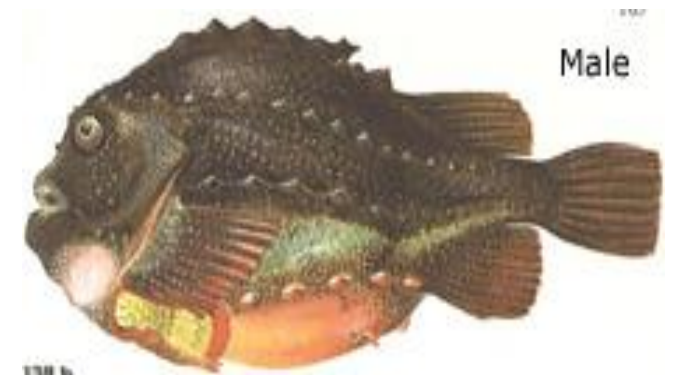




# ***Detection of Ranavirus and VHSV Genotype JV in Lumpfish in Iceland***

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# Genetic structure of the lumpfish *Cyclopterus lumpus* across the North Atlantic

*ICES J. Mar. Sci. (November/December 2014) 71 (9): 2390-2397*

*first published online May 28, 2014 doi:10.1093/icesjms/fsu071*

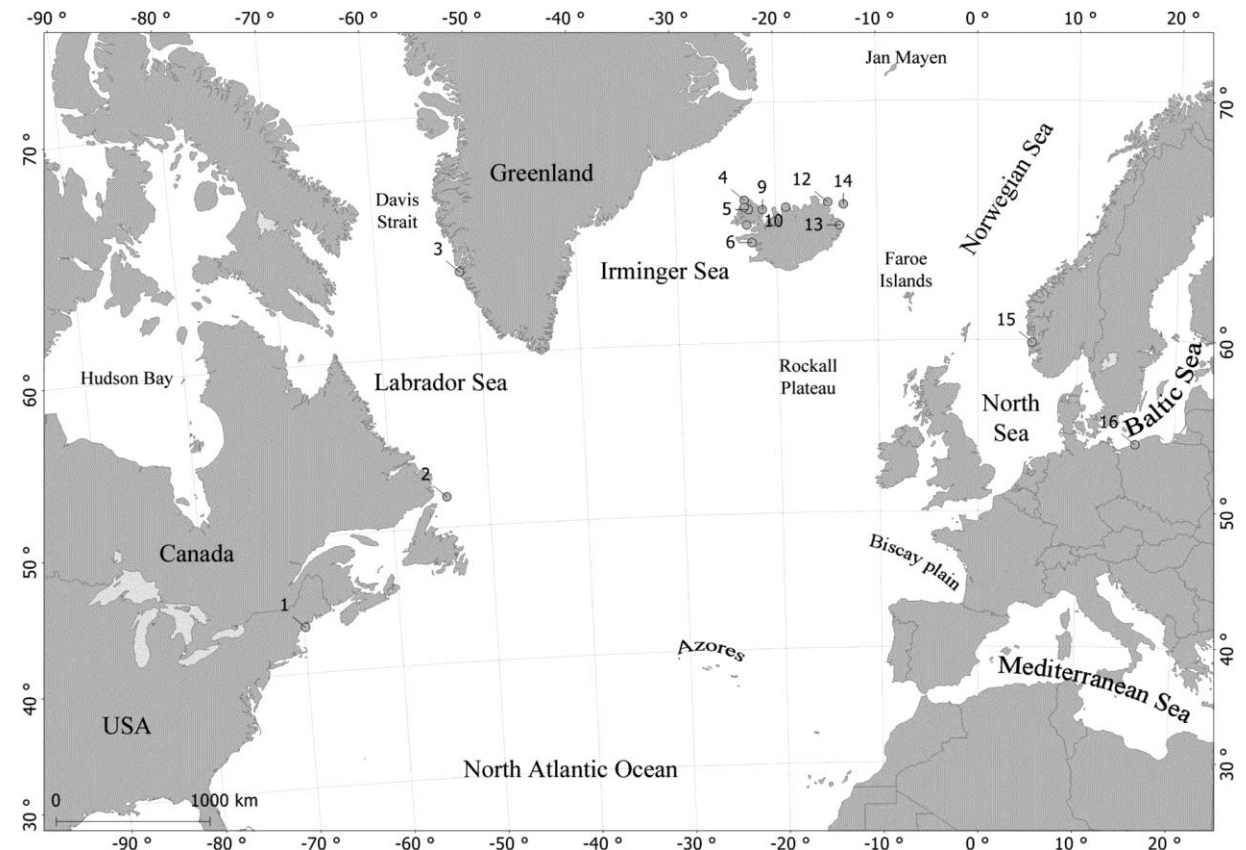
Christophe Pampoulie, Sigurlaug Skirnisdottir,  
Guðbjörg Olafsdottir, Sarah J. Helyar,  
Vilhjálmur Thorsteinsson, Sigurður Þ. Jónsson,  
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Hedeholm, Halldór Ólafsson, Anna K.  
Daníelsdóttir, and Jacob M. Kasper

