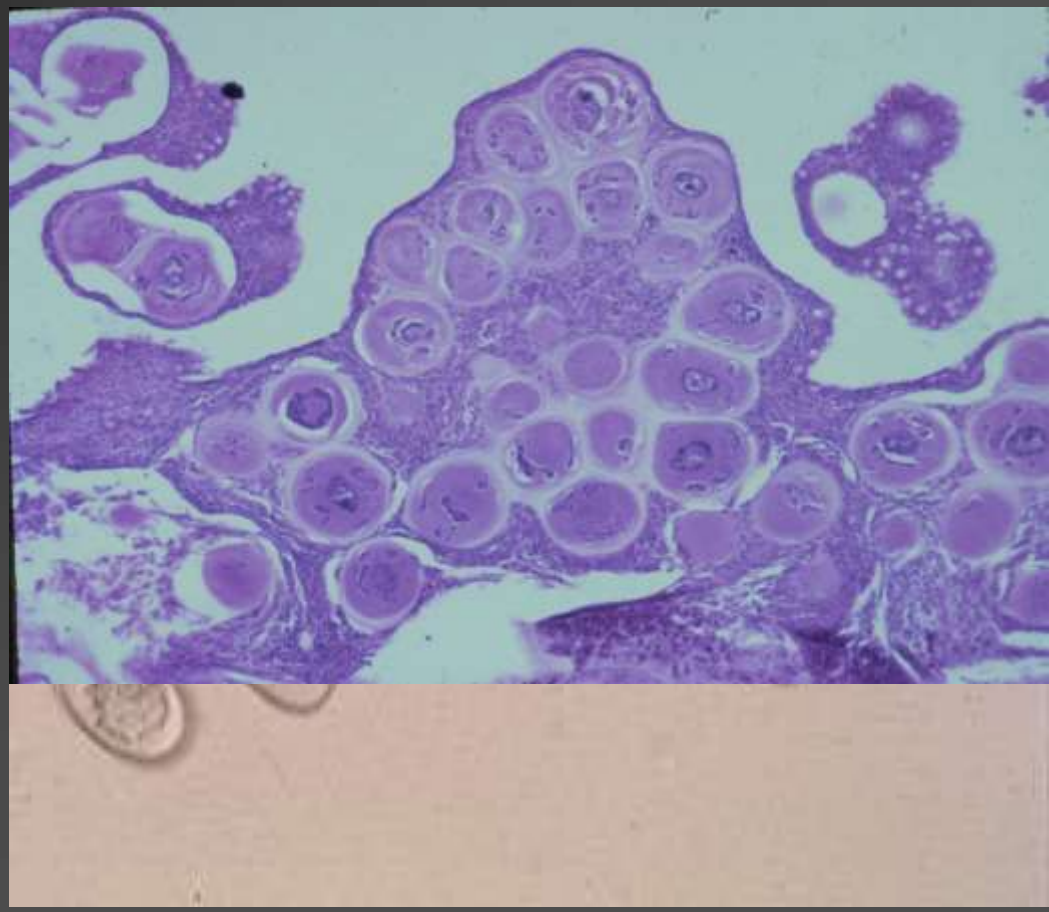
Medical Management of Disease in Ornamental Fish

What to do….what to do?

Avoiding the shotgun approach

Avoiding the shotgun approach

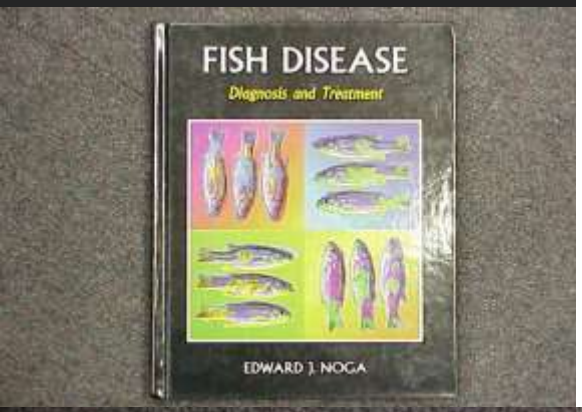
- Empirical treatment?
  - What are you treating??
    - Bacteria?
    - Parasites?
    - Fungus?
    - Virus?
    - Water quality?
  - Expense associated with random treatments
    - $$$
  - Losses associated with misdiagnosis/empirical treatment
    - $$$

