

Zoonotic diseases in Svalbard

by Torill Mørk, veterinarian, Veterinary institute in Tromsø



tv2.no/nyheter: Harald Os (t.v.) fra Mattilsynet og seniorrådgiver Espen Stokke fra naturforvaltning tar prøver av en død rein som ble avlivet i nærheten av Longyearbyen på grunn av mistanke om rabies. Foto: SYSSELMANNEN PÅ SVALBARD/Scanpix



Veterinærinstituttet
National Veterinary Institute

Definitions

- **Zoonotic diseases/Zoonoses** - diseases that can be transmitted between animals and humans.

Usually meaning; infectious diseases in animals that can be transmitted to humans

- Infection may be transmitted by direct contact, indirect contact (through contaminated objects), or vectors (insects).
- **Main host** - animal species where an infectious agent circulates within the population. Other species, including humans are infected occasionally but seldom transmit the disease further.

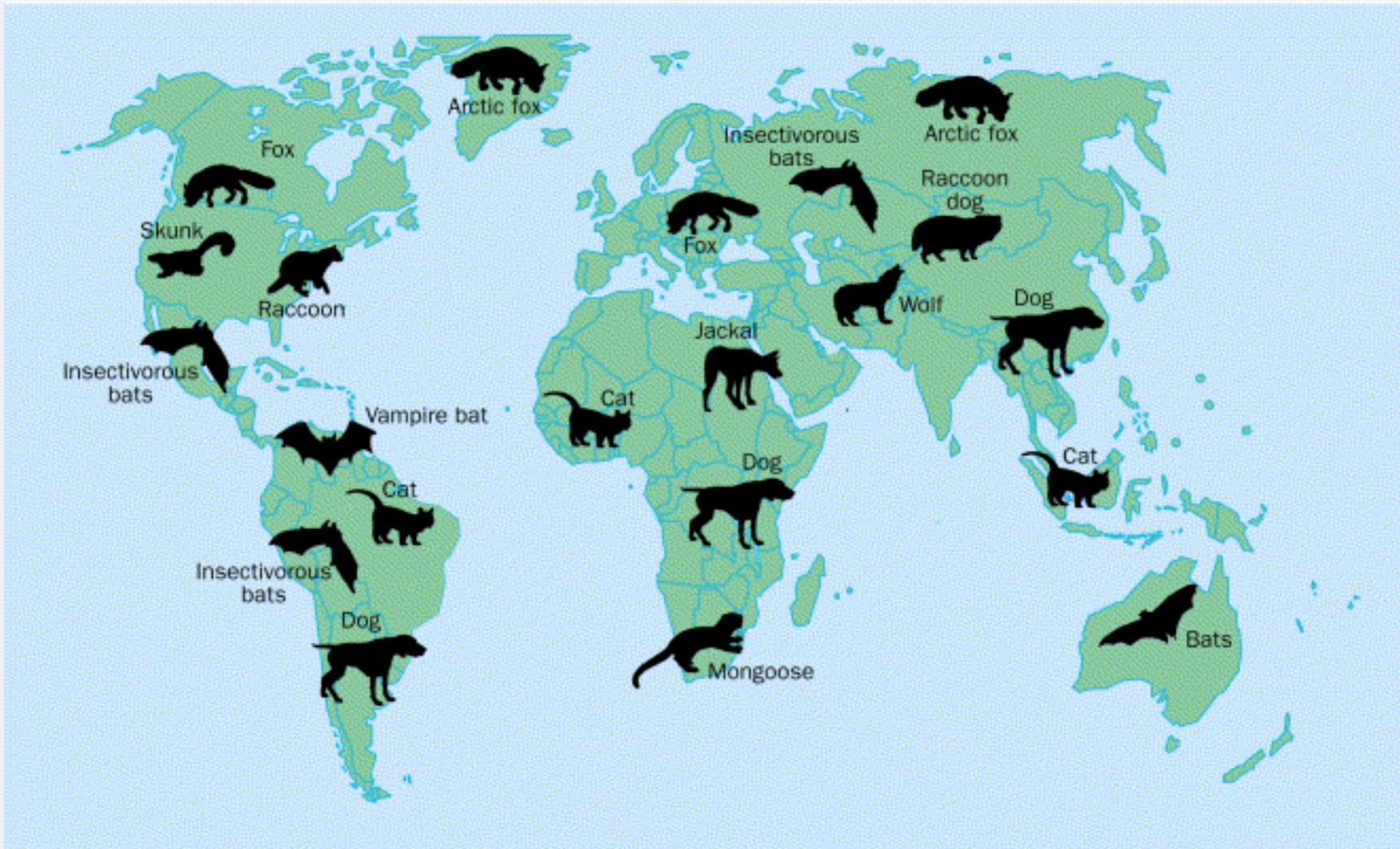


Rabies



- Disease caused by the **rabies virus**.
- Viruses are infectious agent that replicates only within the cells of living hosts.
- The rabies virus can cause disease in almost all mammals but the succibility varies
- Foxes are higly succesible, infection with low virus doses can cause disease.
- Main hosts - mainly carnivores with relatively high population density such as foxes, wolfs dogs, raccon, racoon dog

