Quantifying Toxoplasmosis gondii presence in wastewater and freshwater systems
Introduction

Toxoplasma gondii is a parasitic protozoan that is shed from the body via oocysts in cat feces and is often consumed by other animal species living on land and in the water. In Hawaii, toxoplasmosis has been found post mortem in terrestrial and marine animals, including endangered species (e.g., Hawaiian Crow and Red-footed Boobies, Monk Seal: Dawson 2010; Honnold et al. 2005; Work et al. 2000, 2002). Similarly, off California, toxoplasmosis has been associated with mortality in sea otters (Jessup et al. 2007). In humans it can cause serious effects on the unborn, pregnant women, and immunocompromised individuals (Torrey and Yolken 2003). Furthermore, toxoplasmosis causes subtle changes in behavior, especially for assessing risk, and has been linked to schizophrenia (Torrey and Yolken 2003; McAllister 2005; Lafferty 2006).

Cats, including house cats (Felis catus), are the definitive host, meaning that the disease only occurs when cats are present. Toxoplasmosis transmission has traditionally been associated with eating uncooked meat or soil, but it can also be acquired by inhalation from dust, soil, or cat litter, and from water contaminated by cat feces (Benenson et al. 1982; Dabritz et al. 2006; Duffy 2012). This project will provide needed information on the public health and environmental risks associated with this waste product in Hawaiian freshwater systems. Quantifying levels of toxoplasmosis in aquatic systems is of great interest to state and federal agencies, including the State of Hawaii’s Department of Land and Natural Resources, State of Hawaii’s Department of Health, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration, due to both the human and animal health problems associated with the parasite.

Problem and Research Objectives

Because Hawaii has a large number of free roaming cats there is a large potential for fecal matter to enter the water system both via overland flow and through the sewage system, as occurs in California (Dabritz et al. 2006). Given the human and environmental health concerns associated with Toxoplasmosis, our objective is to determine its presence and relative abundance in the waste disposal system of Honolulu and freshwater systems of Oahu. By testing both freshwater streams and wastewater plant streams we will be able to provide the first ever assessment of toxoplasmosis in Hawaii’s aquatic systems.

Methods

In determining if toxoplasmosis is present in Oahu streams the first step is conducting water sampling for the parasite. In the first year of the project several water filtering approaches have been investigated based on sampling equipment, cost, and ability to effectively capture oocysts. At present different filtering methods are being screened. Following water sampling the samples will be filtered for collection of oocysts. The elute from the filter will be analyzed with PCR against known markers for toxoplasmosis. Similar work has already been done on fecal samples and yielded positive results.
**Principal Findings and Significance**

In progress, nothing to report.

**Publications Cited in Synopsis**


