Prevalence of *Toxoplasma gondii* in Antillean manatees (*Trichechus manatus manatus*) and investigating transmission from feral cat feces in Puerto Rico

**Outline**
- Introduction & Justification for Research
- Research Objectives
- Proposed Methods & Materials
- Data Analysis
- References

**Antillean Manatee** (*Trichechus manatus manatus*)
- Range is mostly surrounding Puerto Rico
- Historically: Hunting
- Boat Strikes
- Disease
- Habitat Degradation
- Losses in Sea Bed Habitats
- Herbivorous
- Main food sources: Sea grasses
- The manatee is listed as "endangered" under provisions of the Endangered Species Act of 1973, 16 U.S.C. 1531 et seq.

FERAL CATS?
Feral Cat Populations

- Save the Gato: estimates 250 individuals
- University of Puerto Rico: about 400 individuals

A cat and Its Parasite

- Etiological agent: *Toxoplasma gondii*
- Disease: Toxoplasmosis
- Classification:
  - Eukaryotic Protozoan
  - Subphylum: Apicomplexa
  - Subclass: Coccidia
- Intestinal parasite of felids
- DH: Wild and Domestic Felids
- IH: All Mammals and Birds (Assadi et al., 1995)
- Human Health Threat (US: 1/3 of Population) (CDC Website: Parasites)

The Parasite

*Toxoplasma gondii*

- Fecal oocysts
- Tissue cysts containing bradyzoites in prey
- Oocysts ingested by animals
- Oocysts contaminating cat litter
- Soil, water, and grass contaminated with oocysts
- >1 to 2 days
- Oocysts on unwashed fruits and vegetables
- Oocysts or tissue cysts ingested by animals
- Tissue cysts containing bradyzoites in undercooked or raw meats
- Tachyzoites transmitted transplacentally to fetus
- Organs containing bradyzoites or blood containing tachyzoites
FRESHWATER RUNOFF

SLIME?!

Justification

Objectives:

1. Determine the seroprevalence of *Trichoplax gondii* in Antillean manatee populations in Puerto Rico.
2. Determine the seroprevalence of *T. gondii* in feral cat populations in Puerto Rico and the prevalence of *T. gondii* oocysts in wild feral felines.
3. Compare genotypes.
Methods and Materials

- Sampling: Manatees
  - Live Animals:
    - Health assessment study by the Manatee Conservation Center of Puerto Rico
    - Serum collection (+ blood clot)
  - Deceased Animals:
    - Opportunistic Collection of:
      - Serum and blood pooled around heart
      - Heart
      - Brain
      - Tongue
      - Intestine
      - Pancreas
      - Milk

- Sampling: Felids
  - 1mL of Serum (+ blood clot)
  - 4 grams of Feces

Material and Methods

- Screening
  - MAT (Modified Agglutination Test) (Desmonts and Remington, 1980; Dubey and Desmonts, 1987)
    - All serum samples
    - IgG >/= 32
  - Centrifugal Fecal Floatation with Sucrose (Dabritz, 2007; Dryden, 2005)
    - All fecal samples
    - Oocysts Shedding
Material and Methods
- PCR (Polymerase Chain Reaction) (Homan et al. 2000)
  - All tissues
  - Determine tropism
- Bioassay and Genotyping (Su et al. 2010)
  - All fresh Heart Samples
  - Blood clot in live clinical animals

Data Analysis
- Prevalence data will be analyzed by logistic regression with AIC to evaluate whether transmission of *T. gondii* is driven by sex, age or location.
- Seroprevalence of *T. gondii* in manatees and felids will be determined based on MAT results
- Descriptive/Comparative analysis of genotypes

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Photograph References

- http://www.thehulltruth.com/carolinas/325715-n-carolina-fresh-water-run-off-satellite-shot.html#b
- http://cmbc.ucsd.edu/Research/student_research/Earth_Altered/Transformed_Landscapes/sdcalifornia.png
- Bossart et al. 2012, provided by Antonio Mignucci
- Photo courtesy of Dr. Lucio-Forster, Cornell University
- Life cycle courtesy of Greg Schweiger
- Photos of parasite stages courtesy of UTCVM: Parasitology Lab

Literature References

- NSF Posterwall of research projects: http://posterhall.org/igert2013/posters/341