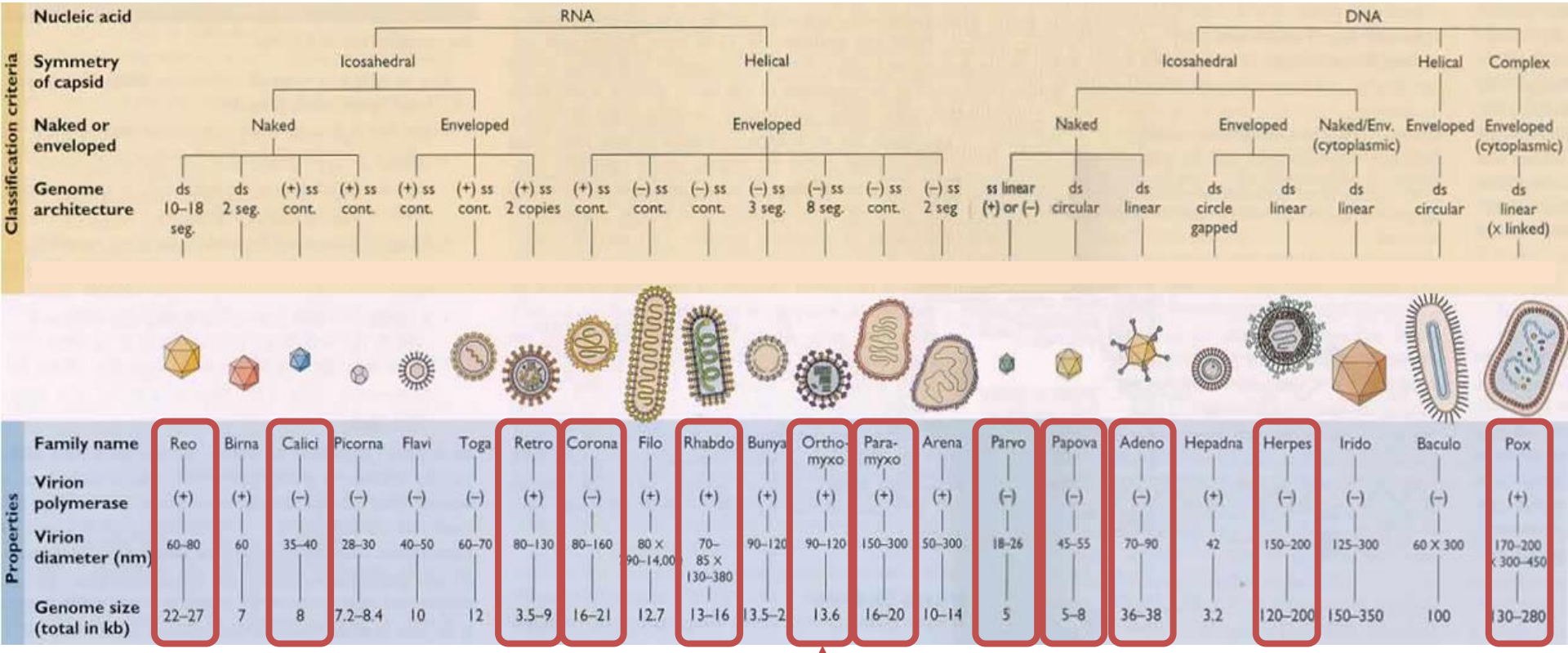
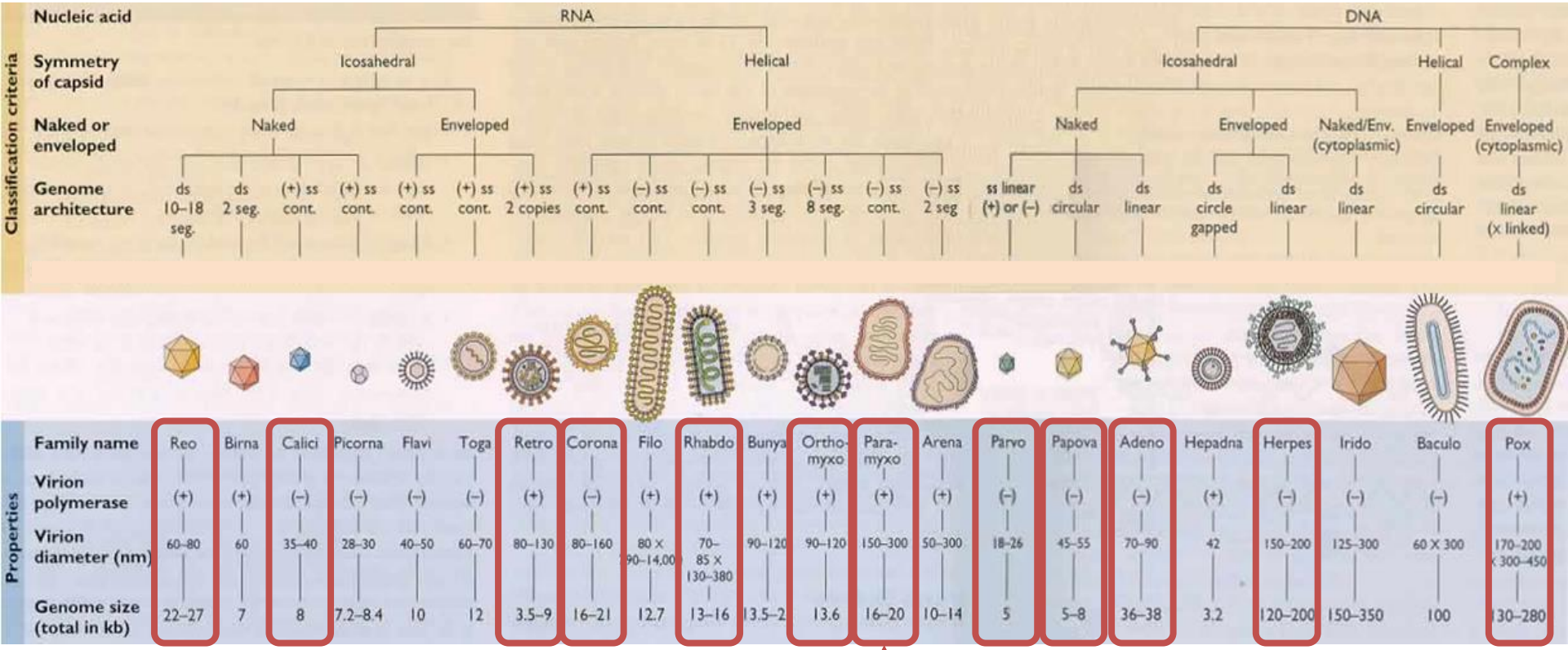