Main host for rabies virus



Different virus genotypes, adjust to its host

Figure from «Rabies re-examined», Rupprecht et al 2002



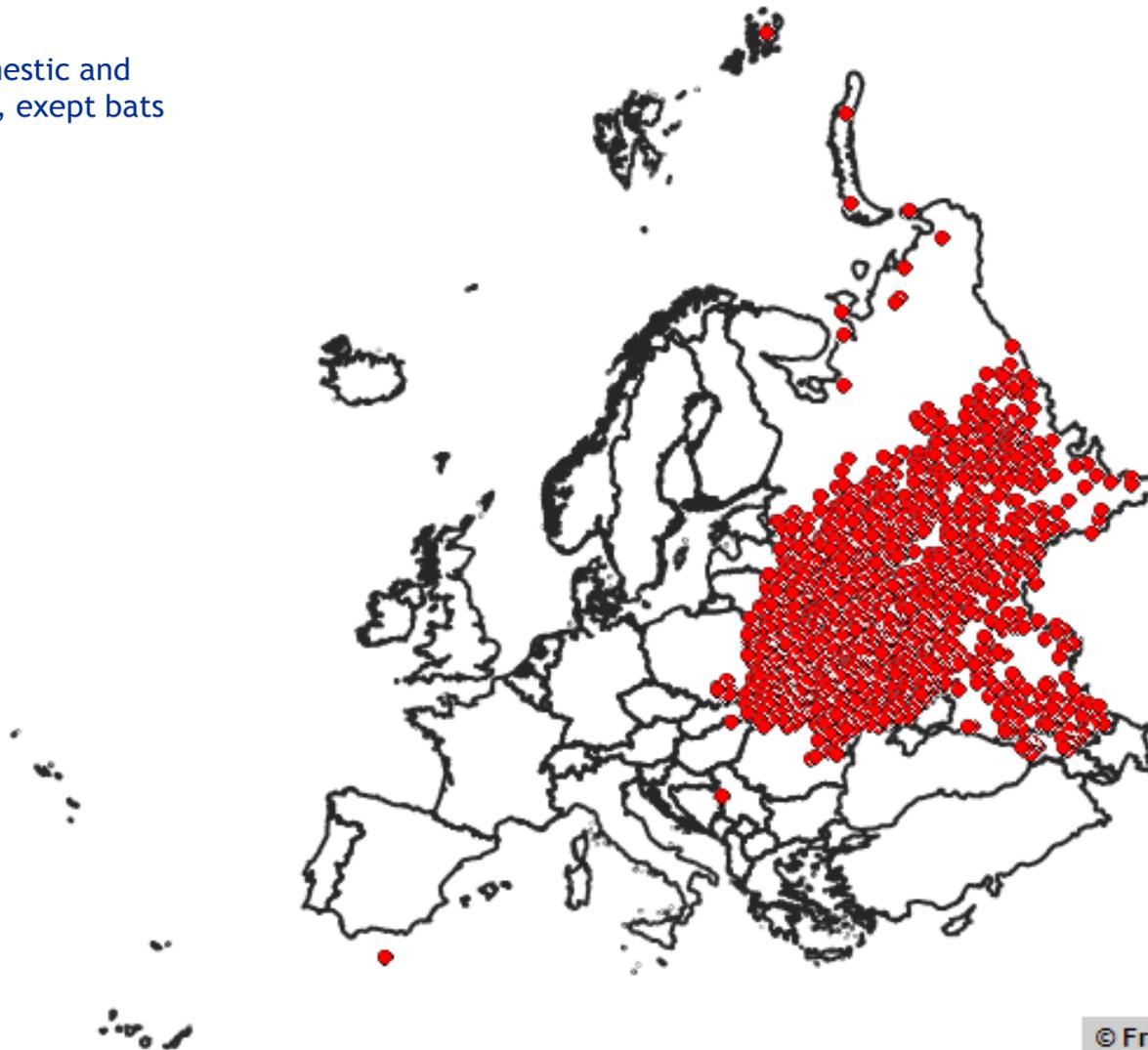
Rabies - an old disease

- Rabies is one of the oldest known infectious disease with written reports/stories from 2000 B.C.
- Rabies occurs throughout most of the world, in more than 150 countries and territories
- Infection causes tens of thousands of deaths every year, mostly in Asia and Africa
- 40% of people who are bitten by suspect rabid animals are children under 15 years of age
- Every year, more than 15 million people worldwide receive a post-bite vaccination. This is estimated to prevent hundreds of thousands of rabies deaths annually.
- Dogs are the source of the vast majority of human rabies deaths, contributing up to 99% of all rabies transmissions to humans.
- Rabies elimination is feasible by vaccinating dogs.



Rabies cases in Europe 2016

Cases in domestic and wild animals, except bats



© Friedrich-Loeffler-Institut

Rabies Bulletin Europe, www.who-rabies-bulletin.org



Rabies in Svalbard



Bilde: Ragnar Sønstebo

- The arctic fox is the main host. The virus circulates in the fox population - most likely not endemic but introduced from fox migration .
- The virus «survives» within the fox population as long as there is one infected animal which can transmit the virus to another susceptible animal.
- Reindeer and humans are «spill over hosts» infected but seldom transmit the disease to other animals/individuals.
- The reindeer dead from rabies in Svalbard have most likely been bitten by a rabid fox.
- Only one report of polar bear with rabies from Canada

