

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

Alice Balard^{1,2}, Victor Hugo Jarquín-Díaz^{1,2}, Jenny Jost¹, Iva Martinová³, Ludovít Ďureje³, Jaroslav Piálek³, Miloš Macholán⁴, Joëlle Goüy de Bellocq³, Stuart J.E. Baird³, and Emanuel Heitlinger^{1,2}

¹Institute for Biology. Department of Molecular Parasitology. Humboldt University Berlin, Germany

²Leibniz Institute for Zoo and Wildlife Research, Berlin, Germany

³Research Facility Studenec, Institute of Vertebrate Biology, Czech Academy of Sciences, Czech Republic

⁴Laboratory of Mammalian Evolutionary Genetics, Institute of Animal Physiology and Genetics, Czech Academy of Sciences, 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 in a new transect of 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
- Modellisation of parasite load along hybridization index, test hybrid effect by maximum likelihood
- 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

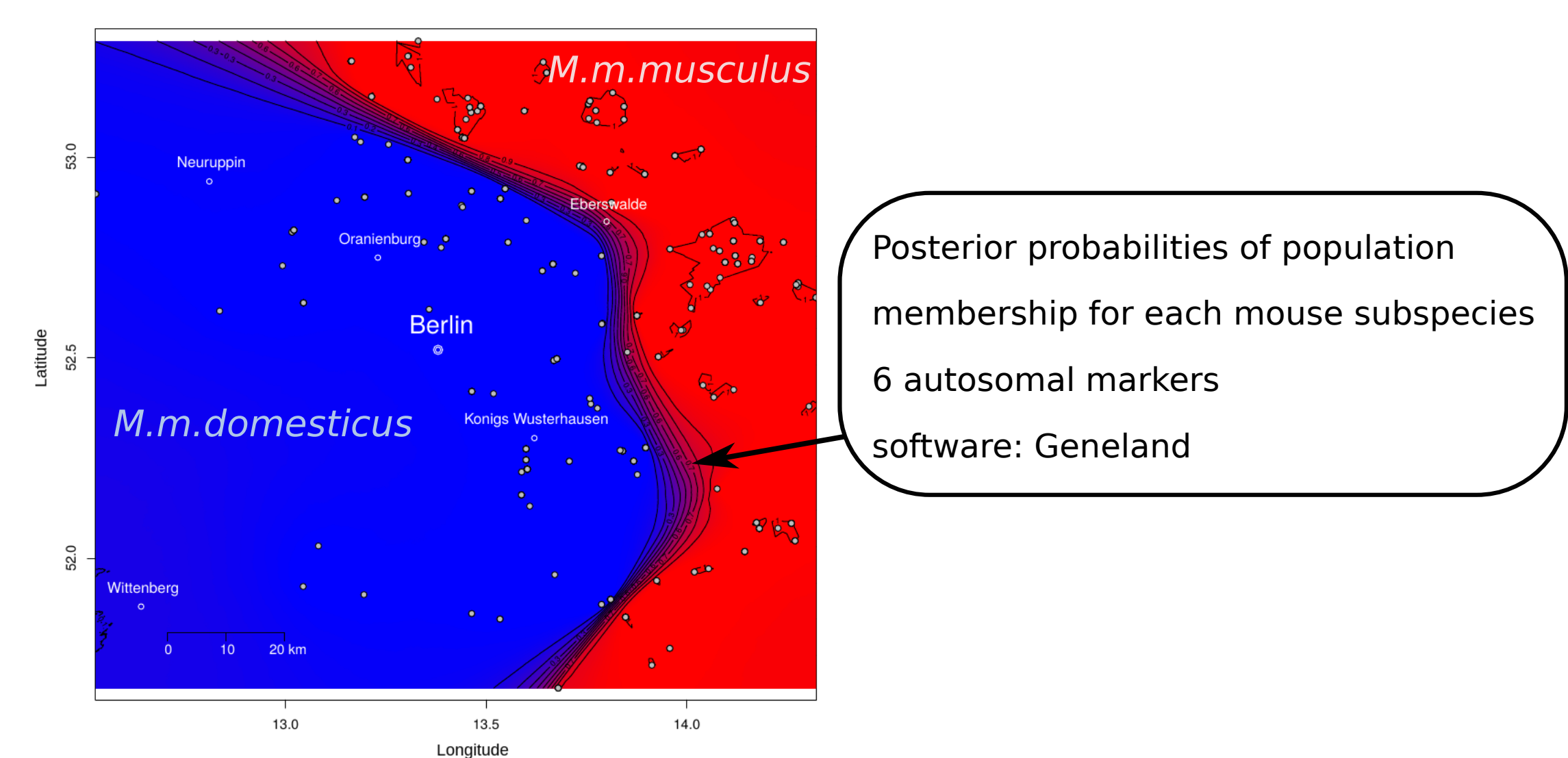


Fig. 1: Map of sub species separation in our sampling area (Berlin-Brandenburg, Germany)

