Are you a large, promiscuous cichlid living in a densely populated habitat!? If so, you are probably infected with parasites…

Christian K. Owusu

Parasites constitute an important (and all too often underappreciated) component of natural ecosystems. Typically, parasites are regarded as medical nuisances, with very little appreciation for their incredible diversity, dizzying array of life cycle strategies and baffling host immune evasion techniques. Though parasites admittedly siphon vital resources from their hosts and, in certain cases, cause significant morbidity and even mortality, their interactions with hosts have also driven the evolution of incredibly complex immune machinery, resulting in increased host diversity over evolutionary time. Despite their prominent role, parasites are understudied; especially when one takes into account the fact that most host species harbour at least one parasite unique to that particular species. The unfairness of the whole situation prompted biologist Donald Windsor to start the "Equal Rights for Parasites" campaign, arguing that rare parasites deserve as much protection as their equally rare but vastly more visible hosts.

To help redress this imbalance, I studied the prevalence and diversity of gut helminths (parasitic worms) in Lake Tanganyikan cichlids, the parasites of which are currently extremely poorly described. I analysed data collected from more than 500 specimens belonging to 32 different cichlid species to identify host traits associated with differences in the risk of parasitism amongst the different species. Specifically, I tested the effect of body size, brain mass, gut length, depth, trophic level (position on the food chain), habitat complexity and mating system on the prevalence and diversity of parasites (together constituting parasite load). Habitat complexity and mating system were both used as measures of social interaction, with habitat complexity reflecting the degree of social interactions between different species (the more complex the habitat, the greater the diversity of cichlid species living there, leading to more inter-species interactions) and type of mating system measuring interactions between individuals of the same species (e.g. monogamy versus promiscuity).

I found that the different measures of parasite load were partially explained by a combination of three traits: body mass, habitat complexity and mating system. Habitat complexity was the strongest predictor of parasite load in all cases, providing strong support for the hypothesis that social interactions and particularly, interactions with other species significantly increases a species' risk of parasitism. Generally, the data suggests that large, promiscuous cichlid species living in species-rich habitats are not only more likely to be infected with helminths, but will also harbour a greater diversity of these parasites. This study provides much needed research into the correlates of parasite exposure in natural ecosystems. Such information is limited, and will both be of significant scientific interest and, more directly, applied relevance in the management of wild fish stocks and commercial fish farming.

Degree project in Biology, Master of Science (2 years), 2013
Examensarbete i biologi 30 hp till magisterexamen, Uppsala universitet, 2013
Biology Education Center and Department of Animal Ecology
Supervisors: Niclas Kolm and Alexander Hayward