Leptospirosis reservoir animals

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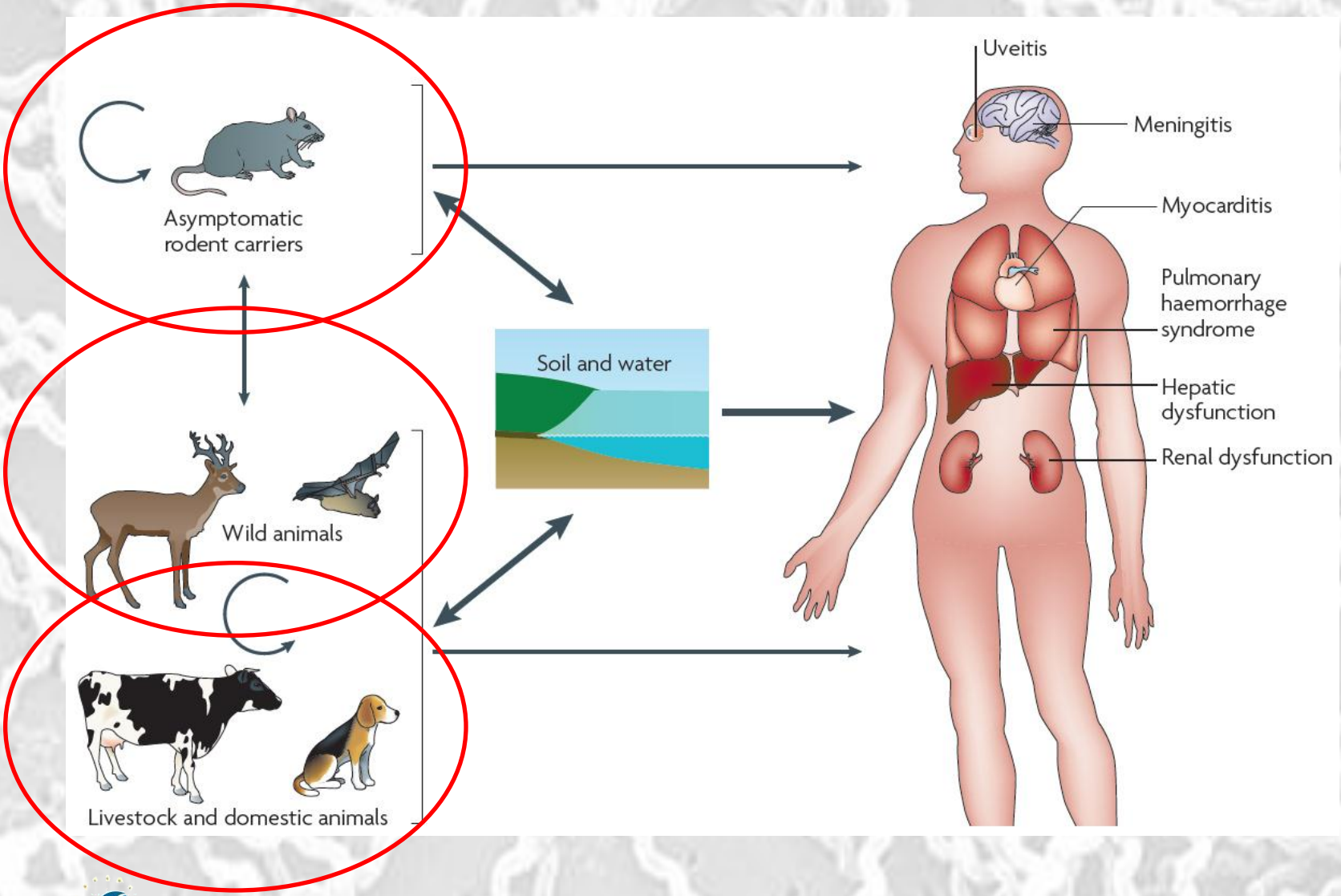
"The world most widespread (bacterial) zoonosis"



Leptospirosis in animals

- Virtually <u>any Mammal species</u>
- Clinical presentations in animals <u>very similar to human</u>:
  Non-symptomatic to rapidly fatal,
  including forms regarded as rare in humans
  (e.g. abortions in cattle and pigs, uveitis in horses,…)

- Highly dependant on the host / strain association
  (co-evolution)
- Of outstanding importance for understanding and controlling human leptospirosis.

