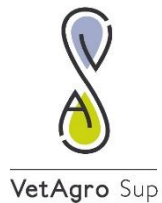


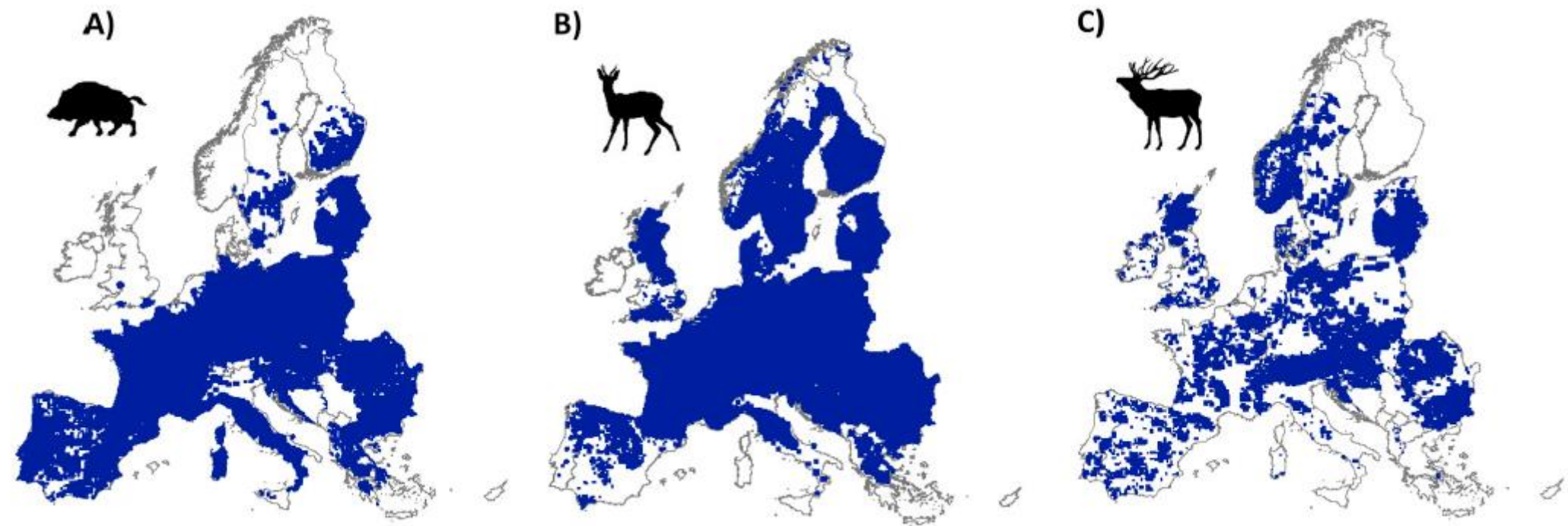


Investigating the transmission of gastro-intestinal nematodes between livestock and roe deer using deep-sequencing analyses

Camille Beaumelle^{1,6}, H el ene Verheyden³, Libby Redman⁴, Jill de Rijke⁴, Florence Veyszi ere⁵, No emie B egoc⁵, Slimania Benabed^{1,6}, Bruno Cargnelutti³, Bruno Lourtet³, Marie-Th er ese Poirel^{1,6}, Glenn Yannic², Philippe Jacquiet⁵, John S Gillear⁴ and Gilles Bourgoin^{1,6}



Wild ungulates increase in spatial range and abundance

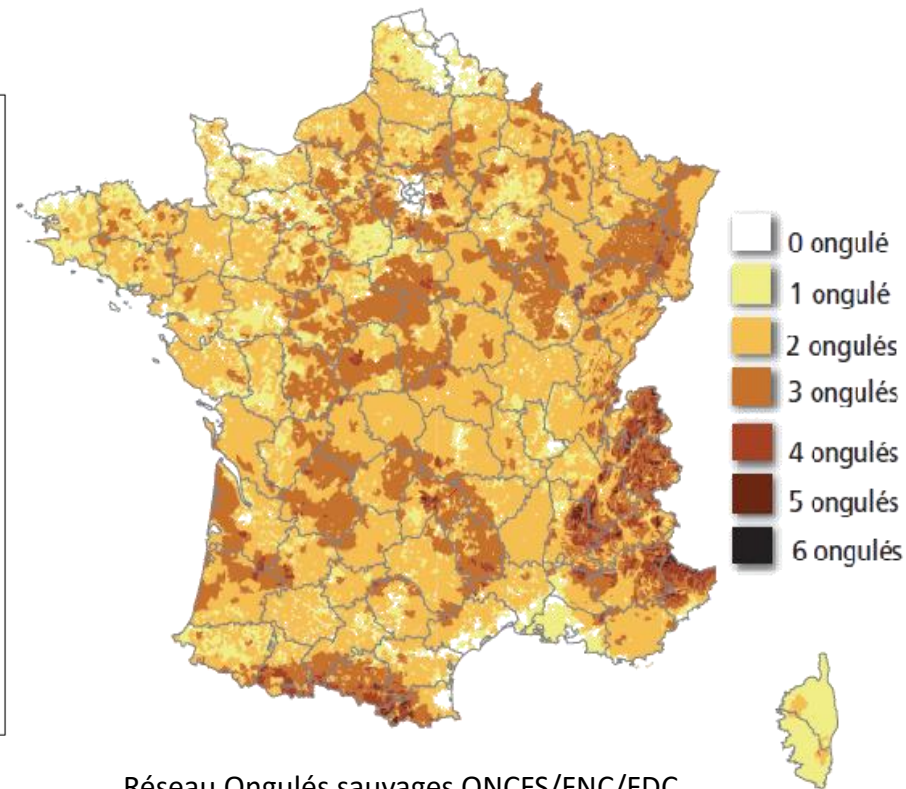
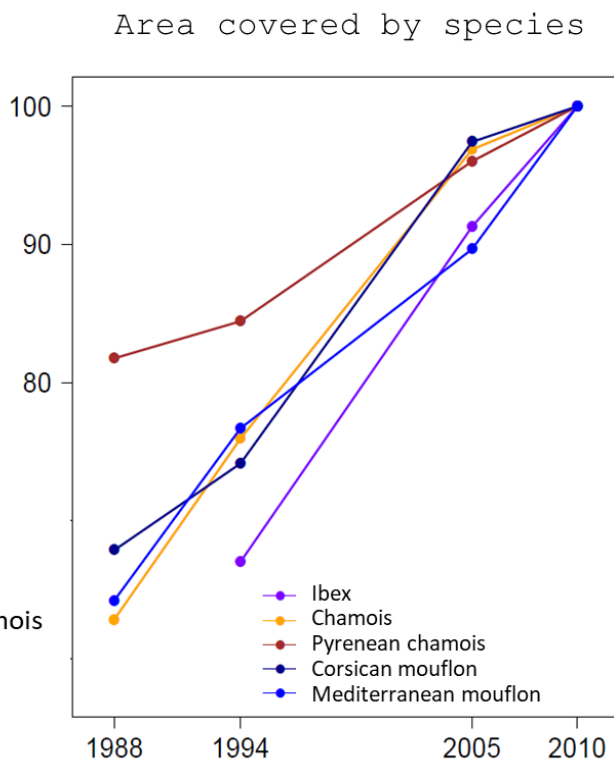
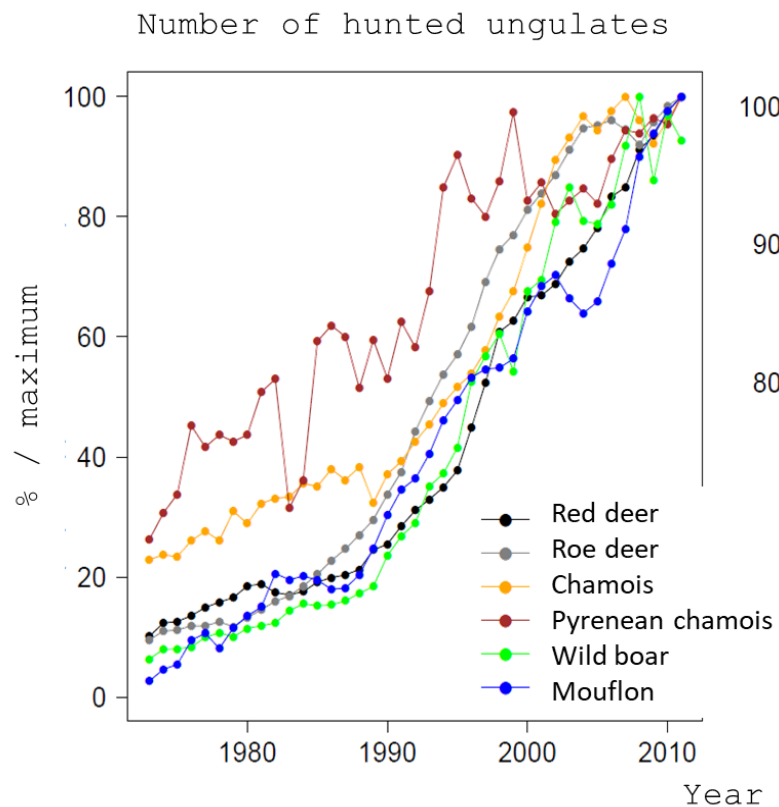


Linnell et al. 2020



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Wild ungulates increase in spatial range and abundance



Réseau Ongulés sauvages ONCFS/FNC/FDC
Graphes: P. Marchand



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Overlap between wild and domestic ungulates

3



Overlap between wild and domestic ungulates



➔ Pathogen transmission

Overlap between wild and domestic ungulates



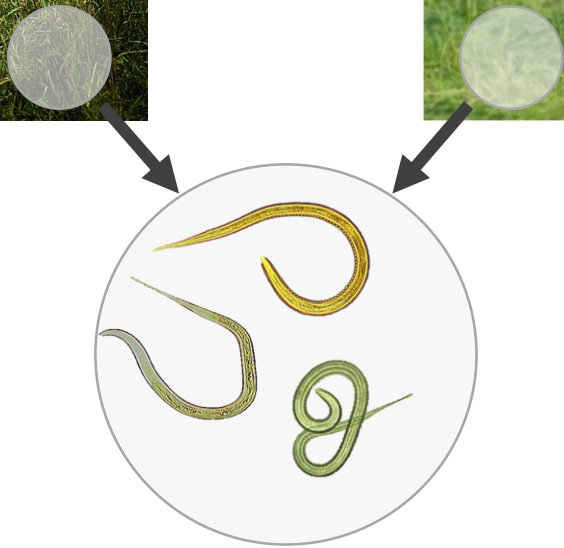
Pathogen transmission

- Density of host species
- Host-pathogen compatibility
- Pathogen control

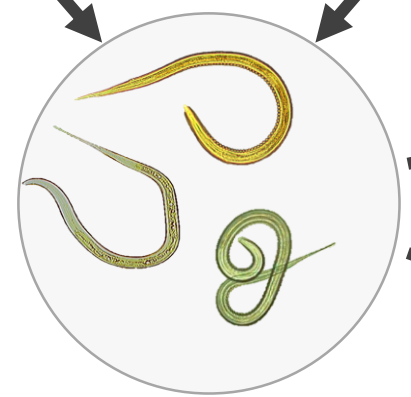
A major threat for wild and domestic ungulates: the gastrointestinal nematodes



