Tuesday, September 24

3:30 – 5:30 PM

- (Dan) Intro to Fish/ Amphibian Health Management including general quarantine recommendations **~15min**
- (Shane) Water 101 including top chemistry/ quality parameter review (Salinity, temp, pH, alkalinity, O2, nitrogen cycle, chlorine/ amines, other contaminants) **~15min**
- (Shane/ Dan) Hands-on experience in basic water quality and chemistry evaluation (25 participants) x5 *real* cases . **~40 min**
- (Shane) Fish Health Management including useful tricks and standard techniques in fish health evaluation **~20min**
- (Dan) Amphibian Health Management including useful tricks and standard techniques in amphibian health evaluation **~20min**

Health Management of Fishes and Amphibians

Shane Christian & Daniel Dombrowski, M.S., D.V.M.

Health Management of Fishes and Amphibians

- Focus on stress reduction and limited handling
- Maintain good water quality (regular monitoring)
- Consider unique anatomy and physiology (lungs v/s gills)
- Standardize quarantine procedures
- Minimize movement and exposure
- Knowledge of common and emerging disease

Handling Safety

Red Lionfish
(*Pterois volitans*)

Colorado River toad
(*Incilius alvarius)*

Fish Handling Safety

Envenomation symptoms include: oedema, extreme pain, vomiting, fever, sweating, rare cases- death (Church and Hodgson).

Amphibian Handling Safety

Caution:
5-MeO-DMT and Bufotenin

Anti-Predator Defense: Parotoid gland and skin secretions

Sudden onset: (oral contact) ↑ salivation, ↓ respiration, seizures, paresis, and death

Handling Safety

Consider the handler and the animal

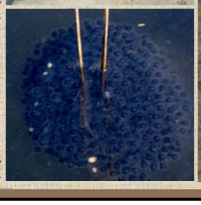
Handling Techniques:
- ✓Reduce stress
- ✓Minimize time
- ✓limit contact
- ✓Monitor temperature

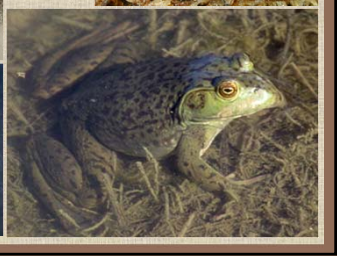
Fishes:

- Class Agnatha (jawless fish) 100+ species
- Class Chondrichthyes (cartilaginous fish) 1000+
- Class Osteichthyes (bony fish) 28000+

Class: Amphibia

Order: Anura (6000+ sp.)
Order: Caudata (600+ sp.)
Order: Gymnophiona (200+ sp.)





Fishes of North Carolina

220+ Freshwater
350+ Estuarine/ Inland Marine

Amphibians of North Carolina

~ 30 Frogs
~ 50 Salamanders

Natural History

1. Geography
2. Habitat
3. Life Strategy
4. Size
5. Behavior
5. Activity
6. Food
7. Breeding

Understanding Natural History is the Key to Developing the Best Health Management Plan

Natural History

Aquatic Species:

- Salinity
- Temperature
- pH
- Hardness
- Stability
- Water Movement
- Water Quality
- Light/ Cycle
- Depth/ Volume
- Substrate/ Cover

Appropriate Captive Husbandry is the Foundation of the Best Health Management Plan

Health Management

Develop a Plan:

1. Goals
2. Species
3. Collection size
4. Open/ Closed Collection
5. Special Project Needs
6. Risk Assessment
7. Disease Screening
8. Health Monitoring
9. Husbandry

Health Management

Basic Quarantine Protocols:

Plan
Acclimation
Arrival Treatments
Initial Medical Exam
30 Days Isolation/ Observation
Taxa specific Disease Screening
Fecal Examinations
Exit Exam

Consider Water Handling Protocols- Including Initial Treatment, Water Quality Monitoring, and Disposal

Water Quality Evaluation as Part of a Health Management Plan of Captive Amphibians & Fish