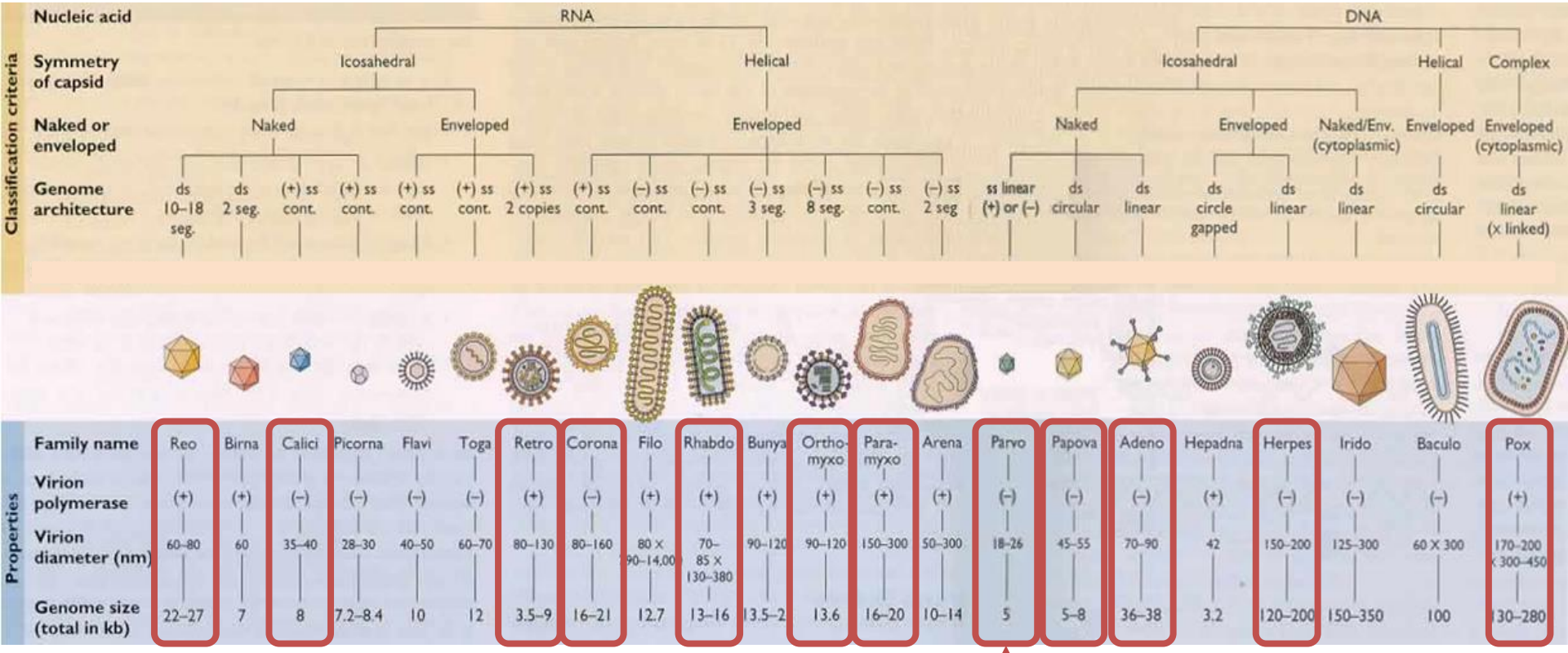
Rabies