The disease Rabies



Figure from «Rabies re-examined», Rupprecht et al 2002

Transmission/Infection: Mainly through bites, wounds, scratches or seldom through mucous membranes

Incubation period: Variable, most often 1-2 mnd

The virus stays in the wound/place of inoculation in a short period. Invades perifer nerves and moves inside nerves to the CNS (spinal cord, brain) where it replicates.

Clinical symptoms occur when the virus reaches the CNS. After replication the virus spreads through nerves in the body, reaches the saliva glands. The virus can be found in the saliva before symptoms are observed.

The virus «hides» from the immune system in nerve tissue - there are no immune repsonce before replication in the CNS - no testing of antibodies (blood test) is possible before it is too late.. deadly encephalities (infection of the brain)



Clinical symptoms in animals

All animals exhibit certain neurological signs but varies within species



Prodromal (first) stage:

- After a certain incubation period, the onset of clinical symptoms follows. During this first stage which usually lasts for about 1-3 days minor behavioural changes might occur, i.g aggressiveness in tame animals, daytime activities in nocturnal animals, no fear of humans in wild animals or abnormalities in appetite.

Excitative (furious) phase:

- Eventually, the prodromal stage is followed by a period of severe agitation and aggressiveness. The animal often bites any material. Rabid dogs, for example, may develop a typical high barking sound during furious rabies. Death may follow convulsions even without the paralytic stage of the disease.

