

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 Martincová³, 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

* contact: alice.cam.balard@gmail.com

Testing parasite resistance in *Mus musculus domesticus*, *M. m. musculus* and their hybrids

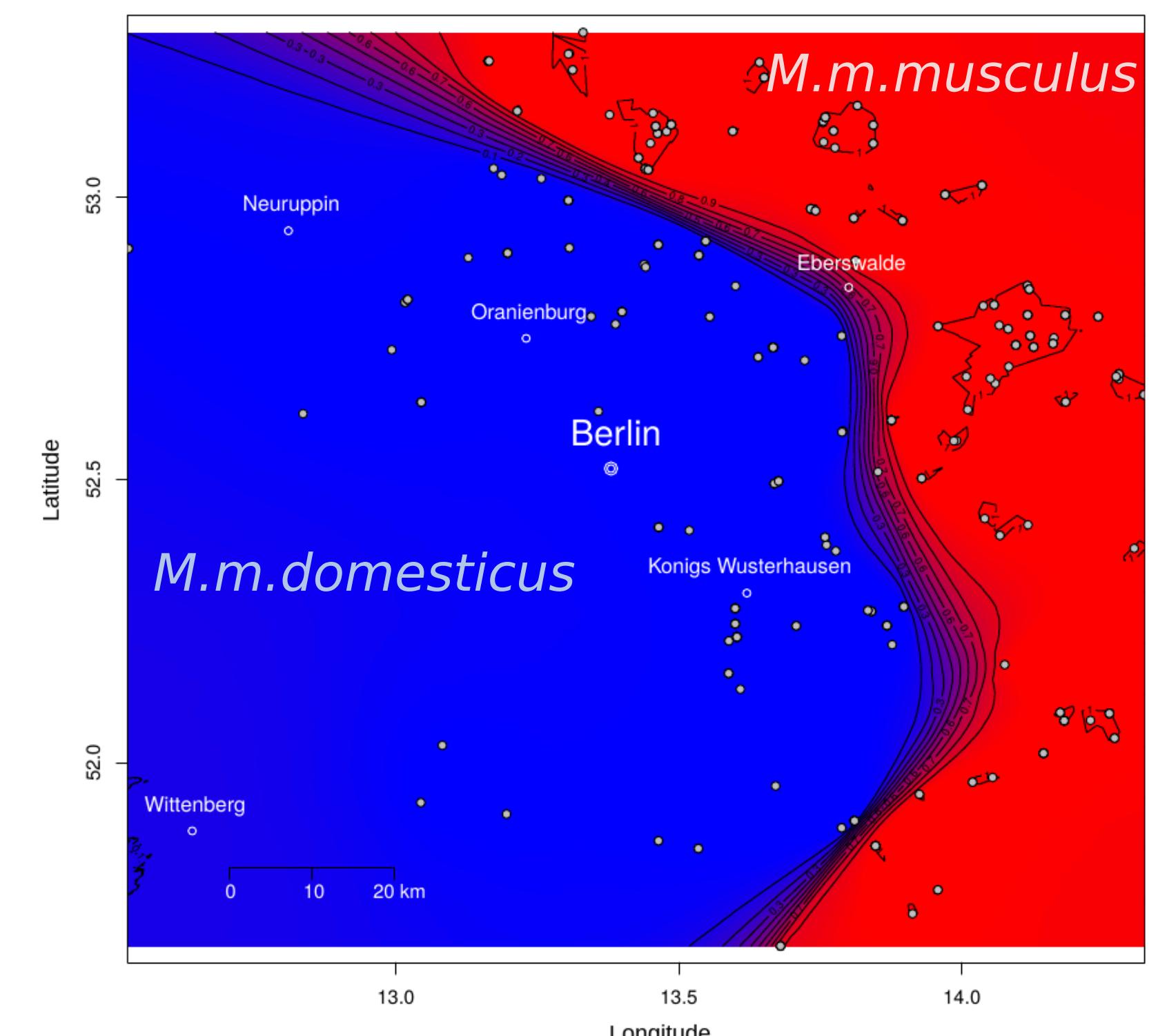
• Parasite models:

