

Amoebic Gill Disease

Dr. Hamish Rodger

Oranmore, Co. Galway, Ireland

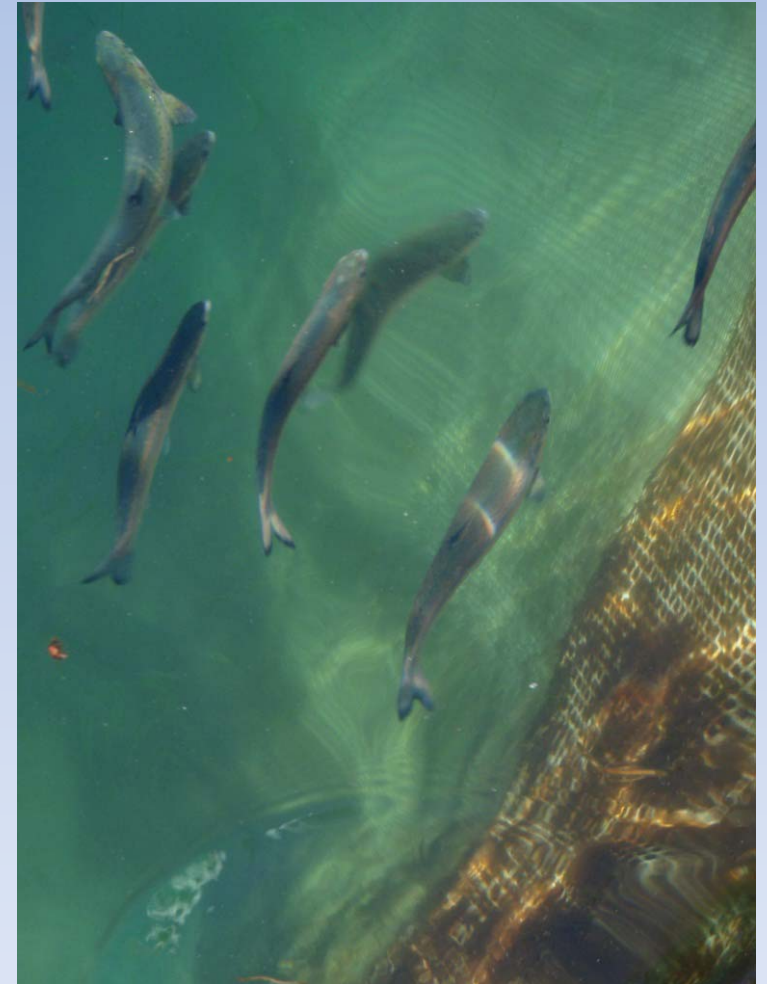
www.vetaquainter.com

Vet Aqua 
INTERNATIONAL



Outline

- Background & brief history
- The parasite
- Clinical signs & diagnosis
- Treatment/s and control
- Prevention & monitoring



Brief history of amoebic gill disease (AGD) in marine salmon

- Australia since 1980s
- WA, USA (1985 –)
- Ireland 1995 (8 sites), sporadic since until 2011 outbreak (12 sites)
- France & Spain (1995)
- Scotland (2006 – 7 [2 sites] & 2011 [26 sites])
- Norway 2006 (4 sites)
- Chile (2007 -)

AGD impact - Australia

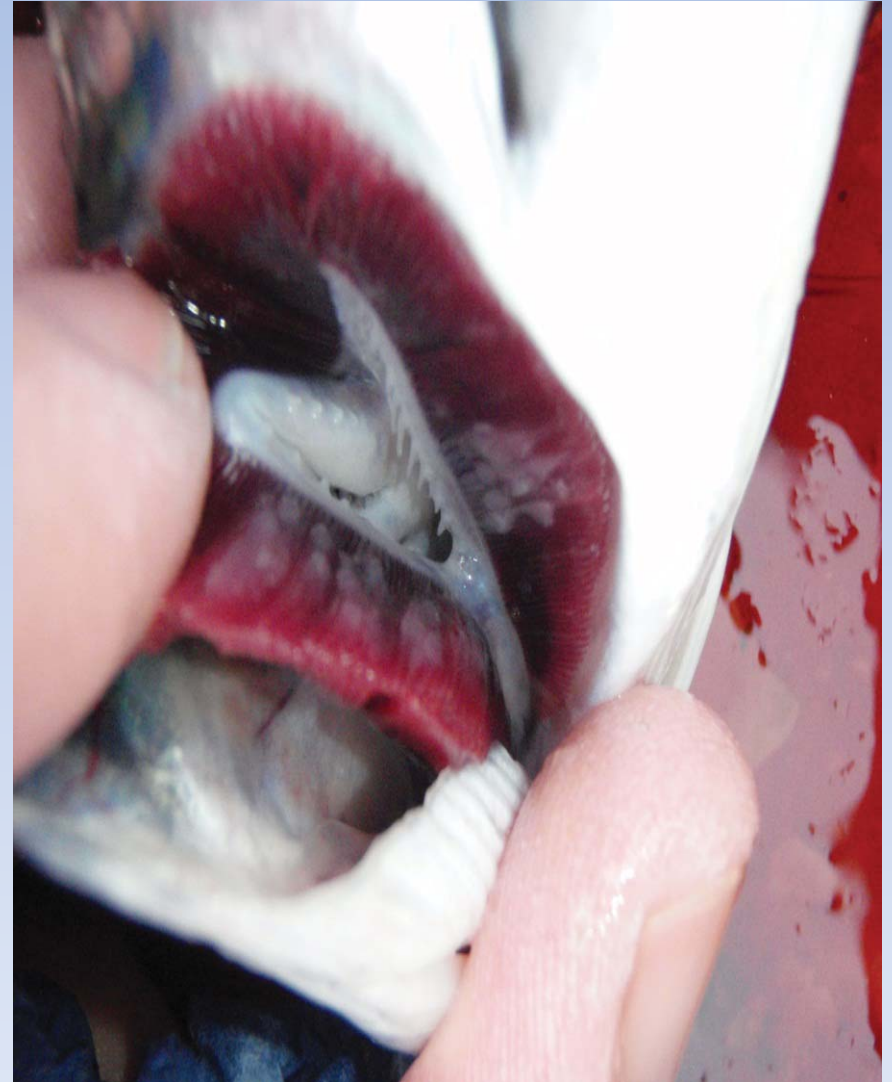
- 10% stock loss/week untreated in Australia
- Reduced growth
- Freshwater baths prophylactic (13 x in 15 month cycle)
- 50 – 75 litre FW/smolt
- Adds 10 – 20% production cost
- 80c – AUD\$1/kg COP

AGD impact – Scotland & Ireland

- Mortalities
- Loss in growth
- Increased percentage poor condition
- Increased susceptibility to disease
- Mortalities at lice bath treatment
- Emergency/early harvests

AGD risk factors

- High salinity (> 32ppt)
- High water temperature
- Blooms or swarms?
- Prior gill disease?
- Biofouling?
- Smolt quality/size?
- Farming area/site?
- Other infected sites in area



AGD 2011 Europe – 1st indications

- France – July
- Ireland – August (and re-emerged October)
- Scotland – September
- Why?