A major threat for wild and domestic ungulates: the gastrointestinal nematodes



A major threat for wild and domestic ungulates: the gastrointestinal nematodes

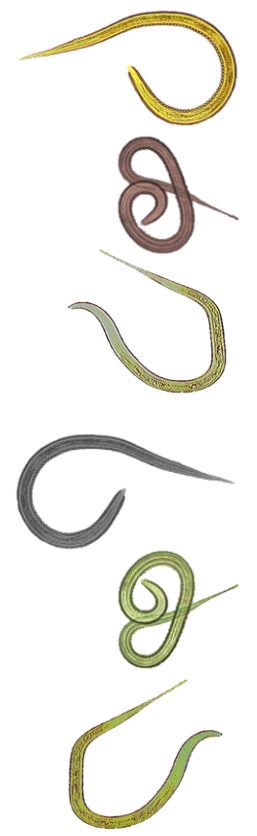


Worldwide distribution
Hoberg et al. 2001



- Economic loss
 - Wildlife population dynamic
- Roeber et al. 2013; Thompson et al. 2010*

The gastrointestinal nematodes of sheep and roe deer





The gastrointestinal nematodes of sheep and roe deer

“specialist”



e.g. *Cooperia curticei*



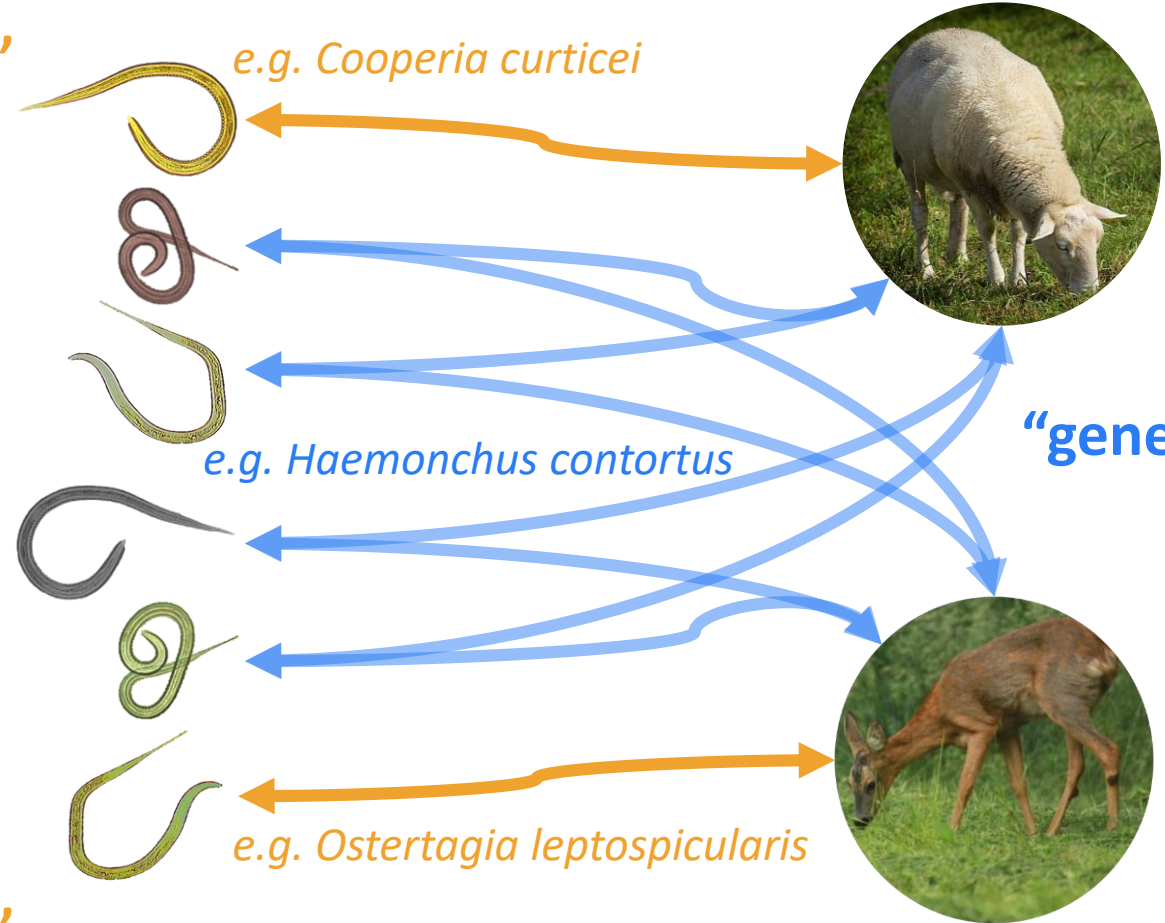
e.g. *Ostertagia leptospicularis*

“specialist”



The gastrointestinal nematodes of sheep and roe deer

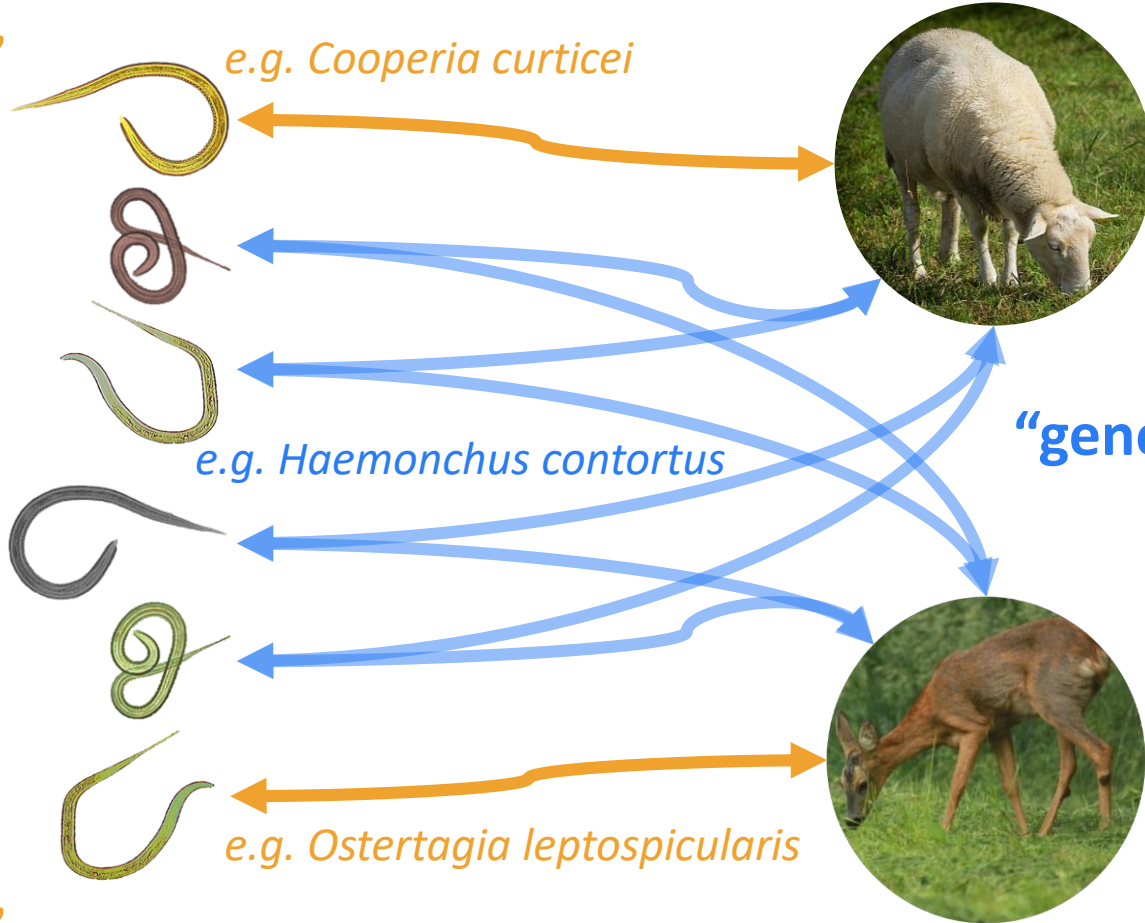
“specialist”



“specialist”

The gastrointestinal nematodes of sheep and roe deer

“specialist”



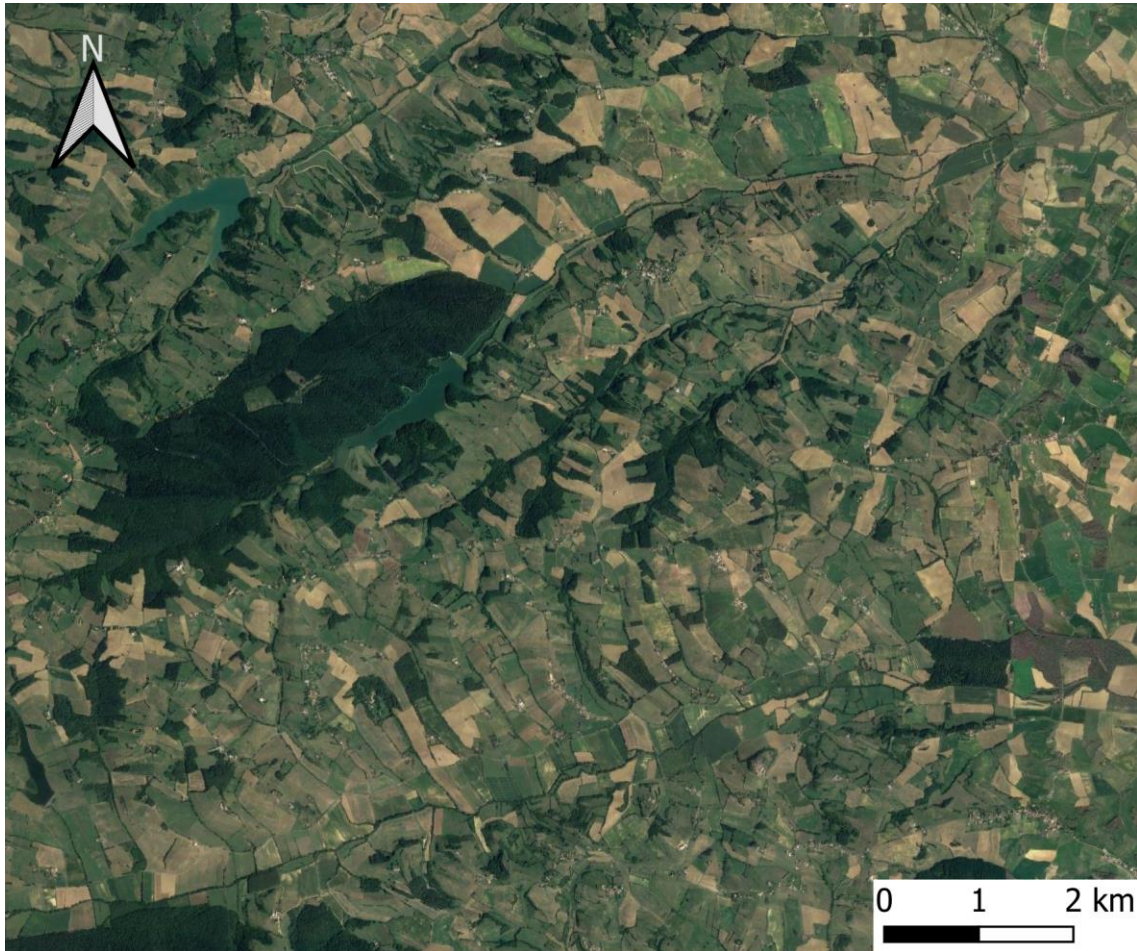
“generalist”

