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

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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 omnicaruleus* *Neochromis "unicuspid scaper"* *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.

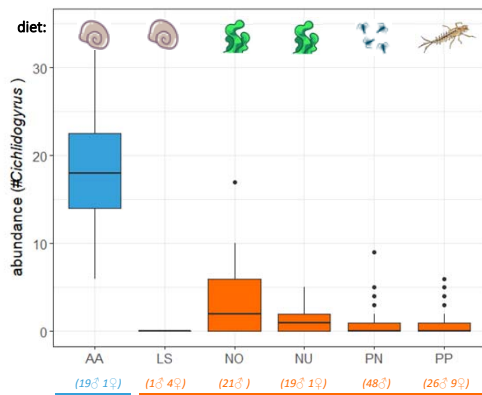


Fig. 1: *Cichlidogyrus* abundance of **non-radiating** and **radiating** hosts. Despite their ecological similarity, presumably causing similar exposure, worm load differs within molluscivores (AA, LS). Top drawings represent diet. Host sample size in brackets.

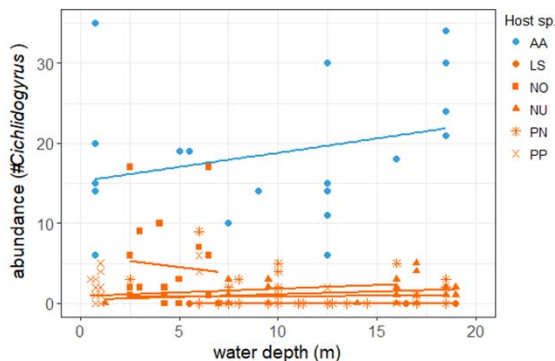


Fig. 2: *Cichlidogyrus* abundance is not related to the capture water depth of its host.

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.

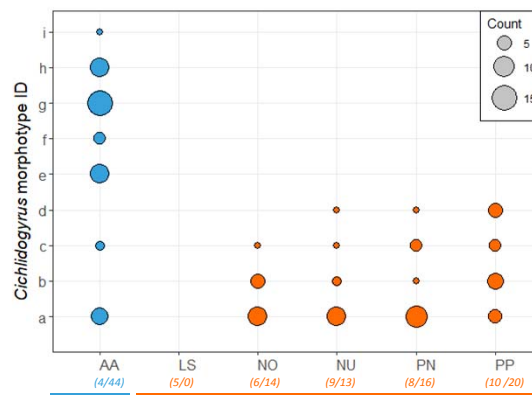


Fig. 3: *Cichlidogyrus* morphotype distribution across **radiating** and **non-radiating** cichlid lineages. Morphotypes "e" to "i" were found only in AA. Host/parasite sample size in brackets.



Cichlidogyrus spp.
100 µm

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.

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