Three distinct genetic groups:

**Maine-Canada-Greenland (west)**

**Iceland-Norway**

**Baltic Sea**



# Production of lumpfish: juvenile cleanerfish

Number produced			
<u>Country</u>	<u>2014</u>	<u>2015</u>	<u>2016 (estimate)</u>
Iceland	350.000	300.000	1-2.000.000
Norway	3.500.000	10.000.000	20.000.000
Scotland		1.200.000	Increase

# Viruses isolated from wild lumpfish (broodfish) 2015



# The first virus was isolated in the spring of 2015

## Screening on cell culture: intended export

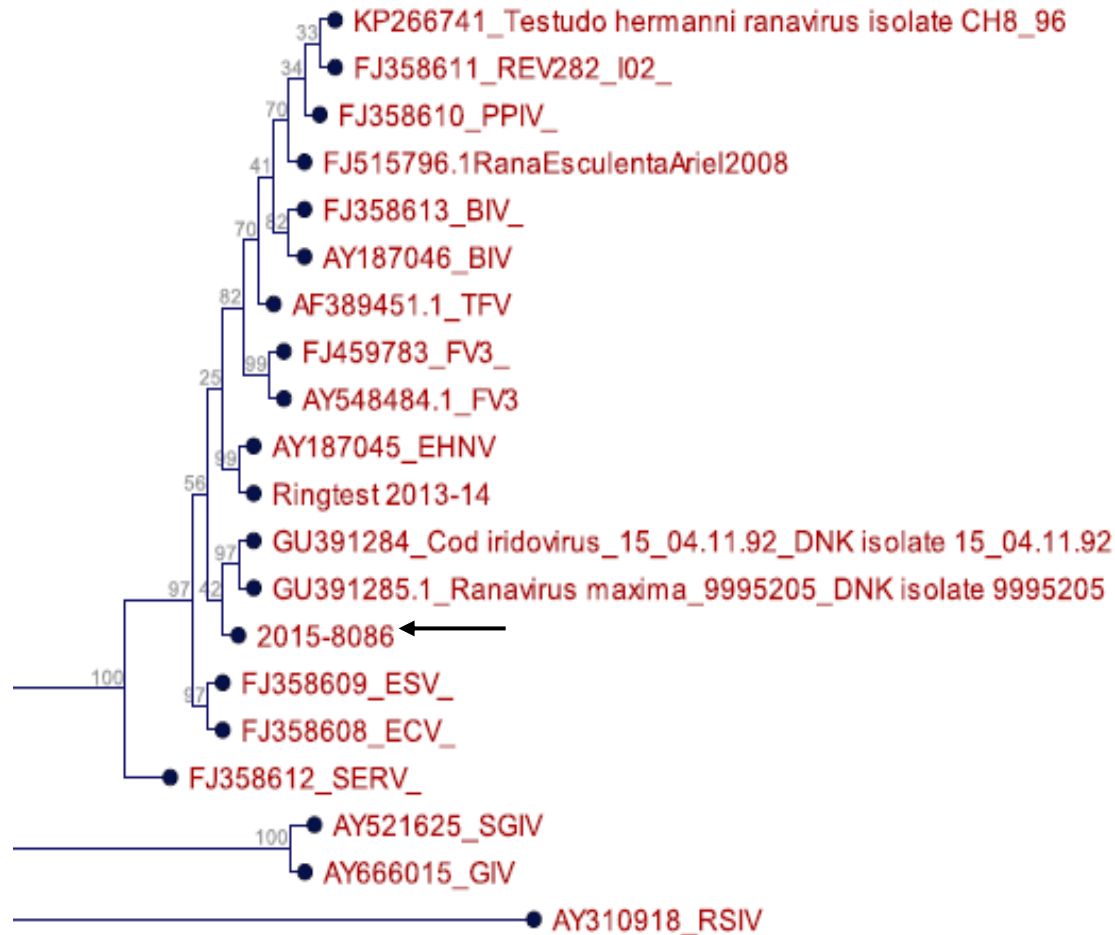
- Cultivation: positive in Bf-2 cells
- Iridovirus primers\* for MCP\*\* yielded positive results (EURL)
  - Sequencing: **Ranavirus**
    - **Species ???**

