Disease occurrence in raccoons (*Procyon lotor*) from rural and urban populations in Germany - Preliminary results -

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North American raccoons (*Procyon lotor*)

Introduced species in Europe, Caucasus & Japan

Germany: First introduction 1934
→ 2 core populations
Why raccoons?

Introduced species in Europe

Very adaptable species → rural & urban areas

Close contact: humans, domestic animals & wildlife

Vector for infectious diseases in North America

What diseases occur in raccoons in Germany?

Differences between rural and urban populations?

→ Interaction with other animals/humans?
Projekt Waschbär (F.-U. + B. Michler)

Müritz National Park (MNP) population

Raccoon population ecology in Germany

Research foci:
Spatial & migration behaviour
Population structure & size
Social system
Epidemiology
Reproduction
Feeding ecology
Study area

Müritz National Park

Berlin metropolitan area
Material & Methods

Raccoon carcasses
Road-killed, hunted or euthanized

Necropsy
Carcass condition
Macroscopic changes
Organ samples
Material & Methods

Histology of organ tissues
4% formalin
H&E staining

Bacteriology
Suspicious organ lesions
Bacteriology lab, Dr. Grobbel (IZW)
Material & Methods

Parasitology
Main focus: *Baylisascaris procyonis*
Helminth & ectoparasites

Virology (as reported in American raccoons)
Canine Distemper Virus (CDV)
Parvovirus (PV)
Infectious canine hepatitis (CAV-1)
Aujeszky’s Disease (SuHV-1)
PCR & RT-PCR assays + cell cultures
Preliminary results
Macroscopic changes

Liver:
Multifocal capsular white foci
Preliminary results
Microscopic changes

Inflammatory changes
Preliminary results
Microscopic changes

Inflammatory changes

Anthracosis in Berlin animals
Coal particles in the lung
Preliminary results

Samples of 12 animals sent to Bacteriology:
Bacteria associated with pathological findings:
*Yersinia enterocolitica* → Liver abscess
*Clostridium perfringes* type A → Haemorrhagic enteritis

Parasitology:
*Baylisascaris procyonis*: Not found in any animal
Unidentified trematode in tongue tissue of MNP animals →
Unidentified trematode in raccoons

Parasite morphology
→ suspicious for mesocercarial stage of *Alaria alata* !?
Histology examination of tongues

Parasitic cysts adjacent to blood vessels

Location: connective tissue

Local inflammatory response

Renteria-Solis et al., Parasitol Res 2013
Histology examination of tongues

Parasitic cysts adjacent to blood vessels

Location: connective tissue

Local inflammatory response

→ Hematogenic spread of the mesocercariae!

Renteria-Solis et al., Parasitol Res 2013
Cooperation with Leipzig University (Dr. K. Riehn):

Tongues of 35 raccoons examined

Mesocercaria isolation (Riehn et al., 2011)

Trematode identification → PCR assay

Renteria-Solis et al., Parasitol Res 2013
Mesocercariae in raccoons from Germany

Isolation of mesocercaria (n=11/35)

PCR positive for *Alaria alata* (n=10/11)

Broad host range $\rightarrow$ adaptation to introduced species
Raccoons $\rightarrow$ paratenic host
Lower occurrence in urban areas $\rightarrow$ lack of intermediate hosts

Renteria-Solis et al., Parasitol Res 2013
Life cycle of *Alaria alata*

Egg → miracidium → 1st spoorocyst → 2nd spoorocyst → cercaria → mesocercaria → metacercaria → adult.

Final host

1st intermediate host

2nd intermediate host

Pictures: Aleida Renteria
**Life cycle of *Alaria alata***

Egg $\rightarrow$ miracidium $\rightarrow$ 1st sporocyst $\rightarrow$ 2nd sporocyst $\rightarrow$ cercaria $\rightarrow$ **mesocercaria** $\rightarrow$ metacercaria $\rightarrow$ adult.

![Diagram of the life cycle of Alaria alata](image)
Life cycle of *Alaria alata*

Egg $\rightarrow$ miracidium $\rightarrow$ 1st spoorocyst $\rightarrow$ 2nd spoorocyst $\rightarrow$ cercaria $\rightarrow$ mesocercaria $\rightarrow$ metacercaria $\rightarrow$ adult.

Paratenic host (mesocercaria)

Final host: Metacercaria + adult

1st intermediate host (paratenic host)

2nd intermediate host (mesocercaria)

Pictures: Aleida Renteria
Life cycle of *Alaria alata*

Egg → miracidium → 1st spoorocyst → 2nd spoorocyst → cercaria → mesocercaria → metacercaria → adult.

**Final host**

**Paratenic host** (mesocercaria)

**1st intermediate host**

**2nd intermediate host** (mesocercaria)

**Pictures**: Aleida Renteria
**Sarcoptic mange in urban raccoons**

Raccoons from Berlin
Severe skin infection by intracorneal mites = *Sarcoptes scabiei*
Only 1 previous report in raccoons from US (Fitzgerald et.al., 2004)

**Contact with urban wildlife/pets !**
**Current work: Virology screening**

Cooperation with Giessen University (Dr. M. König)

Frozen organ samples -80°C

First screening of Berlin animals
9 positive for viral nucleic acids

Sequencing & phylogenetic analysis
Current work: Berlin distemper outbreak

Started December 2012
Organs from Berlin raccoons
RT-PCR assays
Comparison with MNP outbreak, 2007 (Michler et al., 2009; Nikolin et al., 2011)
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