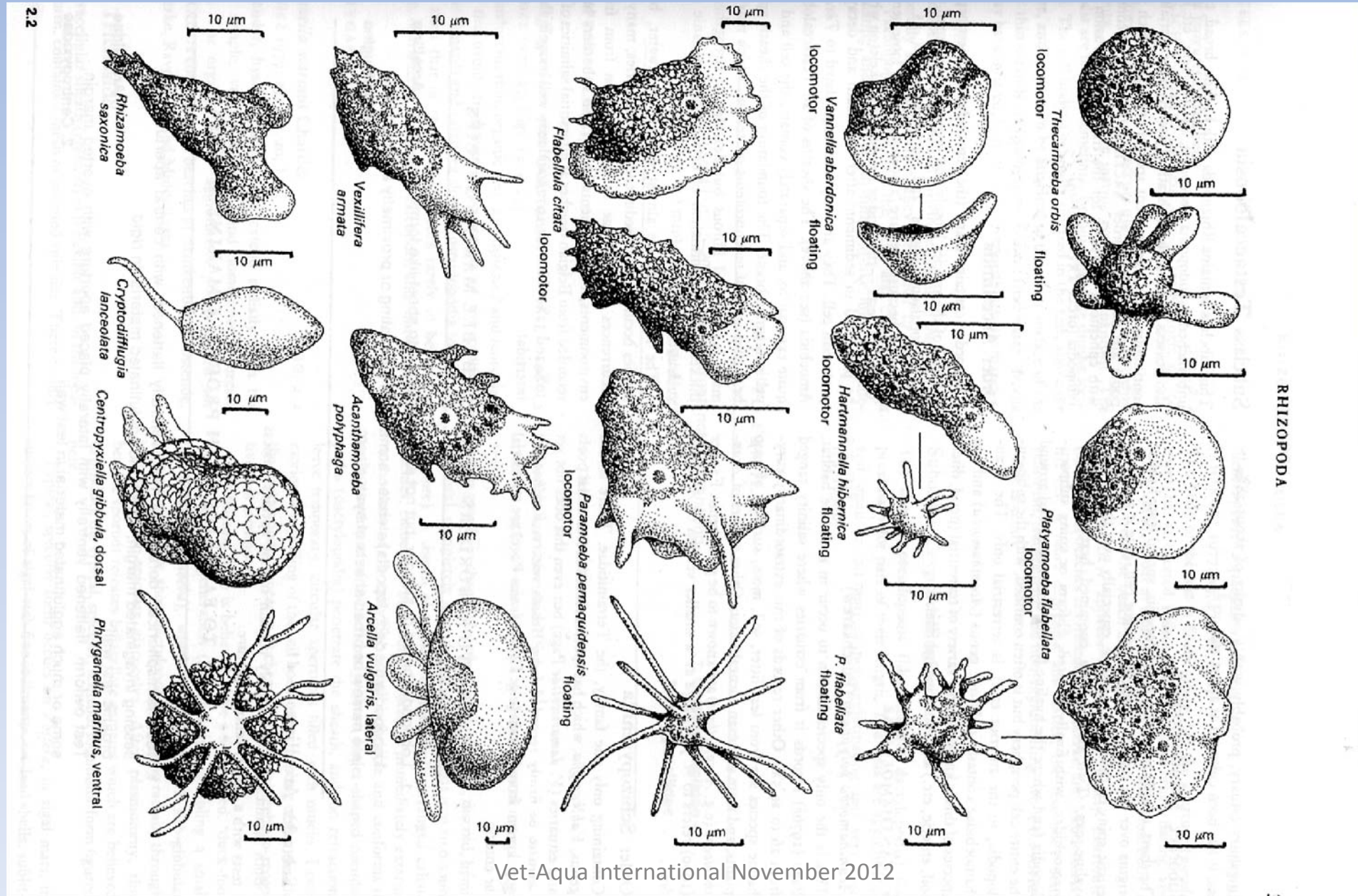


2012

- Continued in sites from 2011
- France, Ireland & Scotland
- Orkneys, Shetland (August onwards)



Marine amoeba (Hayward & Ryland [2003] Marine Fauna of the British Isles and North-West Europe)