\*OIE manual: Hyatt et al., 2000

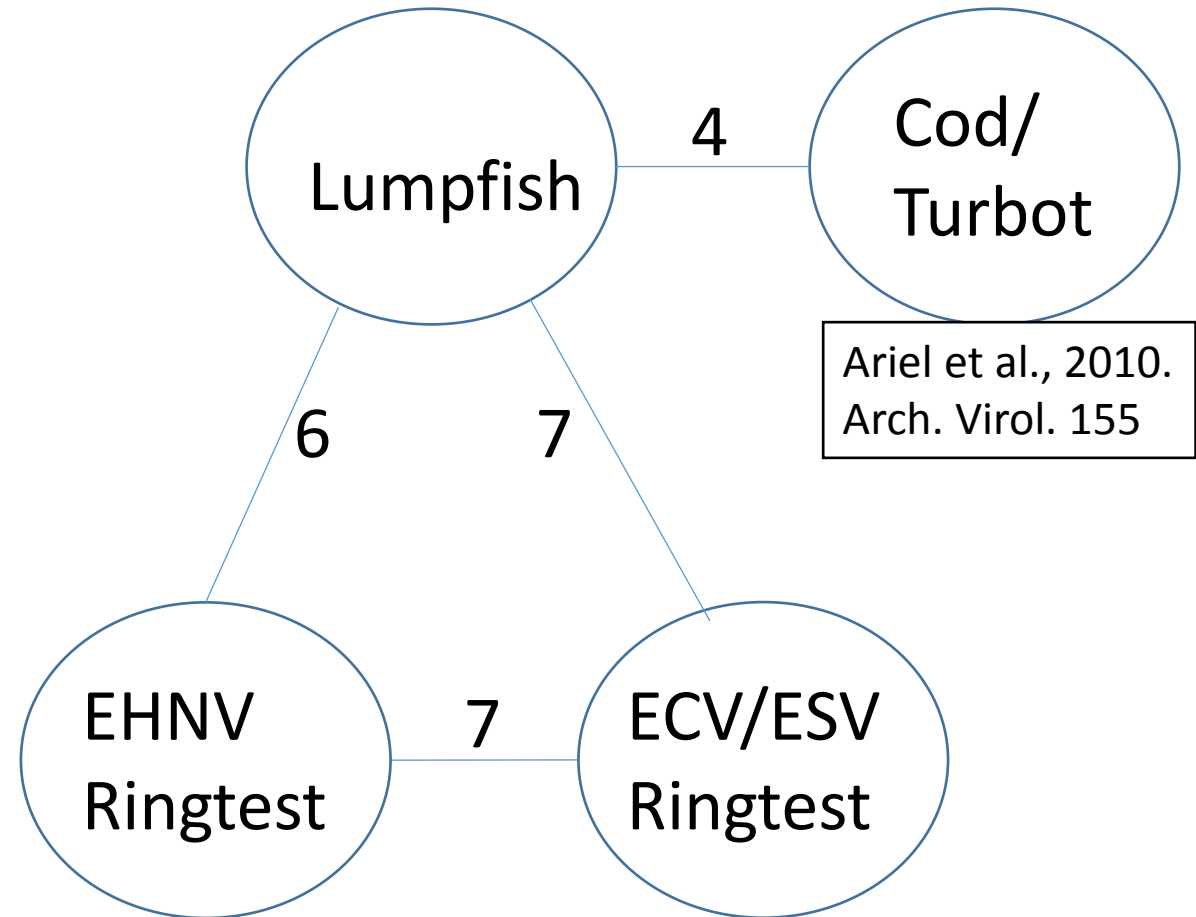
\*\* major capsid protein gene

**First isolation of  
Ranavirus in the  
N-Atlantic ocean**

# Comparison to known Ranavirus MCP seq.

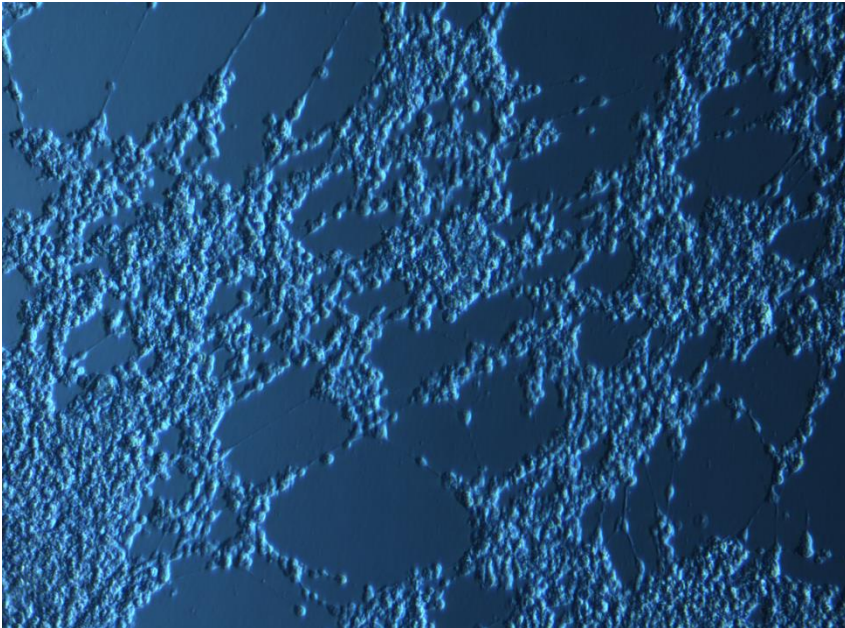


Differences in seq. data.  
MCP gene, 479 bp.