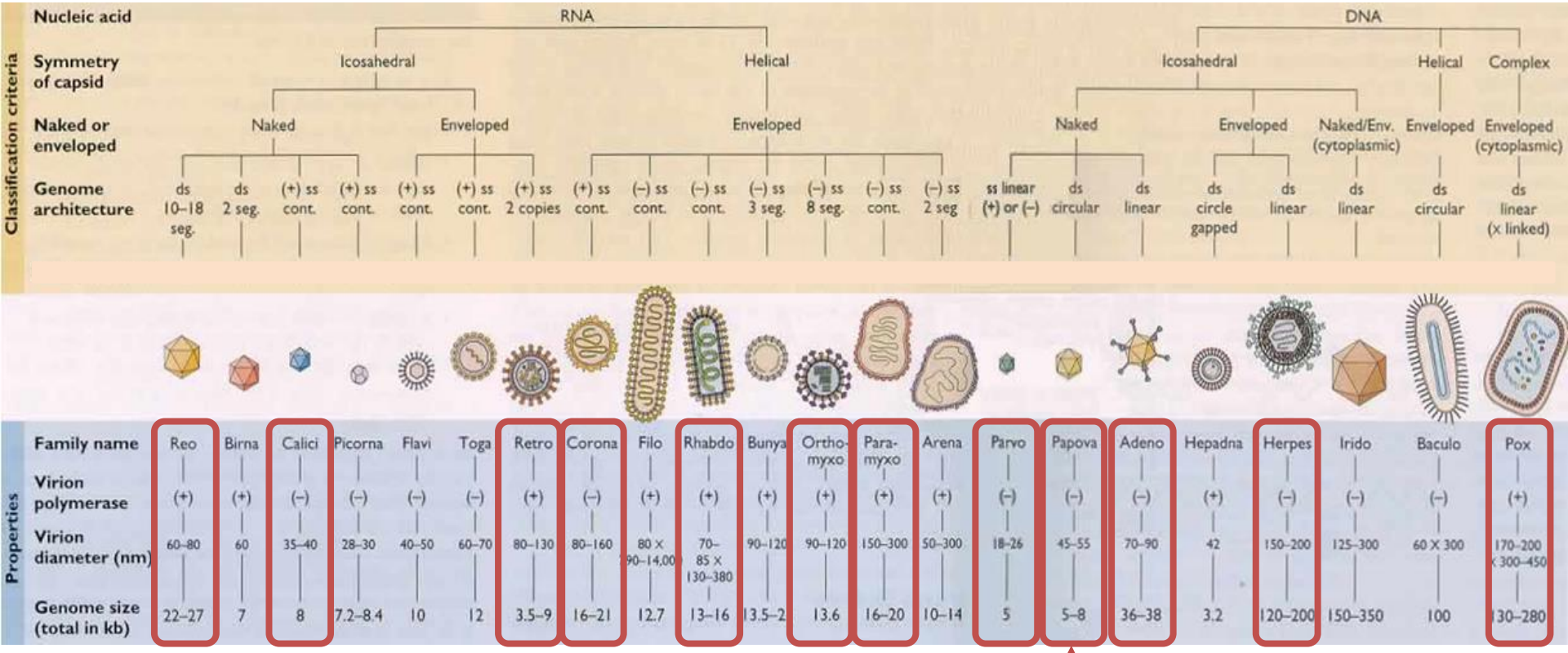
Influenza viruses
Infectious salmon anaemia