- Drugs
- Fences
- Rotational grazing

- No control
- Few recent studies

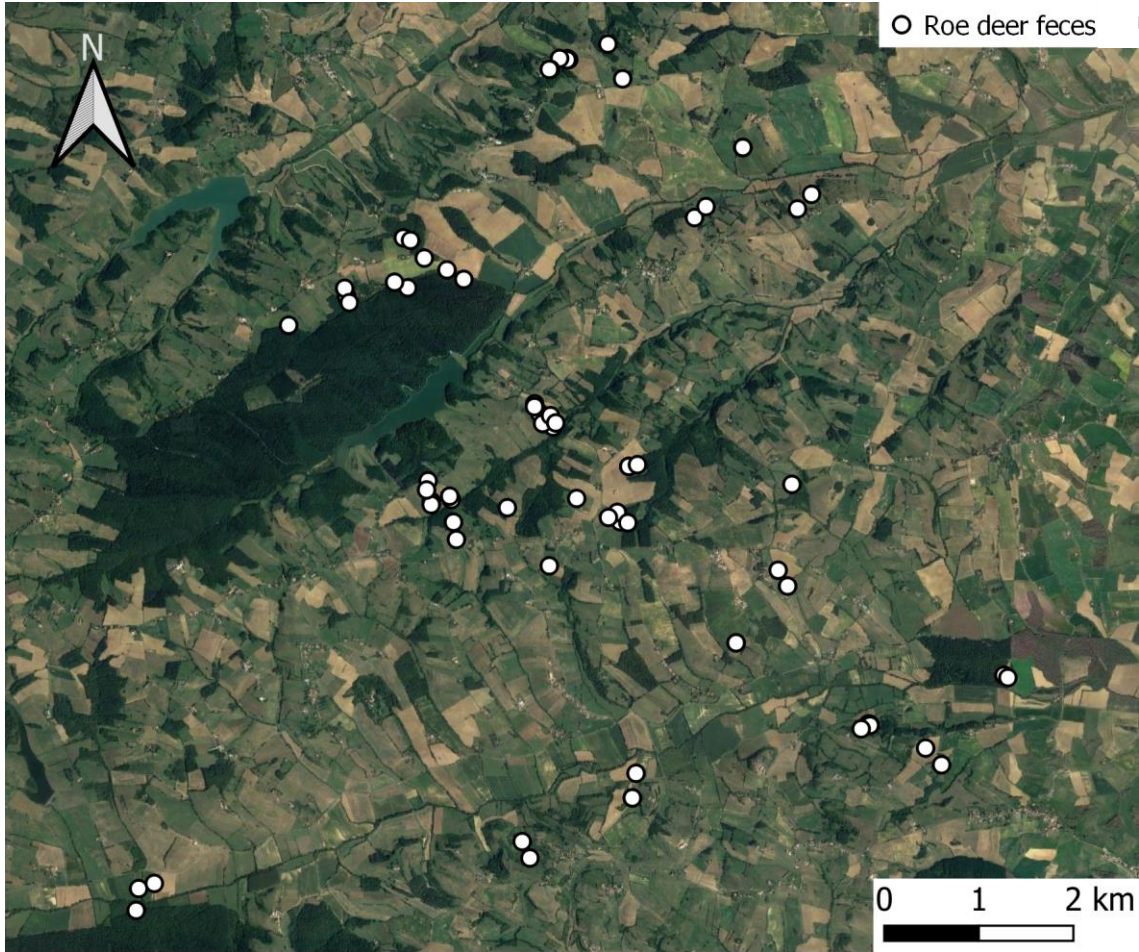
“specialist”

The sheep and roe deer samples in the study area



rural landscape

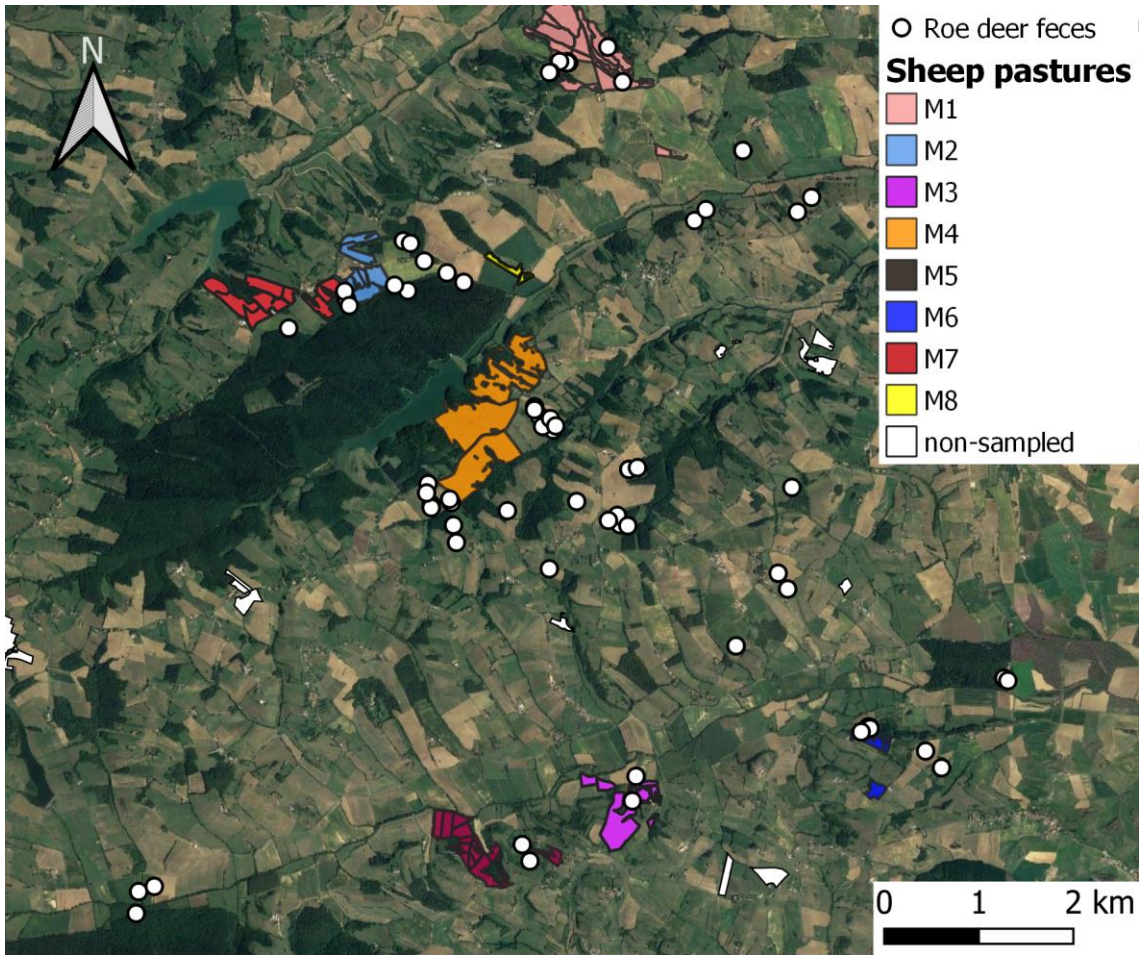
The sheep and roe deer samples in the study area



→ From captured roe deer or on the ground

rural landscape

The sheep and roe deer samples in the study area



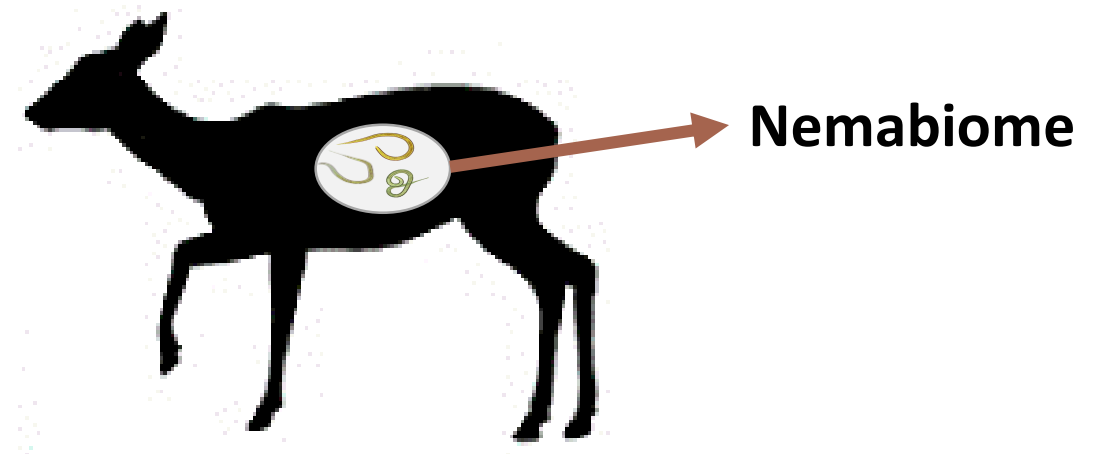
→ From captured roe deer or on the ground

- Different anthelmintic treatment
- Different herd size
- Different breed

rural landscape

Aim of the study

Assess the consequences of livestock on the nemabiome of a wild ungulate



Hypothesis

 **Roe deer and Sheep should have different nemabiomes**



Hypothesis

Roe deer and Sheep should have different nemabiomes



Roe deer nemabiomes should differ according to livestock proximity





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Generation of nemabiome data