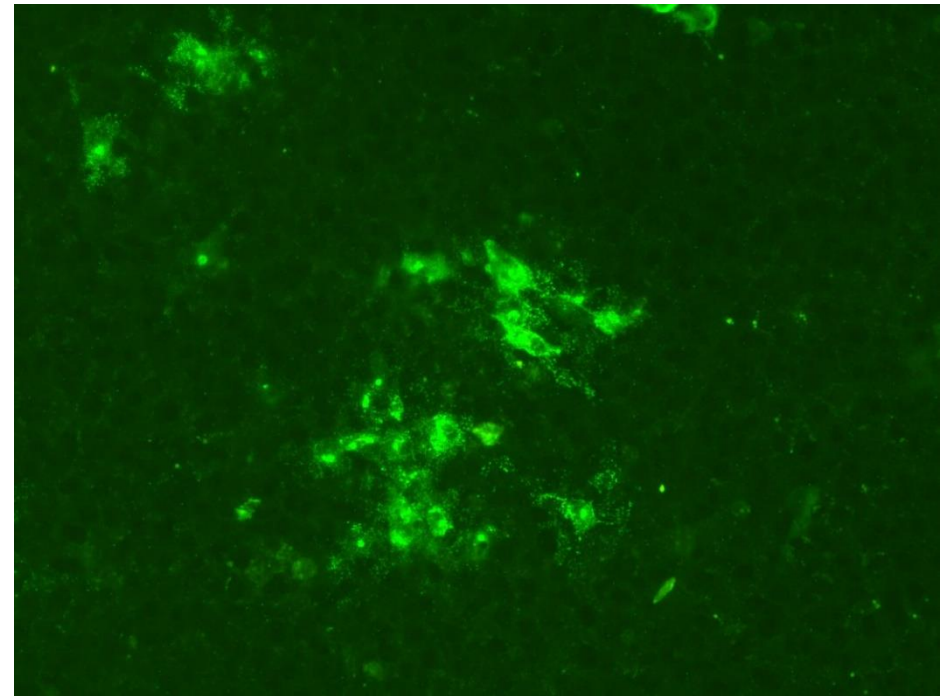


# Ranavirus in Bf-2 and EPC cell cultures

Bf-2 cells



EPC: polyclonal ab against Ranavirus



# Ranavirus titrated: 5 cell types incubated at 3 temperatures

10 degrees	3 d.p.i	5.d.p.i	14 d.p.i
BF-2	1.3 x 10 <sup>5</sup>	1.3x 10 <sup>6</sup>	2.7x 10 <sup>8</sup>
CHSE	1.9x10 <sup>4</sup>	1.9x10 <sup>4</sup>	1.3x10 <sup>5</sup>
EPC	1.3x10 <sup>3</sup>	1.3x10 <sup>4</sup>	1.3x10 <sup>4</sup>
FHM	-	-	-
RTG	-	-	1.3x10 <sup>5</sup>
15 degrees	3 d.p.i	5.d.p.i	14 d.p.i
BF-2	5x10 <sup>4</sup>	8x10 <sup>5</sup>	5x10 <sup>8</sup>
CHSE	1,9x10 <sup>4</sup>	1,9x10 <sup>4</sup>	5,9x10 <sup>6</sup>
EPC	1.9x10 <sup>3</sup>	1.9x10 <sup>3</sup>	1.3x10 <sup>6</sup>
FHM	-	-	-
RTG	-	1.3x10 <sup>3</sup>	1.9x10 <sup>5</sup>
20 degrees	3 d.p.i	5.d.p.i	14 d.p.i
BF-2	1.3x10 <sup>5</sup>	2.3x10 <sup>7</sup>	4x10 <sup>8</sup>
CHSE	1.3x10 <sup>4</sup>	1.3x10 <sup>4</sup>	1.3x10 <sup>5</sup>
EPC	1.3x10 <sup>3</sup>	1.3x10 <sup>3</sup>	5.9x10 <sup>5</sup>
FHM	-	-	-
RTG	1.3x10 <sup>3</sup>	1.3x10 <sup>3</sup>	1.3x10 <sup>4</sup>