Larry (Shane) Christian, BS
Coordinator of Veterinary Services
Dr. Daniel Dombrowski, MS,DVM
Chief Veterinarian
North Carolina Museum of Natural Sciences

Thinking Aquatic

- A captive aquatic animal will spend its entire life in a confined space containing water
- All biological functions take place in this water
- Terrestrial animals can more readily escape poor environmental conditions

Water Chemistry

- Can be a complicated part of aquatic species management
- You do not need to be chemists to understand the basic principles

Oxygen

- The most important life-supporting component in water
- Much more oxygen in air than water
- Important factors affecting oxygen saturation: Temperature, atmospheric pressure, salinity, aquatic plants

Temperature

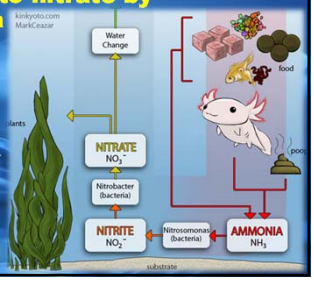
- The higher the water temperature, the less dissolved oxygen
- Water at 4 degrees Centigrade contains twice as much oxygen as water at 40 degrees Centigrade

Salinity

- As salinity increases the amount of dissolved oxygen decreases
- Assuming all other factors are equal, there is more oxygen in freshwater than in the ocean

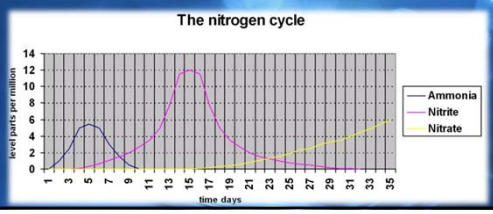
The Nitrogen Cycle

- Ammonia is converted to nitrite by *Nitrosomonas* bacteria
- Nitrite is converted to nitrate by *Nitrobacter* bacteria
- Nitrate is either removed with water changes or by aquatic plants and algae



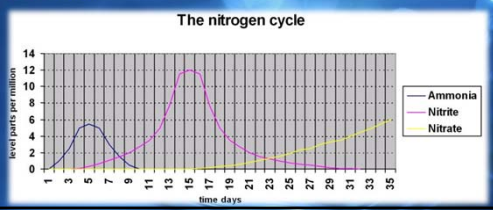
Ammonia

- The unionized form (NH3) is much more toxic than the ionized form (NH4+)
- pH is the most important factor affecting the ratio of unionized to ionized ammonia
- Levels greater than 0.05 mg/L are cause for concern



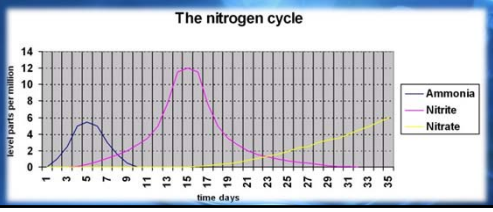
Nitrite

- An intermediate compound in the nitrogen cycle which can be very toxic to freshwater fishes
- Levels greater than 0.1 mg/L are cause for concern
- Chloride competes for uptake at the gill epithelium



Nitrate

- The least toxic of the three nitrogen compounds but high levels can be stressful for aquatic species
- Levels greater than 50 mg/L are cause for concern
- Persistently elevated levels also contribute to algal growth in the aquarium or pond



pH

- pH is a logorithmic measurement of dissolved hydrogen ion activity in water
- Many aquatic animals can survive a wide range of pH values as long as changes are gradual
- Since pH is logarithmic, there are 100 times more hydrogen ions in water with a pH of 6.0 as there are in water with a pH of 8.0

pH and the Aquarium

- Oxidation of ammonia and nitrite produces hydrogen ions
- In most cases, the pH of an aquarium gradually drops over time
- Ammonia is much more toxic when the pH is elevated

Alkalinity

- Represents the buffering capacity of water
- Alkalinity does not refer to pH, but instead refers to the ability of water to resist change in pH
- Buffering capacity is dependent on anions (carbonate and bicarbonate) not cations (calcium and magnesium).