sampling



Generation of nemabiome data



sampling

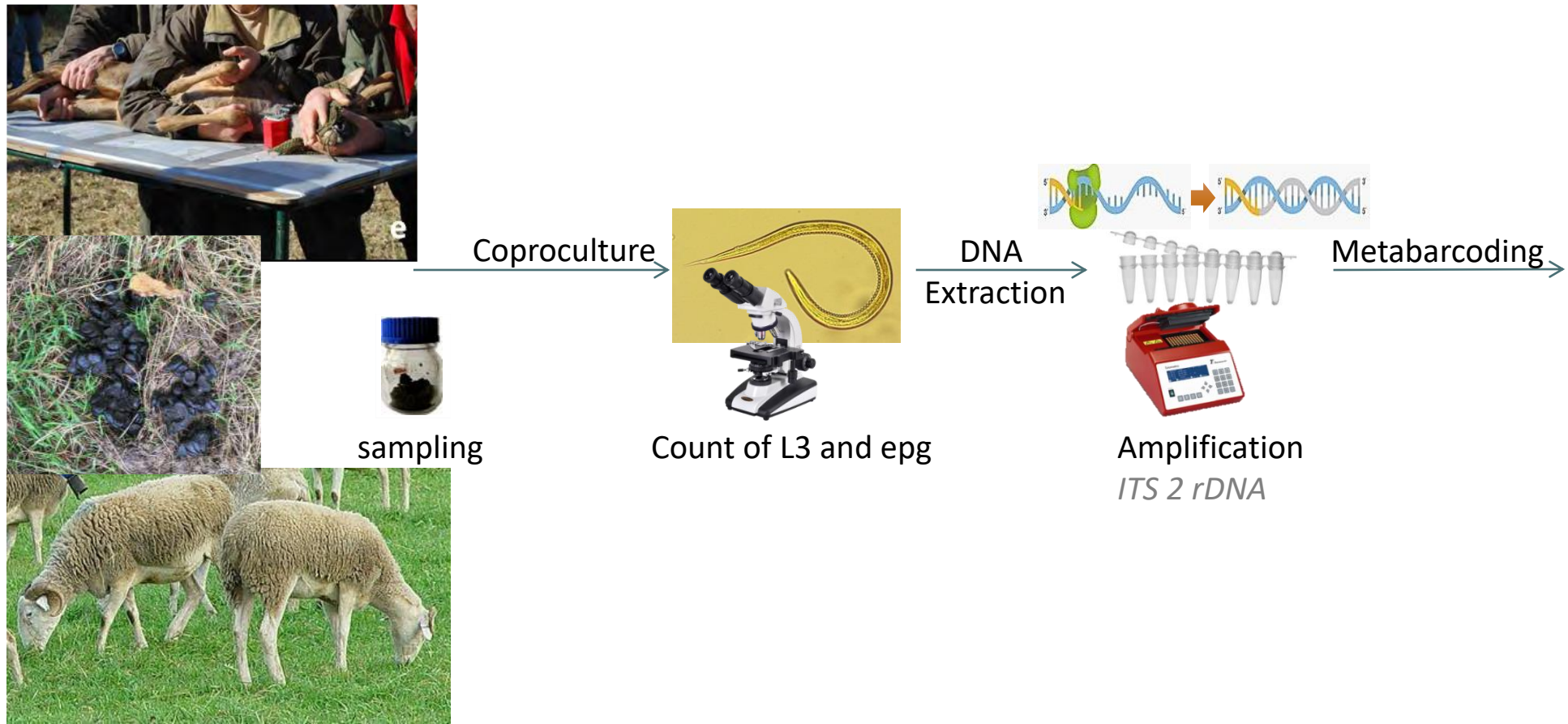


Coproculture

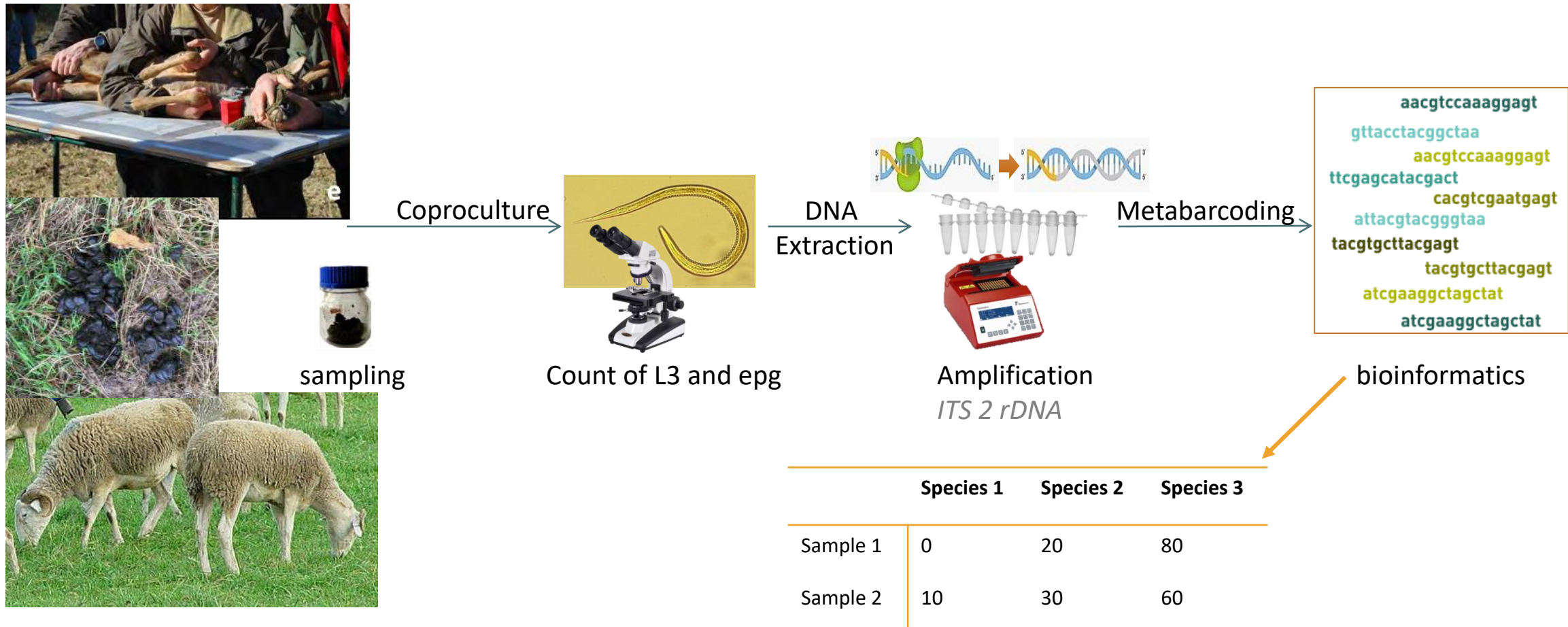


Count of L3 and epg

Generation of nemabiome data

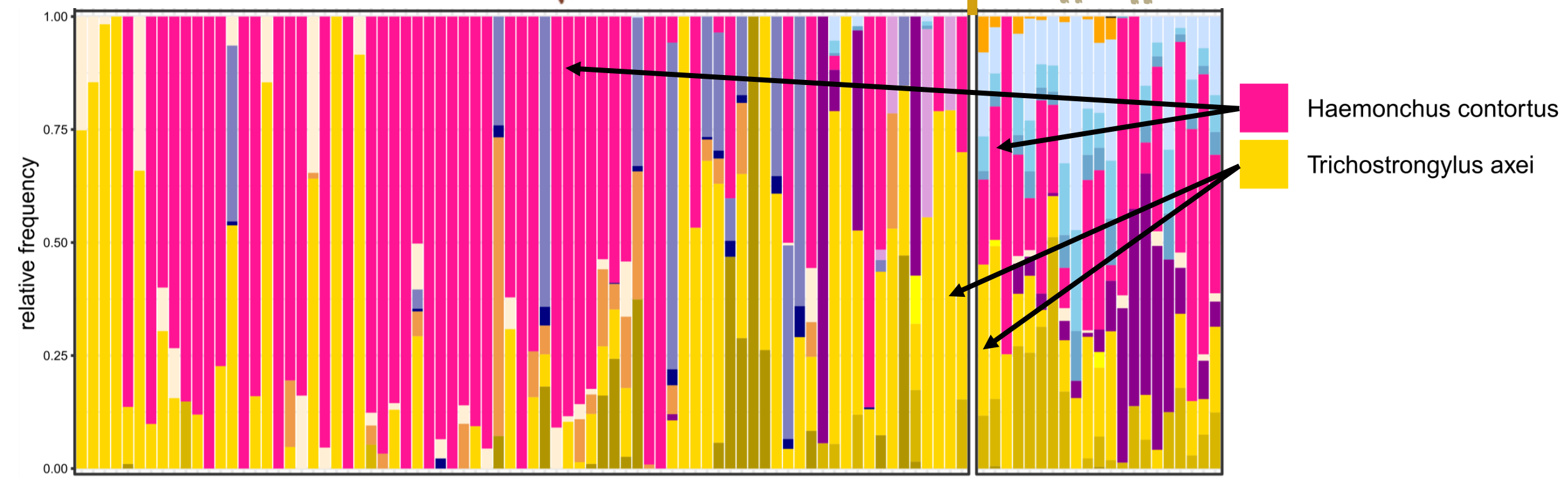


Generation of nemabiome data





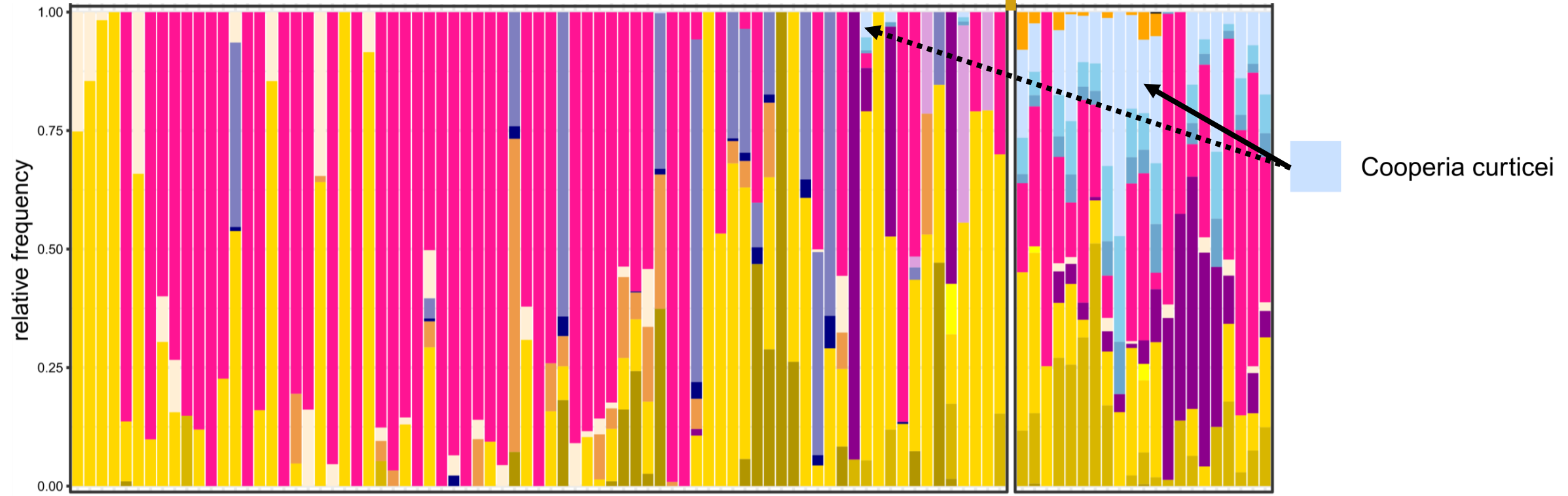
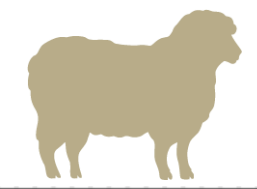
H1: Roe deer and Sheep should have different nemabiomes





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H1: Roe deer and Sheep should have different nemabiomes