# The second isolate in late summer of 2015

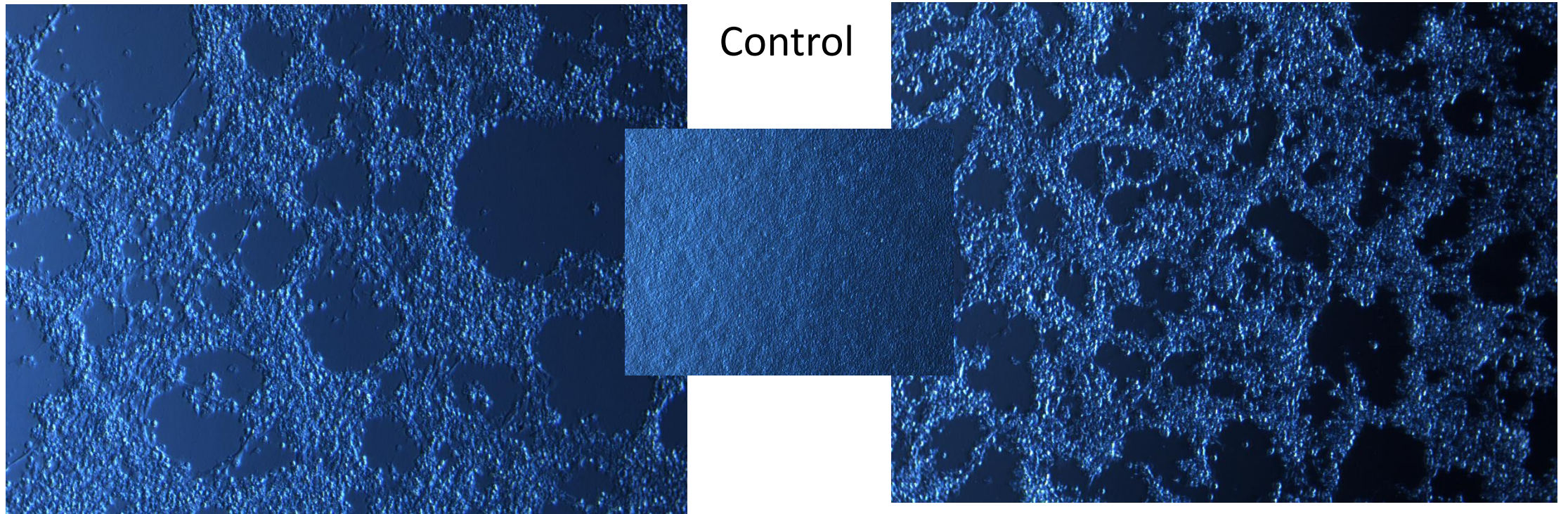
Cell culture: EPC and Bf-2 positive

- PCR (IPNV, IHNV, EHN, SVCV, VHSV and Ranavirus)
- **VHSV** positive. Verified by EURL in Copenhagen
- The first time that a notifiable viral fish disease is diagnosed in Iceland
