Cichlidogyrus infection may reveal a role of parasites in an adaptive radiation

Gobbin, Tiziana; Vanhove, Maarten; Maan, Martine; Seehausen, Ole

Publication date:
2017

Citation for published version (APA):
Gobbin, T., Vanhove, M., Maan, M., & Seehausen, O. (2017). *Cichlidogyrus infection may reveal a role of parasites in an adaptive radiation*. Poster session presented at ESEB 2017, Groningen, Netherlands.

Cichlidogyrus infection may reveal a role of parasites in an adaptive radiation

T Gobbin[1,2,3], MPM Vanhove[4,5,6,7], ME Maan[3], O Seehausen[1,2]

Introduction

Parasites may engage in arms races with host populations, and may promote the evolutionary diversification of their hosts. Lake Victoria cichlids and their parasites are a good system to study this process. One lineage of cichlids has rapidly made a large species radiation while others have not speciated at all. Cichlids of both groups are infected by *Cichlidogyrus* spp., a cichlid-specific monogenean gill parasite that has undergone its own radiations elsewhere in Africa. We compare cichlids of a radiating and a non-radiating lineage to test predictions of diversification and co-diversification.

If *Cichlidogyrus* is involved in host diversification, then we expect

- **reduced infection abundance and lower parasite diversity in species of the radiating lineage**, resulting from specific resistance evolution.
- **different infection profiles amongst species of the radiation**.

Methods

1. *Cichlidogyrus* flatworms were isolated from gills and their morphology was assessed under a microscope.

NON-RADIATING

Astatoreochromis alluaudi

2. Conducted for six sympatric host species: an ancient endemic non-radiating species and five endemic species of the rapid radiation, which vary in their ecology (diet, water depth).

RADIATING

Labrochromis "stone" | *Neochromis omnicæruleus* | *Neochromis "unicuspid scraper"* | *Pundamilia nyererei* | *Pundamilia pundamilia*

Parasite Abundance

Cichlidogyrus abundance is higher in the non-radiating cichlid than in sympatric radiating species.
Abundance is not related to diet or water depth.

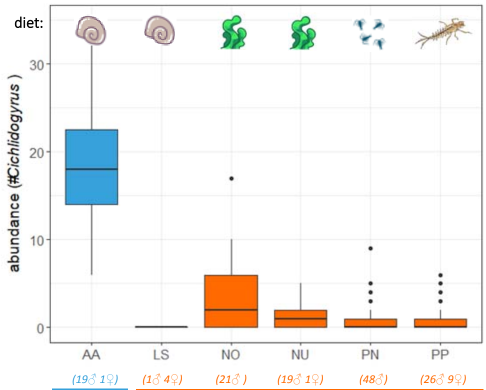

Fig. 1: *Cichlidogyrus* abundance of non-radiating and radiating hosts. Despite their ecological similarity, presumably causing similar exposure, worm load differs within molluscivores (*AA*, *LS*). Top drawings represent diet. Host sample size in brackets.

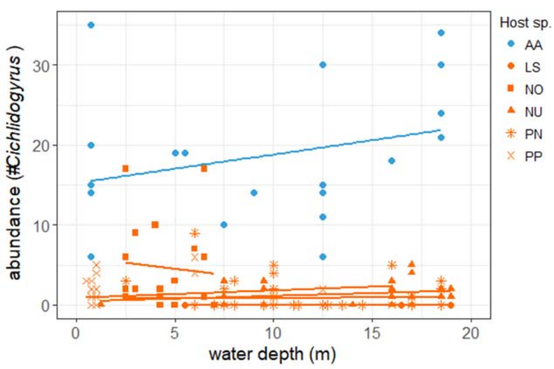

Fig. 2: *Cichlidogyrus* abundance is not related to the capture water depth of its host.

Cichlidogyrus Species Diversity

The non-radiating cichlid is infected by more *Cichlidogyrus* (tentative) morphospecies than radiating cichlids. However, species of the radiation do not differ in the composition of their *Cichlidogyrus* fauna.

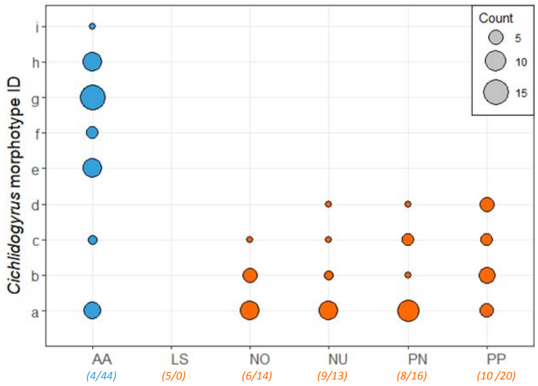

Fig.3: *Cichlidogyrus* morphotype distribution across radiating and non-radiating cichlid lineages. Morphotypes *"e* "to *"i"* were found only in *AA*. Host/parasite sample size in brackets.

Cichlidogyrus spp.

Conclusions

Cichlidogyrus abundance is lower (**fig.1**) and its community is less diverse (**fig.3**) in the cichlids of the radiation than in the non-radiating cichlid. Radiating cichlids are infected by only a subset of parasite species observed, suggesting they are resistant to some of the species that infect *A.alluaudi*. Infected radiating hosts do not differ in their parasite species composition, inconsistent with a co-diversification scenario.

Cichlidogyrus abundance varies within host trophic groups (**fig.1**) and within water depths (**fig.2**), suggesting that differences between host species in worm abundance are unlikely to be explained by differences in exposure alone.

download

Acknowledgements:
Museo Cantonale di Storia Naturale, Lugano (CH) for providing the microscope.
Funding: FNSNF, University of Bern, University of Groningen.

Affiliations:
[1] University of Bern, Institute of Ecology and Evolution, Switzerland.
[2] EAWAG Swiss Federal Institute of Aquatic Science and Technology, Department of Fish Ecology and Evolution, Switzerland.
[3] University of Groningen, Groningen Institute for Evolutionary Life Sciences, Netherlands.
[4] Royal Belgian Institute of Natural Sciences, Capacities for Biodiversity and Sustainable Development, Belgium.
[5] Masaryk University, Department of Botany and Zoology, Czech Republic.
[6] KU Leuven, Laboratory of Biodiversity and Evolutionary Genomics, Belgium.
[7] Hasselt University, Research Group Zoology: Biodiversity and Toxicology, Belgium.

Contact:
tiziana.gobbin@eawag.ch