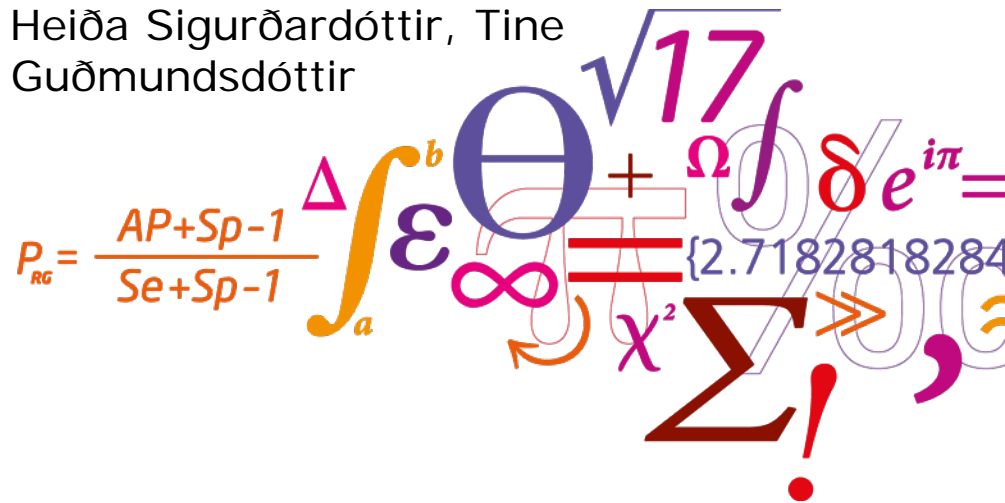




New Viral Haemorrhagic Septicaemia (VHS) virus subtype in Europe

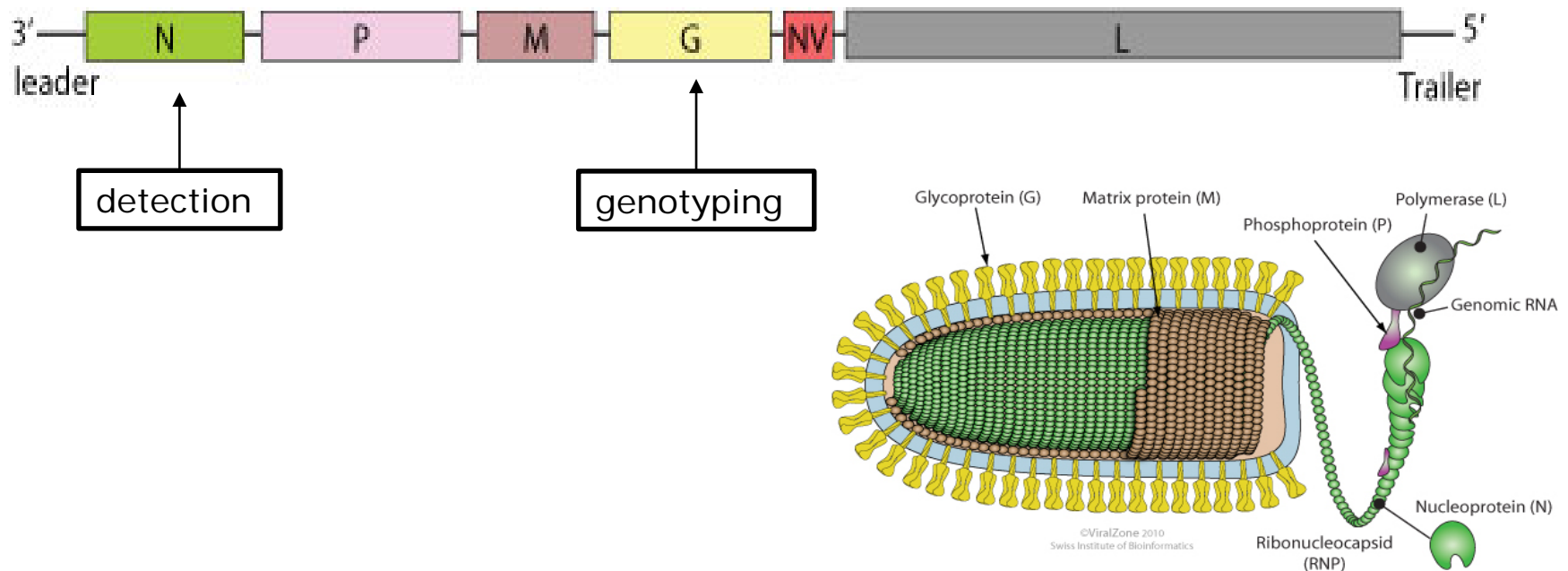
Argelia Cuenca, Niccoló Vendramin, Heiða Sigurðardóttir, Tine Iburg, Niels Jørgen Olesen, Sigríður Guðmundsdóttir