- OIE notification 23rd of October 2015
- Measures: Stamping out, disinfection / disinfestation

# VHSV in EPC cells

Ringtest 2015

Icelandic isolate



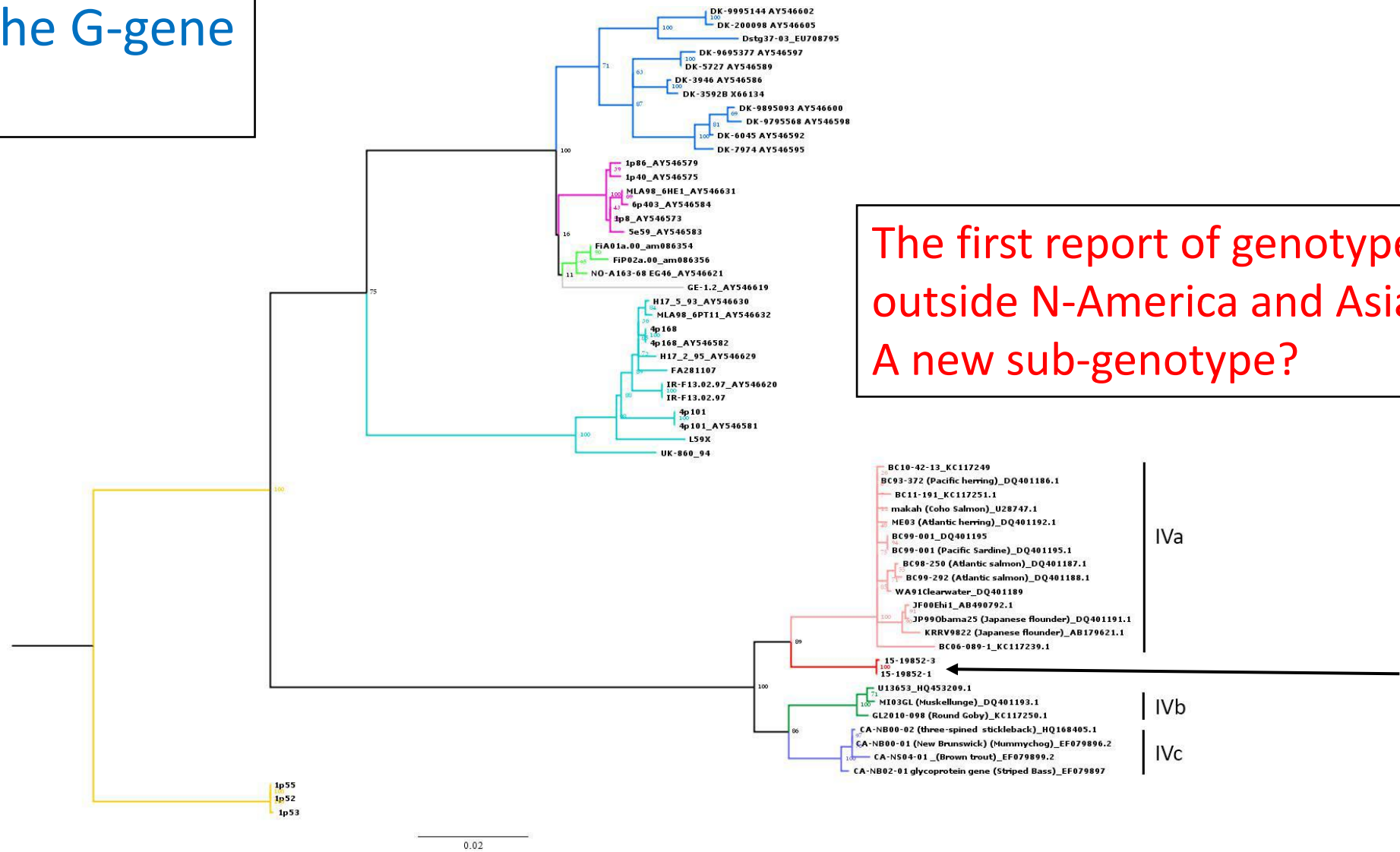
# VHSV has been detected in > 80 species of fish.