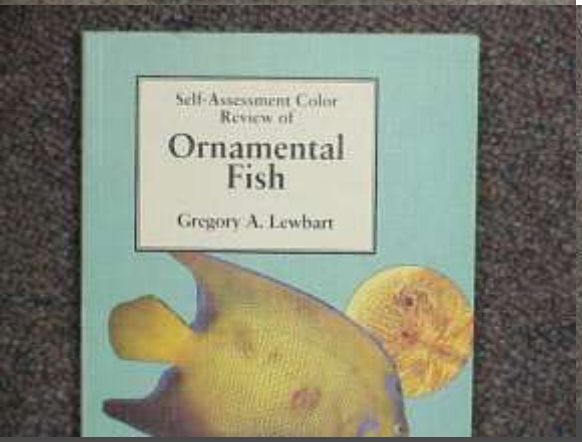


Setting up a fish diagnostic and treatment plan

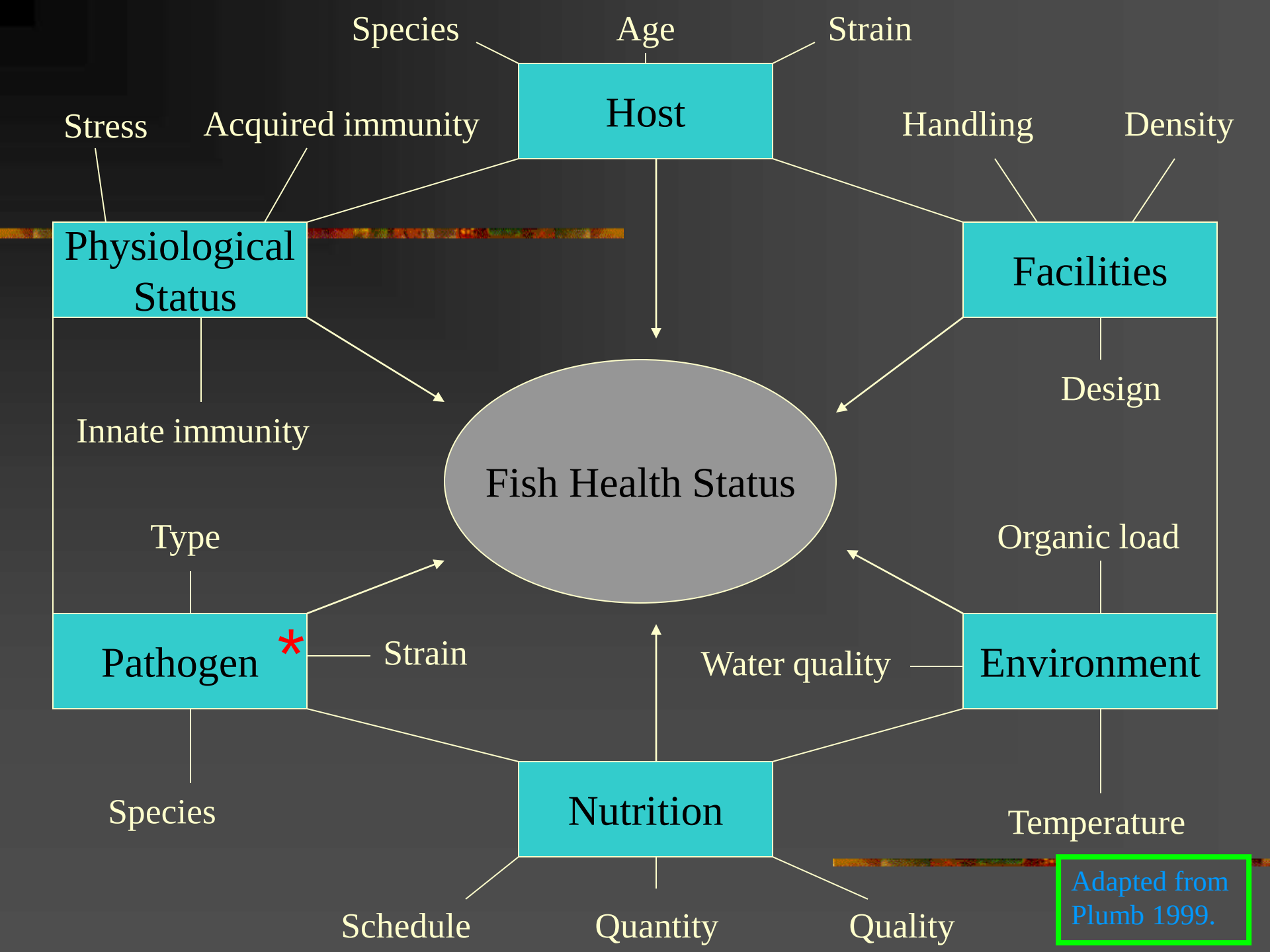
- Established hospital aquarium
  - dechlorinated, aged water
  - filtration, heater, lighting
- Fish medical literature
- Water test kits
- Microscope
- Diagnostic laboratories
- Ante-mortem and Post-mortem examinations
- Anesthetic (MS-222)
- Disease diagnosis
- Chemotherapeutics

Literature: Fish Medicine





- Literature
  - Fish Disease
    - E. Noga
  - Fish Medicine
    - M. Stosskopf
  - Self- Assessment Ornamental Fish
    - G. Lewbart
  - A Common Sense Guide to Fish Health
    - Terry Fairfield


Species
Age
Strain
Host
Stress
Acquired immunity
Handling
Density
Physiological Status
Facilities
Innate immunity
Design
Fish Health Status
Type
Organic load
Pathogen
*
Strain
Water quality
Environment
Species
Nutrition
Temperature
Schedule
Quantity
Quality
Adapted from Plumb 1999.

Examining the water

- Water quality exam
  - Primary problem
  - Contributes to problem
    - Role of organics
      - Infectious disease
      - Affects on therapeutics?

Examining the water

- What to measure?
  - physical characteristics
    - turbidity and solids
    - temperature
  - chemical analysis
    - Ammonia, Nitrite, nitrate, pH, alkalinity, hardness, chlorine

Understanding the problem

- Ante-mortem diagnoses

  SAVE THE FISH!

- Post-mortem diagnoses

  SAVE THE TANK!

Anesthetics- Immersion

- Tricaine Methanesulfonate (MS-222)
  - most widely used
  - Dose:
    - induction: 100-200 mg/L
    - maintenance: 50-100 mg/L
  - Recovery
    - < 10 minutes for short procedure
    - 4-6 hours for longer procedure

Got sick fish?