Paralytic (dumb) phase:

- This stage is characterized by the inability to swallow, leading to a typical sign of foaming saliva around the mouth. Some animals may develop paralysis beginning at the hind extremities. Eventually, complete paralysis is followed by death.

Some animals show symptoms from all stages, others from only the excitative/furious form or the paralytic/dumb form



Cases in Svalbard



Arctic fox bites the shot gun of a hunter, rabies outbreak 2011. Shown at TV2

Film by Harald Os, Mattilsynet



Few reported cases of Human rabies in the arctic



Foto: Norbert Rosing, National Geographic

- **Greenland** - only one single human case reported in spite of epidemics among dogs before upstart of vaccination of dogs around 1960.
- **Arctic Russia** - A man is reported to have developed rabies after being bitten in the nose by an arctic fox in 1982, in Anadir, Chukot of northeast Siberia (*Selimov et al. 1990*).
- Three human cases in 1987-98 in the Pskov and Leningrad districts (*Selimov et al. 1994*).
- A man died of rabies in Norilsk in northwest of Siberia, in 1998, after being bitten by a rabid wolf.
- The arctic virus strain is less pathogenic to man? Not likely
- There are several reports indicating that most dogs infected with arctic rabies develop “dumb rabies”, which reduces the risk of human infection
- the Arctic is scarcely populated and people wear protective outdoor garments in the cold climate - less risk of bite wounds



Prevention of rabies in humans

Vaccination/ Pre-exposure prophylaxis

Vaccines are offered to people at high risk of exposure such as those working in rabies diagnostic or research laboratories, veterinarians, researchers working in the field, fox trappers, wildlife officers (Governor of Svalbard).

Post-exposure treatment (after contact with possible rabid animal)

After exposure, prevention of infection is assured by post-exposure prophylaxis consisting of local treatment of the wound (see below), initiated as soon as possible after an exposure, followed by vaccination and a passive immunization (antibodies/immunoglobulin), if indicated.

In connection with the rabies outbreak in 2011, 280 people had received post-exposure treatment by the 28 september 2011.

Local treatment of wounds - first aid

Any bite wound or scratches that might be contaminated with rabies virus should immediately be flushed with rinsing water. Thorough washing for a minimum of 15 minutes with soap and water, detergent/desinfectant should follow. Suturing of the wound should be avoided.



Important to remember!

- The virus is transmitted through direct contact
- The virus is mostly in the brain and saliva (the head) in a rabid animal
- The virus survives well in frozen tissue

- Use gloves if handling a dead fox or reindeer.
- Remember not to contaminate objects
- Wash hands !
- The brain is essential to the diagnostics - if you need to shoot a rabid fox - don't shoot in the head



