

# Fish Health Assessment of Glass Eels from Canadian Maritime Rivers

D. Groman, R. Threader, D. Wadowska, T. Maynard and L. Blimke

Aquatic Diagnostic Services, Atlantic Veterinary College

Ontario Power Generation

Electron Microscopy Laboratory, Atlantic Veterinary College

Kleinschmidt Associates



## Project Background

**Objective** - Capture glass eels in NS/NB for stocking in Great Lakes Watershed

**Protocol** - Transfer glass eels to quarantine

Health Assessment ( G. L. F. H. C.)

OTC Marking of glass eels

Transfer and stocking (Ontario & Quebec)



**Glass Eel Transfer**



**Glass Eel Stocking**



**Glass Eel Stocking Data**

Year	Number kg Purchased	Purchase Price (per kg)	Stocking Date	Stocking Location	Number of Eels Stocked	Mean Length (mm)	Mean Mass (g)
2006	102.07	\$ 637	Oct. 12, 2006	Mallorytown Landing	166,774 <sup>1</sup>		0.69 (n = 25)
2007	151	\$ 1,310 - \$ 1,415	June 21, 2007	Mallorytown Landing	436,907	59.2 (n=49; ±0.5)	
2008	370	\$ 630 - \$ 805	May 15, 2008	Mallorytown Landing	797,475	60.9 (n=40; ±0.6)	0.17 (n=40; ±0.0006)
			May 29, 2008	Mallorytown Landing	518,358	60.4 (n=40; ±0.5)	0.14 (n=40; ±0.0004)
			June 11, 2008	Deseronto	685,728	56.5 (n=40; ±0.5)	0.14 (n=40; ±0.006)
2009	299	\$ 630	June 2, 2009	Deseronto	651,521 (+47,269)	59.14 (n=246; ±4.0)	0.18 (n=246; ±4.0)
			June 2, 2009	Mallorytown Landing	651,521 (+47,269)	59.14 (n=246; ±4.0)	0.18 (n=246; ±0.04)
Estimated Total Number of Eels Stocked from 2006 - 2009					3,908,284		

**Health Assessment**

**Objective** - To screen subsamples of glass eel populations for specific infectious agents

**Protocol** - Transfer live eels from quarantine

Gross Examination and histology for parasites

Pooled samples (10 eels) for virus isolation, molecular diagnostics and bacteriology

**Health Assessment**

**Sampling** - Lot size varied by year (225 - 340 eels) with 170 for parasitology & 170 for pooled tests

**Parasitology** - Gross and histologic examination for swim bladder nematode - *Anguillicoloides crassus*

**Virology** - Virus isolation using tissue culture (VHSV, ISAV, EEHV, IPNV, SVCV, IHNV)

**Molecular Dx.** - PCR, RT-PCR or Nested PCR for viruses

**Bacteriology** - Standard culture, biochemicals, API 20E and Slide Agglutination, MALDI-TOF Mass Spectrometry



Gross Pathology Eel Septicemia

### Glass Eel Diagnostic Data

Parameter	Detection Method	Results
European Eel Herpesvirus	PCR	All sample pools negative for EEHV.
Viral Hemorrhagic Septicemia	Nested PCR	All sample pools negative for VHS.
Infectious salmon anemia virus	RT - PCR	All sample pools negative for ISAV.
Infectious pancreatic necrosis virus	RT - PCR	All sample pools negative for IPNV.
Infectious Hematopoietic Necrosis Virus	RT - PCR	All sample pools negative for IHNV.
Spring Viremia of Carp Virus	RT - PCR	All sample pools negative for SVCV.
Virus Isolation	CHSE / SHK / FHM / EK-1 cells	No virus isolated in any cell line.
Aeromonas salmonicida	Standard plate culture with biochemical identification and slide agglutination	All sample pools negative.
Yersinia ruckeri	Standard plate culture with biochemical identification and slide agglutination	One lot infected in 2009; all other lots negative.