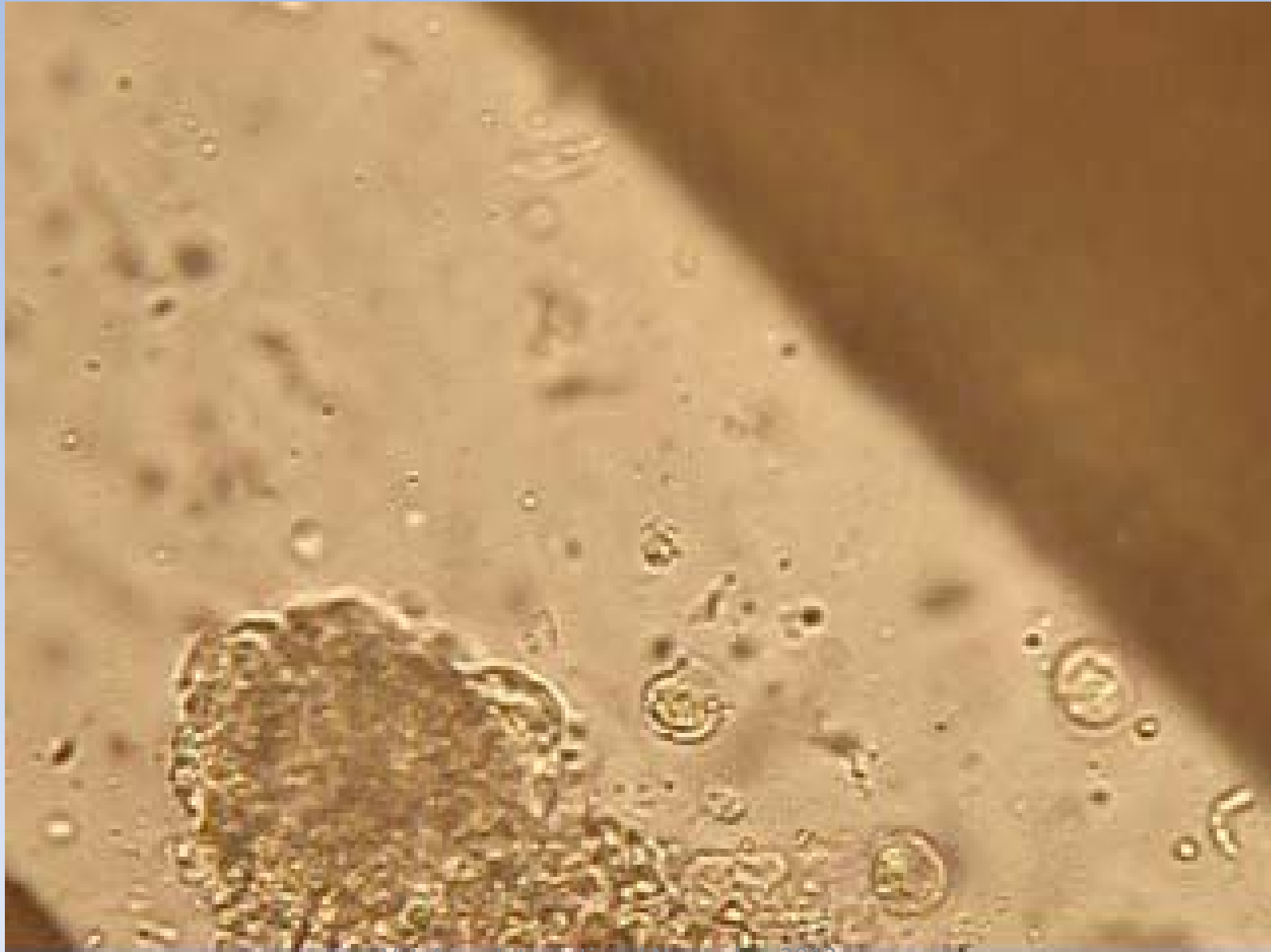


Neoparamoeba perurans

- *Paramoeba pemaquidensis*
- *Neoparamoeba pemaquidensis*
- Then confirmed new species
- *N. perurans*
- parasome



Neoparamoeba perurans & *Trichodina*
sp.



Neoparamoeba sp.

Free living & parasitic

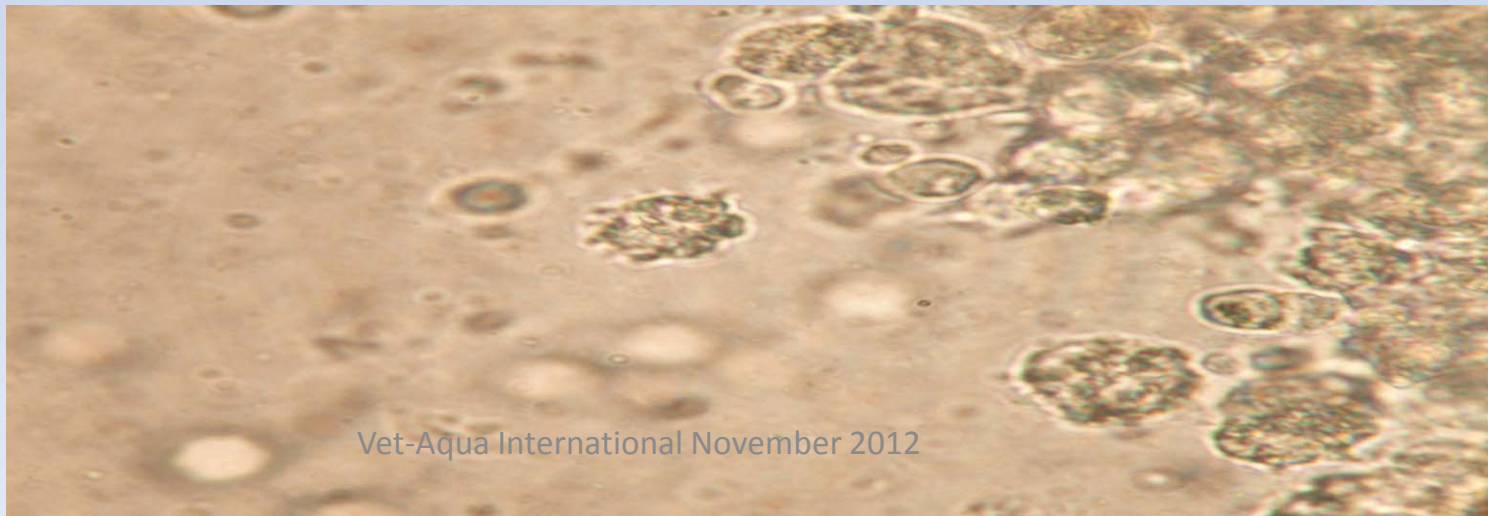
Survives in sediment & net pens

Spread in seawater (>1km)

Survives in seawater at least 14 days

Mean generation time 16 hours

N. perurans now cultured (Crosbie *et al.* 2012)



Clinical signs & diagnosis



Gill scores (0 – 5)

AGD gross pathology

-May under/over estimate AGD

-Smaller fish worst affected

- Support with fresh smears and histology



Gross gill score system

(from Taylor *et al.* 2009)

Infection level	Gill score	Description
Clear	0	Healthy red colour
Very light	1	1 white spot, light scarring or undefined necrotic streaking
Light	2	2 – 3 spots/small mucus patch
Moderate	3	Thick mucus patch or spot groupings (up to 20% gill area)
Advanced	4	Up to 50% of gill area
Heavy	5	Majority of gill surface