- *Eimeria* spp., obligate intracellular parasite (Apicomplexa: Coccidia). **High impact on host health expected**
- Pinworms (*Aspiruluris tetraptera* and *Syphacia obvelata*). **Low impact on host health expected**

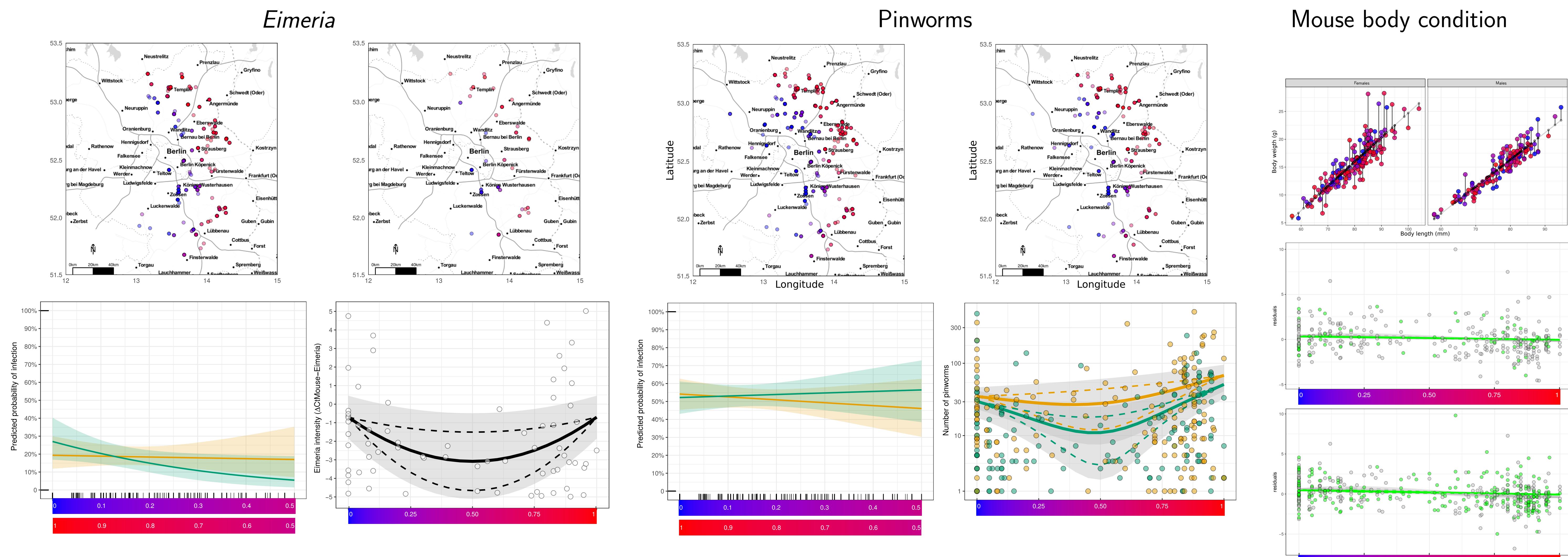
• Aim of the study: **Investigating hybrid susceptibility/resistance of house mice to parasites presenting different pathogenicity, using prevalence and intensity data in a new transect of the European house mouse hybrid zone**

Material & Methods

- Sampling 660 mice over 4 years; Host genotyping (4-14 diagnostic markers) on a 0 to 1 scale (equal admixture hybrids = 0.5)
- *Eimeria* load estimated by quantitative PCR
- Pinworm 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. Modellisation of body condition along hybridization index, test hybrid effect by maximum likelihood, test difference between infected/non-infected



Eimeria spp. and pinworm loads are lower in hybrids than in parental mice



- Similar parasite prevalence along the hybrid index
- Statistically significant lower parasite load in the center of the hybrid zone
- No indication of differential body condition between infected/non-infected / along hybrid gradient

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)
- Independence 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