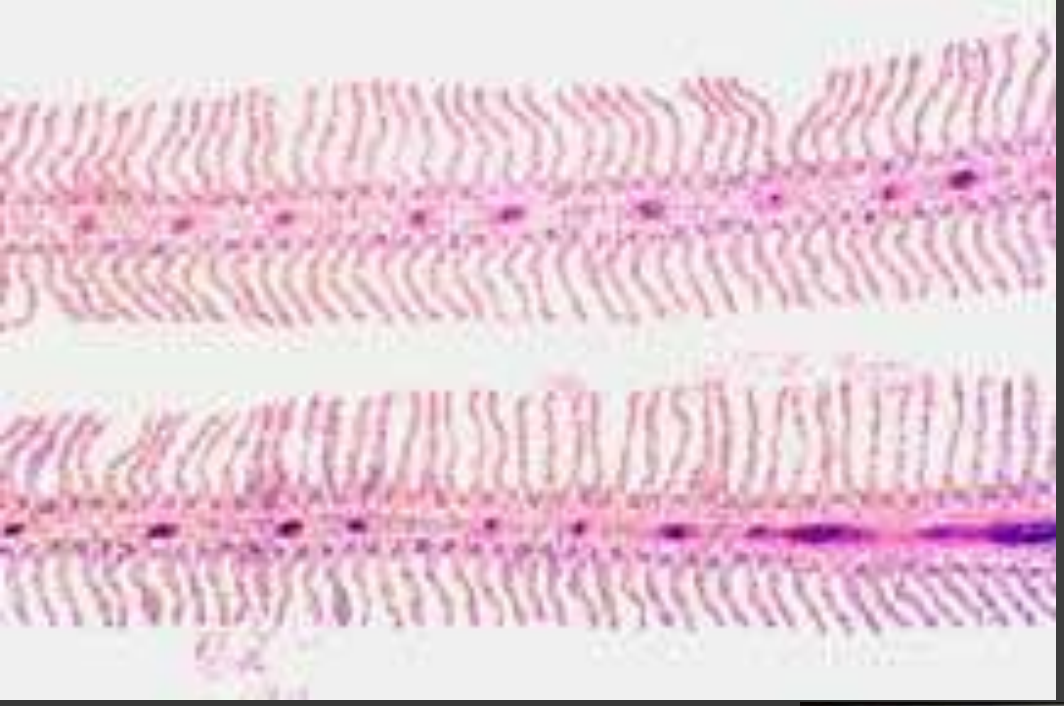
- External disease
  - Mucous production
  - Fin erosion
  - Ocular changes (erosion)
  - Skin hemorrhage
- Internal disease
  - Anorexia
  - Depressed
  - Poor body condition
    - muscle wasting
  - Dyspnea
  - Abnormal swimming
  - Flashing
  - Distended abdomen
  - Ocular changes