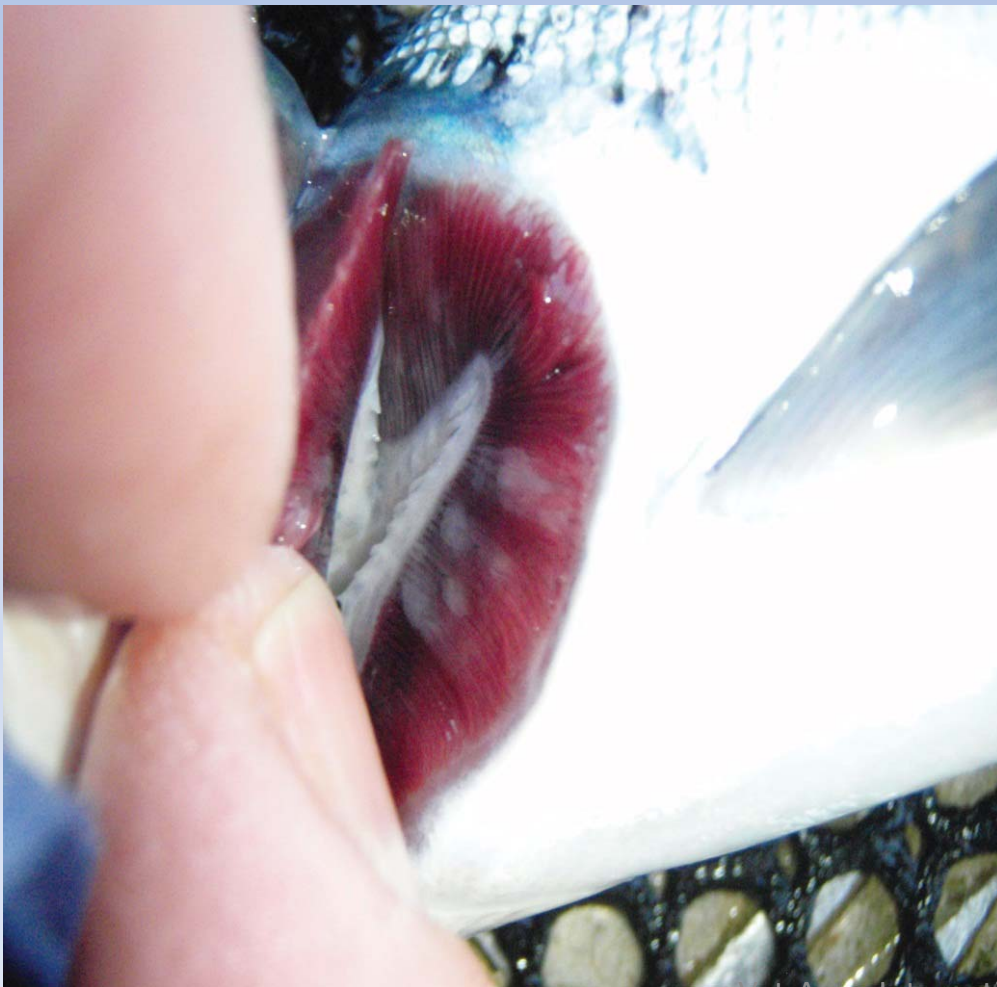
Gill monitoring

- Weekly exam (with lice exam)
- Gill score
- Fresh microscopy (sample lethargic, check nodules, etc.)
- Histopathology (ditto)
- PCR



