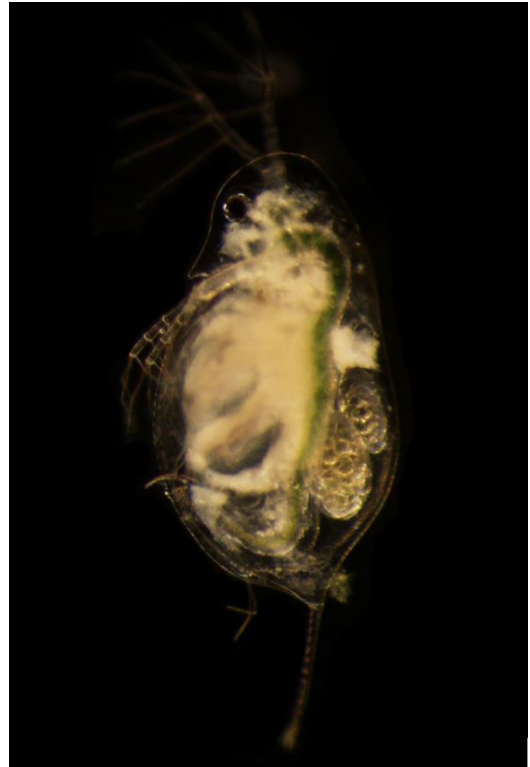


## Poor food quality for hosts lowers transmission potential of their parasites

*Rachel M. Penczykowski, Brian C. P. Lemanski, R. Drew Sieg, Spencer R. Hall, Jessica Housley Ochs, Julia Kubanek, and Meghan A. Duffy*

Consumers face wide variation in resource quality across habitats and through time. In this study, we focused on how the quality of food available to hosts affects the ability of parasites to infect and replicate within them. For instance, hosts that eat higher quality food might be more resistant to infection if they are in better overall condition or can meet nutritional demands of immune function. On the other hand, better fed hosts may provide more fuel for the parasite to use for its own growth. Food quality may also influence host growth or behaviour in ways that affect the probability of encountering parasites and becoming infected. To differentiate among mechanisms such as these, we manipulated resource quality (high quality green alga vs. low quality cyanobacterium) for a freshwater zooplankton host. The host becomes infected by accidentally ingesting spores of a fungal parasite while filter feeding. We hypothesized that hosts fed the lower quality resource would have slower growth, consume parasite spores at a lower rate (due to a known positive relationship between body size and feeding rate for this species), and consequently have lower infection risk. In addition, we expected that the production of new parasite spores would be lower in hosts fed low quality food. As hypothesized, hosts on the low quality diet had low infection risk because of their small size and low rate of parasite exposure. Smaller hosts also yielded fewer parasite spores. However, there was also an effect of food quality on foraging behaviour independent of body size, and hosts that were switched from high to low quality food at the time



*Daphnia dentifera* host infected with the fungal parasite *Metschnikowia bicuspidata*. Photograph credit: Isabella Oleksy.

of parasite exposure had much lower feeding rate and corresponding infection risk than expected for their body size. In a second experiment, we tested chemical traits of the low quality resource which might have driven these effects. Our study highlights that changes in food quality can alter multiple traits of hosts and parasites, and illustrates how those mechanisms can be experimentally disentangled. This is especially relevant for freshwater ecosystems, where excess nutrient loading often causes shifts from green algae to cyanobacteria.