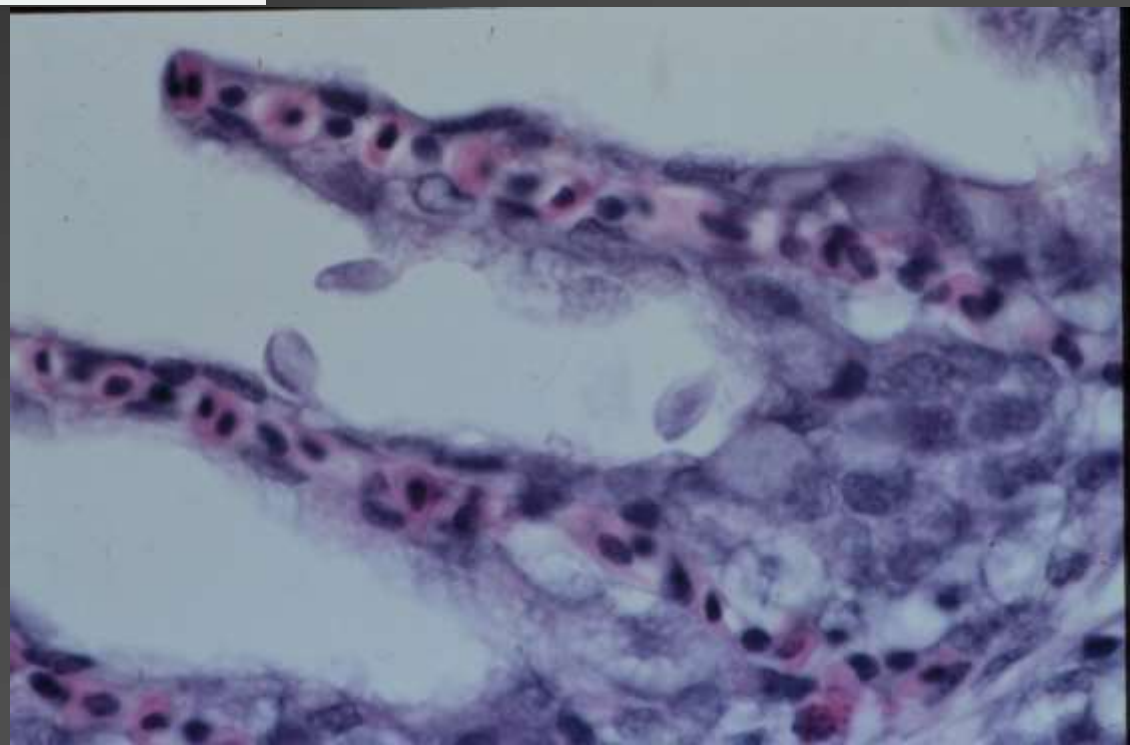
Ante-mortem Diagnostic tests

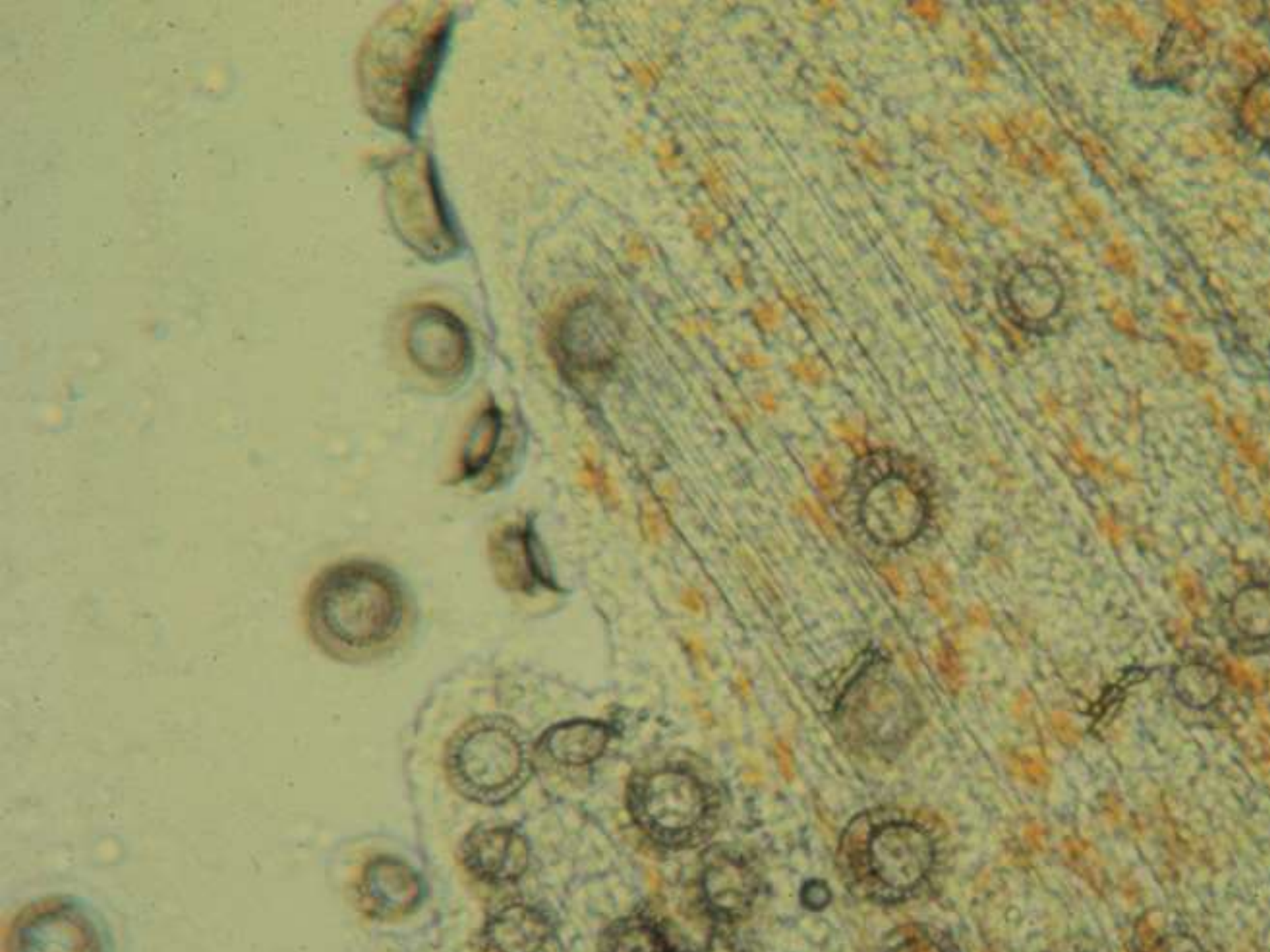
- Diagnostic tests
  - skin scrape
    - slide or back side of scalpel
    - drag slide from cranial to caudal direction
    - sample mixed with saline and stained slide

Ante-mortem Diagnostic tests

- Diagnostic tests:
  - rule in/out disease
  - use anesthesia
    - analgesia
  - gill clip
    - technique
    - place sample on slide with saline