AGD pathology

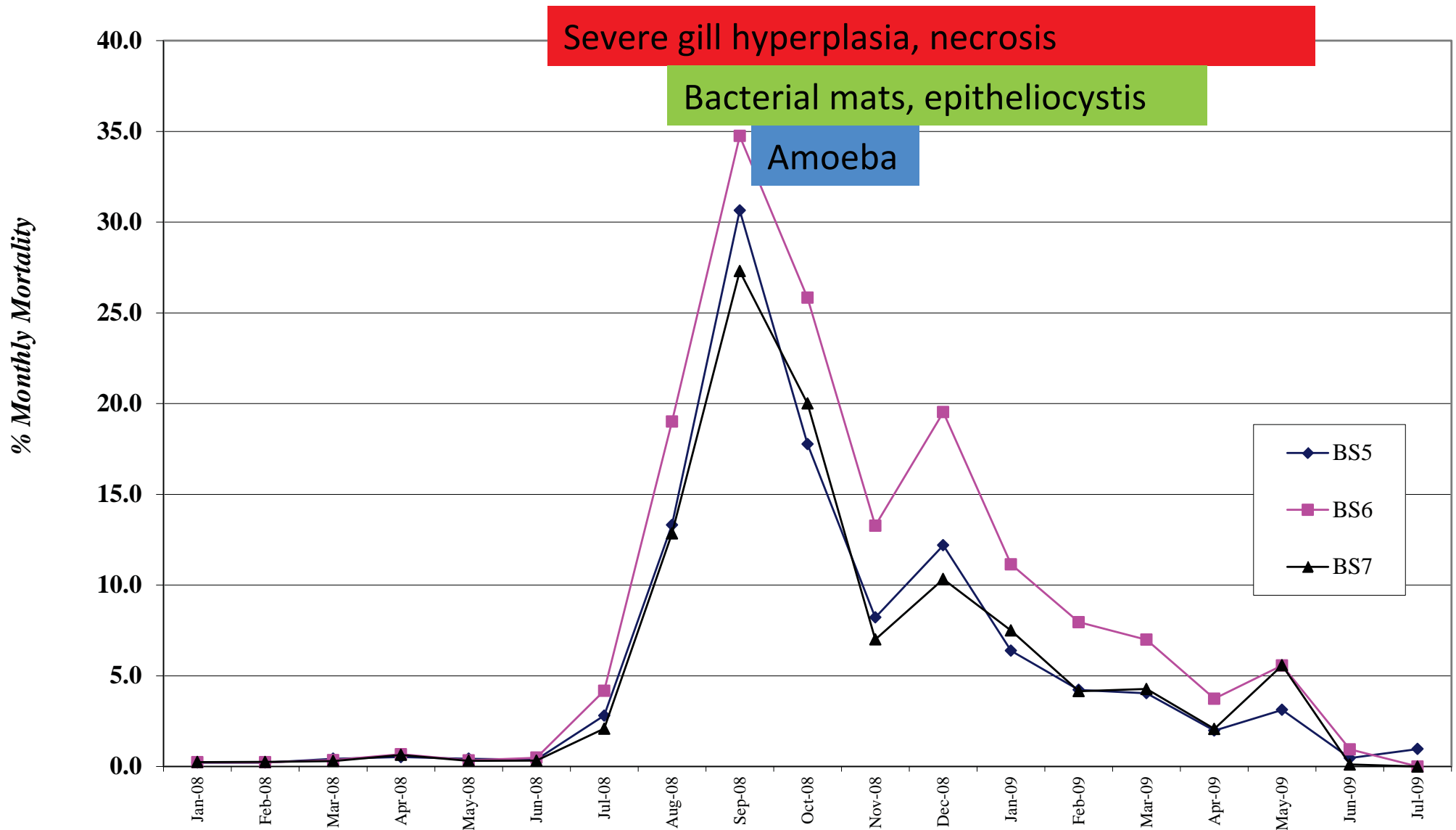
Early stage lesions



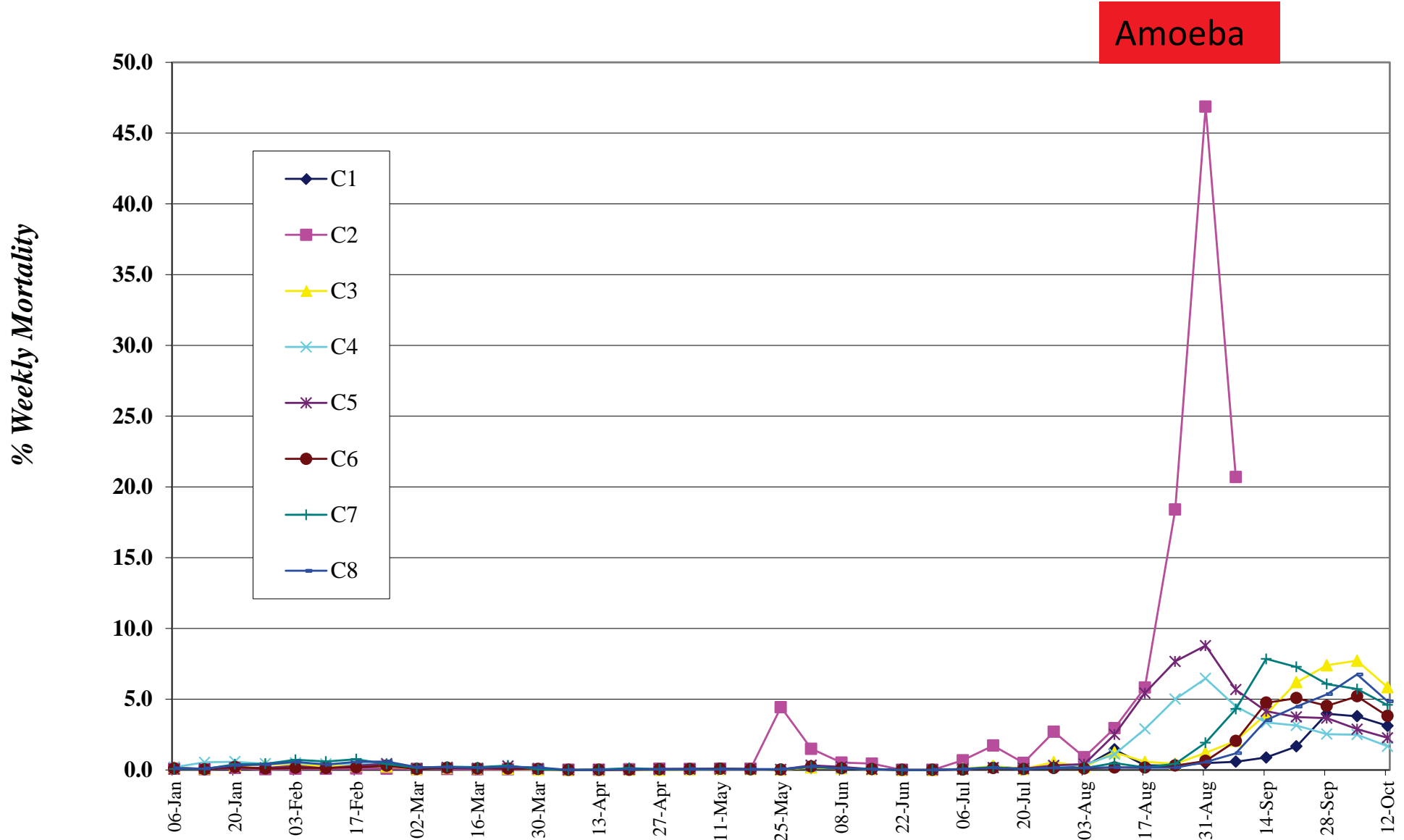
Healing (adaptive, post treatment)