Viral Haemorrhagic Septicaemia virus (VHSV)

Negative ssRNA virus with a linear genome of about 11 kb

The genome encoded six proteins.



- It has been found in more than 90 fish species
- Virulence to different hosts seems to be related to genotype



Continental Europe
rainbow trout



Great Lakes 2005-2008

Freshwater drum, Muskellunge,
round goby, yellow perch,
bluegill, black crappie, etc

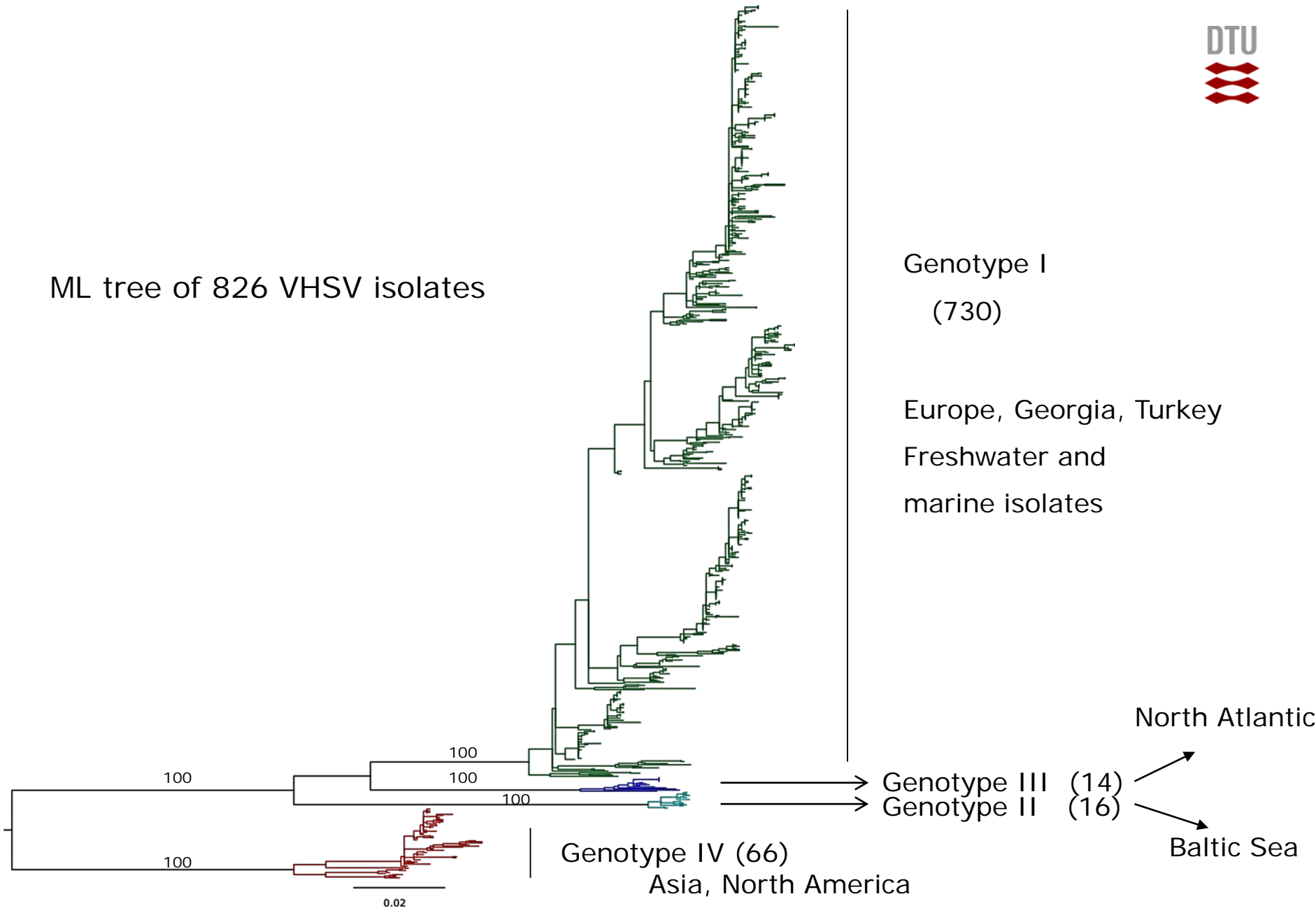
(28 species fresh water fish)