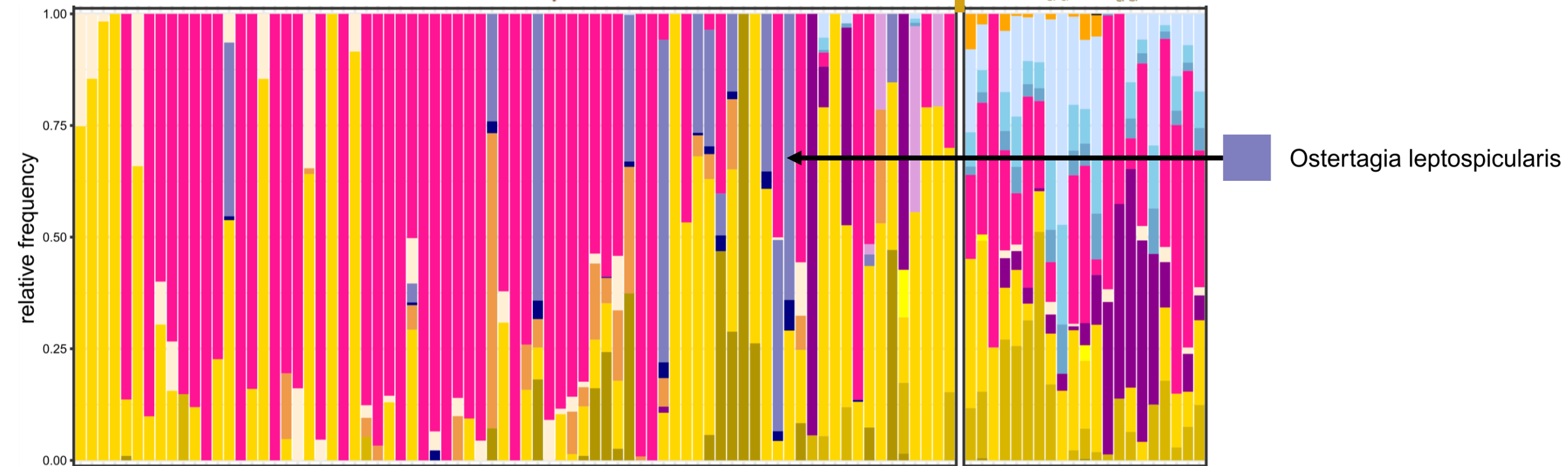
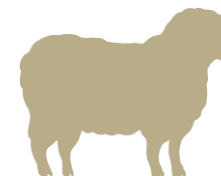




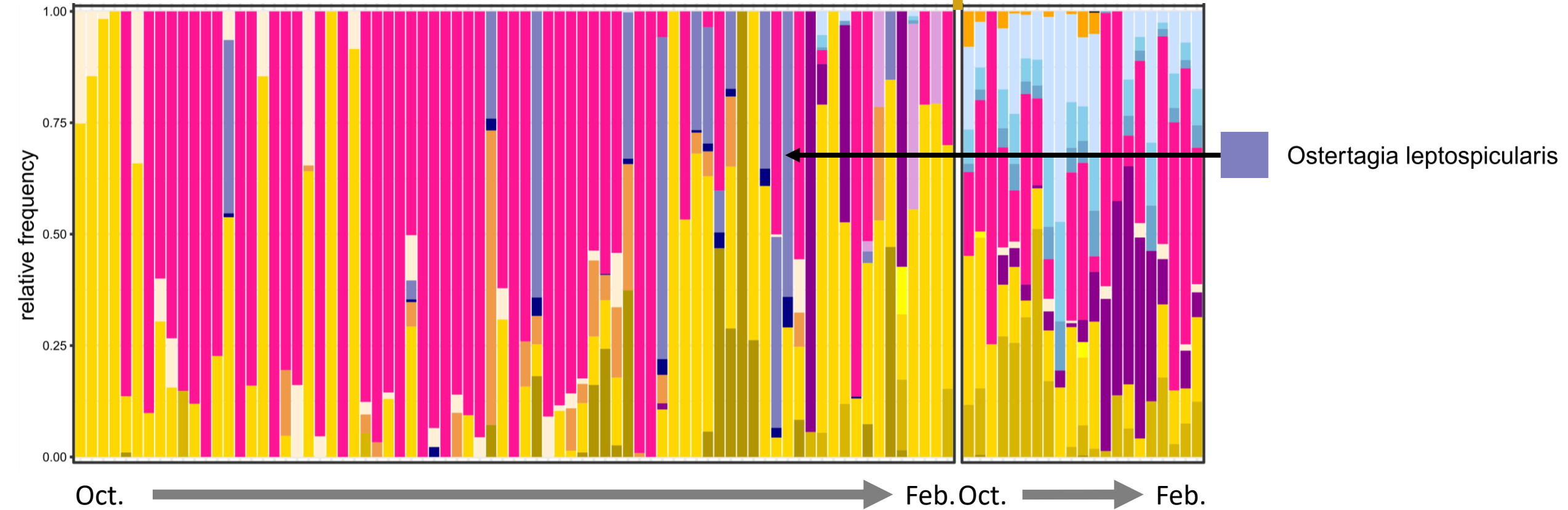
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H1: Roe deer and Sheep should have different nemabiomes

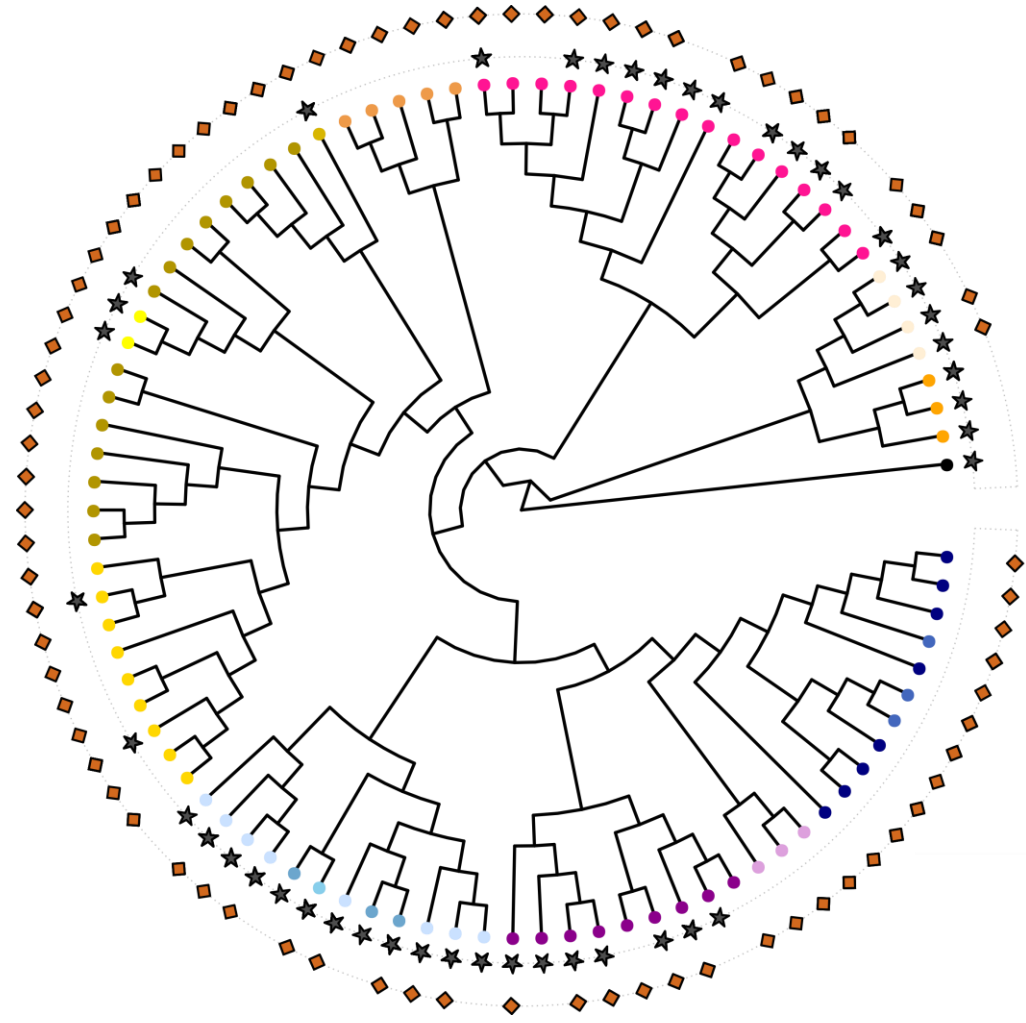
10



H1: Roe deer and Sheep should have different nemabiomes



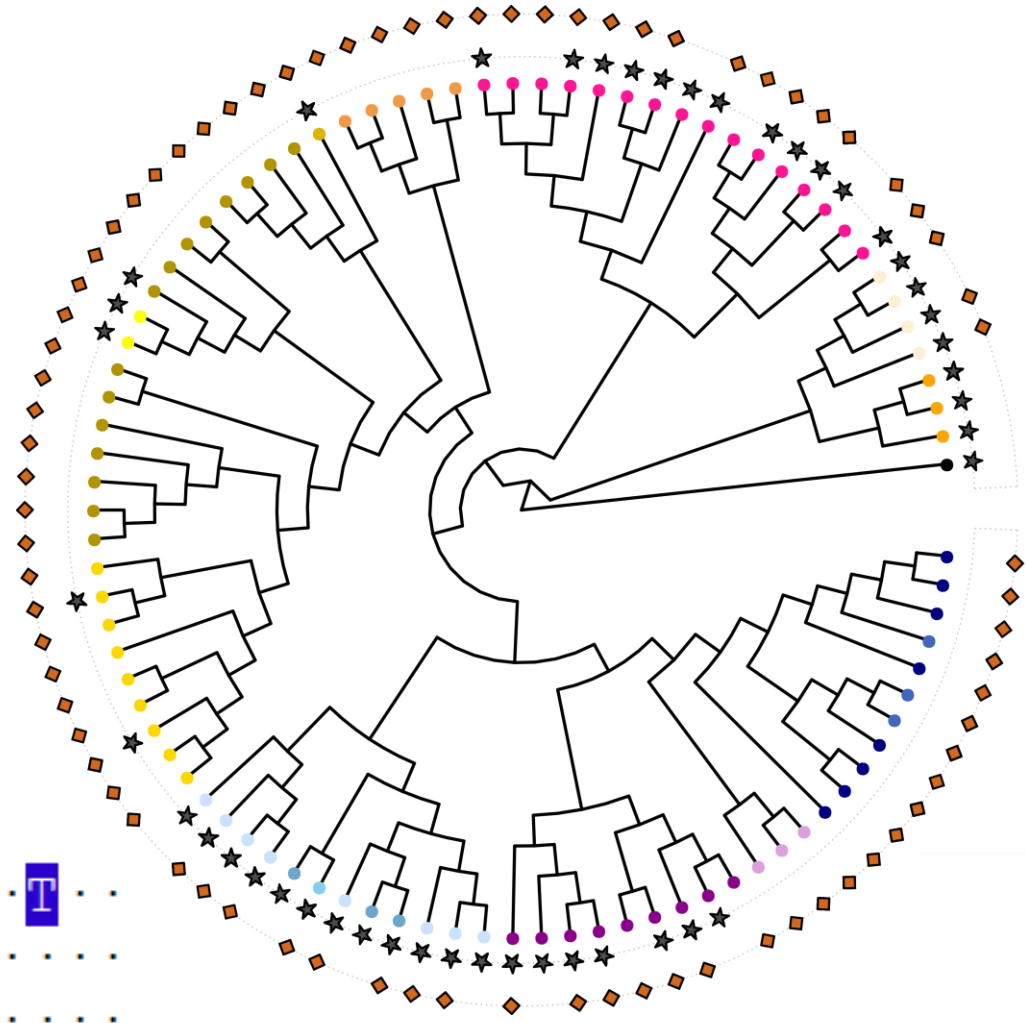
H1: Roe deer and Sheep should have different nemabiomes