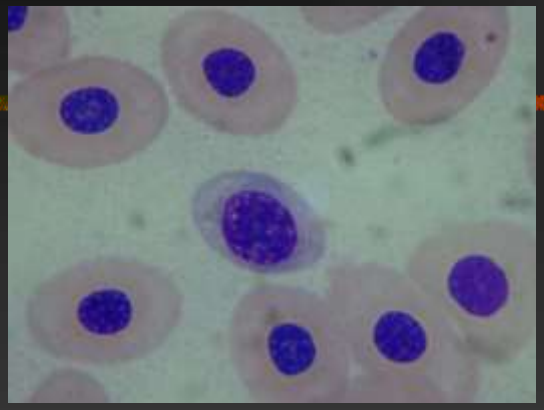
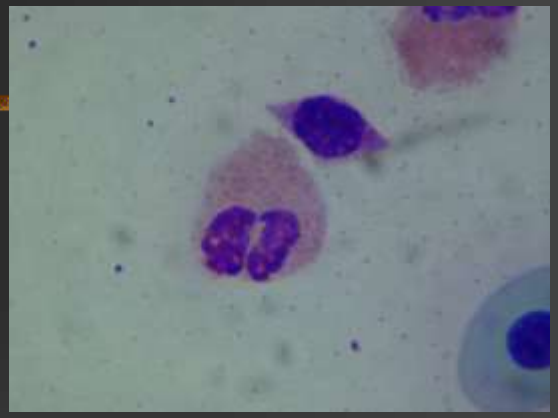
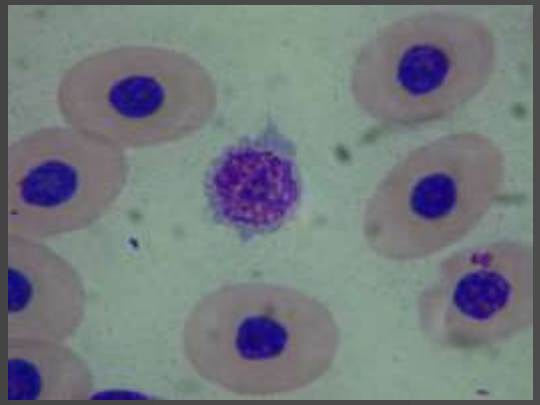
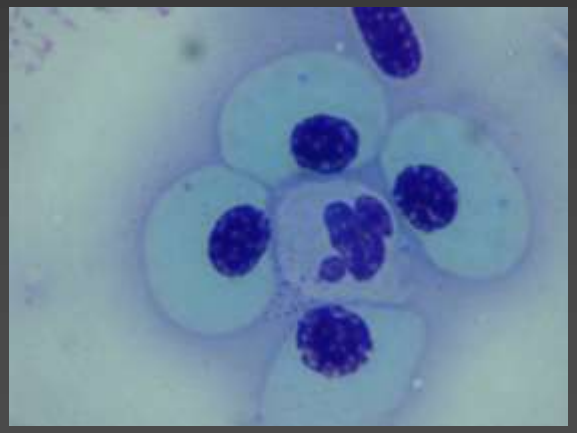
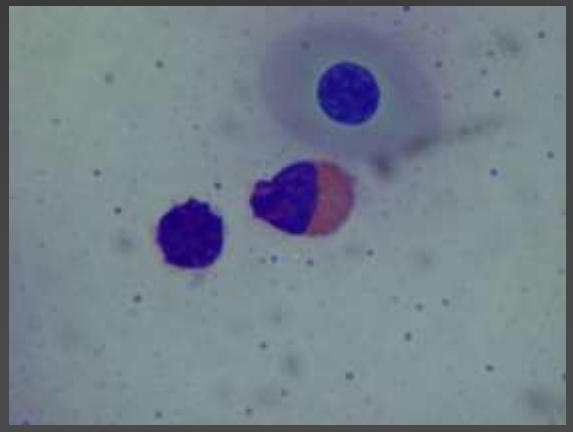
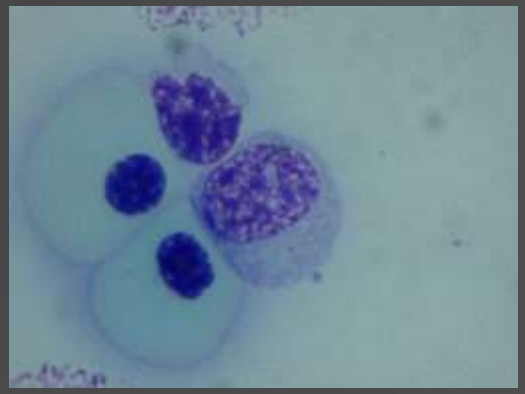