North Pacific Ocean

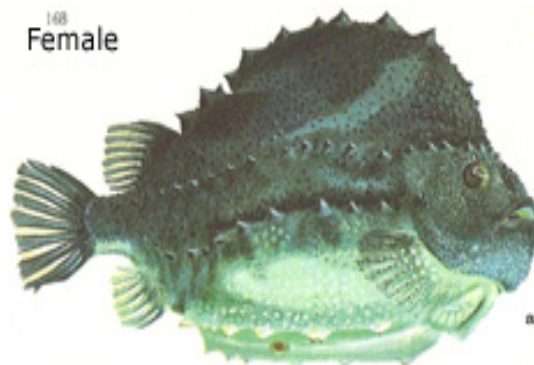
Coho salmon, Bastard halibut
(Olive flounder), Pacific
sardine, Atlantic salmon, etc

ML tree of 826 VHSV isolates



The case

- In 2015 VHSV was isolated from lumpfish in Icelandic waters
- The first time that a notifiable viral fish disease is diagnosed in Iceland
- First time that VHSV is found in lumpfish



Genetic structure of lumpfish

- Three genetically distinct populations of lumpfish in North Atlantic:
 - 1) Maine–Canada– Greenland (NW)
 - 2) Iceland– Norway (NE)
 - 3) Baltic Sea
- East Greenland might constitute a potential barrier for a gene flow between the east and west clusters

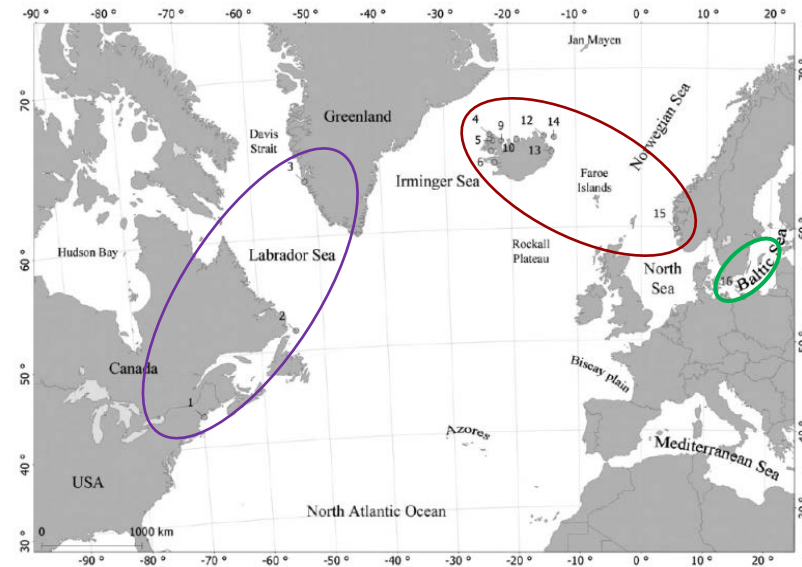


Figure 1. Sampling location of lumpfish *C. lumpus* across the North Atlantic. Numbers refer to sample number in Table 1.