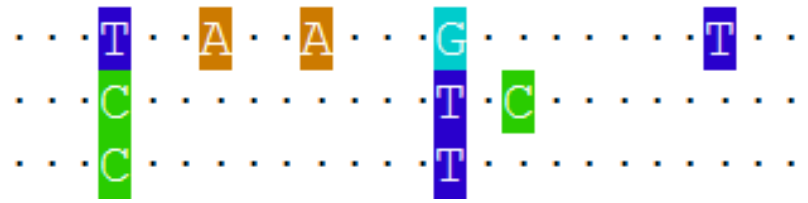


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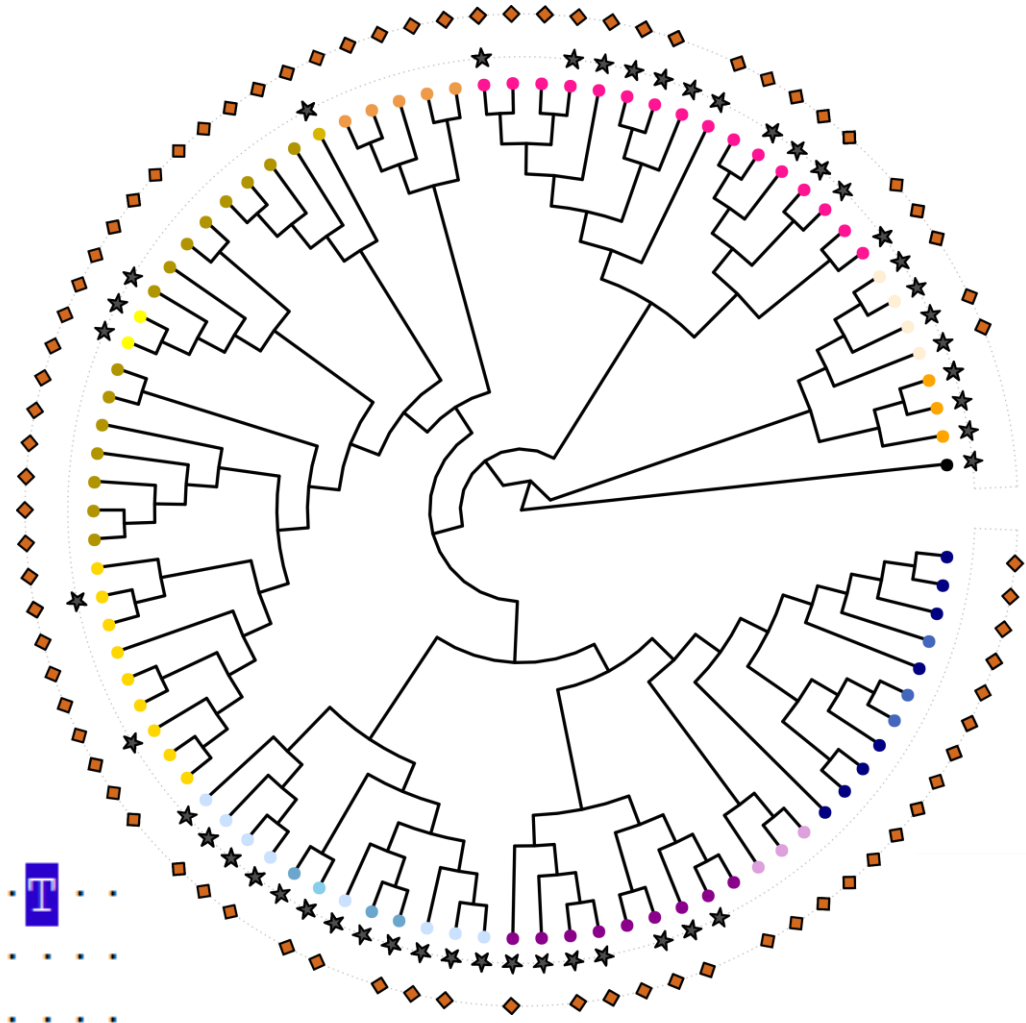
H1: Roe deer and Sheep should have different nemabiomes



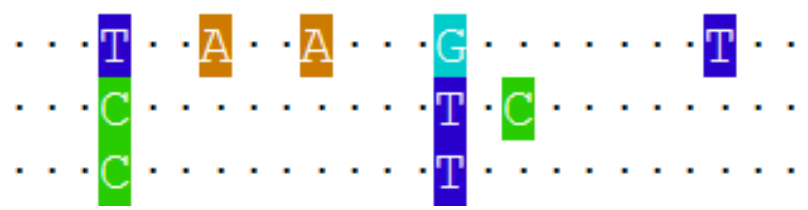
- *T. circumcincta*
- *H. contortus*
- *S. spiculoptera*



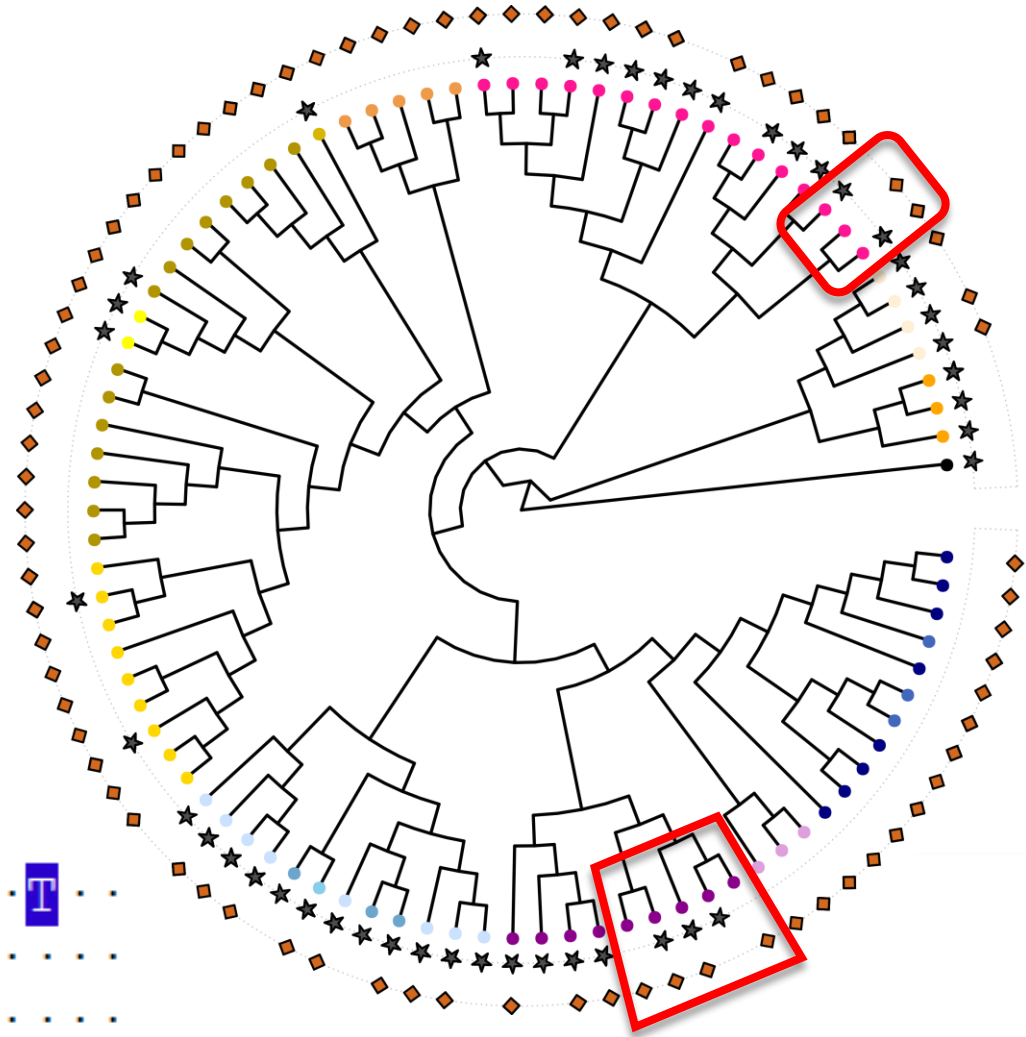
H1: Roe deer and Sheep should have different nemabiomes



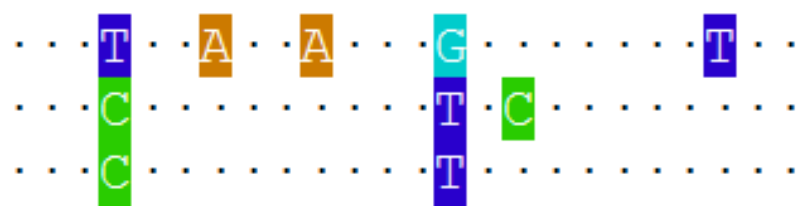
- *T. circumcincta*
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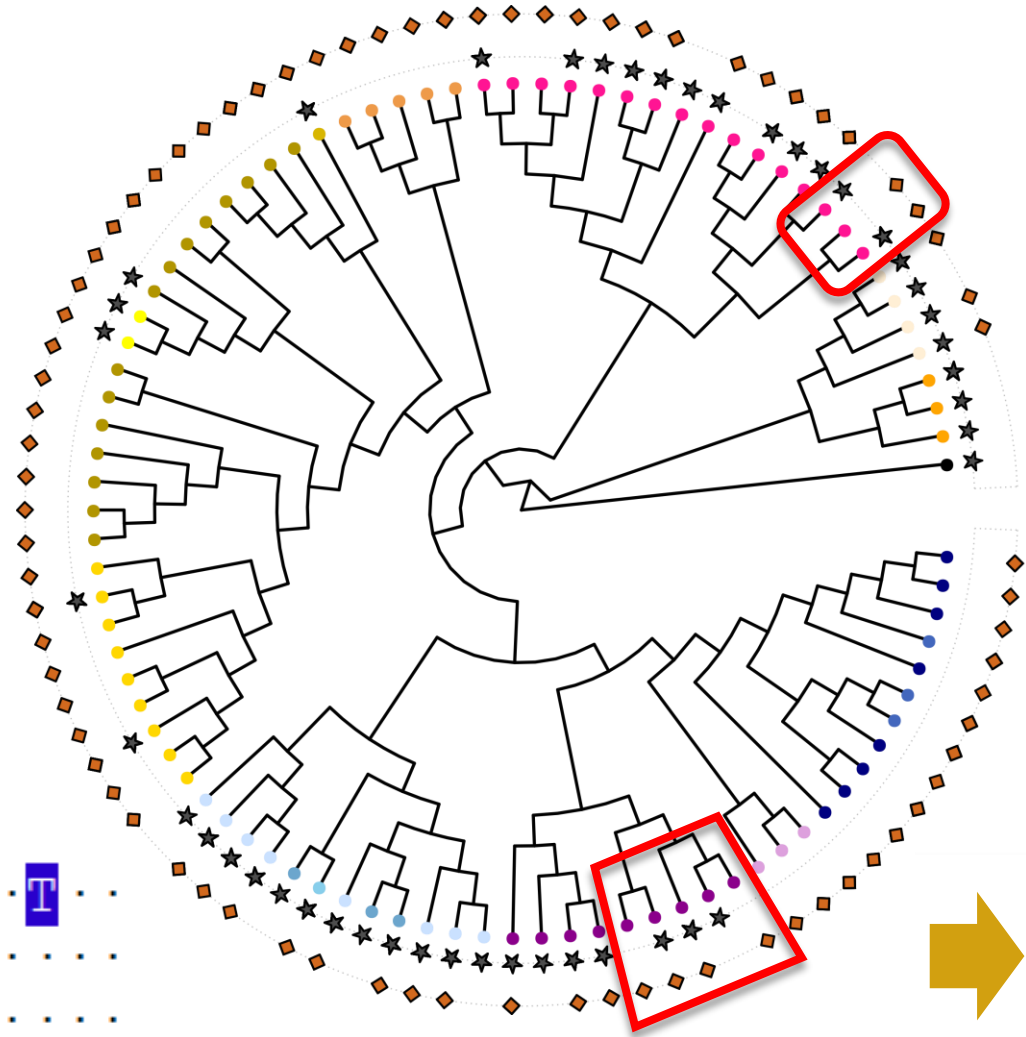
H1: Roe deer and Sheep should have different nemabiomes



