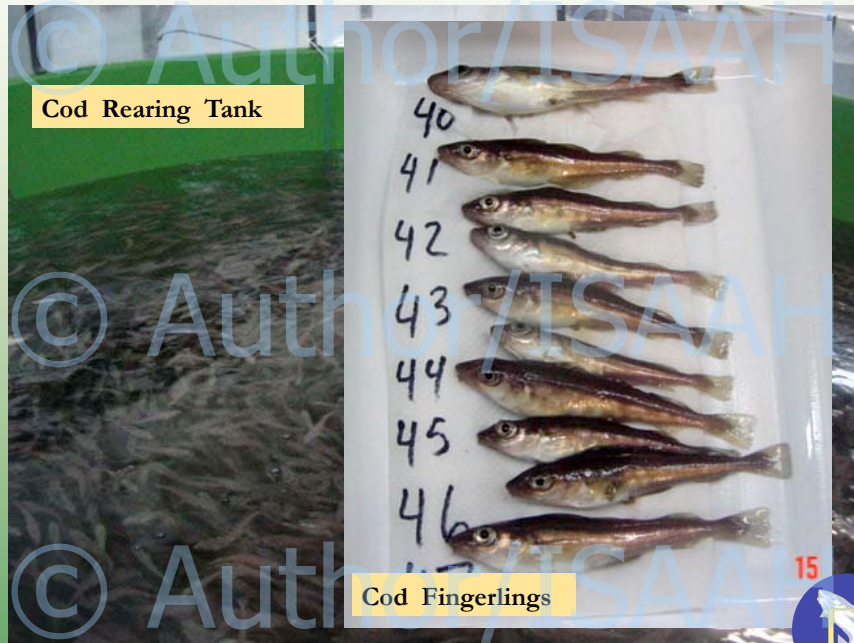


Yersiniosis in Farmed Atlantic cod (*Gadus morhua*) in a Marine Nursery in Atlantic Canada.

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Clinical History

- Fish transferred to nursery in November 2009
- Increased mortality noted in early December
- Clinical signs included fish spiraling (likely due to granulomatous otitis)
- Diagnostic testing confirmed *Yersinia ruckeri*, in fish and incoming water samples
- Fish treated with in-feed antibiotic
- Non-responsive to therapy, and culled
- Nursery located in salmon rearing area



Diagnostics Testing

- Samples submitted for virus isolation, RT-PCR for Betanodavirus, bacteriology & histology
- Six submission recorded between Dec - 2009 and Feb - 2010
- All submission negative for Betanodavirus, final four positive for *Yersinia ruckeri* Type-I
- Early histology confirmed low-grade septicemia, later samples show systemic granulomatous bacterial vasculitis



Bacterial Identification of *Yersinia ruckeri* isolates from Atlantic Cod

Sampling date	Gram	CO	37 □ C	TSI	ADH	LDC	ODC	SIM 22 □ C	Sugar Rx ARA/RH/ XYL	Agglutination	API 20 E Biocode (37 □ C)
Dec.16/09	Neg bacilli	-	+	K/A	-	+	+	-/-/+	-/-/-	+ YR Type-I - YR Type-II	4104100
Jan. 5/10	Neg bacilli	-	+	K/A	-	+	+	-/-/+	-/-/-	+ YR Type-I - YR Type-II	4104100
Feb. 15/10	Neg bacilli	-	+	K/A	-	+	+	-/-/+	-/-/-	+ YR Type-I - YR Type-II	4104100

Bacterial Identification of *Yersinia ruckeri* isolates from Atlantic Cod

The isolate was found to be sensitive by the **Kirby Bauer Method** to the follow aquaculture antibiotics:

Enrofloxacin,
Aquaflor,
Trimeth/sulfa,
Oxytetracycline

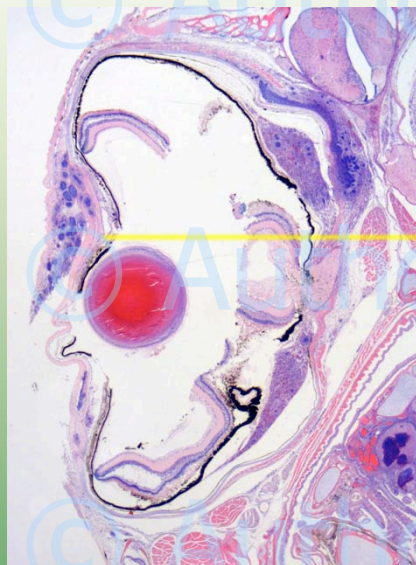
Isolates were further confirmed using **MALDI – TOF Mass Spectrometry** against *Yersinia ruckeri* controls