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Original Article

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

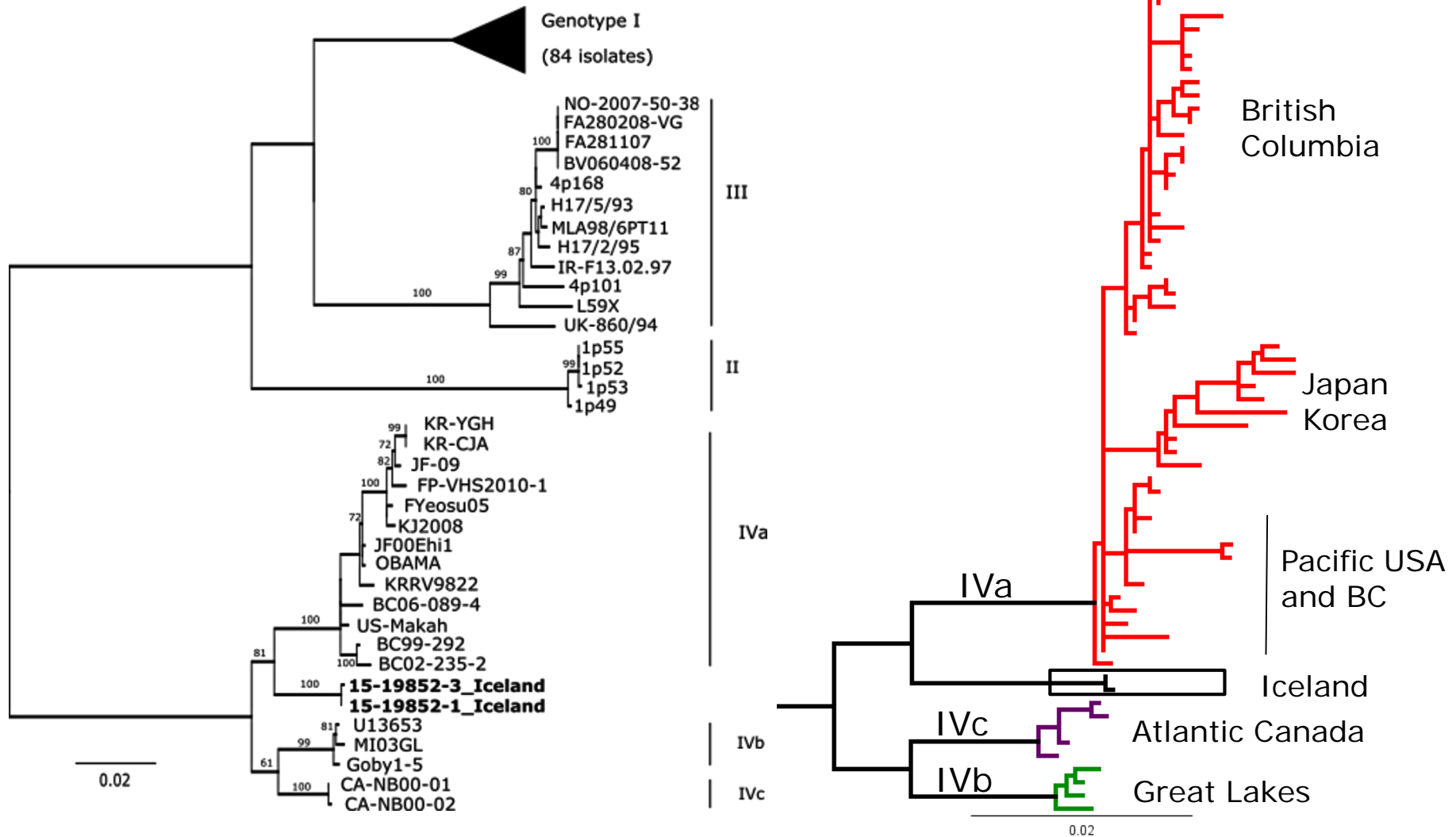
Christophe Pampoulie^{1*}, Sigurlaug Skirnisdottir², Guðbjörg Olafsdóttir², Sarah J. Helyar², Vilhjálmur Thorsteinnsson¹, Sigurður Þ. Jónsson¹, Alain Fréchet³, Caroline M. F. Durif⁴, Sally Sherman⁵, Magdalena Lampart-Kaluzniacka⁶, Rasmus Hedeholm⁷, Halldór Ólafsson⁸, Anna K. Danielsdóttir², and Jacob M. Kasper^{1,8}