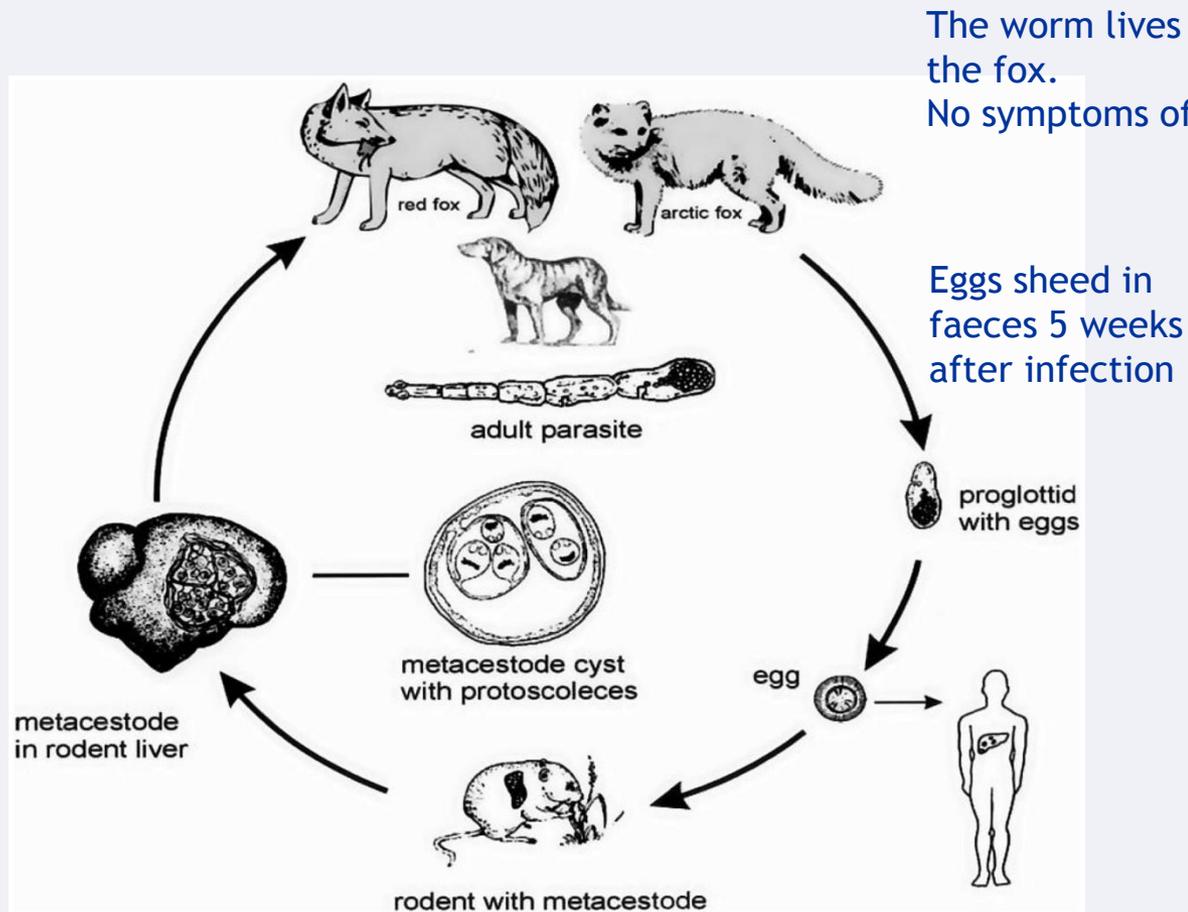
Vaccination of animals

- All dogs on Svalbard must be vaccinated.
- Cats are not allowed.
- **Oral vaccination of wild animals through baits**
- The oral vaccination of foxes against rabies have been essential to stop a major rabies epidemic in foxes in Europe .
- The annual number of rabies cases in Europe dropped from 21.000 in the year 1990 to 5.400 in 2004.
- In most parts of Western and Central Europe rabies has been successfully controlled and eradicated.
- Vaccine baits are distributed by plane, helicopter and manually.
- Not rationally in Svalbard due to geography and climate. The commercial vaccines available are not effective in cold climate.