Histopathology Summary

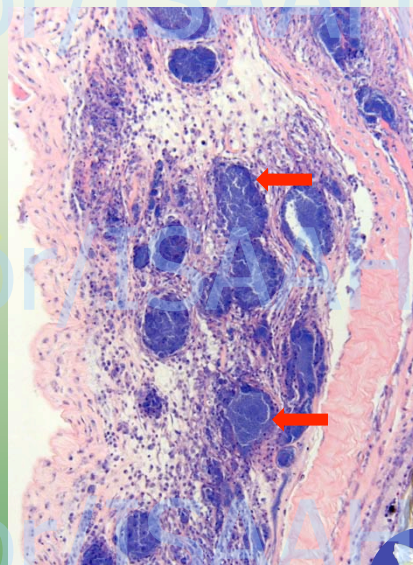
- Initially septicemia with mononuclear phagocytosis localizing in Choroid Rete of eye and gas bladder
- Progressing systemic mononuclear and bacterial vasculitis, otitis and pericarditis
- Terminal lesions with granulomatous bacterial inflammation of nearly all organ systems
- NB: The cell mediated response from the Cod immune system encases bacterial colonies reducing efficacy of antibiotic therapy

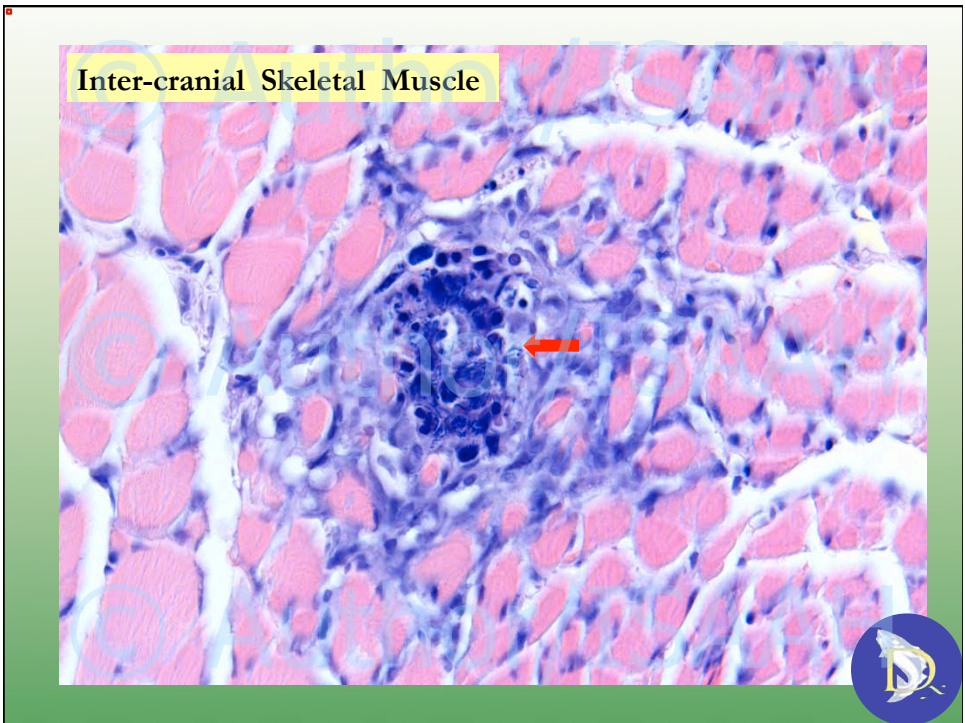
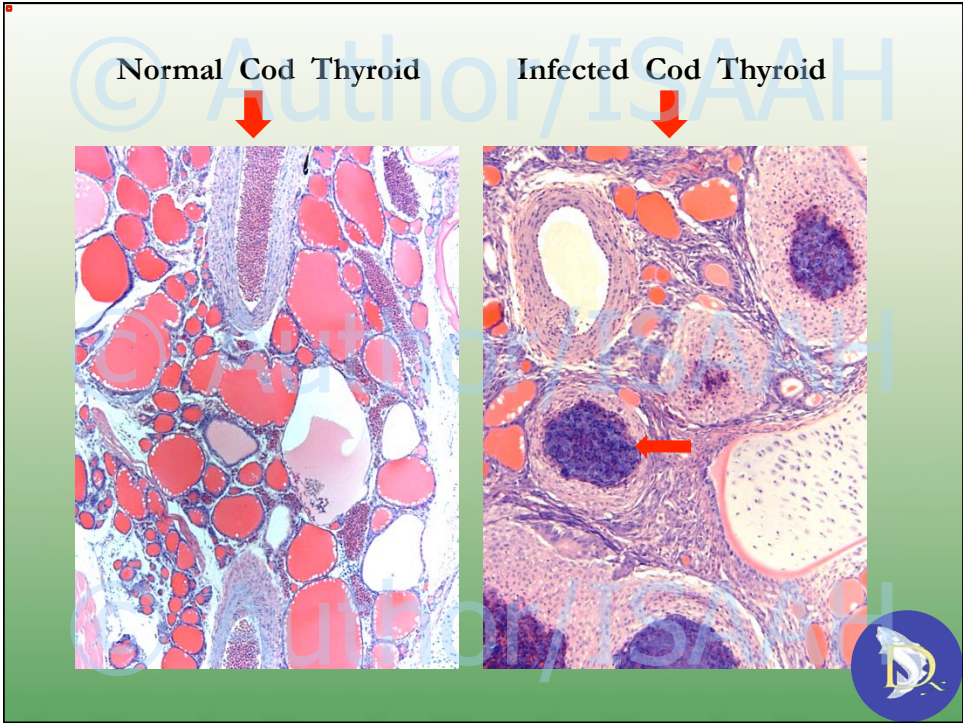


