

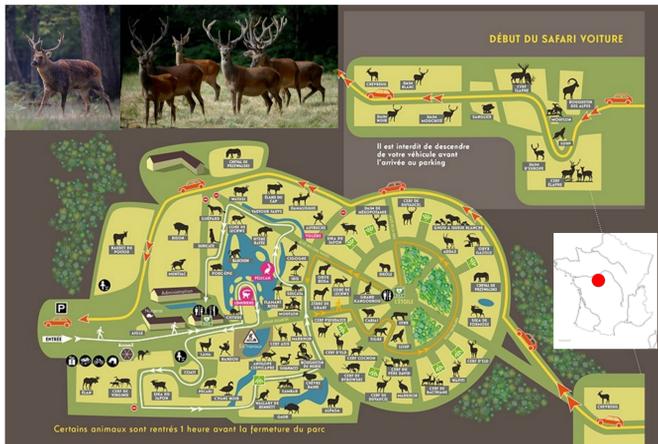
Deer carrying *Anaplasma capra* : a new zoonotic tick-transmitted pathogen in Europe ?

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Anaplasma spp. in red deer and swamp deer in a wild reserve fauna

“La Haute-Touche” wild reserve fauna



Aim : identification of Anaplasmatataceae in Ungulates in the context of a complex animal population

The wild fauna reserve

210 ha
 1300 animals from 5 continents
 50 Ungulate species

Sample collection

Blood collection : 2015-2018
 59 Red deer (*Cervus elaphus*)
 7 Swamp deer (*Rucervus duvaucelii*)

Sample analysis : partial gene amplification and sequencing

Nested PCR to amplify a 541 bp region of the Anaplasmatataceae 23S rDNA (1)
 Complementary identification using other genetic markers : 16S rDNA, *groEL*, *gltA* (1, 2)

Detection of *Anaplasmatataceae* by 23S nPCR

Anaplasma phagocytophilum

Infection prevalence : 23.7%
 Red deer but not in swamp deer

Amplification of *Ralstonia pickettii*

Contamination of 16.7% of the blood samples
 Detection and identification in some negative controls:
 contamination of PCR solutions

“*Candidatus Anaplasma mediterraneum*”

Two red deer, one swamp deer
 Sequences blasted with uncharacterized *Anaplasma* from sheep (2)

First identification of *Anaplasma capra* in Europe in deer

Further molecular characterization of the new *Anaplasma* species

Sequences of three other genes (16S rDNA, *groEL*, *gltA*) were obtained for the three infected deer. They all demonstrated the strongest sequence identities with *Anaplasma capra*, a new species recently described in China as a zoonotic agent (3).

Anaplasma capra local persistence in the Reserve

The first infected animal was detected in 2015, and the two other infected animals (2017) were born in the Reserve, attesting a local persistence and transmission of *A. capra*.

A red deer found positive in 2017 was still carrying the bacteria 4 months later, suggesting that deer may act as a reservoir.

Identities of the new detected *Anaplasma* with reference species

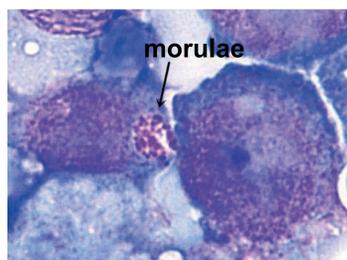
Gene	GenBank accession numbers	Reference organisms and sequences	Identity rate
23S rDNA	MH084723-24	<i>Cand. A. mediterraneum</i> KY498330	99.6 %
16S rDNA	MH084721-22	<i>A. capra</i> KM206273 - MF066917	99.6% - 99.8%
<i>groEL</i>	MH084717-18	<i>A. capra</i> KM206275 - AB454078	91.4% - 97.7%
<i>gltA</i>	MH084719-20	<i>A. capra</i> KM206274 - MG940872	87.9% - 98%

Anaplasma capra: overview of a new zoonotic blood pathogen

Anaplasma capra

- **widespread in far East countries:** *Anaplasma capra* has been first detected in Japan in 2001, and subsequently in China (2010).
- **infecting diverse domestic and wild ungulates:** sheep, goat, cattle, sika deer, japanese serow.
- **detected in many tick species** (*Haemaphysalis longicornis*, *Ixodes persulcatus*, *Rhipicephalus microplus*) but no proof of vectorial competence.

Anaplasma capra in THP-1 cells (from 3)



Anaplasma capra: a zoonotic pathogen

In China, a surveillance study performed on patients with tick-bite history highlighted the human infection of 6% of these patients with *A. capra*.

General clinical features in human patients have included febrile manifestations as well as eschar, lymphadenopathy and gastrointestinal symptoms.

A. capra has been successfully cultivated in human cell lines (photo from 3).

Conclusion

In this survey, we detected in deer and identified a new zoonotic *Anaplasma* species, *A. capra*, for the first time in Europe. Whether it is an endemic or imported species from Far East, it seems to be transmitted locally and maintained in the deer population. The zoonotic ability of the european variant as well as its mode of transmission remains to be elucidated.