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

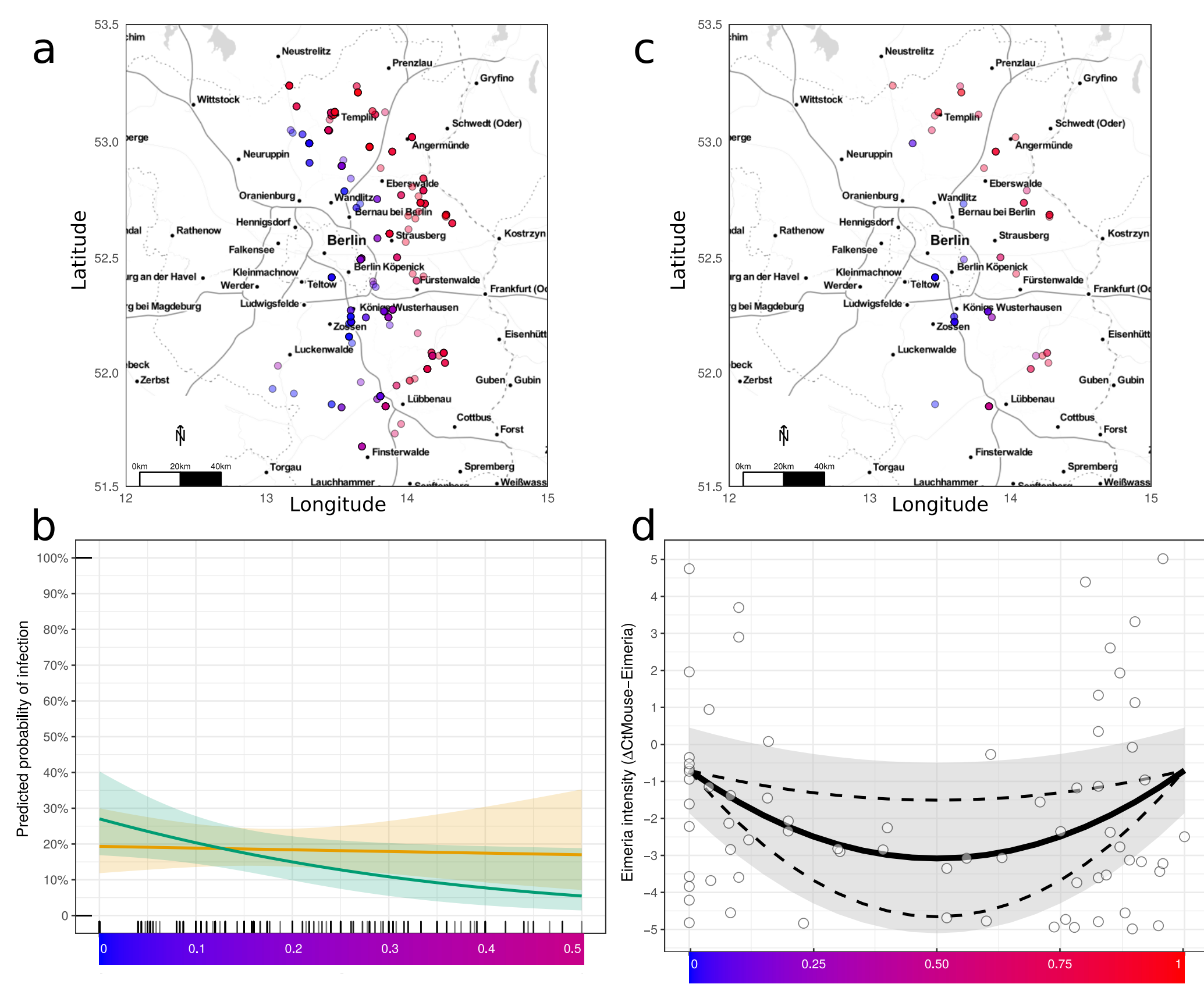


Fig. 2: Eimeria

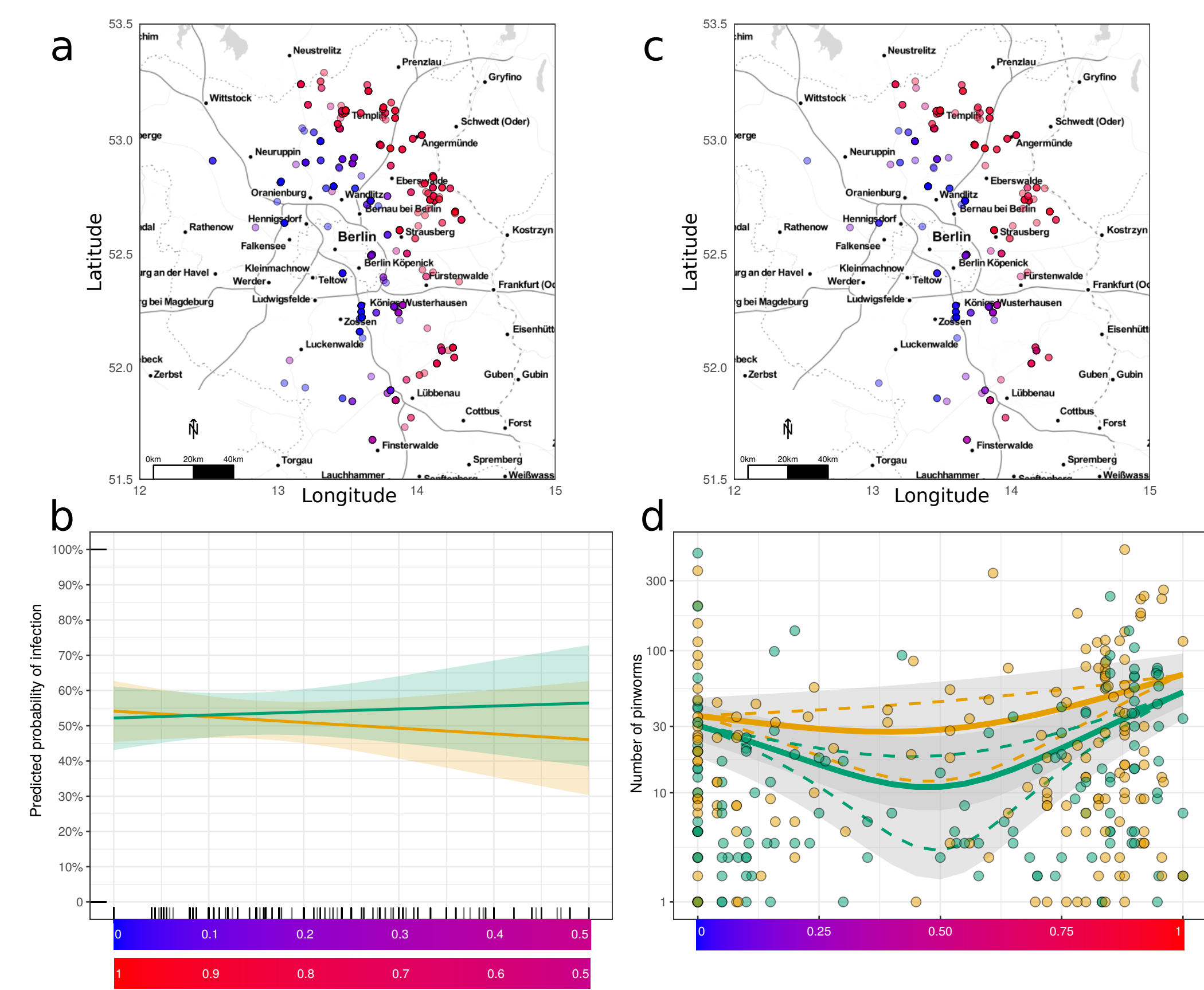


Fig. 3: Pinworms

(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. Alicebalard/parasiteLoad DOI: 10.5281/zenodo.2535547