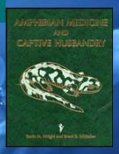
Chlorine and Chloramine

- Toxic compounds used to make water safe for human consumption
- Very deadly to fish because they cause acute gill necrosis resulting in asphyxiation
- Easy to neutralize with inexpensive chemicals

Copper

- Copper is occasionally added to water to control algae, treat for infectious disease, & can be leached out of copper pipes
- Levels greater than 0.1 mg/L are dangerous for freshwater fishes

REFERENCES & ADDITIONAL RESOURCES:



- Stoskopf: Fish Medicine
- Wright & Whitaker: Amphibian Medicine And Captive Husbandry
- UFL-Fisheries and Aquatic Sciences (SFRC)

http://edis.ifas.ufl.edu/department_fisheries_and_aquatic_sciences

Wetlab:

- Hands-on experience in basic water quality & chemistry evaluation with real-life clinical case discussions

External Parasite Screen as Part of a Health Management Plan of Captive Fish

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Dr. Daniel Dombrowski, MS,DVM
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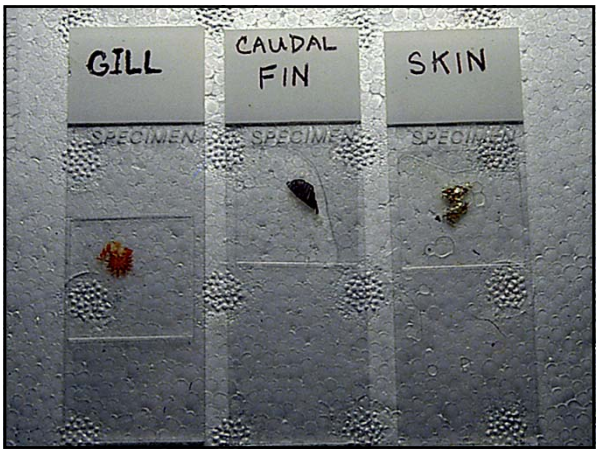
North Carolina Museum of Natural Sciences

Underlying Causes

Pet Fish History:

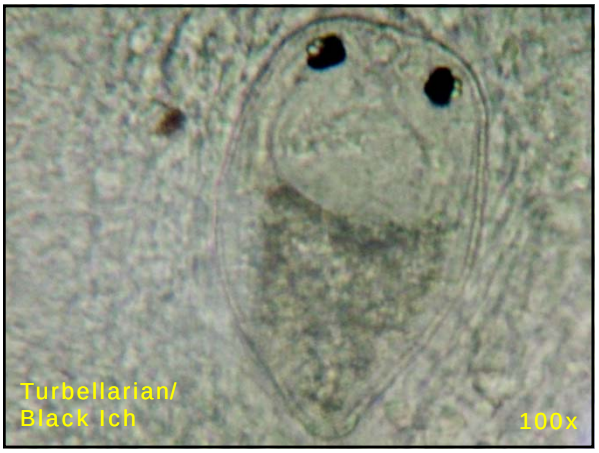
- Current/Previous Issues
- Medical/Treatment History
- Diet
- Bio-security History
- Environmental Parameters

