

# Reduced Eimeria and pinworms loads in hybrid mice of the European house mouse hybrid zone

Alice Balard<sup>1,2</sup>, Victor Hugo Jarquín-Díaz<sup>1,2</sup>, Jenny Jost<sup>1</sup>, Iva Martincová<sup>3</sup>, Ludovít Ďureje<sup>3</sup>, Jaroslav Piàlek<sup>3</sup>, Miloš Macholán<sup>4</sup>, Joëlle Goüy de Bellocq<sup>3</sup>, Stuart J.E. Baird<sup>3</sup>, and Emanuel Heitlinger<sup>1,2</sup>

<sup>1</sup>Institute for Biology, Department of Molecular Parasitology, Humboldt University Berlin (HU), Philippstr. 13, Haus 14, 10115, Berlin, Germany

<sup>2</sup>Leibniz-Institut für Zoo- und Wildtierforschung (IZW) im Forschungsverbund Berlin e.V., Alfred-Kowalke-Straße 17, 10315, Berlin, Germany

<sup>3</sup>Research Facility Studenec, Institute of Vertebrate Biology, Czech Academy of Sciences, Květná 8, 603 65 Brno, Czech Republic

<sup>4</sup>Laboratory of Mammalian Evolutionary Genetics, Institute of Animal Physiology and Genetics, Czech Academy of Sciences, Veverí 97, 60200 Brno, Czech Republic

## General

- Parasite models:
  - *Eimeria* spp., obligate intracellular parasite (Apicomplexa: Coccidia). **High impact on host health expected**
  - Pinworms (*Aspiculuris tetraptera* and *Syphacia obvelata*). **Low impact on host health expected**
- Host model: *Mus musculus domesticus*, *Mus musculus musculus* and their hybrids
- Aim of the study:  
**Investigating hybrid susceptibility/resistance of house mice to parasites presenting different pathogenicity, using prevalence and intensity data throughout the European house mouse hybrid zone**

## Material & Methods

- Sampling 660 mice over 4 years; Host genotyping (4-14 diagnostic markers) on a 0 to 1 scale (50/50 hybrids = 0.5)
- *Eimeria* load estimated by quantitative PCR
- Pinworm (*Aspiculuris tetraptera* and *Syphacia obvelata*) load estimated by count
- Modelling of parasite load along hybridization index, test hybrid effect
- Logistic regression presence/absence of parasite in direction of the hybrid zone center
- Body condition (residuals body length/body weight) between infected/non infected + along gradient of hybridicity