### Glass Eel Diagnostic Data

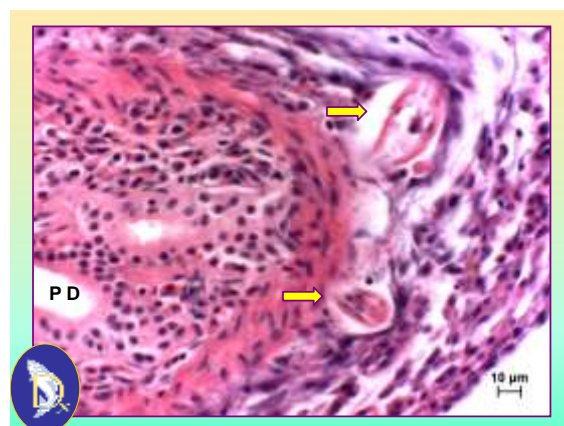
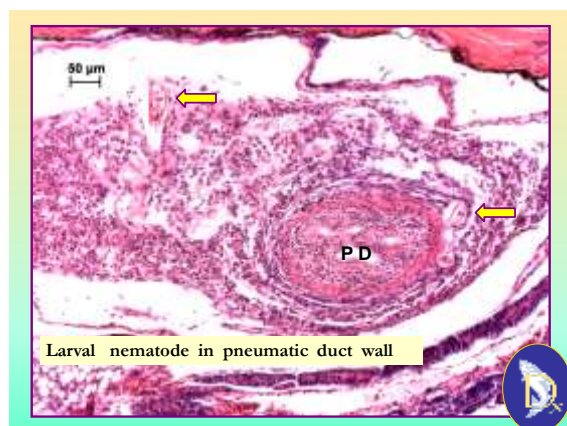
Gross Parasitology was completed using dissecting microscope examination, with all samples negative for *A. crassus*.

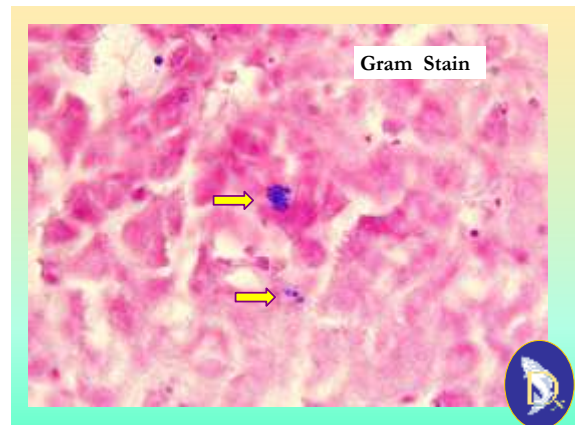
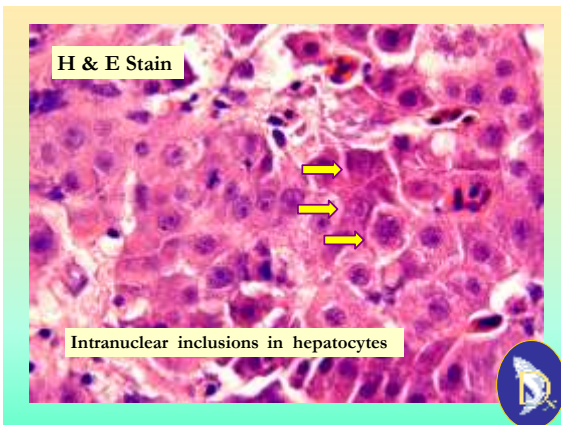
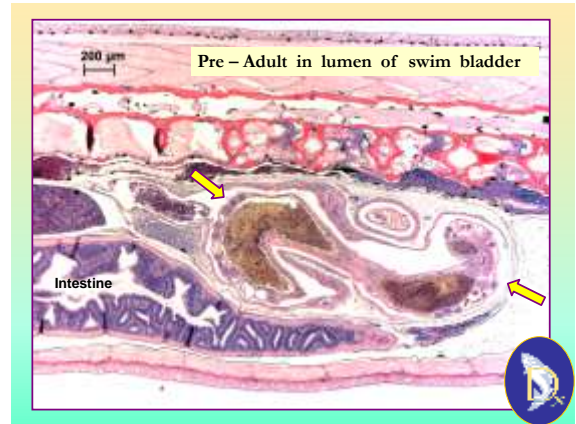
Histological evaluations were completed on serial sections of sagittally bisected eel viscera, with pneumatic duct and gas bladder examined for larval nematodes and pre-adult worms.