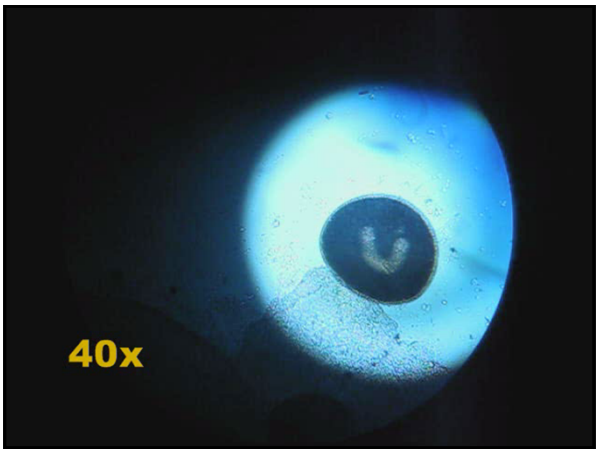
Diagnostic Techniques

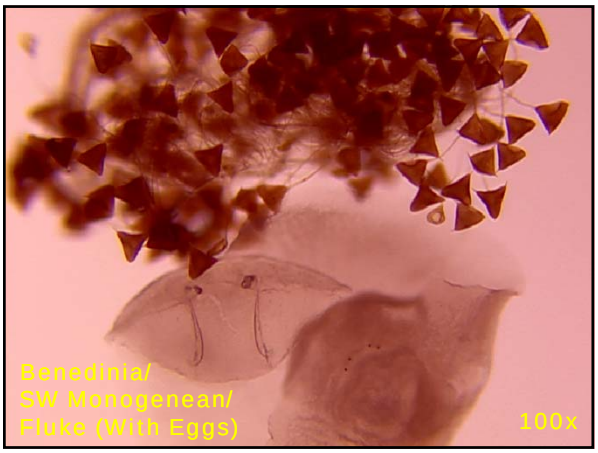


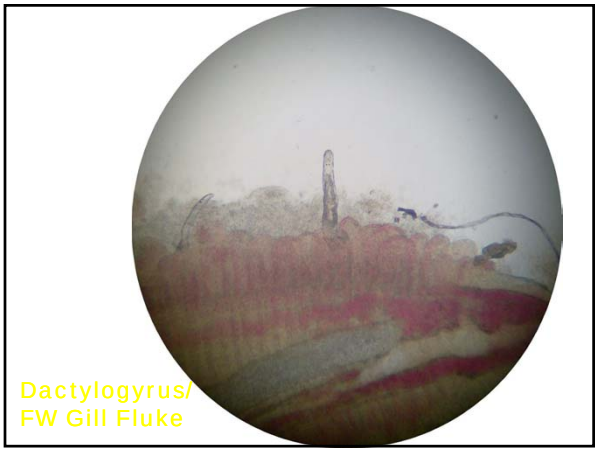
Parasite ID:

