

Totiviruses, parasites and everything else

Totiviridae are unsegmented, icosahedral dsRNA viruses which display a fascinating diversity of hosts, a disparity of host effects, and a divergence of transmission strategies. Hosts include human parasites like *Giardia*, plant parasitic oomycetes, fungi and yeasts, red macroalgae (seaweed), terrestrial crustaceans like woodlice, insects like flies, mosquitoes, ants and wasps, marine crustaceans like shrimp, but also fish, fresh water snails that are intermediate hosts to parasites, and plants like papaya, notoginseng, maize, and wild petunias. In *Leishmania* and *Trichomonas*, the viruses increase the virulence of the parasites (hypervirulence), while in Victoria blight of oats it reduces the virulence of the fungus (hypovirulence). In salmon, smelt, and shrimp, it causes myocarditis and myonecrosis, in golden shiners it is asymptomatic. In *Leishmania* and many fungi and some plants, it is non-infectious and vertically transmitted, while in *Giardia*, fish, shrimps, and papaya, it is horizontally transmitted.

Using PCR with degenerate primer sets, we are trying to explore the taxonomic boundaries of the vertically transmitted viruses in parasites to estimate the evolutionary age of first infection, the virulence in *Giardia*, and the evolutionary origin of dsRNA viruses in arthropods, especially sand flies, which are vectors of *Leishmania*.