‘*Candidatus* Neoehrlichia mikurensis’ - a novel tick-borne pathogen

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Natural history of ’*Candidatus* Neoehrlicha mikurensis’

- First detected in ticks in **the Netherlands** (Schouls *et al.,* 1999).
- PCR detection in **Japan**, given the provisional name ’*Candidatus* Neoehrlicha mikurensis’ (Kawahara *et al.,* 2004).
- ’*Candidatus* Neoehrlicha lotori’, in raccons **North-America** (Dugan *et al.,* 2005).

First human cases

- First cases in 2010: **Sweden** (Welinder-Olsson *et al.,* 2010), followed by cases in **Switzerland**, **Germany** and the **Czech Republic** (Fehr *et al.,* 2010; von Loewenich *et al.,* 2010; Pekova *et al.,* 2011).
- 7 human cases from **China** (Li *et al.,* 2012).

11 human cases in Europe 2010-2013

- More males than females (8/11)
- Median age 67
- Less than half recalled tick bite
- Immune supressive treatment (10/11)
- Lacking spleen (8/11)

Symptoms

- Fever (11/11)
- Localized pain in muscle/joints (8/11)
- Blood cloth or other vascular events (6/11)

Picture by Lars Råberg

Tick-borne diseases

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- Ticks surpass all other arthropods in the variety of microorganisms they transmit.

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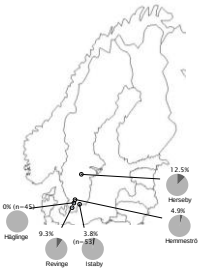
- Ticks surpass all other arthropods in the variety of microorganisms they transmit.
- Despite this, the full diversity of infectious agents transmitted by ticks are still incompletely known.

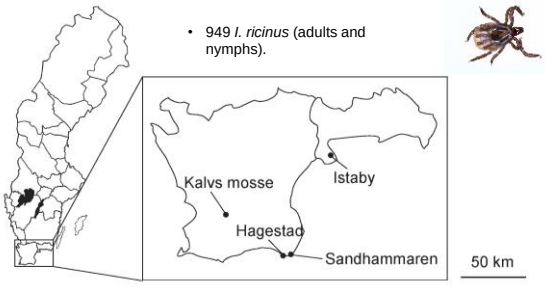
Reservoir hosts

'*Candidatus* Neoehrlichia mikurensis' in rodents, Sweden.



Andersson and Råberg 2011, Emerging Infectious Diseases.

'*Candidatus* N. mikurensis' in *Ixodes ricinus*,



- 949 *I. ricinus* (adults and nymphs).

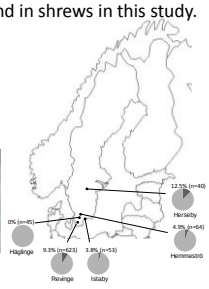
'*Candidatus* N. mikurensis' in *Ixodes ricinus*,

- Real-time PCR assay targeting the *groEL* gene of '*Candidatus* N. mikurensis'
- Overall prevalence 6.0%
- Co-infection with *B. afzelii* in 2.1% of the ticks, which is significantly more than expected under random co-occurrence.

Andersson et al., 2013 *Vector-Borne and Zoonotic Diseases*

Reservoir hosts

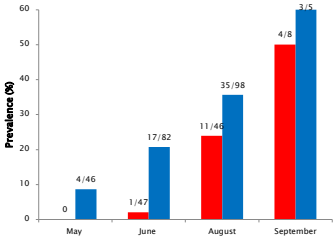
Occurs in bank voles, field voles, yellow-necked mice and in wood mice. Not found in shrews in this study.



Andersson and Råberg 2011, *Emerging Infectious Diseases*.