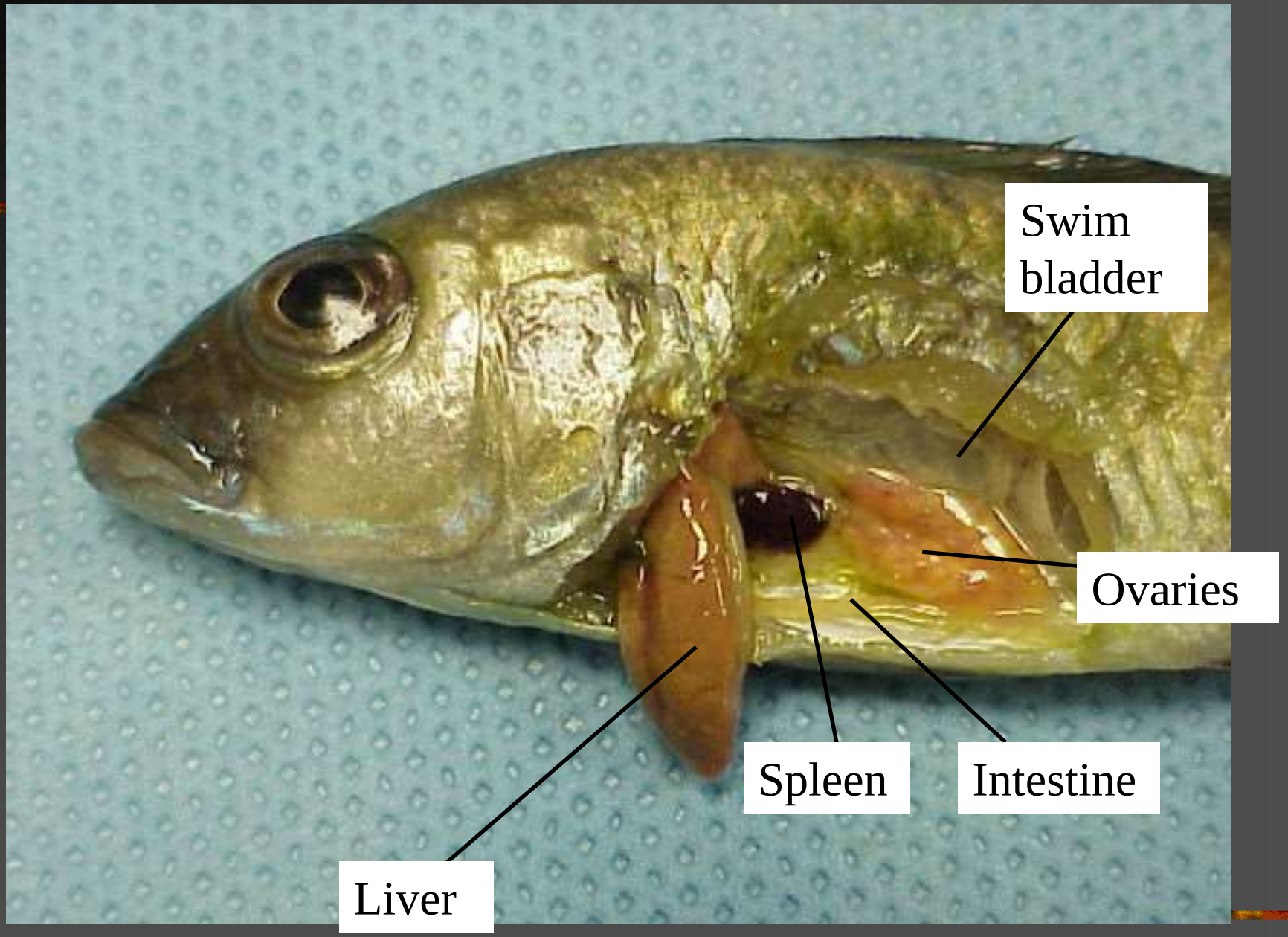
Diagnostic tests

- Diagnostic tests
  - venipuncture
  - caudal vein
    - ventral to caudal vertebrae
  - 25-30 ga needle
  - use anticoagulant
  - analysis
    - PCV, blood smears, cell counts

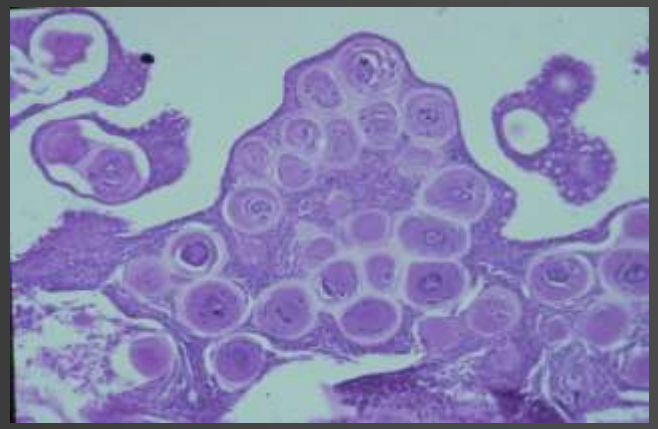
Post-mortem examinations

Sacrifice one (or 2 or 3) for the good of all


Swim bladder
Ovaries
Spleen
Intestine
Liver

Diagnostic laboratories

- Veterinary pathology services
  - Northwest Zoo Path
  - State diagnostic laboratories
  - Private firms
    - Culture
    - Histopathology



Therapeutic considerations?


WATER WONDERS
API
FURAN-2
T.C. TETRACYCLINE
GENERAL CURE
SUPER ICK CURE
TRIPLE SULFA
E.M. ERYTHROMYCIN
Mardel
Maracyn
Maracyn-Two
KENT
Freshwater Plant
Neutral Controller
AQUARI-SOL
QuICK Cure
FUNGUS CURE
SAFE&EASY
ROOT TABS
FLUKE-TABS
FURANASE
Formalin
No More Algae
CLOUT
Parasite Clear
Water Clear
Water Safe PLUS
ALGAEFIX
PHOS-X
Ick Clear
Fungus Clear


XIAN LENG HOLDINGS BERHAD
祥龍控股(馬)有限公司
專業龍魚配方
龍魚抗病毒劑
Arowana
Anti-Virus
AQUACHEM
XIAN LENG HOLDINGS BERHAD
祥龍控股(馬)有限公司
專業龍魚配方
龍魚滅寄劑
Arowana
Parasite Cure
AQUACHEM
XIAN LENG HOLDINGS BERHAD
祥龍控股(馬)有限公司
專業龍魚配方
龍魚特效抗菌劑
Arowana Cure
AQUACHEM
XIAN LENG HOLDINGS BERHAD
祥龍控股(馬)有限公司
專業龍魚配方
龍魚除苔劑
Arowana Algaecide
AQUACHEM

Therapeutics

- General considerations
  - fish diseases fulminating, treat immediately
  - treatments may damage biofilters
  - remove carbon filters when using bath/immersion
  - oral and parenteral routes preferred
    - bath techniques inconsistent