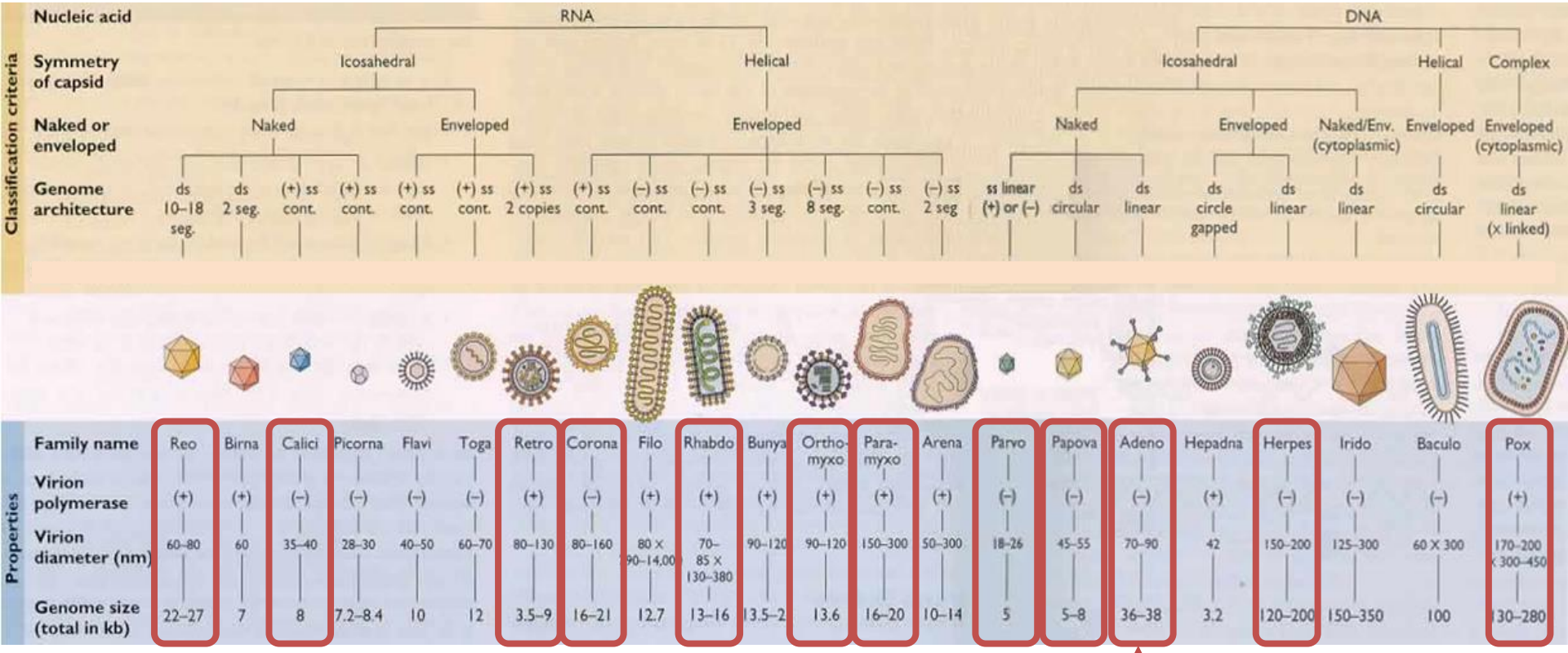
Canine & Phocine distemper
Cetacean morbillivirus
Peste des petits ruminants
Parainfluenza
Newcastle disease



