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Behavior modifying parasites: The role of infection in the behavior of fish hosts

Parasites make up nearly half of all species on the planet and are defined as any organism that has a harmful, durable consumer relationship with an individual of another species. Thus, these organisms play an indelible role in how animals' function and interact with each other but are often disregarded in studies of animal behavior. Parasites may modify their host's behavior to increase their own survival and ability to infect new susceptible hosts, but there is much to be learned about exactly what host behaviors are changed and how this may influence a host's ability to survive in its environment. In California, a decades-long research program has been underway examining these concepts using a trematode endo-parasite (i.e., found inside its host rather than on its skin; *Euhaplorchis californiensis*) that infects the brain and modifies the behavior of its second intermediate host, the California killifish (*Fundulus parvipinnis*), a small-bodied fish species found living in social groups in estuaries throughout California. These modifications help the parasite reach its final host, which are a range of fish-eating marsh birds. Here in south Florida, infection with a closely related and as-yet unnamed parasite species (*Euhaplorchis* sp. A) with a nearly identical life cycle is found in several small-bodied mangrove fishes that are closely related to the California killifish. Unlike the California system, little research has investigated behavior modifications arising from infection in this host-parasite system. Through an ongoing collaboration among PI Dr. Lauren Nadler, NSU faculty member and parasitologist Dr. Christopher Blonar, and ecologist Dr. Nancy Smith (Eckerd College), we plan to investigate how a suite of behavioral traits (sociality, anti-predator response, and personality) are altered in the longnose killifish (*F. similis*) by infection with the parasite *Euhaplorchis* sp. A. Our long-term goal is to understand how infection by *Euhaplorchis* sp. A alters the behavior and physiology of its killifish host, and how these changes scale up to population and community level in natural habitats. As these small-bodied fishes play a key role in estuarine food webs throughout North America, parasite induced changes in behavior could have far-reaching consequences in systems throughout this region and may present a model for generating hypotheses that can be tested in host-parasite systems from other habitats around the world.