





Parasites of the West Indian Manatee



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Introduction: Sirenia


- Classification
 - Order: Sirenia
 - Family: Dugongidae
 - *Dugong dugon*
 - Family: Trichechidae
 - *Trichechus inunguis*
 - *Trichechus senegalensis*
 - *Trichechus manatus*
 - *Trichechus manatus latirostris*
 - *Trichechus manatus manatus*



(Donning and Hayek 1986, Stewart et al. 2002)

Geographic Range and Habitat


- Range
 - Sirenia
 - Antillean manatee
 - Florida manatee
- Habitat
 - Antillean manatee
 - Florida manatee





(Migazzi-Gianmori 1989, Powell et al. 1981, Rathbun et al. 1985)


Feeding Behavior

- **Aquatic vegetation (Primarily Sea grass)**
 - Halodule wrightii*
(Cuban shoal grass)


 - Thalassia testudinum*
(Turtle grass)


 - Syringodium filiforme*
(Manatee grass)




- **Water Depths=2.0 m**
 - Florida
 - *H. wrightii* and *S. filiforme* preferred
 - Less specialized sea grass eaters
 - Antillean
 - *H. wrightii* preferred
 - More specialized sea grass eaters



(Lefebvre et al. 1999, Longshore 1994, Odell 1982, Powell 1978, Reynolds 1981, Smith 1993, <https://www.youtube.com/watch?v=K28dWEdChoc>)

Justification for Research

- **Status**
 - Endangered
 - Less than 200 individuals (PR: 2011)
 - Around 6,000 individuals (FL: Feb 2015)
- **Manatee Mortalities (2015)**
 - Majority Undetermined
 - Boat Strike
 - Illness

(Lefebvre et al. 1989, Lefebvre et al. 2001, <http://www.fws.gov/press/2011/01/110111a.html>, <http://www.fws.gov/press/2015/02/150215a.html>, <http://myfwc.com/research/manatee/rescue-mortality-ecological-mortality-statistics/>)

Research Objectives

- **Question: Do the Antillean manatee and the Florida manatee have the same internal parasites?**
 1. Survey parasites in Florida manatees
 2. Survey parasites in Antillean manatees
 3. Compare the parasites from manatees from Florida manatees against the parasites from Antillean manatees

Methods

- Collections
 - Puerto Rico
 - Fecals opportunistic
 - Florida
 - Fecals collected during
- Diagnostics
 - Fecal Centrifugal Flo
 - Fecal Ethyl Acetate S

(Dryden 2005, Sindberg 2013)

Results: Florida Manatees

Animal **	Trematoda (Flukes)	Nematoda (Roundworms)	Protozoa	Other
CPH 15-11	<i>Chiorchis fabaceus</i>	<i>Heteracheilus tunicatus</i>	<i>Eimeria manatus</i>	2 Unidentified Parasite Eggs
	<i>Nudacotyle undicola</i>		<i>Eimeria nodulosa</i>	
CPH 15-12	<i>Chiorchis fabaceus</i>	<i>Heteracheilus tunicatus</i>	<i>Eimeria manatus</i>	1 Unidentified Parasite Egg
	<i>Nudacotyle undicola</i>		<i>Eimeria nodulosa</i>	

**This project is on-going, only 2 Florida Manatees sampled to date

Chiorchis fabaceus 20x

Nudacotyle undicola 10x

H. tunicatus 20x

Results: Antillean Manatee

Pulmonicola cochleotrema 40x

Eimeria nodulosa 40x

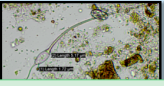
Chiorchis groschaffi 40x

Heteracheilus tunicatus 20x


Eimeria manatus 40x

Results Compared


- Florida
 - *C. fabaceus*
- Antillean
 - *C. groschafti*
 - *P. cochleotrema*
- Shared
 - *N. undicola*
 - *H. tunicatus*
 - *E. manatus*
 - *E. nodulosa*