- Largest - Smallest



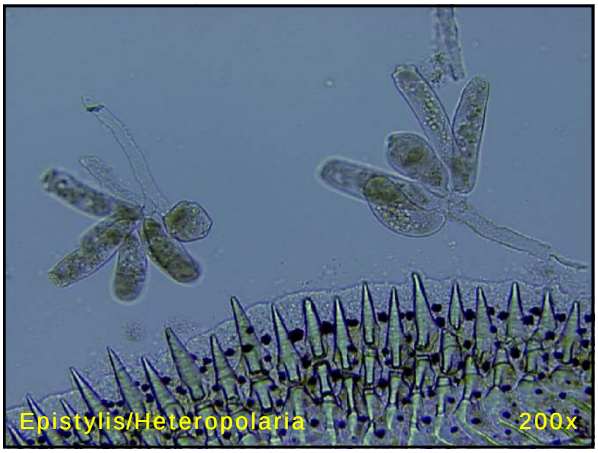

40x

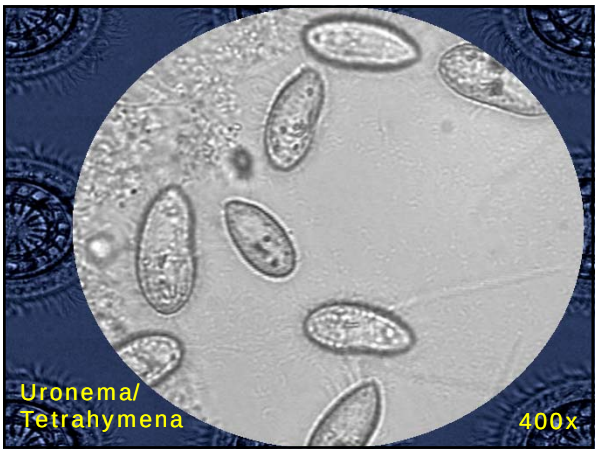

Benedinia/
SW Monogenean/
Fluke (With Eggs)
100x


Dactylogyrus/
FW Gill Fluke

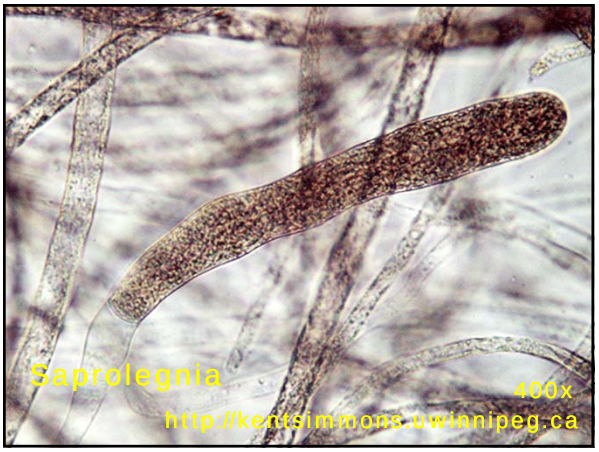

Gyrodactylus/FW Skin Fluke
100x

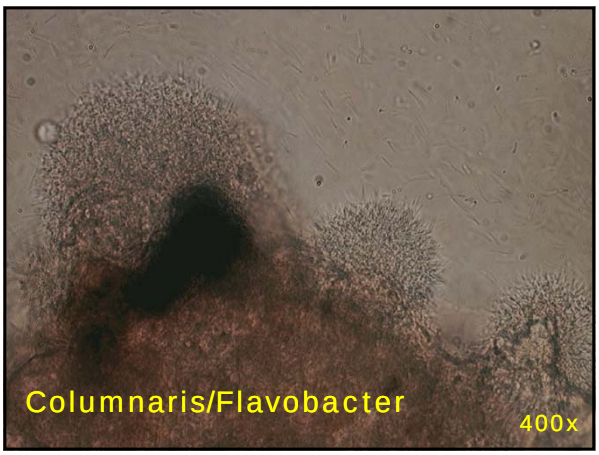

Trichodina
200x

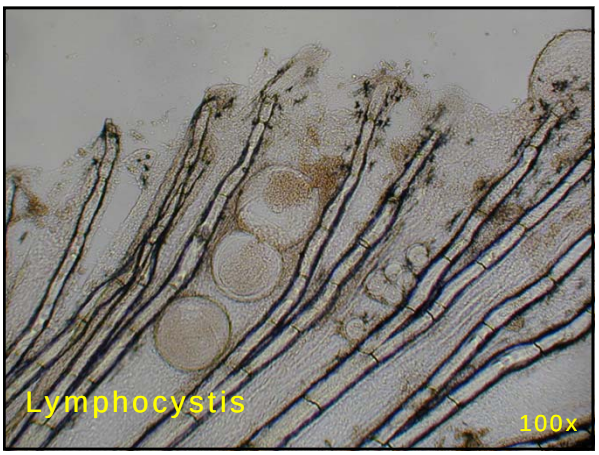

Epistylis/Heteropolaria
200x

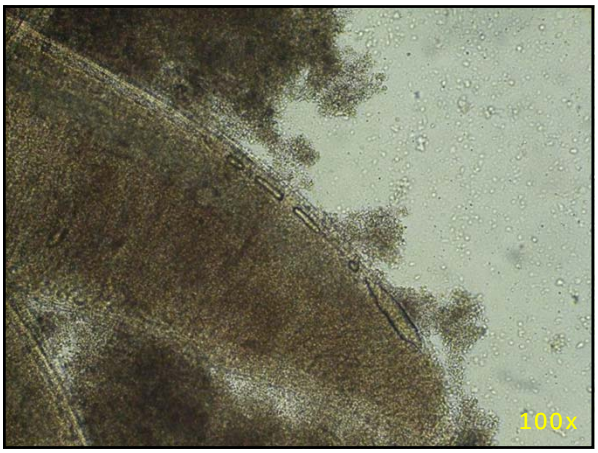


Examples of Other Things Commonly Seen









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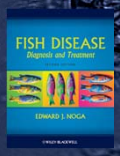