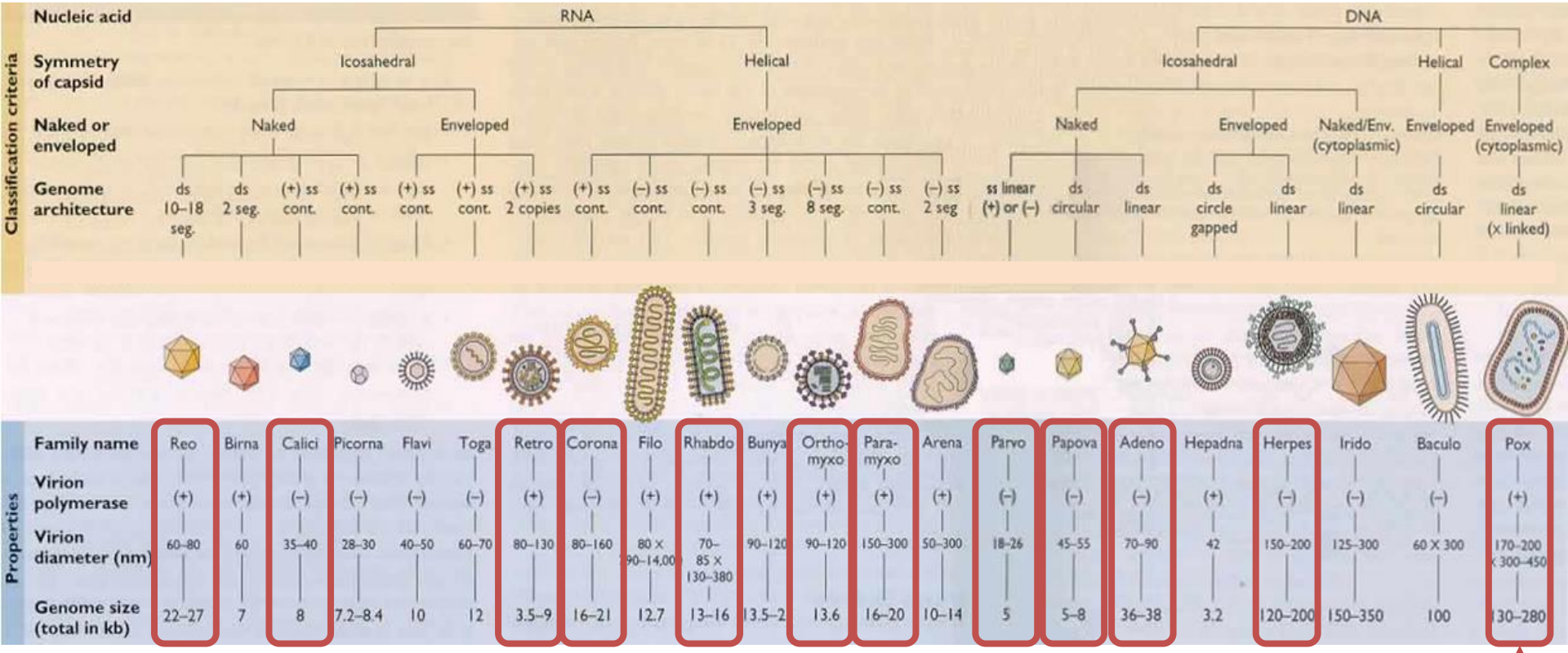
Canine & Feline parvovirus
Porcine parvovirus (SMEDI)
Mink enteritis
Aleutian disease