Downloaded from <http://www.icesjms.org/>

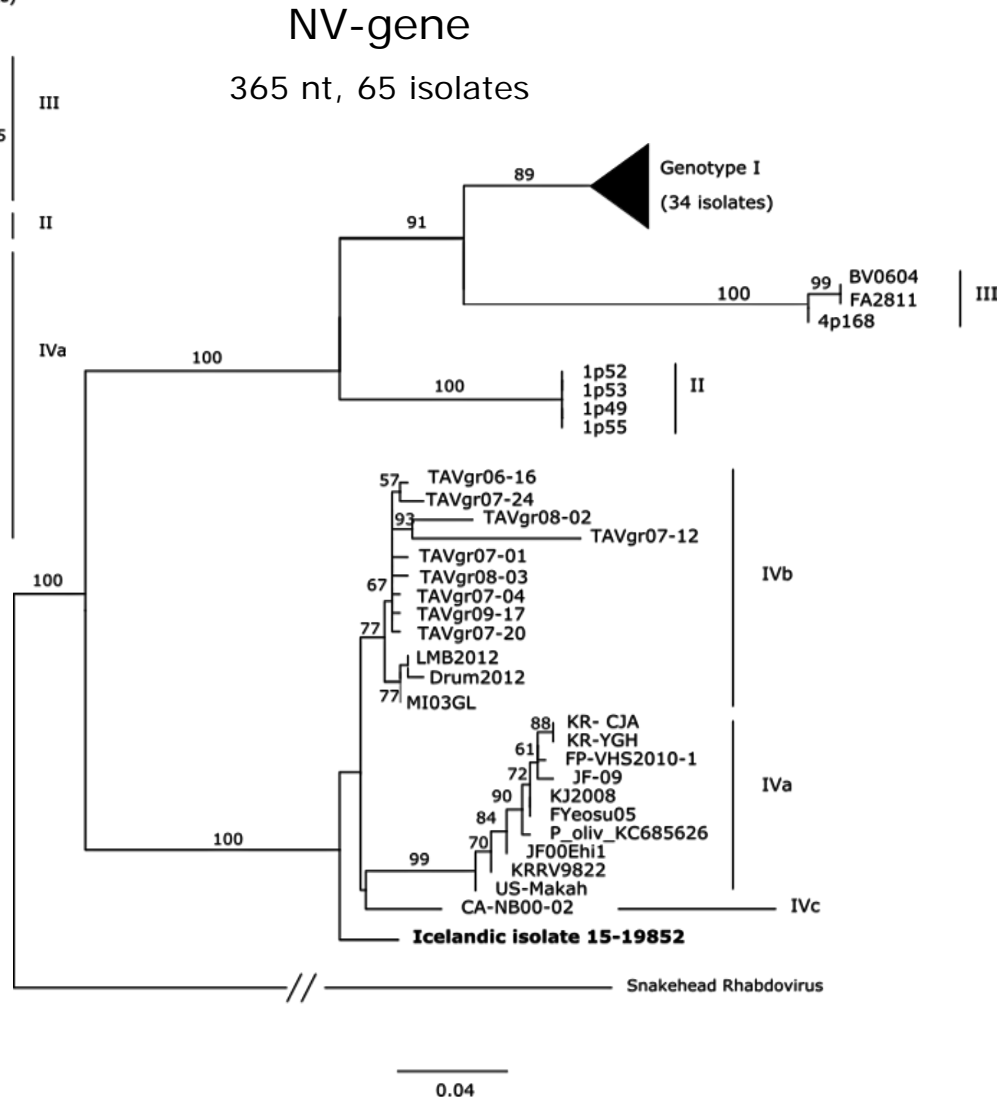
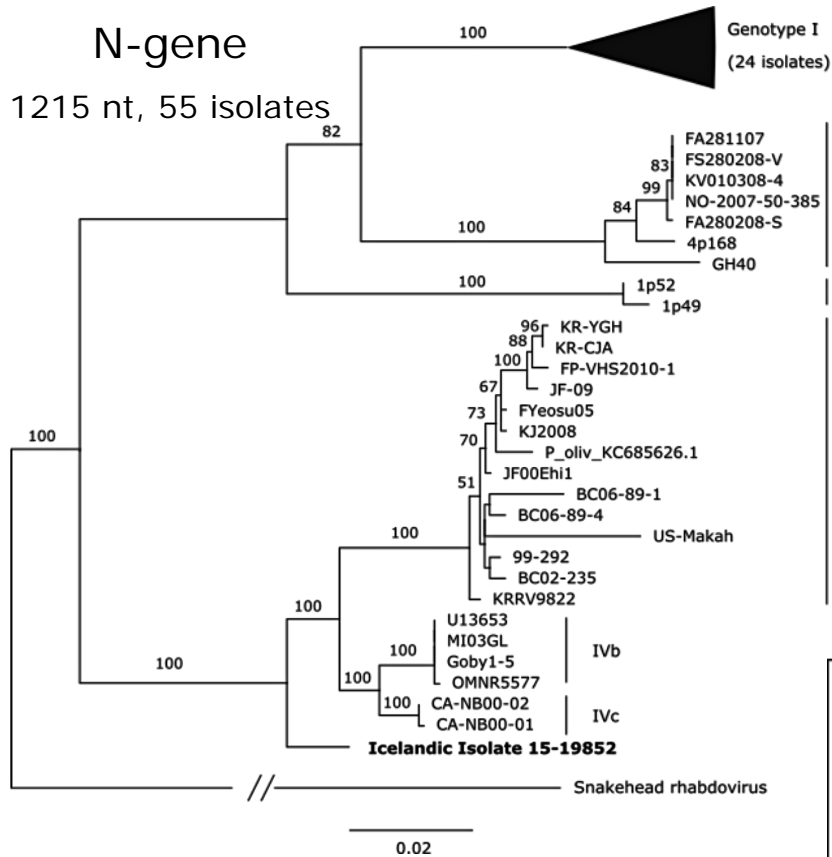
Icelandic isolate

