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Life Cycle of a Parasite (2008)

WHAT METHODOLOGIES ARE AVAILABLE?

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First: Identify the Question

Is it more important to know parasite abundance fluctuations over time

…..or effects on host populations?

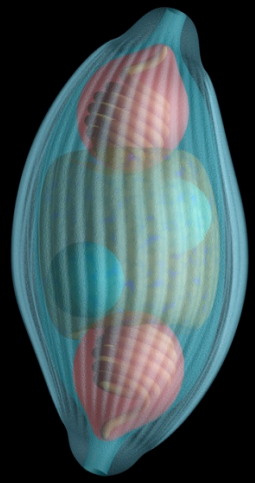
Second:
What do you Monitor?

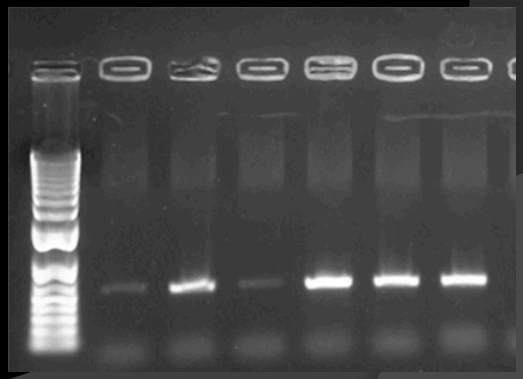
- **Wild fish**
  - **Provides data on actual effects, but difficult to detect loss and don't know where fish became infected**
- **Captive or hatchery fish**
  - **Better data on timing and locations of infection, but only once fish become exposed**
- **Sentinel fish**
  - **Good data on timing and location of infection, but difficult to extrapolate to effects in the wild**

- Invertebrate host
  - Not easy, but this is what drives infections
- Water
  - Provides direct measure of parasite abundance but may be difficult to differentiate life stages

Third: What tests do you use?

- **Assays for presence/absence in host**
  - **Visual identification**
  - **Antibody-based assays**
  - **Molecular - PCR**

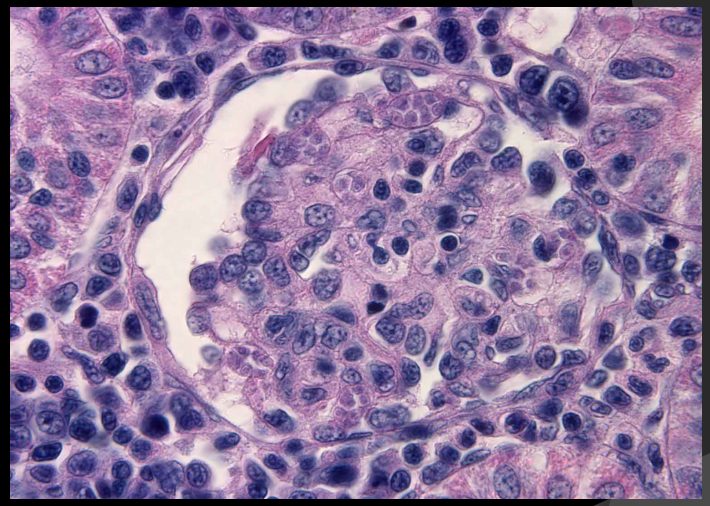




Limitations: Generally don't provide data on parasite abundance or infection severity

Measures of disease severity

- **Provide more quantitative data**
  - **Monitoring data for loss**
  - **Histology**
  - **QPCR**

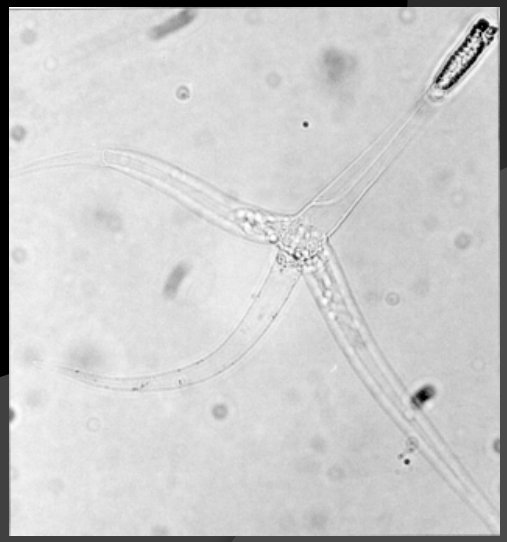


Limitations: Quantification of disease severity difficult unless linked with loss or quantifiable morbidity

i.e. what does a high QPCR value mean?