Echinococcus multilocularis

- The small fox tapeworm, dependent on two host - Foxes (dogs) and rodent/mouse



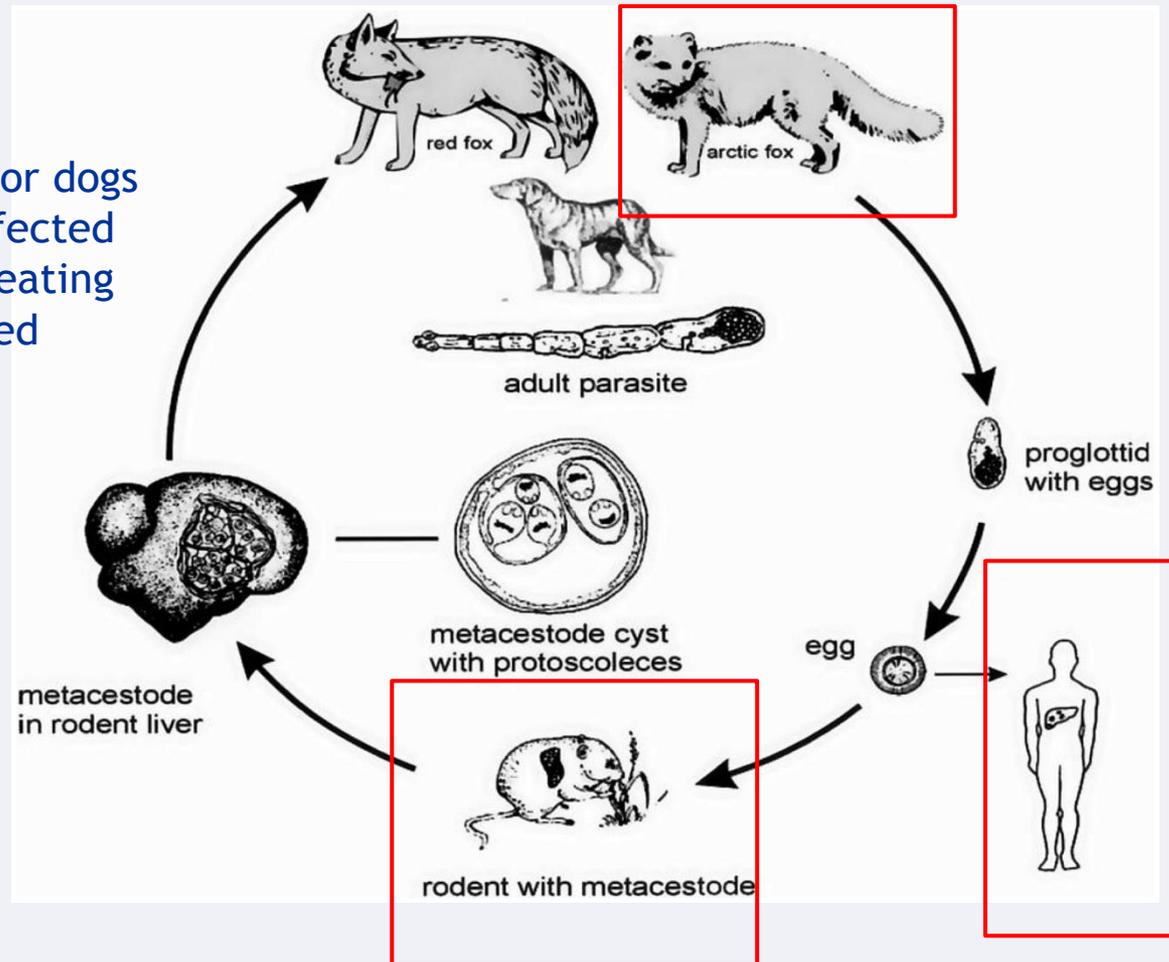
The worm lives 6 mnd in the fox.
No symptoms of disease.

Eggs shed in faeces 5 weeks after infection



E. multilocularis in Svalbard

Foxes or dogs are infected when eating infected voles



People may be infected by eggs from faeces of fox/dogs

Østmarkmus/sibling vole mainly in Grumant area



Echinococcosis - the disease in humans

- Humans act like an intermediate host
Ingestion of eggs leads to tumorlike processes in the liver or other organs.

- The disease develops slowly and symptoms occur after 10-15 years.



Rat with cysts in the liver,
Wikipedia

- The disease is rare but can be deadly if not treated.

- The parasite is most prevalent in the Alps region, about 1 human case per million inhabitants