Therapeutics

- General considerations
  - pharmacokinetics unknown
  - metabolism is temperature dependent
  - resistance to drugs possible if used inappropriately
  - efficacy of over the counter drugs is questionable

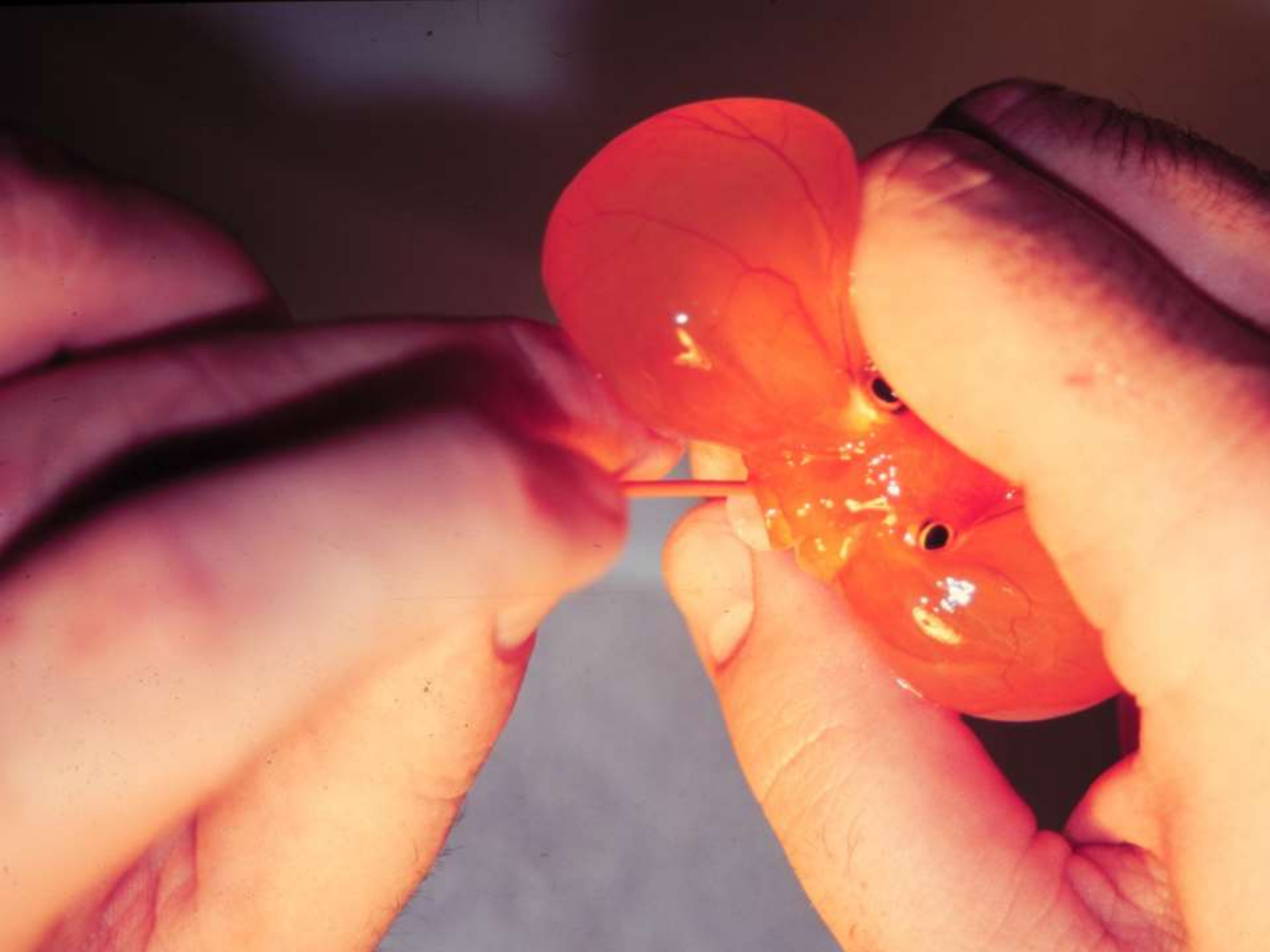
Therapeutics

- Water
  - dip, bath, immersion
  - MIC's probably not reached
  - stress of daily Rx
  - treating the environment

Any differences??

Therapeutics

- Oral
  - excellent delivery route
  - medicated feeds
  - many sick fish anorectic

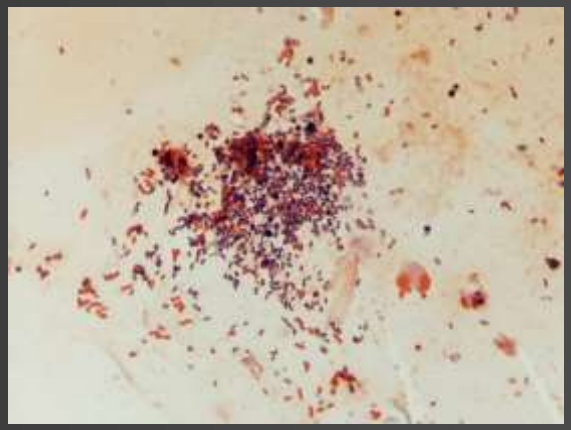


Therapeutics

- Injectable
  - IM and IP
  - rapid
  - longer intervals between handling
  - accurate dosing difficult
    - dilute drug
    - do not use irritating drugs