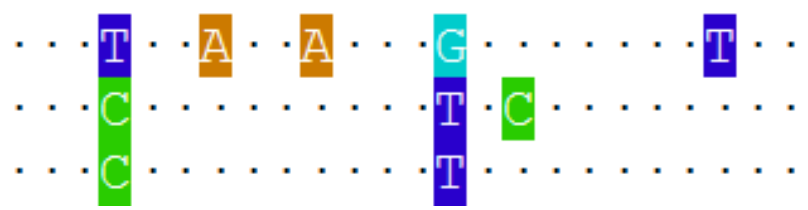
- *T. circumcincta*
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H1: Roe deer and Sheep should have different nemabiomes



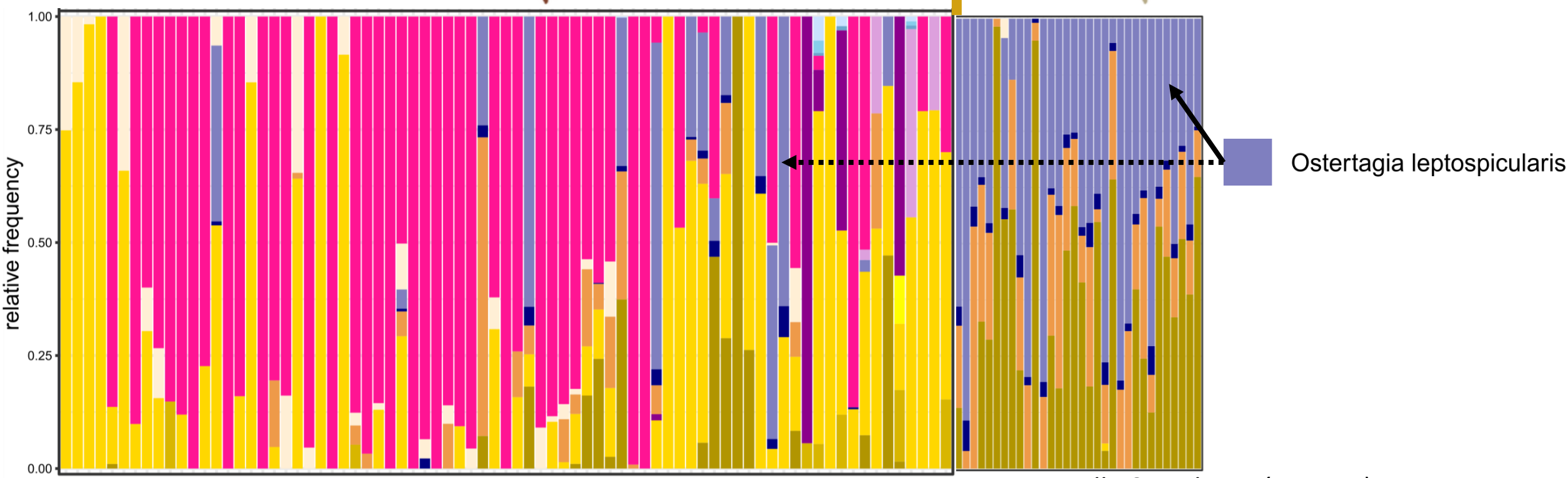
- *T. circumcincta*
- *H. contortus*
- *S. spiculoptera*



Higher diversity in roe deer
Different nemabiomes



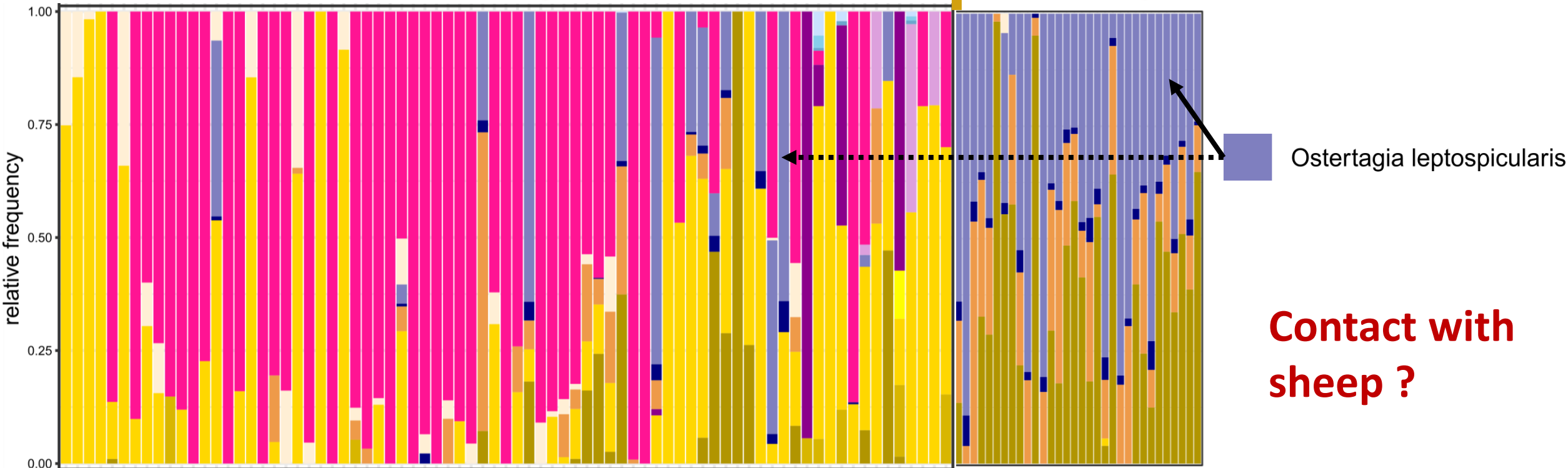
H2: Roe deer nemabiomes should differ according to livestock proximity



Beaumelle & Redman (in prep.)