A few monographs - Rodents

- Rats reservoirs for SG Icterohaemorrhagiae (more rarely Ballum, in black rats)

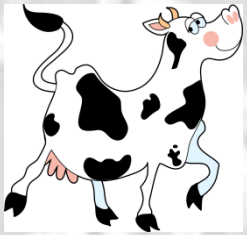
- Mice reservoirs for SG Ballum

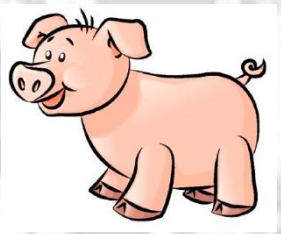
➢ Of worldwide significance, major contributors to both human and animal leptospirosis.

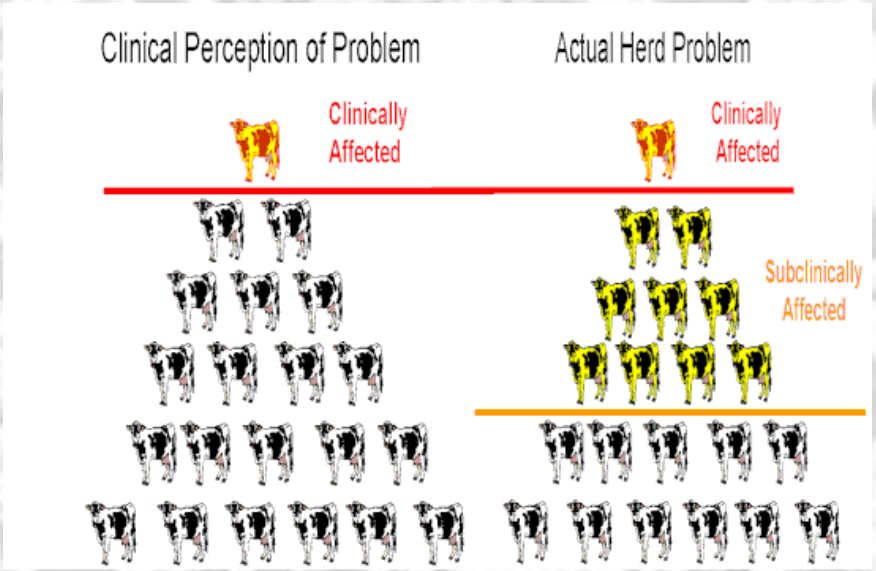
A few monographs – Cattle, deer and pig

- Rarely severe in adults
- Frequently sexually-transmitted
- Frequently a reservoir
- Fever, anorexia, milking loss in cattle
- Reproduction loss (abortions, stillbirths)