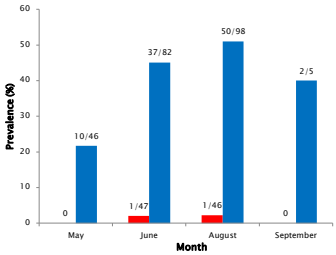
'*Candidatus* N. mikurensis' in bank voles (*Myodes glareolus*)

Candidatus Neoehrlichia mikurensis

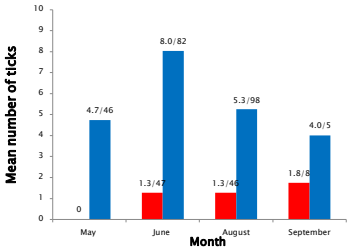


Andersson et al., 2014. *Appl. Environ. Microbiol.*

Borrelia afzelii

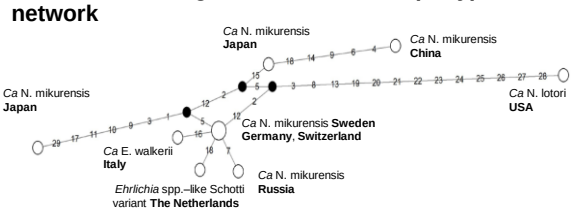


Andersson et al., 2014. *Appl. Environ. Microbiol.*



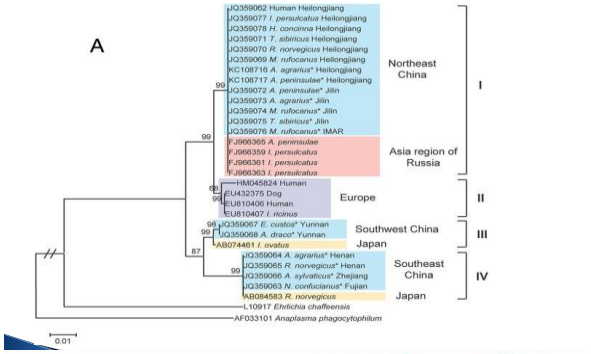
Andersson et al., 2014. *Appl. Environ. Microbiol.*

'*Candidatus* N. mikurensis', genetic relatedness of the 16s r RNA gene, shown as a haplotype network



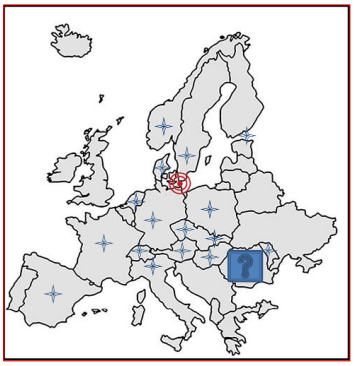
Andersson and Råberg 2011, Emerging Infectious Diseases.

Neighbor-joining tree of "Candidatus Neoehrlichia mikurensis" inferred from 874 bp of the groEL gene sequences (A) using the maximum composite likelihood method.

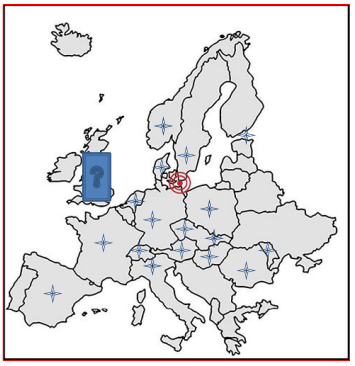


Li H et al. Appl. Environ. Microbiol. 2013;79:1024-1027

Applied and Environmental Microbiology



- *Neoehrlichia* does occur in Romania.
- Co-infection with *Borrelia afzelii*



Conclusions

- Spread througout most of Europé, UK?
- Prevalence in *I. ricinus* typically 6-7%
- Co-infection with *B. afzelii*

Thank you

Lund:

- Lars Råberg
- Kristin Scherman
- Nadège Zaghdoudi-Allan
- Dagmar Clough
- Barbara Tschirren
- Melissa Lemoine

International:

- Lidia Chitimia
- Jean Tsao
- Gerhard Dobler
- Bronislava Víchová

Non-profit funding

The Swedish Research Council

The Swedish Research Council Formas
Committed to excellence in research for sustainable development

The Royal Physiographic Society in Lund

The Lund Animal Protection fund