## There are four genotypes

### **Type      Prevalent host type and location**

- I-a      Farmed rainbow trout and a few other freshwater fish in continental Europe
- I-b      Marine fish of the Baltic Sea, Skagerrak, Kattegat, North Sea, Japan
- I-c      Farmed rainbow trout Denmark
- I-d      Farmed rainbow trout in Norway, Finland, Gulf of Bothnia
- I-e      Rainbow trout in Georgia, farmed and wild turbot in the Black Sea
- II       Marine fish of the Baltic Sea
- III      Marine fish of the British Isles and northern France, farmed turbot in the UK and Ireland, and Greenland halibut (*Reinhardtius hippoglossoides*)
- IV-a    Marine fish of the Northwest Pacific (North America) Japan, and Korea
- IV-b    Freshwater fish in North American Great Lakes region
- IV-c    Atlantic coastal regions of North America

# Seq. from the G-gene



The first report of genotype IV outside N-America and Asia. A new sub-genotype?

**Infection trials set up 2016 at the European Reference Laboratory for Fish Diseases, Veterinary Institute DTU, Copenhagen.**



*Thank you for your attention*



*Acknowledgements*

*Keldur:*

*Heiða Sigurðardóttir  
Árni Kristmundsson  
and colleagues*

*European Reference Laboratory  
for Fish Diseases, Veterinary  
Institute DTU:*

*Niccolo Vendramin  
Niels Jörgen Olesen  
and colleagues*



15.8.2016

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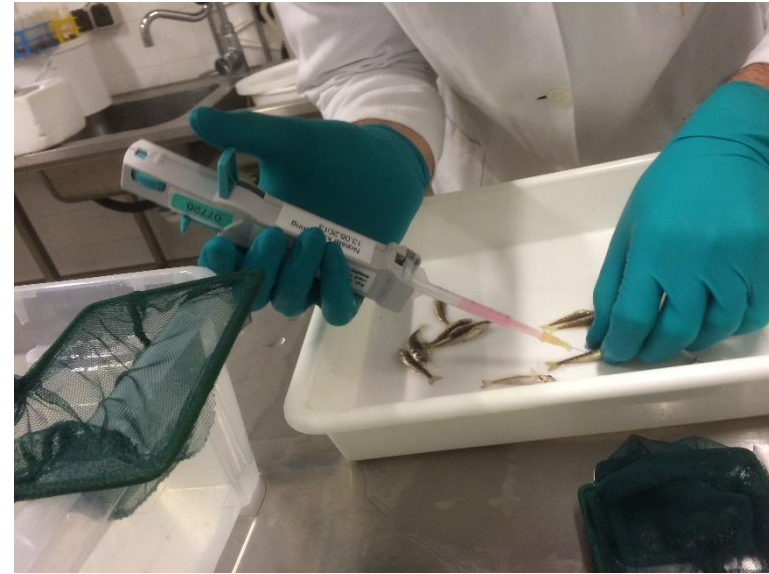
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