- Verified by the EURL for fish diseases
- Pathogenicity trials in lumpfish, rainbow trout and Atlantic salmon
- Risk assessment use of lumpfish as cleaner fish in the salmon industry
- Genetic characterization of new isolate:
 - Sequences from the whole G, N and NV genes were obtained
 - Phylogenetic analysis including all public available data for the N, and NV-genes
 - Phylogenetic analysis restricted to 220 isolates for the G-gene

Single gene analyses – G gene



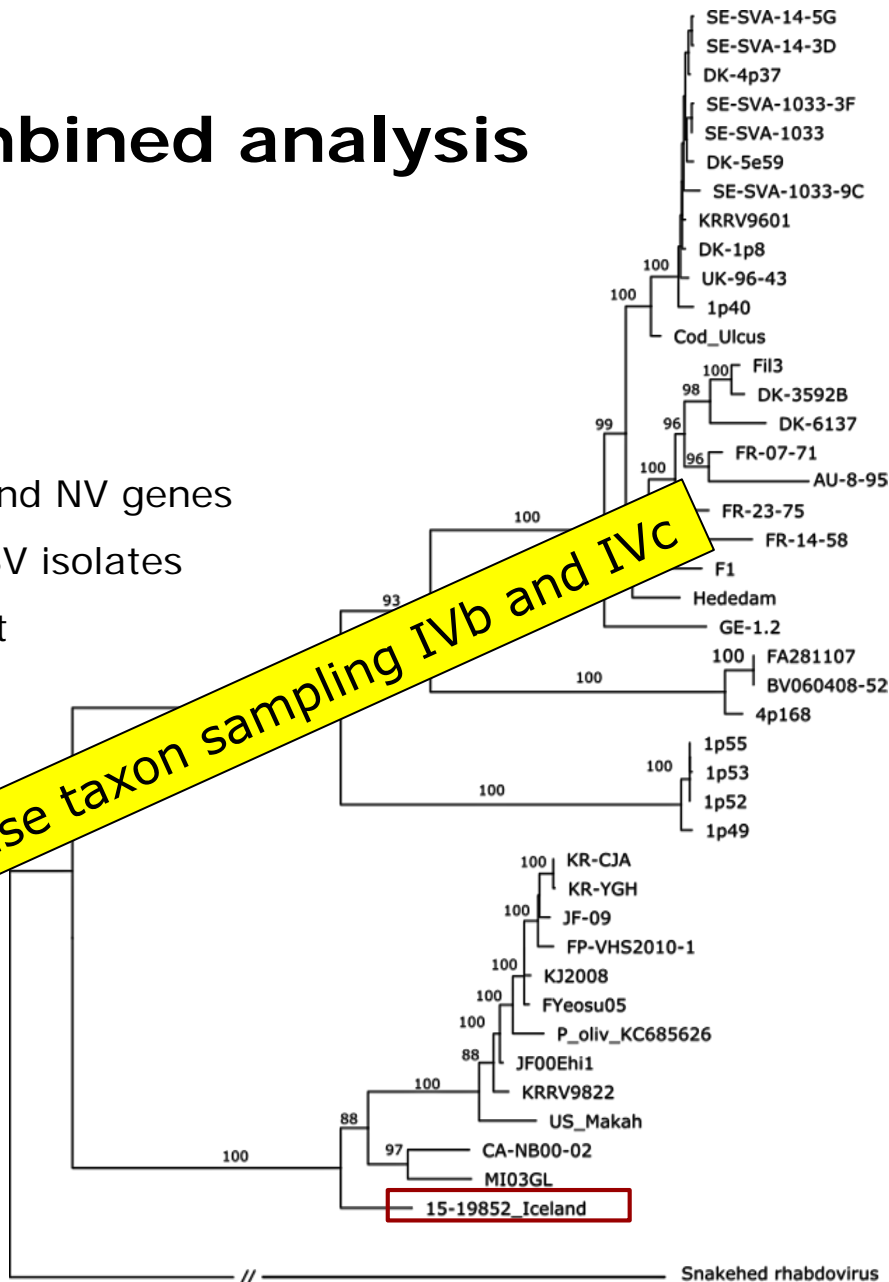
Single gene analyses – N and NV genes



Combined analysis

N, G, and NV genes