Bacteria

- General considerations:
  - bacterial infections in fish can rapidly become systemic
  - most infections are cased by Gram-negative bacteria
  - most infections are stress mediated
    - poor water quality, overcrowding, poor diet
  - culture considerations
    - incubation temperature



Therapeutics

- Water bath
  - Oxytetracycline
    - 10-50 mg/L for 1 hour
    - 10-100 mg/L for 1-3 days
  - Kanamycin
    - 50-100 mg/kg every 3 days, change water
  - Furazolidine
    - 1-10 mg/kg 24 hours

Therapeutics

- Oral
  - Amoxicillin
    - 40-80 mg/kg/day for 10 days
  - Enrofloxacin
    - 10 mg/kg for 10 days
  - Erythromycin
    - 25-50 mg/kg for 7 days
  - Trimethoprim sulfa
    - 50 mg/kg for 5 days
  - Oxytetracycline
    - 55-80 mg/kg for 10 days

Therapeutics

- Injectables
  - Enrofloxacin
    - 10 mg/kg IM or IP every 3 days
  - Chloramphenicol
    - 20-50 mg/kg IP once a week for 2 weeks for ulcer disease in goldfish
  - TMPS:
    - 50 mg/kg IP daily for 7 days

Parasites

- Clinical signs depend on parasite and location involved
  - gills
    - hypoxia (gulping) and coughing
  - body surface
    - flashing, rubbing, scale loss, fin erosion
  - internal
    - poor-doer, anorexia, weight loss

Therapeutics

- External Protozoa
  - copper sulfate
    - freshwater:
      - every other day for 3 treatments for Ich
        - longer treatments if cool temperatures
      - monitor water levels
        - immunosuppressive
        - toxic to aquatic plants
        - toxic to invertebrates and elasmobranchs
        - do not use at alkalinity <50 ppm

Therapeutics

- External Protozoa
  - Copper
    - saltwater
    - use chelated form
    - 0.15-0.2 mg Cu/L for 14-21 days
    - toxic to invertebrates and elasmobranchs

Therapeutics

- External Protozoa
  - Formalin
    - bath:
      - 0.125-0.250 ml/L (125-250 ppm) up to 60 minutes
      - monitor closely for behavior and neurological changes
    - prolonged immersion
      - 0.015-0.025 ml/L (15-25 ppm) 24 hours
    - Toxic side effects potentiated at temperatures >80F
    - Wear gloves when handling formalin

Therapeutics

- External Protozoa
  - Malachite Green
    - prepare stock solution to 3.7 mg/ml
    - bath:
      - 13-16 ml/L of stock solution for 10-30 s
      - 0.26 ml/L for 30-60 minutes
    - prolonged immersion
      - 0.026ml/L for 24 hours 3 times at 3 day intervals
    - topical on lesion: 100 mg/L
    - carcinogenic: wear gloves
    - remove residual with activated carbon

Therapeutics

- Sodium chloride
  - Used as a stress reliever from 0.1 to 1 ppt
  - Parasite and *columnaris* treatment requires levels of 4-5 ppt. (g/l)
  - My preference: 3-5 g/L or ½-1 tsp/L

Therapeutics

- External Protozoa
  - Potassium permanganate
    - prolonged immersion
      - 2.0 mg/L
    - water with high organic loads require higher dosing levels
  - Water
    - FW fish- saltwater dip
    - SW- freshwater dip
    - Monitor closely, remove at first signs of stress

Therapeutics

- Monogenetic trematodes
  - Formalin
  - Trichlorfon
    - bath
      - 2-5 mg/L for 60 minutes
    - prolonged immersion
      - 0.25 mg/L <80F
      - 0.50 mg/L >80F
      - two treatments at 3 day intervals

Therapeutics

- Monogenetic and Digenetic trematodes, and Cestodes
  - Praziquantel
    - prolonged immersion
      - 2-10 mg/L for 24 hours
    - oral
      - 50 mg/kg once
    - injectable
      - 25 mg/kg once

Therapeutics

- Gastrointestinal nematodes
  - Fenbendazole
    - prolonged immersion
      - 2 mg/L once a week for 3 weeks
    - oral
      - 25 mg/kg/day for 3 days
      - 50 mg/kg once a week for 3 weeks
  - Levamisole
    - oral
      - 2.5-10 mg/kg/day for 7 days

Therapeutics

- Gastrointestinal Protozoa
  - Hexamita
  - Metronidazole
    - prolonged immersion
      - 25 mg/L every other day for 3 treatments
    - oral
      - 25 mg/kg/day for 5-10 days
      - 100 mg/kg/day for 3 days
      - soak brine shrimp in 1% solution (refrigerator) for 3 hours

Therapeutics

- Antifungals
  - Formalin
    - prolonged immersion
      - 0.015-0.025 ml/L (15-25 ppm) 24 hours
  - Malachite green
    - prolonged immersion
      - 0.026ml/L for 24 hours 3 times at 3 day intervals
    - topical on lesion: 100 mg/L
  - Saltwater

Zoonotic Diseases

- Humans exposed by ingestion or contact with fish or water
  - Contamination of open wounds
  - Immunocompromised and young people more susceptible
  - *Erysipelothrix rhusiopathiae, Mycobacterium, Staphylococcus, Streptococcus, Clostridium, Salmonella, Edwardsiella*
  - Always wear gloves


Questions?