- Stoskopf: Fish Medicine
- Noga: Fish Disease: Diagnosis & Treatment
- UFL-Common FW Fish Parasites Pictorial Guide

http://edis.ifas.ufl.edu/TOPIC_SERIES_Common_Freshwater_Fish_Parasites

Amphibian Health Management

Shane Christian & Daniel Dombrowski, M.S., D.V.M.

Amphibian Water

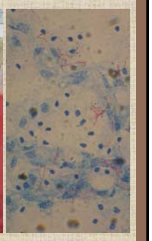
Think Fish:

Most Larval and Some Adult Amphibians Have Gills and Require an Aquatic Environment

Even Terrestrial Adult Amphibians with Lungs Face Many of the Same Water Quality & Chemistry Issues as Fish.

Biosecurity

1. Human Health/ Safety
2. Animal Health/ Safety
3. Collection/ Herd Management



Quarantine

- All New Animals
- Biosecure Facility
- All-in All-out
- 30 Day Minimum Isolation
- Individual Identification
- Behavioral Observation
- Feed Record
- Physical Examination
- Minimum Database
- Fecal Evaluations
- Disease Screening

Physical Examination

Minimize Handling
Posture & Mentation
Movement & BCS
RR, HR, Temp,
Neuro- withdraw/ righting
Systems Check

Ziploc® Bags Work Great for Safe Short-term Restraint and Handling of Small Amphibians

Common Health Problems

Edema Syndrome- "sick amphibian"

Many Causes-
Sometimes Able to Save Individual-
Very Important to fully Evaluate- for Collection Health (Herd Health Management)

Common Health Problems

Sepsis/ Septic Dermatitis- "Red leg"

Common Health Problems

Nutritional Disorders

Metabolic Bone Dz
Thiamine Df
Vit A Df
Vit D Df
Steatitis/ Vet E Df
Corneal Lipidosis
Idiopathics (Spindly Leg)

Common Health Problems

Trauma

Aggression Common in Group Housed Animals- Sometimes Inappropriate or Uneaten Live Food Can Cause Stress and Trauma

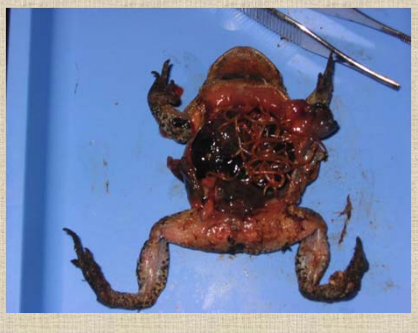
Common Health Problems

Prolapse

Bufo marinus

Common Health Problems

Ectoparasites & Endoparasites



Common Health Problems

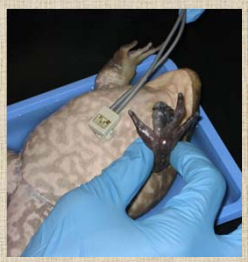
?

Common Health Problems

GI Obstruction/ Foreign Body

Common Health Problems

Neoplasia



Squamous Cell Carcinoma

Anesthesia

Buffered tricaine methanesulfonate (MS-222) solution (1-3 g/L) -isomer of benzocaine

100% oxygen in water

Intubation ventilation as needed

Euthanasia

Buffered MS-222 solution (1-10g/L)
Pentobarbital (100 mg/kg)

Necropsy

Emerging Infectious Diseases

Batrachochytrium dendrobatidis
Ranaviruses (family Iridoviridae)

Skin Swabbing Technique

Screening for Amphibian Chytrid Fungus

Thank you!