Financial loss poorly studied

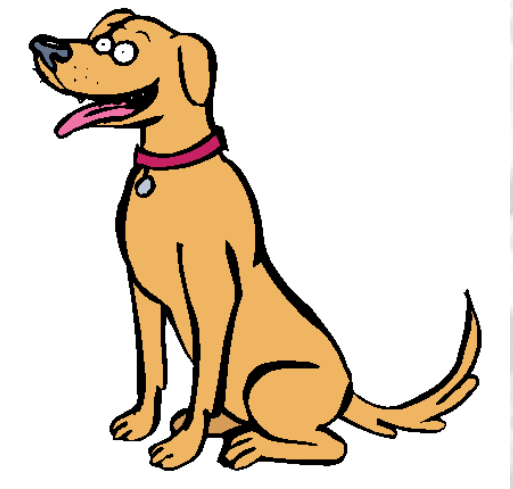






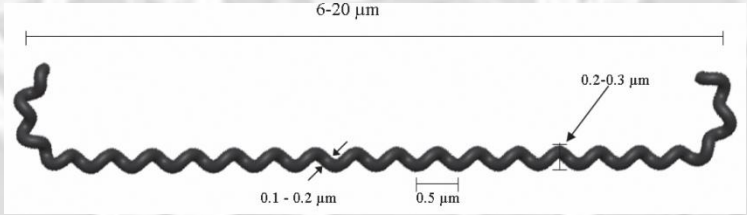
A few monographs - Dogs

- Possible typical Weil's syndrome if infected with Icterohaemorrhagiae:
  - Renal and hepatic failure, haemorrhages, pulmonary haemorrhages, digestive symptoms…
- As susceptible hosts, they reflect the environmental contamination
- Chronic asymptomatic reservoir if infected with Canicola (or others?)
  - No clinical signs in chronic carriers
  - Excrete virulent leptospires in urine



Leptospira phylogeny and taxonomies

A double, non-consistent taxonomy…

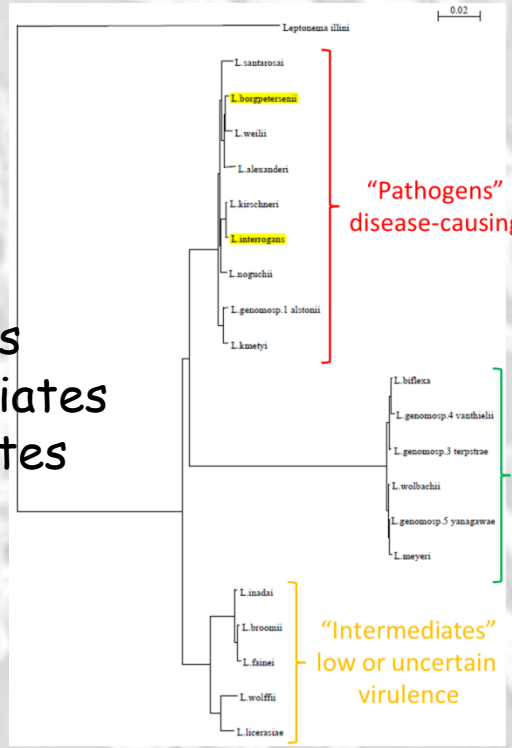


Serology:

- More than 230 serovars
- grouped into ~20 serogroups

Genetics:

- 9 pathogens
- 5 intermediates
- 6 saprophytes



⚠ Most serovars put together strains belonging to different species

⚠ All species have strains in several serogroups

Complex taxonomies

Serovar	Strain	Serogroup	DNA species	Country of origin	Source
pomona	Johnson	Pomona	*L. interrogans*	?	?
pomona	24K	Pomona	*L. noguchii*	USSR	?
pomona	164	Pomona	*L. interrogans*	USA	Bovine
pomona	Wickard	Pomona	*L. interrogans*	USA	Bovine
pomona	Pomona	Pomona	*L. interrogans*	Australia	Human
pomona	S91	Pomona	*L. interrogans*	USA	Pig

Example: 1 serovar but 2 genomic species!

