

# PATTERNS OF GASTROINTESTINAL PARASITE INFECTION OF FREE RANGING BABOONS AT WILDCLIFF NATURE RESERVE, SOUTH AFRICA

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## Introduction

Gastrointestinal parasite infections are widespread and are an increasing threat to natural populations (Ezenwa, 2003). This information is particularly concerning when applied to primates, as exponential human population growth makes human-primate contact increasingly inevitable and there is a high risk of transmission to humans (Gillespie, 2006). Collecting descriptive baseline data of infections in wild populations is important in determining patterns of parasitism and will result in effective disease management, which ultimately includes applications to human health.

I propose to conduct a baseline survey of the gastrointestinal parasites of Chacma baboons (*Papio ursinus*) at Wildcliff Nature Reserve. Parasites play a central role in ecosystems and at low levels they are a normal component of a functioning ecosystem (Gillespie, 2006). At higher levels, parasites have the potential to impact host survival and reproduction, nutrition, and predator escape, and in extreme cases can cause tissue damage, blood loss, congenital malformations, and death (Chandra and Newberne, 1977). Fecal-borne parasites do not require physical contact between hosts, which facilitates transmission among and between species even when no contact is made. This results in a high potential for infection between animals.

It has been recently suggested that a standardized protocol should be adopted in studies of primate parasites to more accurately compare results (Gillespie, 2006). Many studies have investigated parasitic infections in wild primate populations, including baboons. Unfortunately, the use of divergent methodologies has made it difficult to evaluate the data on a meta-level. Therefore, this study will follow the guidelines and methodologies proposed by Gillespie in hopes to introduce the potential for future comparative studies.

In order to predict infection risks, the troop cannot be studied as a group but must instead be studied as independent units (Ezenwa, 2003). In agreement with this concept, Gillespie indicates that collecting supportive data regarding the environment, density, age, sex, behavior, and health status of each individual baboon sampled will make it possible to establish patterns of parasitism. There is evidence that each of these variables may impact individual parasite levels in primate populations. Studies suggest that habitat characteristics affect parasite patterns in primates. Baboons living in montane habitats of South Africa were found to have a smaller number of species of gastrointestinal parasites than baboons living in coastal lowland areas, but output rates were higher in the montane troops (Appleton and Henzi, 1992). It has also been demonstrated that primates in humid habitats harbor a greater prevalence and diversity of intestinal parasites than those found in arid environments (Stuart et al, 1990). Density of baboons and also other potential hosts of parasites of interest should be noted, as research suggests that host density is a strong predictor of parasitic infection rates (Poulin, 1998).

Relationships between parasitic infections and many primate behaviors are likely to exist. Grooming is a probable means of infection, as grooming necessarily brings individuals into close contact, and as already mentioned host density is probably positive correlated with parasitic infection rates. Furthermore, the ectoparasites that primates ingest while grooming are known to act as intermediate hosts for gastrointestinal parasites (Gillespie, 2004).

Nutrition plays an important role in a host's ability to cope with the negative effects of gastrointestinal parasites. Results suggest that under drought conditions, species unable to maintain adequate nutrition, mainly low quality feeders, are less able to cope with gastrointestinal parasite infections. (Ezenwa, 2005 COPIED).

A study conducted by University of Cape Town will use the same methods as those suggested in this proposal and will provide results that can be used in an analysis comparing the patterns of parasitism in urban versus rural baboons.

### **Objectives**

1. To describe the patterns of gastrointestinal parasite (helminth) infection in chacma baboons at Wildcliff
2. To determine the degree to which age, sex, and environmental factors predict host parasite load.

### **Methods**

#### *Study site*

This study will be conducted at Wildcliff Nature Reserve in the Western Cape Province of South Africa. While no formal vertebrate survey has been conducted on the reserve, antelope, chacma baboons, leopards, and a variety of small mammals are known to inhabit the area. DESCRIBE WILDCLIFF

#### *Sampling*

The local troop of baboons will be followed until defecations occur. Fresh fecal material will be collected and placed in collection tubes containing 10% buffered formalin (Gillespie, 2004). The samples will be stored individually in labeled bags and taken to the laboratory for immediate analysis. Samples must be collected immediately after defecation to avoid contamination.

Details will be collected for each individual baboon sampled, including age, sex, environment, behavior, and health status (Gillespie, 2004). Symptoms of illness include, but are not limited to, diarrhea or blood in stool. Habitat and density of baboons will also be noted.

#### *Parasitological Analysis*

Fecal egg concentrations will be determined following the fecal flotation and fecal sedimentation methods outlined by Gillespie (Gillespie, 2004). The protocols are copied below.

##### *A) Fecal Flotation:*

NaNO<sub>3</sub> will be used as the flotation solution as this is effective in isolating many of the nematodes found in wild primates.

1. Add 1 gram of feces to centrifuge tube
2. Fill centrifuge tube 2/3 with distilled water and homogenize fecal pellet with a wooden applicator.
3. Centrifuge samples at 1800 rpm for 10 min.
4. Pour off supernatant.
5. Resuspend fecal material in NaNO<sub>3</sub> solution.
6. Fill tube to meniscus with NaNO<sub>3</sub> solution, and place microscope cover slip on lip of tube.
7. Centrifuge samples at 1800 for 10 min.
8. Remove cover slip from centrifuge tube and place on a slide labeled with the sample number.
9. Scan slide using the x10 objective lens of a compound microscope and identify and count all parasite eggs, larvae, and cysts. Use the x40 objective lens to confirm presence or absence of protozoan cysts.
10. Measure the length and width of individual eggs, cysts, and larvae using a calibrated ocular micrometer.
11. Photograph representatives.

*B) Fecal sedimentation:*

Nematodes and flukes are too heavy to float up in NaNO<sub>3</sub>, so the fecal sedimentation method is necessary to identify of these helminths. Samples for the sedimentation can be used following flotations.

1. Suspend fecal pellet in 40 ml of sedimentation solution (dilute soapy water) in a 50 ml beaker.
2. Filter the suspension through cheesecloth held over the lip of the beaker into a 50-ml centrifuge tube. Rinse cheesecloth with sedimentation solution and refilter through cheesecloth. Dispose of cheesecloth and remaining fecal pellet.
3. Allow filtered suspension to settle until sediment is apparent (5 min).
4. Remove supernatant by pipette and rinse remaining material into disposable beaker with sedimentation solution.
5. Repeat until supernatant is clear.
6. Transfer 5 drops of sediment to a slide labeled with the sample number and cover with 2 cover slips placed side by side.
7. Scan slide under x10 objective lens and identify and count all parasite eggs, larvae, and cysts. Use the x40 objective lens for measurement and confirmation of identifications.
8. Scan slide thoroughly under the x40 objective lens to confirm presence or absence of protozoan cysts.
9. Measure the length and width of individual eggs, cysts, and larvae using a calibrated ocular micrometer
10. Photograph representatives.

*Sample Size*

To be determined

## **Materials**

- Fecal Flotation Solution
- Microscope
- Microscope slides
- Slide cover slips
- Centrifuge

## **References**

Gillespie, T.R. (2006). Noninvasive Assessment of Gastrointestinal Parasite Infections in Free-Ranging Primates. *International Journal of Primatology*. Xx:xx-xx.

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