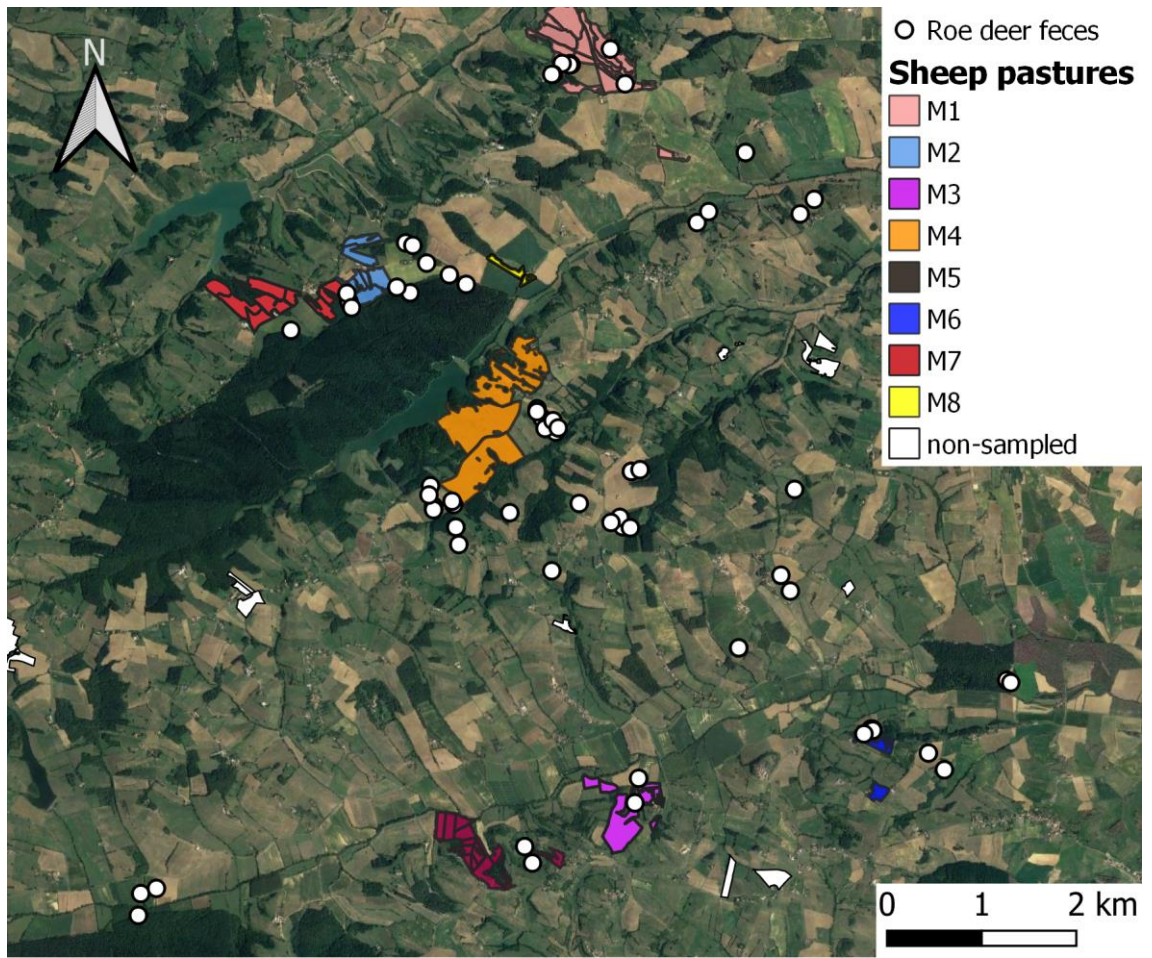


H2: Roe deer nemabiomes should differ according to livestock proximity

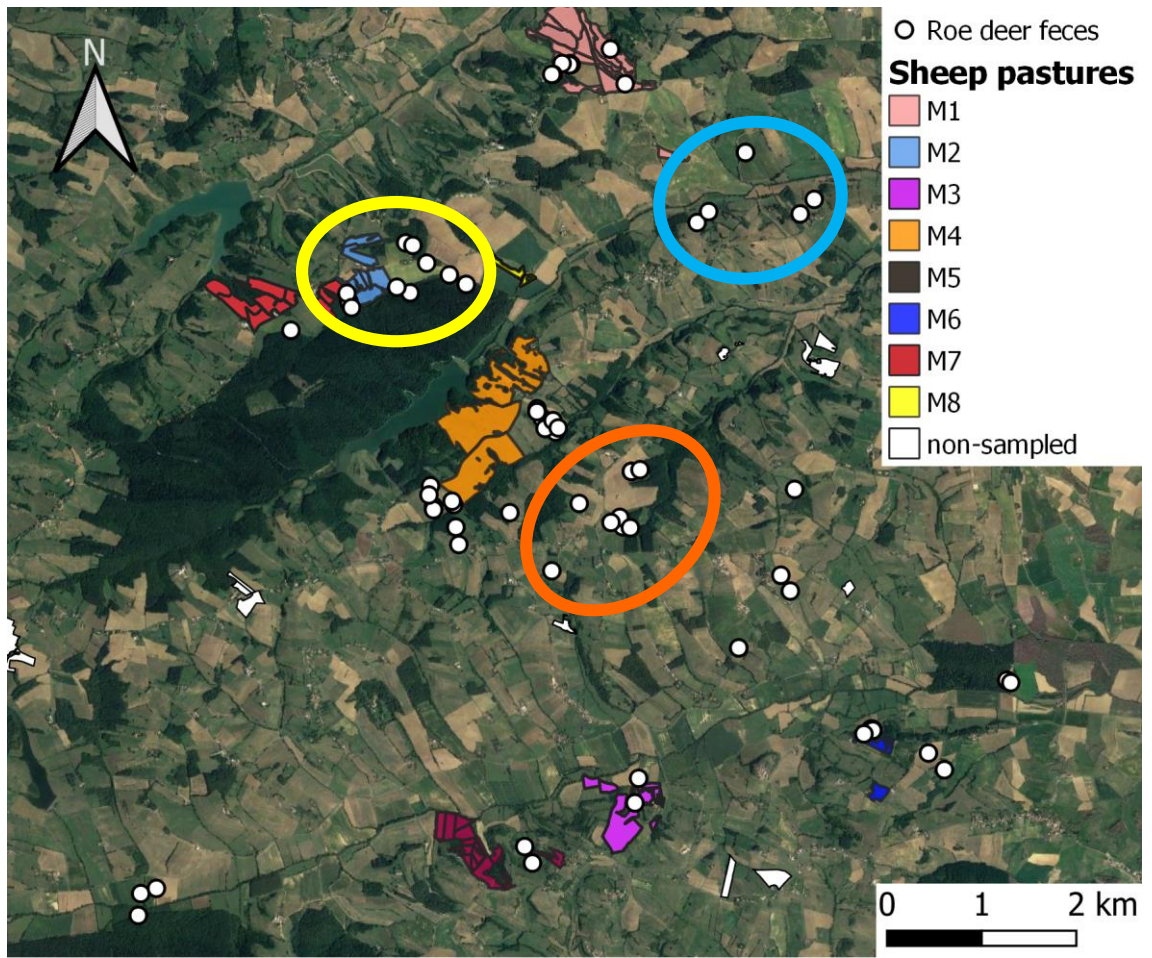


Beaumelle & Redman (in prep.)

H2: Roe deer nemabiomes should differ according to livestock proximity

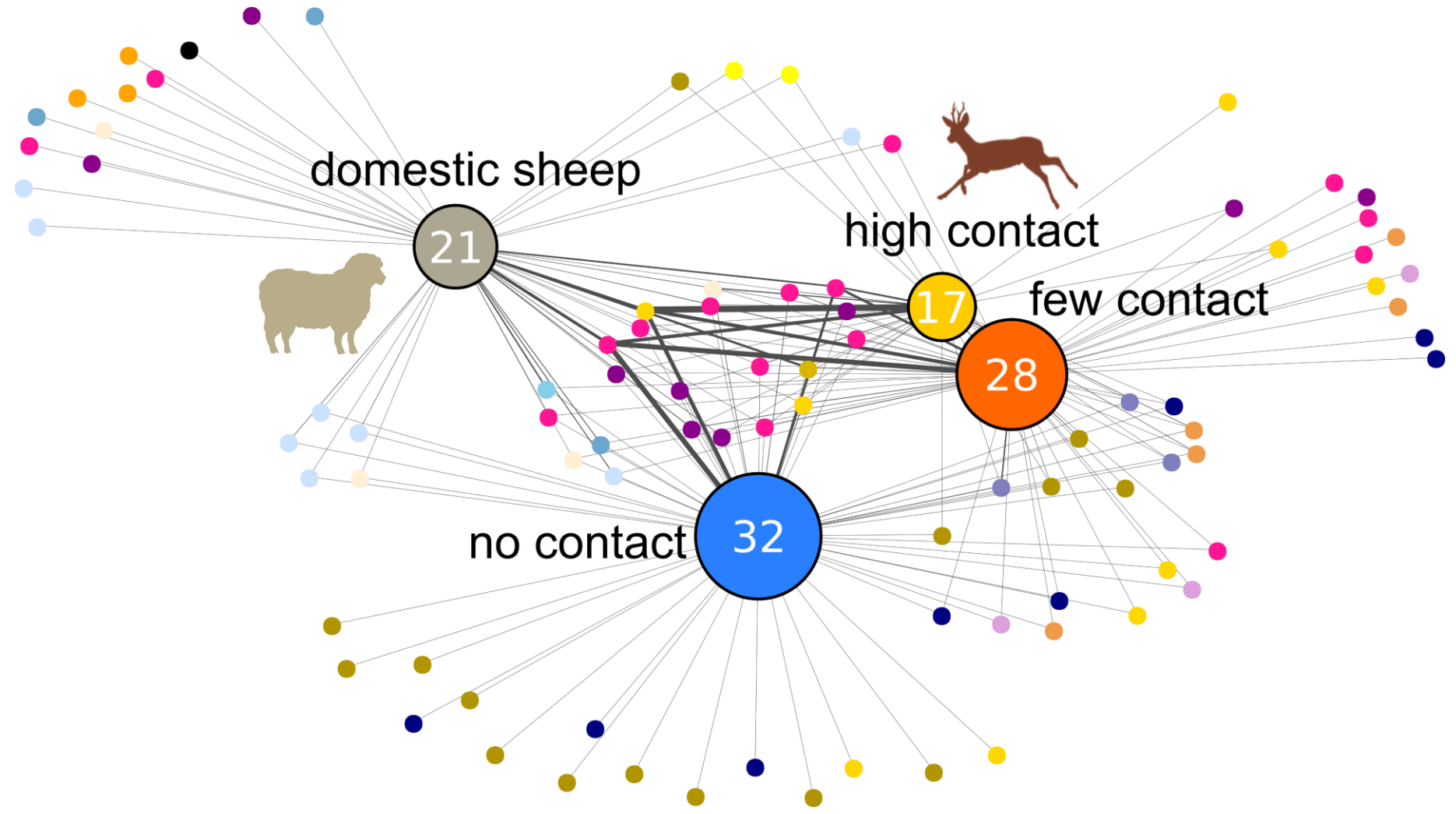


H2: Roe deer nemabiomes should differ according to livestock proximity



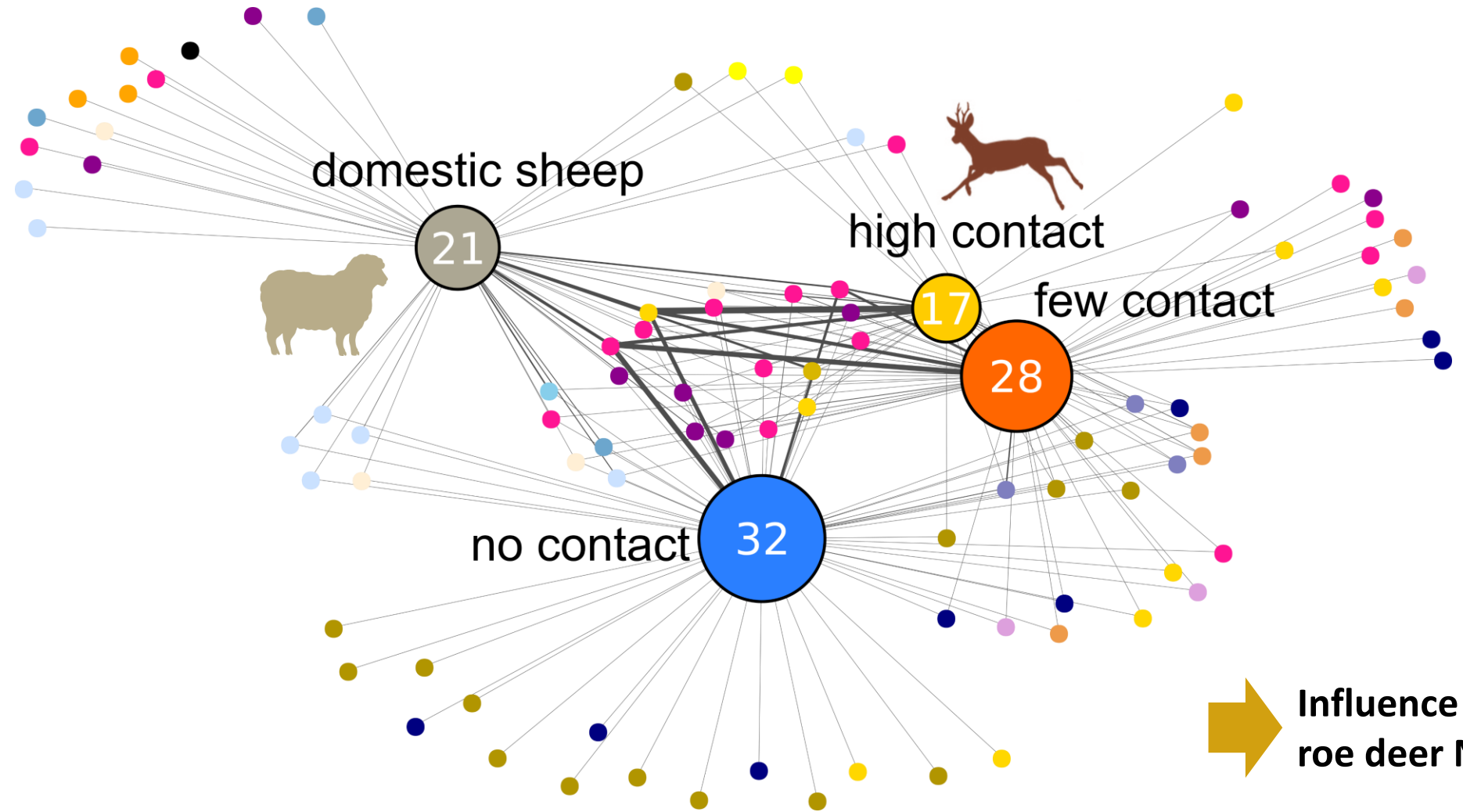


H2: Roe deer nemabiomes should differ according to livestock proximity





H2: Roe deer nemabiomes should differ according to livestock proximity



➔ Influence of sheep pasture on roe deer Nemabiome

Conclusion & future work

- **Roe deer and Sheep have similar gastrointestinal nematodes species but different genetic variants**
- **Roe deer living in the vicinity of sheep pastures have different nemabiomes compared to those with no contact**
- **Investigation of other landscape features and the cross-transmission of gastrointestinal nematodes resistant to anthelmintic tr**



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Thanks for your attention

Any question ?

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camille.beaumelle@univ-smb.fr

Camille Beaumelle