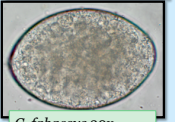
P. cochleotrema 20x



N. undicola 40x



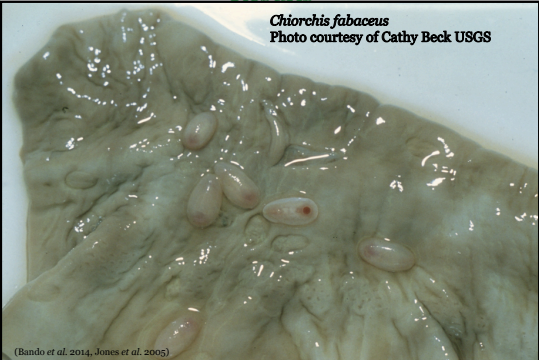
C. groschafti 20x



C. fabaceus 20x

Results

Chiorchis fabaceus
Photo courtesy of Cathy Beck USGS



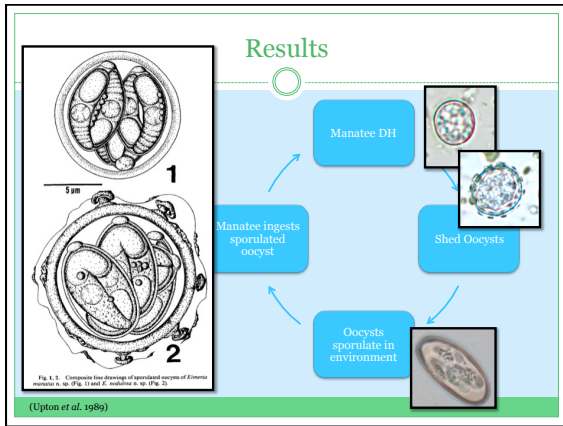
(Bando et al. 2014, Jones et al. 2005)

Results

Heterocheilus tunicatus
Photo courtesy of Cathy Beck USGS



(Sprent 1983)



Discussion

- Florida Manatee

TABLE IV. A summary of the parasites and ciliopods reported from sirenians.

	Site	Source
<i>Trichechus manatus latirostris</i>		
TREMATODA		
Paramphistomidae	<i>Chlorchis fahavasi</i>	Lumen of caecum and colon
	<i>Chlorchis groschaffi</i>	Lumen of caecum and colon
Opisthotrematidae	<i>Pulmonicola concamerata</i>	Nares, lungs
	<i>Moniligerum blairi</i>	Encapsulated in wall of small intestine
Nudacotylidae	<i>Nudacotyle undicola</i>	Lumen of small intestine
NEMATODA		
Ascaridae	<i>Heterocheilus tunnicatus</i>	Lumen and mucosa of stomach, and small intestine

Apicomplexa
Eimeria manatus
Eimeria nodulosa

(Beck and Forrester 1988, Upton et al. 1989)

Discussion

- Antillean manatee

Trichechus manatus manatus

TREMATODA		
Paramphistomidae	<i>Chlorchis fahavasi</i>	Lumen of caecum and colon
	<i>Chlorchis groschaffi</i>	Coy-Otero 1989
Opisthotrematidae	<i>Pulmonicola concamerata</i>	Nares, lungs
	<i>Chlostrema</i>	
NEMATODA		
Ascaridae	<i>Heterocheilus tunnicatus</i>	Lumen and mucosa of stomach, and small intestine

- *Nudacotyle undicola* S.I. Dailey et al. 1988
- *Moniligerum blairi* S.I. Dailey et al. 1988

****First Report of both *Eimeria* spp. in Antillean manatee populations**

(Beck and Forrester 1988, Coy-Otero 1989, Dailey et al. 1988.)

Implications of Results

- Baseline Data
- Aid Conservation
- Manatee Behavior between populations

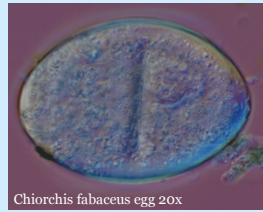
Future Studies

- Future studies should concentrate on the pathogenicity of manatee parasites (is it part of the 'undetermined' manatee mortalities?)
- Future studies should focus on life cycles of these parasites
- Future studies should also focus on the egg stages with good descriptions for reference

(Bando et al. 2014)

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Chiorchis fabaceus egg 20x

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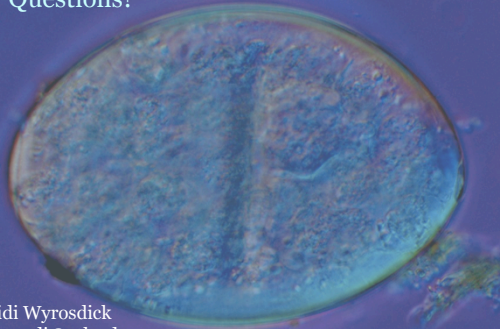
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Questions?



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