Site C 07GS0 Mortality Per Pen

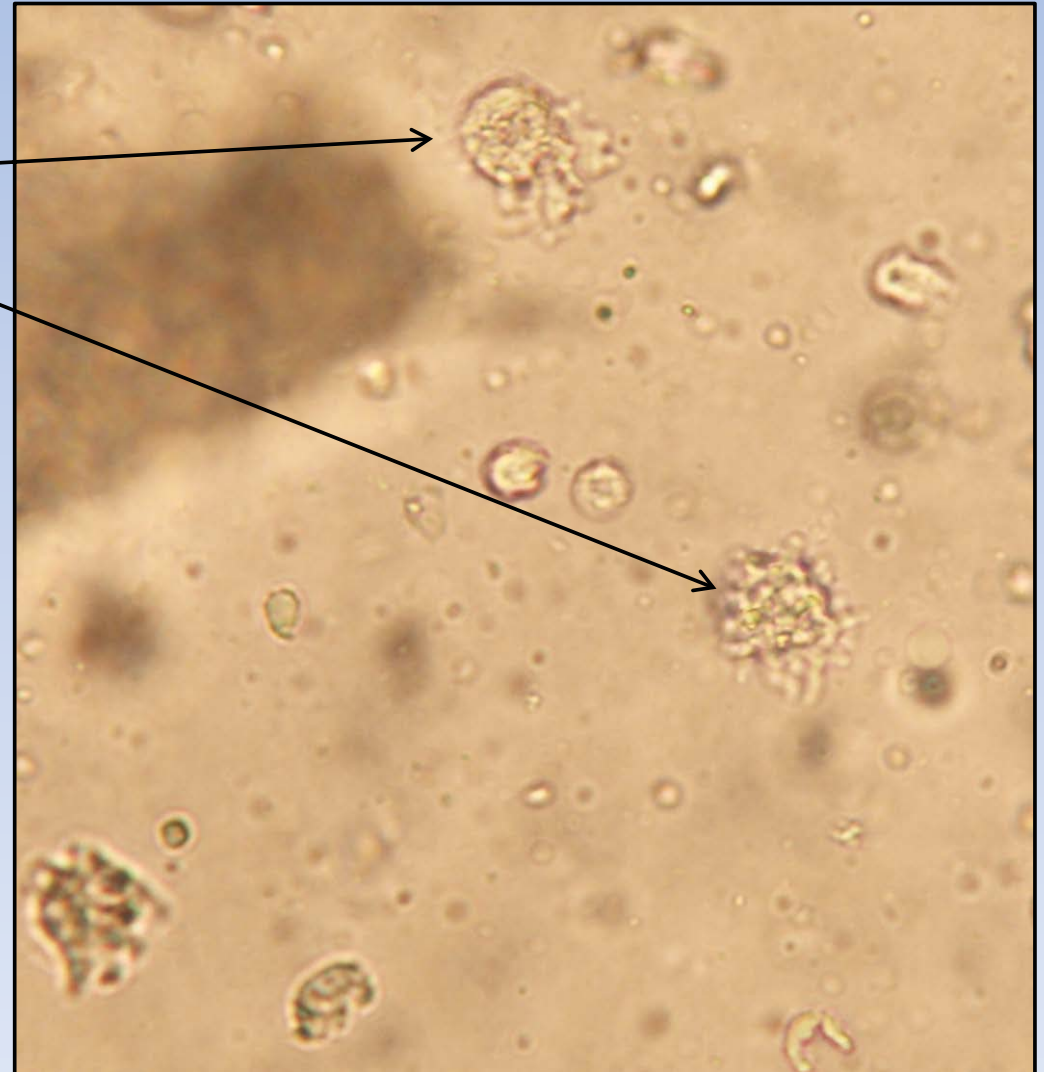


Site B 07GS0 Mortality Per Pen

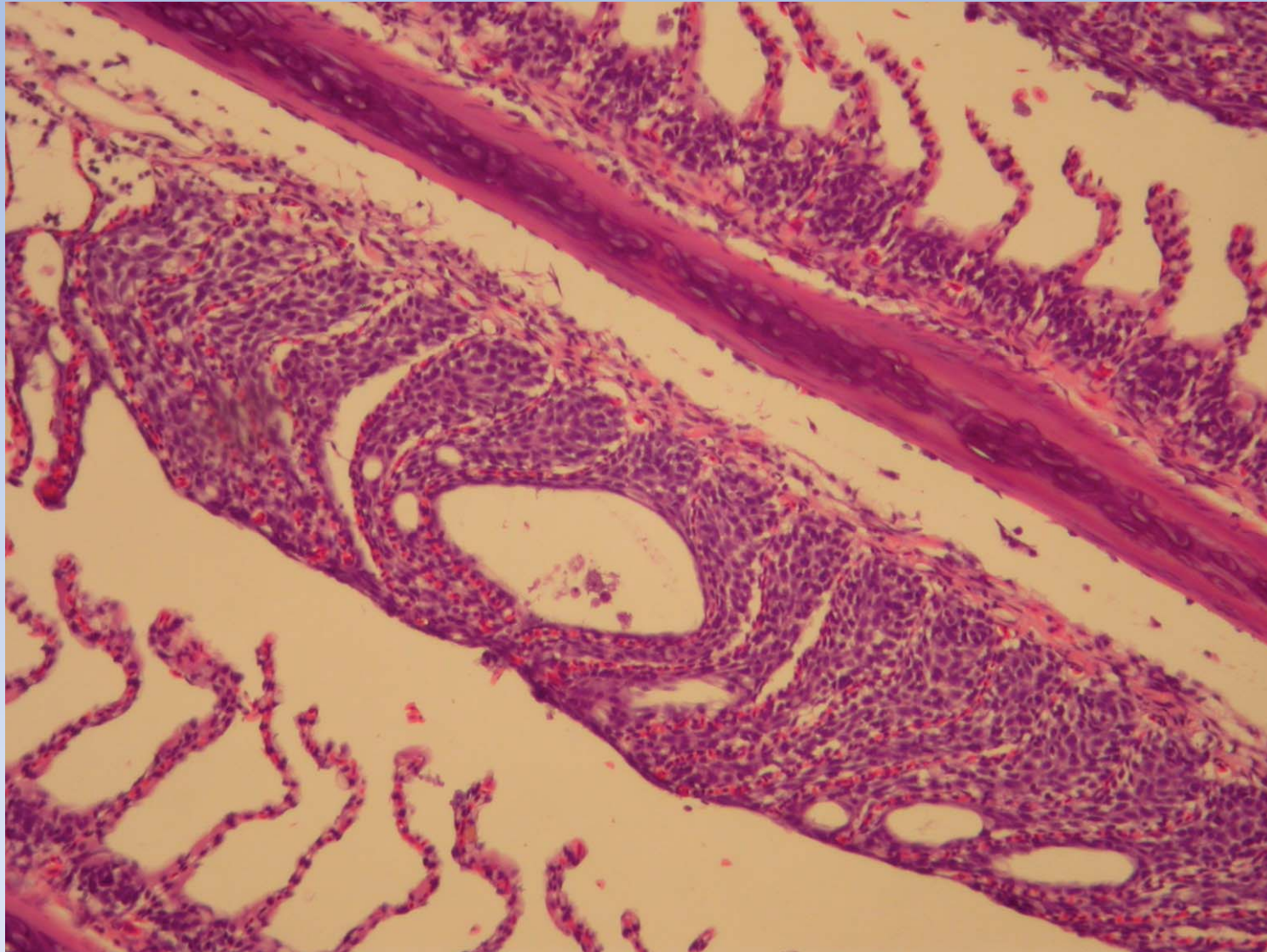


Diagnosis

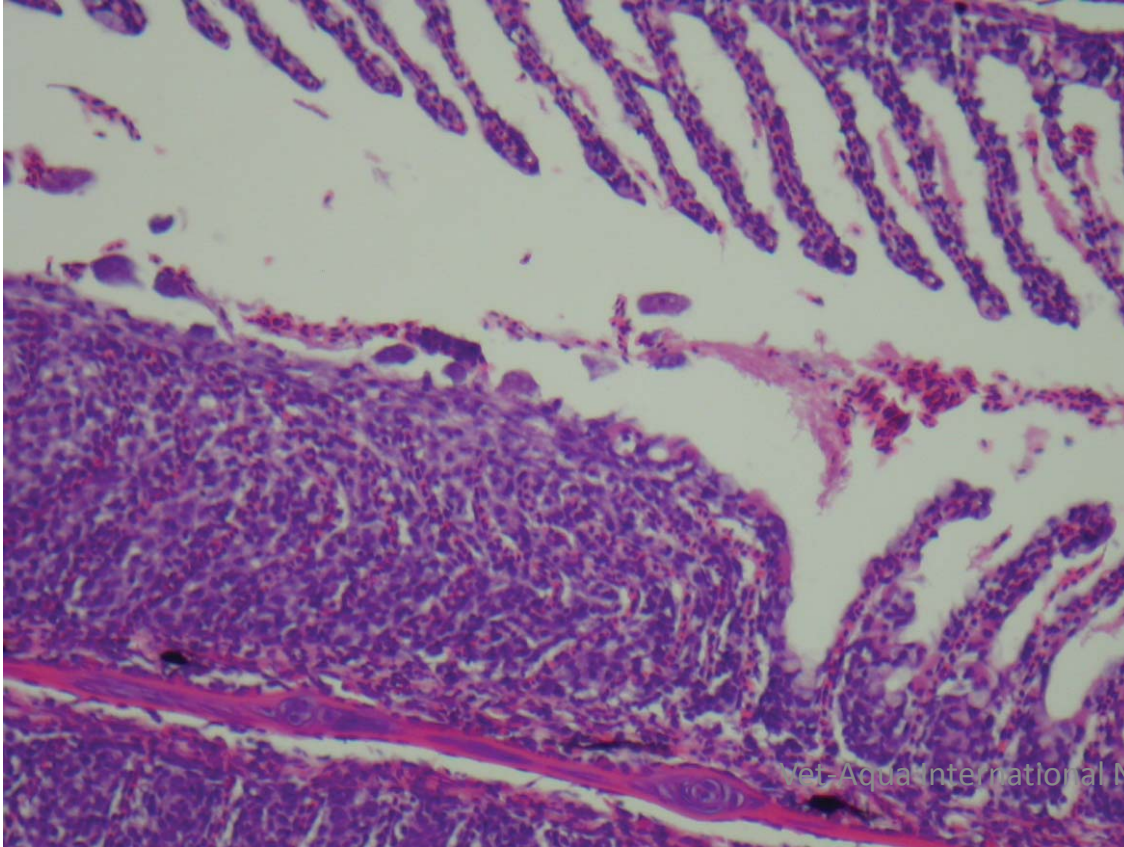