Papillomaviruses
Polyomaviruses

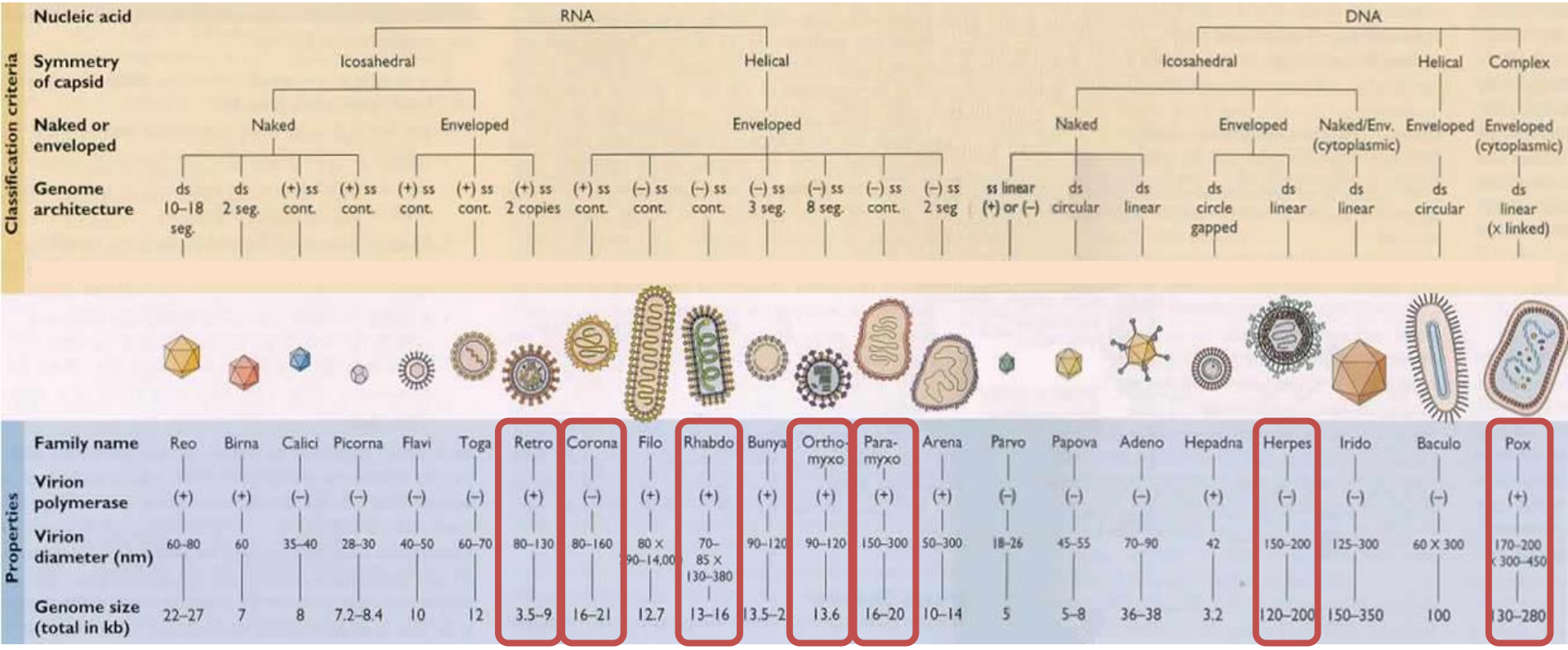


Canine adenovirus 1 – infectious canine hepatitis
Canine adenovirus 2
Many other animal adenoviruses



Cowpox
Monkey pox
Squirrel pox
Orf
Bovine papular stomatitis
Many other animal pox viruses