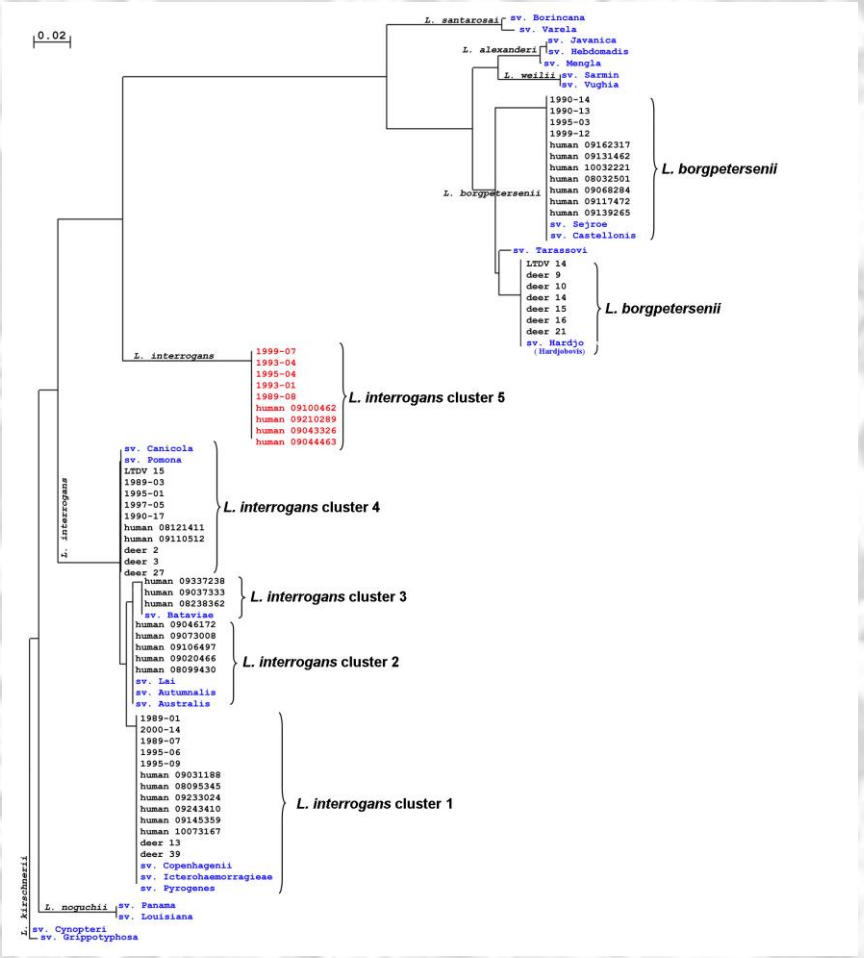
Serovar	Strain	Serogroup	DNA species	Country of origin	Source
hardjo	K-125	Sejroe	*L. borgpeterseni*	USA	Bovine
hardjo	T-20	Sejroe	*L. borgpeterseni*	USA	Bovine
hardjo	Hardjoprajitno	Sejroe	*L. interrogans*	Indonesia	Human
hardjo	Went 5	Sejroe	*L. meyeri*	Canada	?

Example: 1 serovar but 3 genomic species!

Example: *Leptospira interrogans* : ~100 serovars described!

Reconciling serology and genetics?

- Positive serology: proof of a former infectious contact with a leptospire
- Renal carriage and urinary shedding:
  - only some of the animals previously infected.
  - even after serology has turned back negative!
- Multiple positive serogroups in MAT:
  - multiple exposures to different leptospires?
  - co-agglutinins?



Known or suspected reservoir / strain associations

Leptospira species	Serogroup	Known reservoir	% human cases (2009-2013)
Leptospira borgpetersenii	Hardjobovis	Cattle, deer	0%
	Ballum	Mice (+black rats)	5%
Leptospira interrogans	Icterohaemorrhagiae	Rats (3 species)	64%
	Australis	Pig	10%
	Pomona	Pig, deer (cattle?)	2%
	Pyrogenes	unknown	19%

Introduced invasive rodents contribute ~70%!

An unknown reservoir contributes ~20%!

Pigs might contribute up to > 10%

What remains to be explored?

- Animal reservoir of the local Pyrogenes?
- Dynamics of Lepto carriage in herds?
- Financial impact of animal leptospirosis?
- Role of feral invasive Mammals?
- Role of cats? Role of Chiropters?
- Direct / indirect transmission: how humans get infected?
- Animals as vectors in addition to reservoirs?
  →Role of non-severe forms in domestic and pet mammals?
- Geographical distribution in animals?

→ to better address prevention





Merci – Thank you