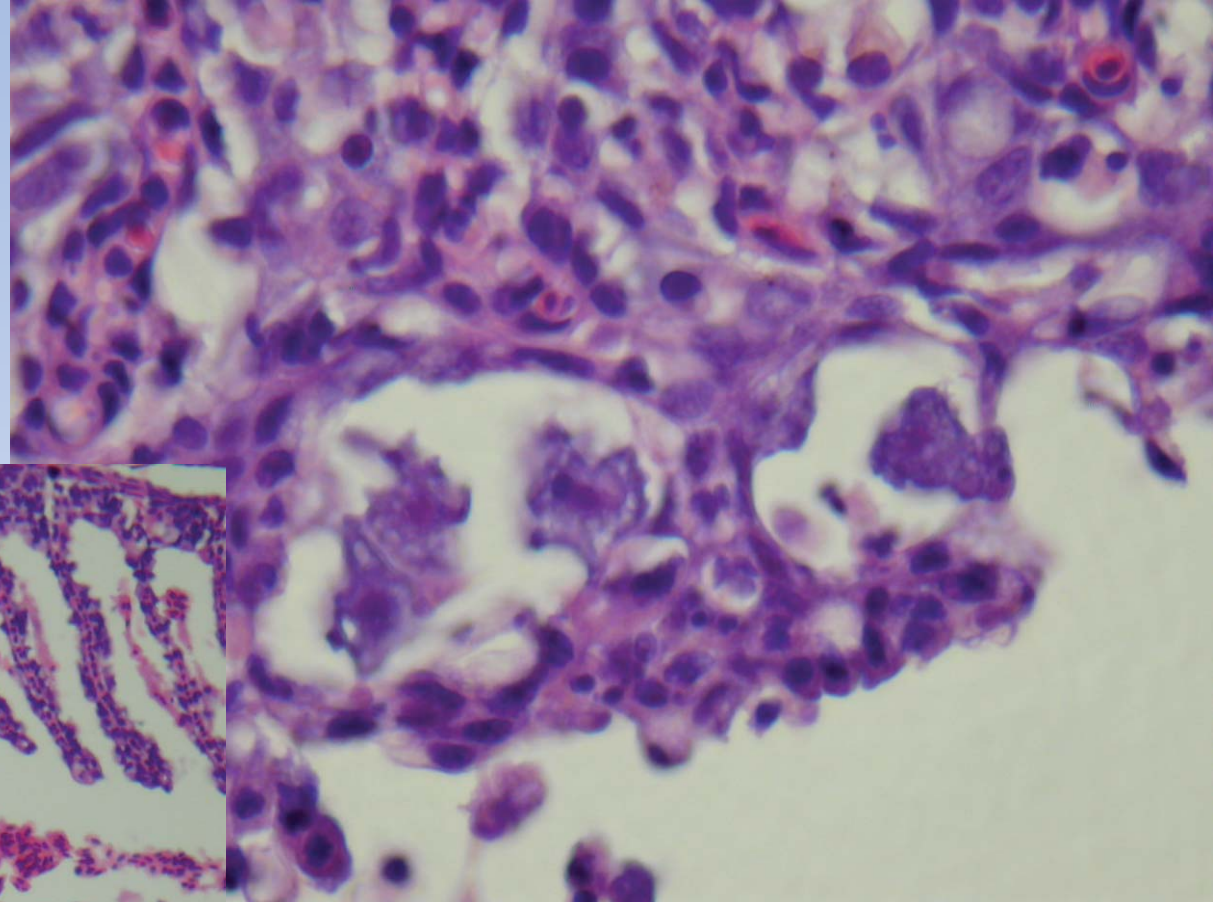
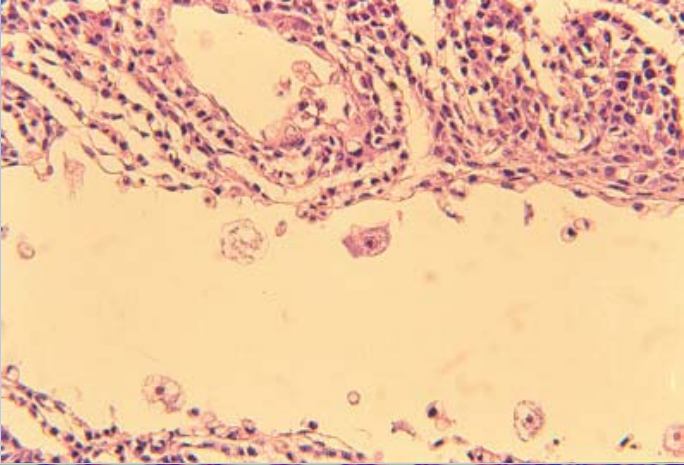
- Clinical signs
- Fresh gill smears
(technique)
- Stained smears
- Histology
- Molecular (PCR)