Assays for parasites in the environment

- **Direct measures of parasite abundance**
  - **Filtration and visual enumeration of parasites in water**
  - **Water filtration with QPCR**

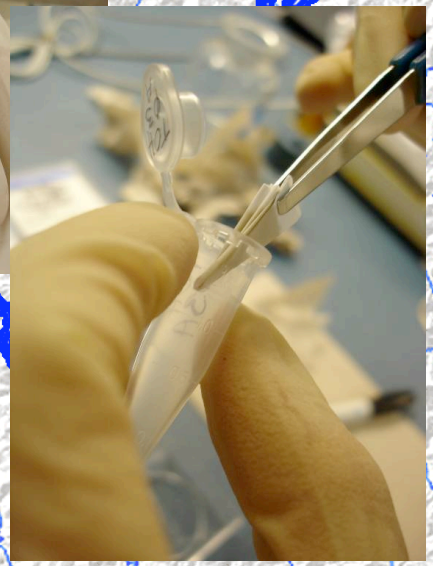


Limitations: visual enumeration has low sensitivity and is time consuming; molecular identification cannot differentiate stages

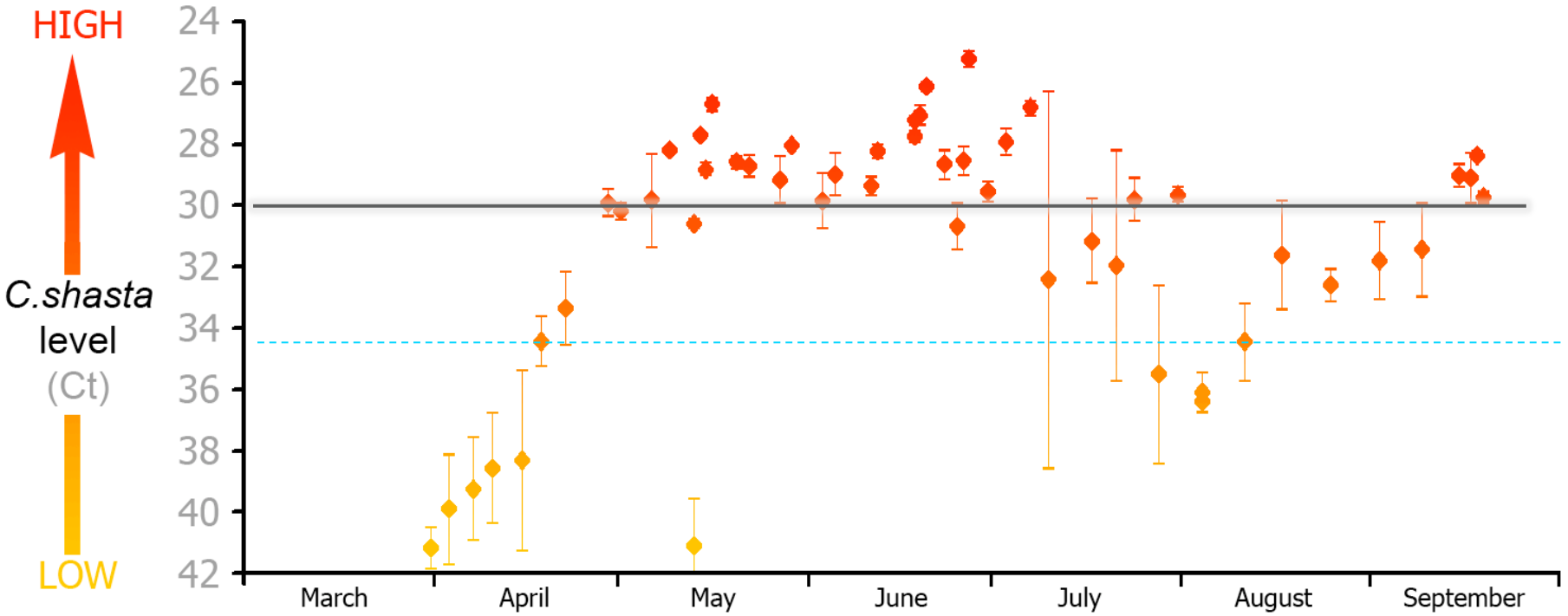
Parasite Density in Water

Collect and filter 1-liter samples of water

Use QPCR assay to determine parasite density in the sample



Applications for Identifying Temporal Patterns



Parasite levels at one site from April through September 2008
Dotted line – 1 parasite/liter
Red line – 10 parasites/liter; mortality occurs in sentinel fish

Limitations of Methods

- Data on disease severity or incidence may be confounded by other factors
  - e.g. changes in host resistance
- Direct measures of parasite abundance require extrapolation to disease effects
- Long-term data sets must be collected in a standardized manner to allow between year comparison.

What I didn't talk about...

- Laboratory challenge models for determining effects of temperature on both hosts and both free-living spore stages
- Models for assessing effects of flow changes on life cycle dynamics
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