RCVS KNOWLEDGE

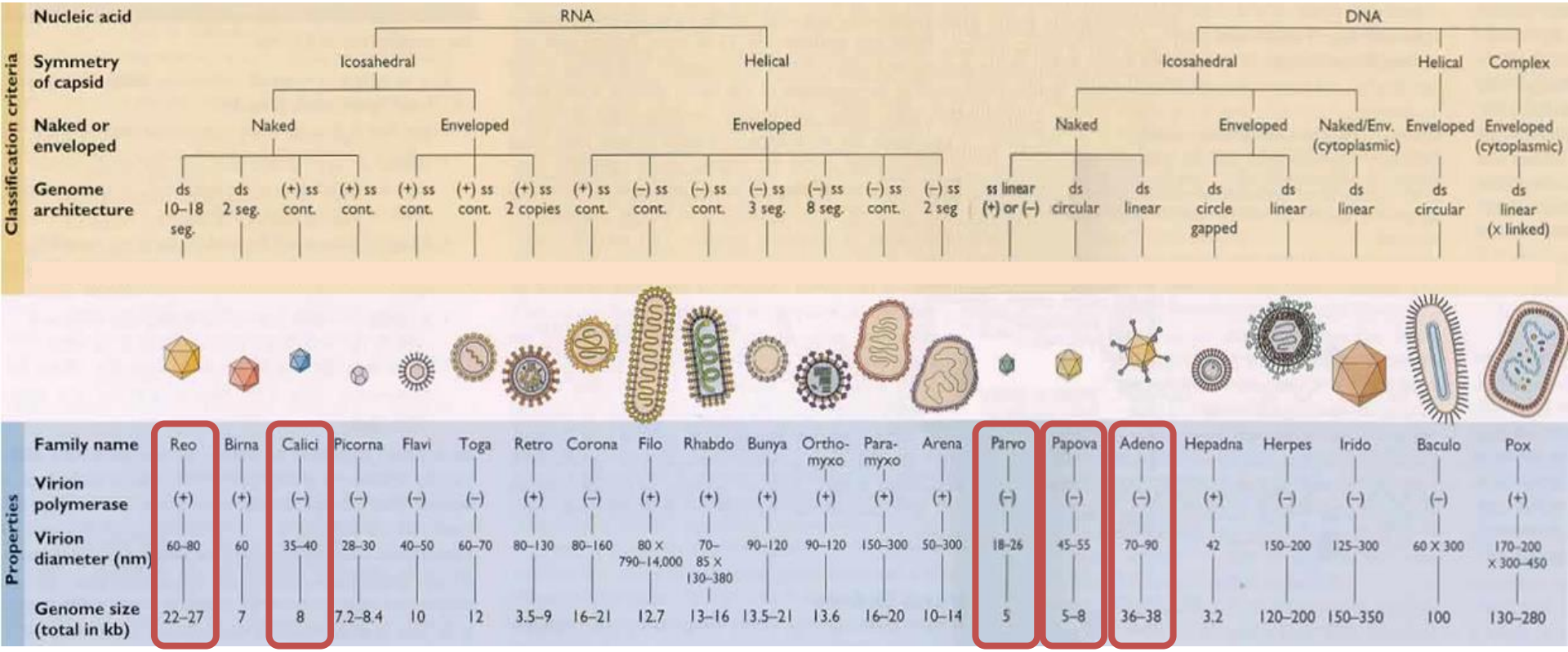


Enveloped viruses

Less stable in the environment

More vulnerable to cleaning & disinfection

Usually sensitive to 70% alcohols



Non-enveloped (naked) viruses

More stable in the environment

Less vulnerable to cleaning & disinfection

Usually resistant to 70% alcohols

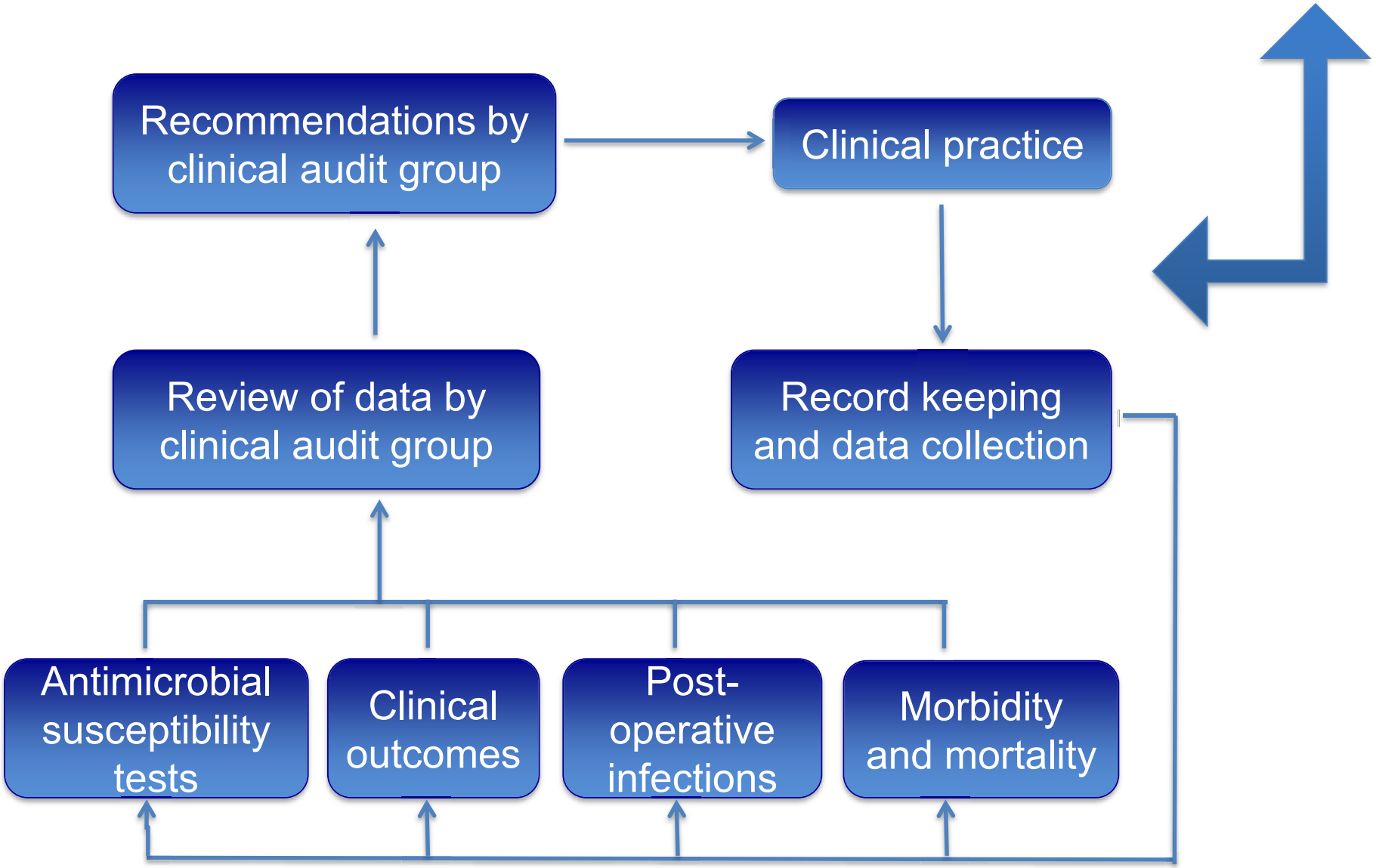
Levels of disinfection

- Sterilisation
  - All living organisms
- High
  - All viruses, vegetative bacteria, fungi and protozoa
  - Most bacterial, fungal and protozoal spores/cysts
- Intermediate/medium
  - All vegetative bacteria
  - Most viruses, fungi and protozoa
  - Does not include spores & cysts
- Low
  - Most vegetative bacteria, fungi and protozoa
  - Enveloped viruses

RCVS KNOWLEDGE

Clinical audit & surveillance

SAVSNET
The Small Animal Veterinary Surveillance Network



Thank you

Coming soon

Part 3: Infection control and biosecurity

More resources at www.rcvsknowledge.org/qi/infection-control

Questions? Email: ebvm@rcvsknowledge.org