AGD histopathology

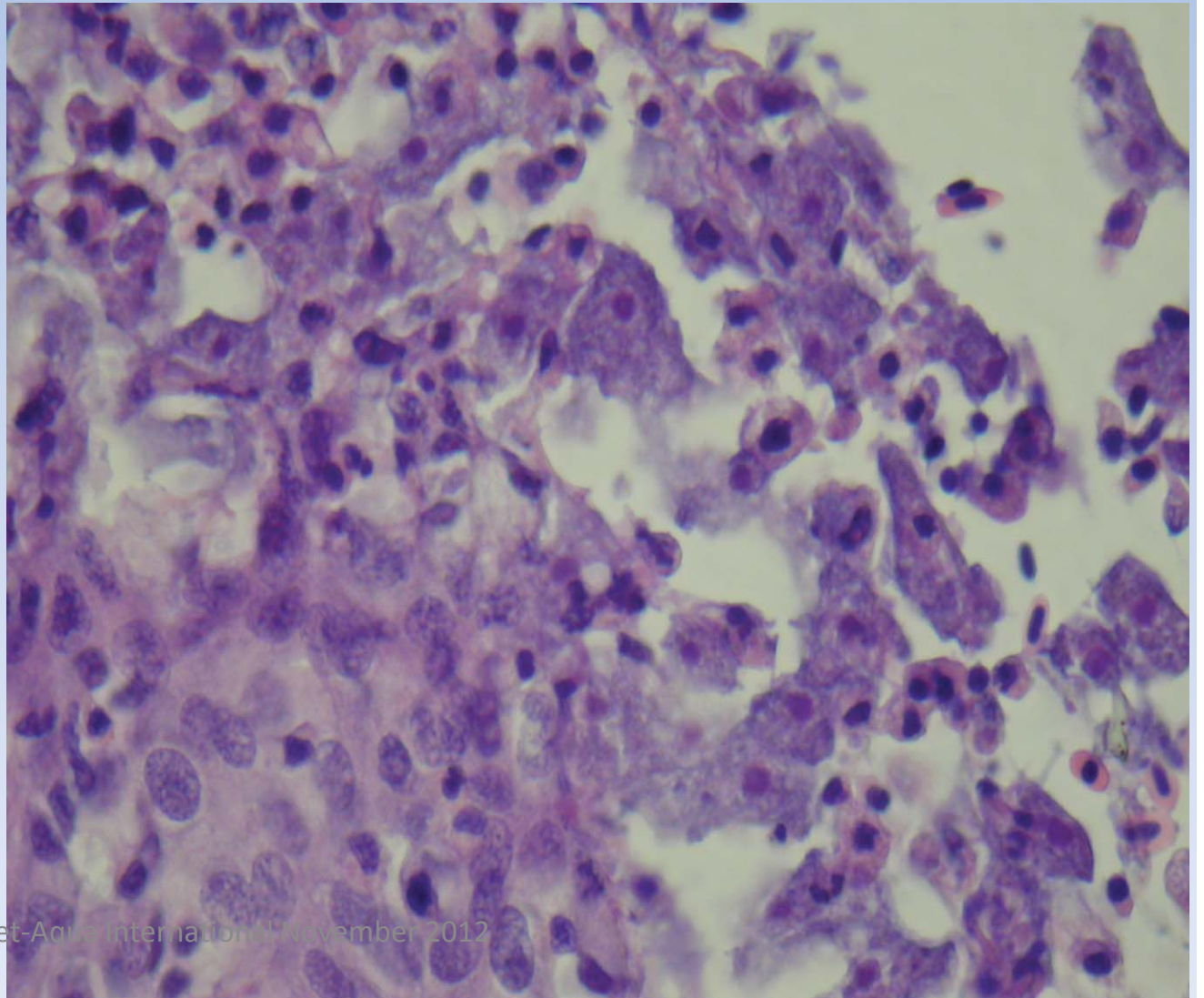


AGD histopathology



AGD histopathology sampling

- Sample affected area/s
- Multiple samples
- Serial sections



Treatment & control

- Freshwater baths (2 – 3 hours), <3ppt
Softer freshwater better
- Hydrogen peroxide (1000 – 1400ppm, 20 – 30 minutes), temperature...
 - Formalin?
 - Chloramine T?
 - In-feeds?

Prevention & monitoring

- Weekly gill checks for signs (beware)
- plus fresh microscopy
- Regular histopath (& PCR)
- Early treatment (be prepared)
- Staff training and awareness
- Net cleanliness & hygiene
- Mort removal
- Fallowing

Training

Vet Aqua 
INTERNATIONAL



Gill scoring

Fresh microscopy

Amoeba identification

**5 practical workshops for Scotland
in 2012**



Future

- Single bay management & fallowing
- Improved bath treatments
- Alternative treatments
- Genetics
- Vaccine?
- In-feed treatments?
- Functional feeds?

- Will AGD recur?....
- Major research focus required

Many, many questions

- Pathogen (variant, reservoirs, survival, ability to spread, what to kill it?)
- Therapies (oral amoebicides, baths, peroxide)
- Net-pen management (role of prior gill disease, risk factors, epidemiology)
- Genetics
- Dietary assistance/impact?

Summary

- AGD major challenge for marine salmon farms
- Has caused significant losses in Europe
- Early detection & preparedness crucial

- Be prepared

Acknowledgements

- Dr. E. Fringuelli, AFBI, Belfast
- Dr. R. Taylor, CSIRO, Tasmania
- Dr. S. Mitchell, Vet-Aqua Inter.
- Salmon farmers, vets & biologists in Ireland & Scotland