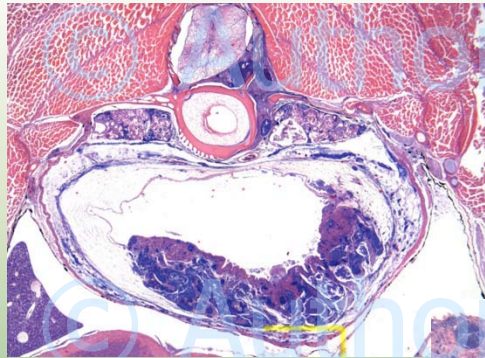
Eye



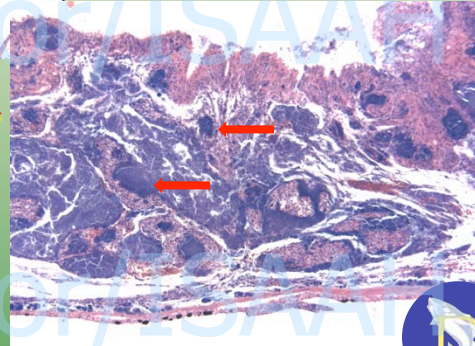
Corneal Vasculature







Cod Gas Bladder Rete
with Marked *Yersinia
ruckeri* Infection



NL 09-303, AVC U35090-09



Icelandic Outbreaks

- In 2005 and 2006 outbreak occurred in marine Atlantic Cod farm in Stadur Iceland
- Reported by Bjarnheidur Gudmundsdottir in 2006 at the ISAAH meeting
- *Yersinia ruckeri* Type-I confirmed as agent, clinical signs targeting eye, all organs affected
- Epidemiology confirmed this isolate identical to that targeting several marine species and Arctic char in facility nearby



Take Home Messages

- Avoid rearing Atlantic cod in association with Salmonid fish farming facilities
- Cod immune response may produce prolonged debilitating granulomatous infection
- Antibiotic therapy may be ineffective due to this immune response
- *Yersinia ruckeri* Type-I can be significant pathogen of many marine fin-fish: Cod, Eel, Halibut, Turbot as well as all salmonids