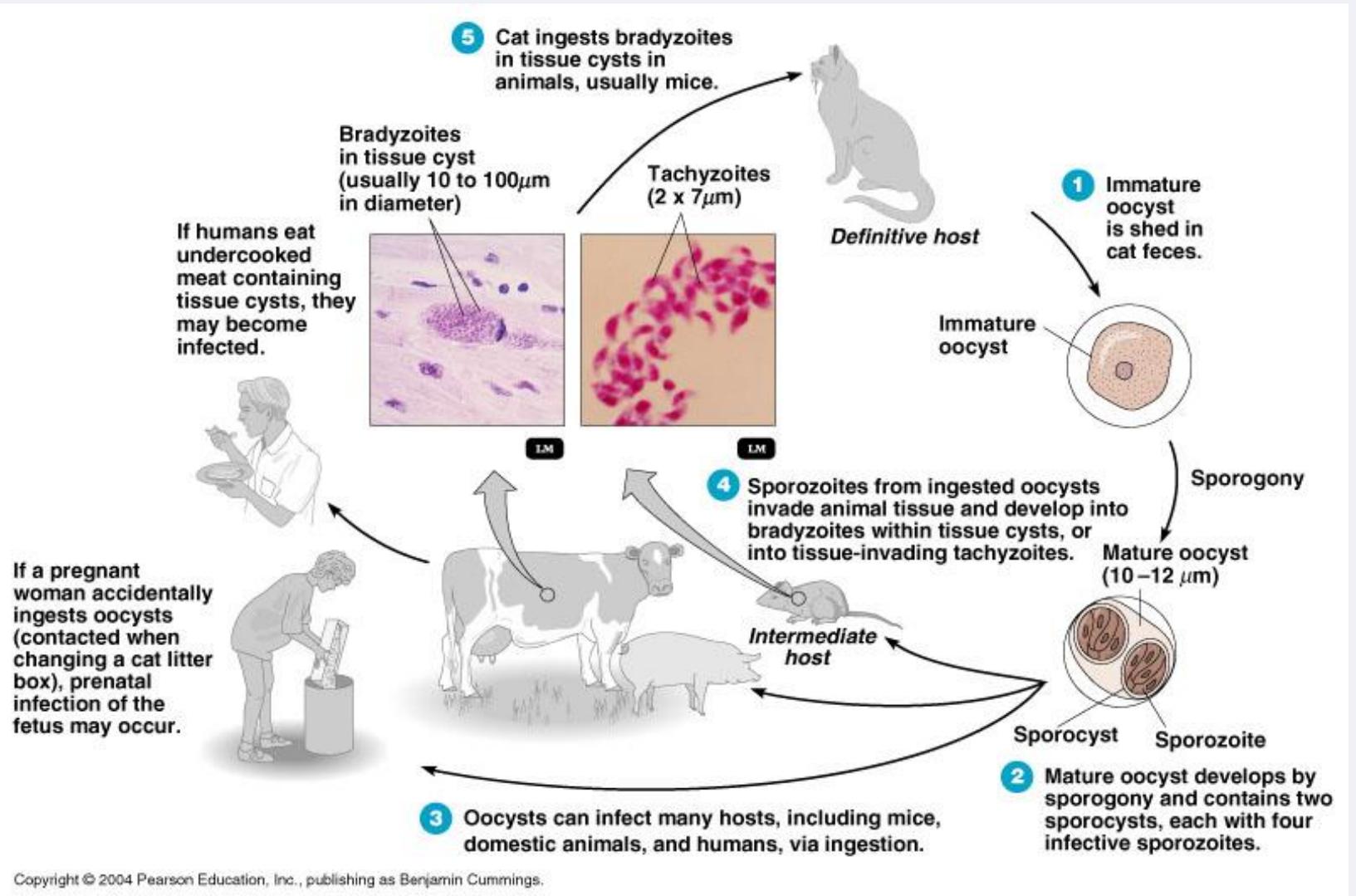
How to prevent infection



The infection risk is through faeces of foxes and dogs!

- Regularly treating with Anthelmintic/anti-parasite treatment of dogs
- Control of the mouse population in/around Longyearbyen
- Prevent foxes from entering kindergarden, school area
- Wash hands
- Special risk in Grumant area (wash hands, do not drink water, dont bring dogs, wash shoes)

Toxoplasma gondii



T. gondii in Svalbard



Foto: Nicolai Herman Jørgensen



Transmission through tissue cysts



Infected in the main land?

Less risk in Svalbard! No cats - no eggs in the environment.

Svalbard reindeer seems not to be infected (Prestrud et al. 2007)



Thank you for the attention