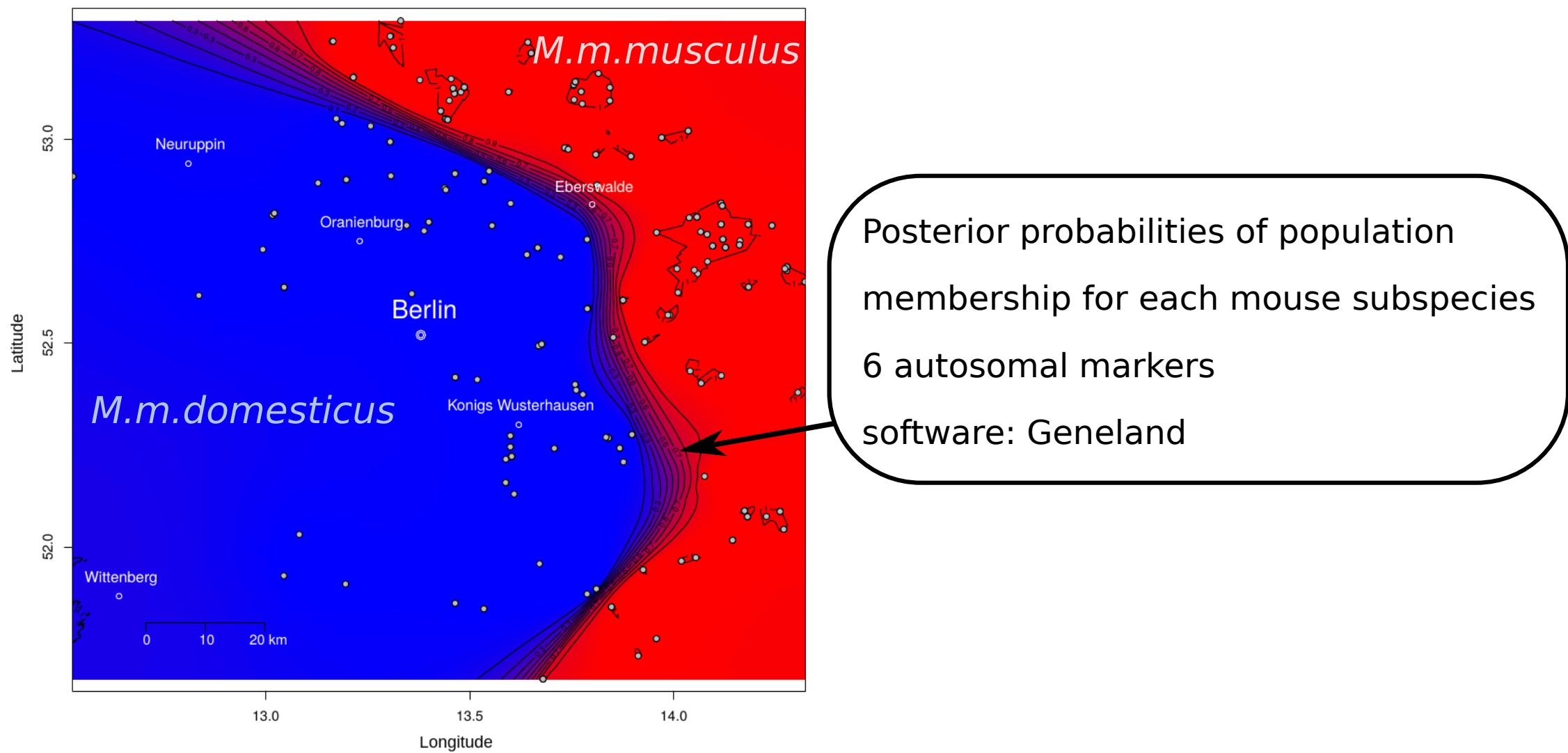


Fig. 1: Map of sub species separation in our sampling area

## Results: Eimeria spp. and pinworm load lower in hybrids than in parental mice

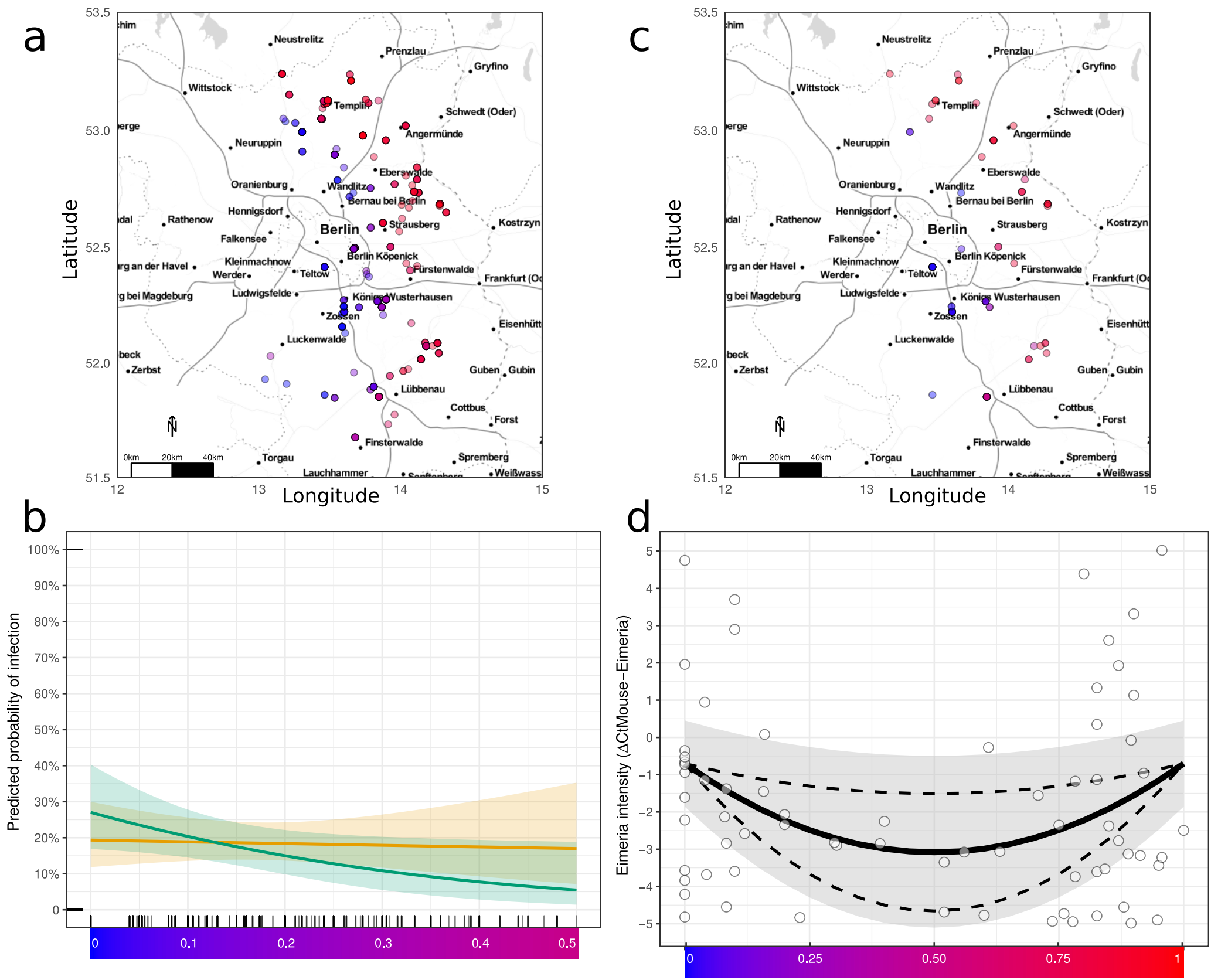


Fig. 2: Eimeria

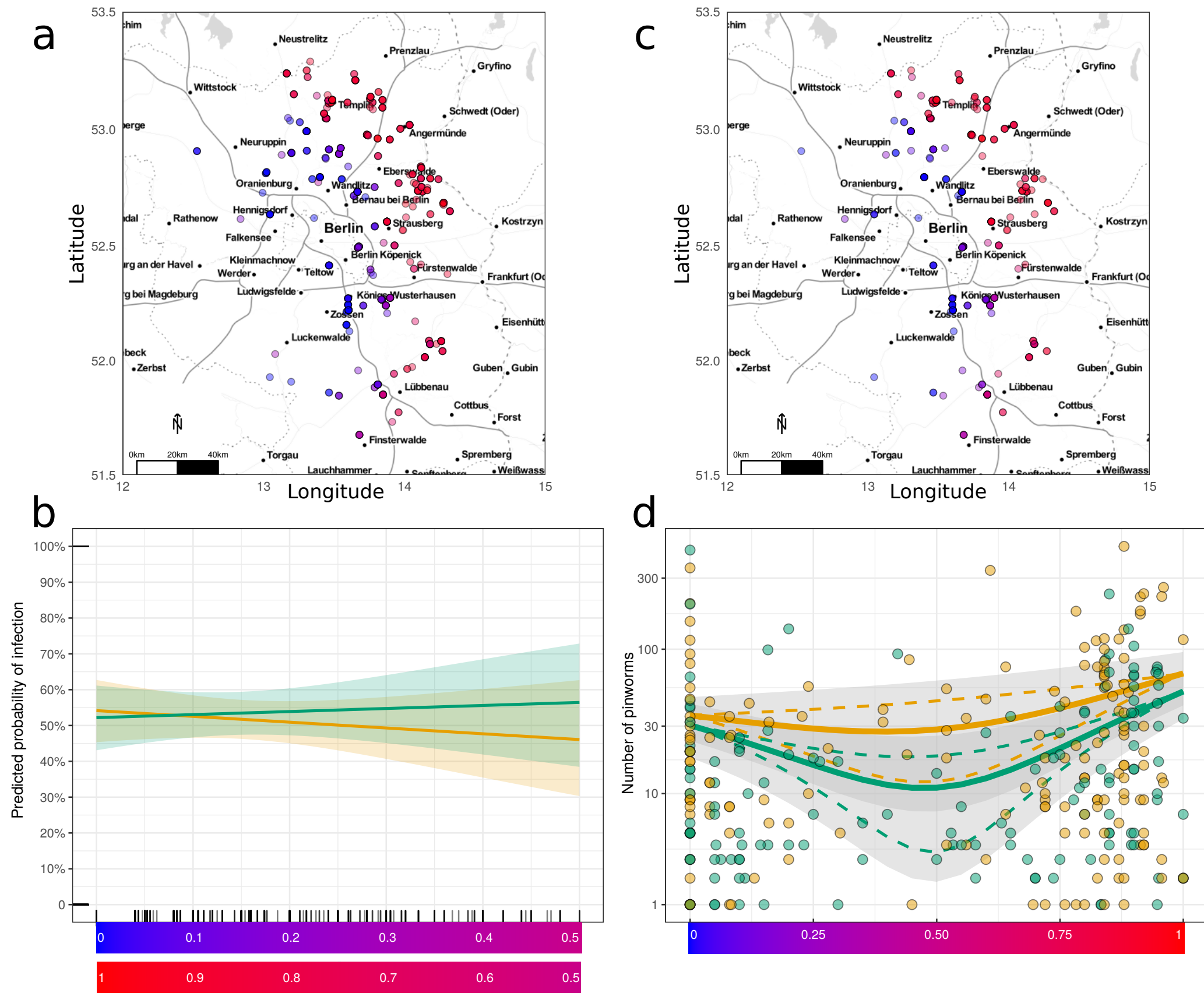


Fig. 3: Pinworms

- (a) Maps of all individuals (b) Predicted probability of infection when approaching the hybrid zone center  
(c) Maps of positive individuals (d) Prediction of parasite intensity along the hybrid index  
males (green)/females (orange)

- No indication of differential body condition between infected/non infected: no evidence of different impacts on hybrid vs. parental hosts health

## Conclusion

- Increased resistance of hybrid mice compared to parental strains for both lower pathogenic parasite (pinworms) and high pathogenic one (*Eimeria*)
- Control for density troughs: no evidence of a lower parasite prevalence in the centre of the hybrid zone (exclude external ecological epidemiological factors)
- **Independance** of hybrid resistance from the parasite pathogenicity level

## References

Balard *et al.* (unpublished) Reduced *Eimeria* and pinworms loads in hybrid mice of the European house mouse hybrid zone  
R package used for modelling: Balard, A., and E. Heitlinger. 2019. Alicabalard/parasiteLoad DOI: 10.5281/zenodo.2535547