 42 VHSV isolates
 3108 nt

Increase taxon sampling IVb and IVc

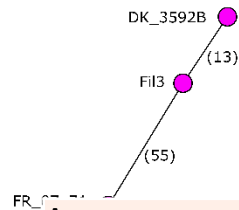


Icelandic VHSV isolate is part of genotype IV

But it does not belong to any of the recognized genotype IV subgroups

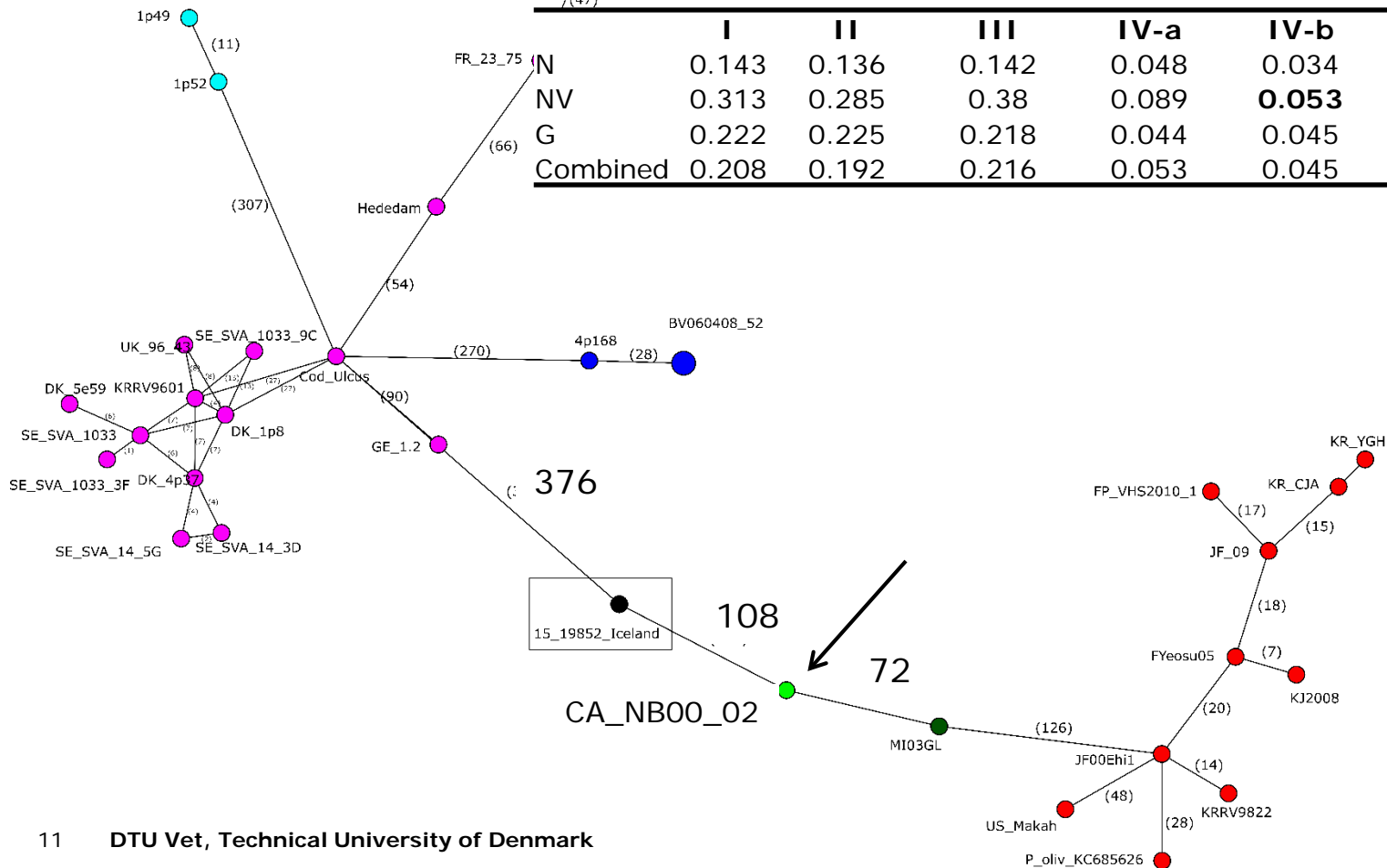
Propose the creation of subgroup IVd

MSN combined dataset



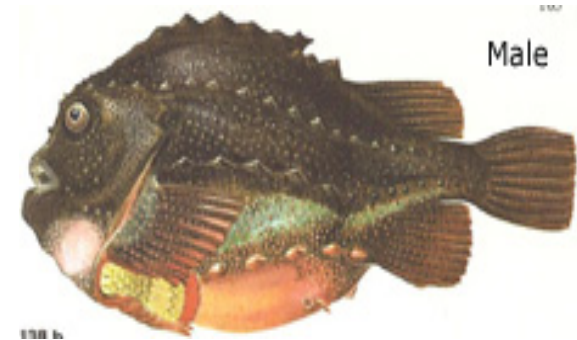
Average genetic distance between the Icelandic isolate and each recognized VHS genotype

	I	II	III	IV-a	IV-b	IV-c
N	0.143	0.136	0.142	0.048	0.034	0.032
NV	0.313	0.285	0.38	0.089	0.053	0.058
G	0.222	0.225	0.218	0.044	0.045	0.043
Combined	0.208	0.192	0.216	0.053	0.045	0.041



Conclusions

- Icelandic isolate is part of genotype IV but not within the recognized genotype IV subgroups
- A new subgroup IVd is proposed
- First time than genotype IV is found in Europe
- Subgroup IVd is more similar to subgroup IVc from the Atlantic coast of Canada, but:
 - Taxon sampling for IVb and IVc needs to be improved
 - Explore further the incongruence in phylogenetic signal between N and G genes
- Assessment of phylogenetic incongruence among VHSV genes
 - Is this a general problem or is restricted to the Icelandic isolate?



Thank you