### Glass Eel Parasitology Data

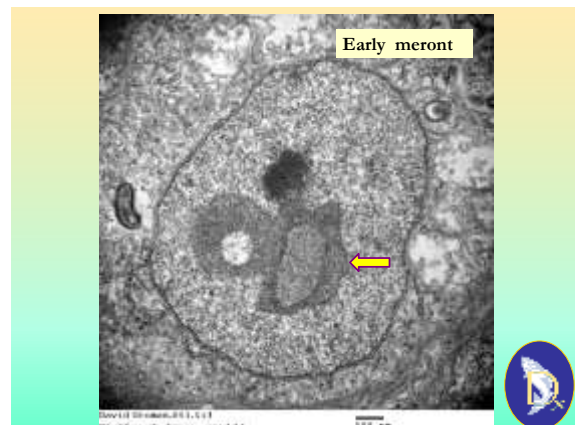
- 1) Trophozoite stages of the ciliate *Ichthyophthirius multifiliis*.
- 2) Necrotizing hepatitis and an associated intranuclear microsporidian, morphologically consistent with a *Nucleospora* sp.
- 3) One Lot from St. Mary's R., NS, with inflammation of the swim bladder and both larval & pre-adult nematodes.
- 4) This lot also was infected with a myxosporean in the urethra and urinary bladder.

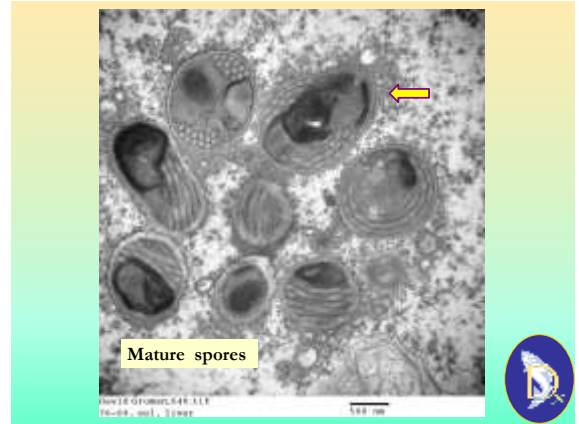
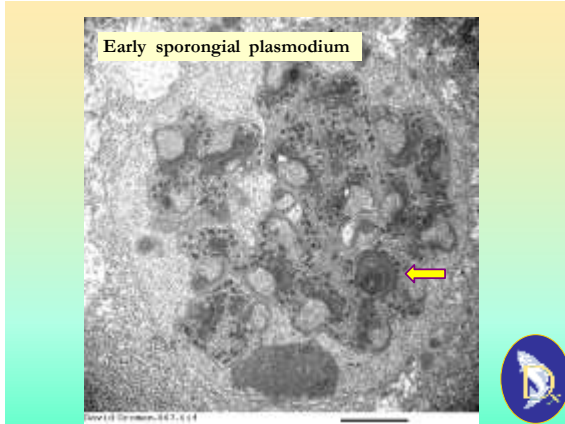




### Glass Eel Parasitology Data

All developmental stages of the organism, meronts, sporoblastic plasmodium and spores, were found in the nuclei of liver cells, intestinal epithelium cells and endothelial cells. In one instance a sprongial plasmodium was observed in a white blood cell. Xenoma was not formed, the organisms were in free contact with nucleoplasm. Size of mature spores varied from 0.8 µm to 1.5 µm.





### Genomic Assessment

Phylogenetic analysis of the small subunit gene indicates that this isolate groups within the *Nucleospora* genus (with *N. salmonis* and *Nucleospora* sp. from English Sole ) but is not *N. salmonis*. There is high bootstrap support for the separation of this new isolate from *N. salmonis*.

