

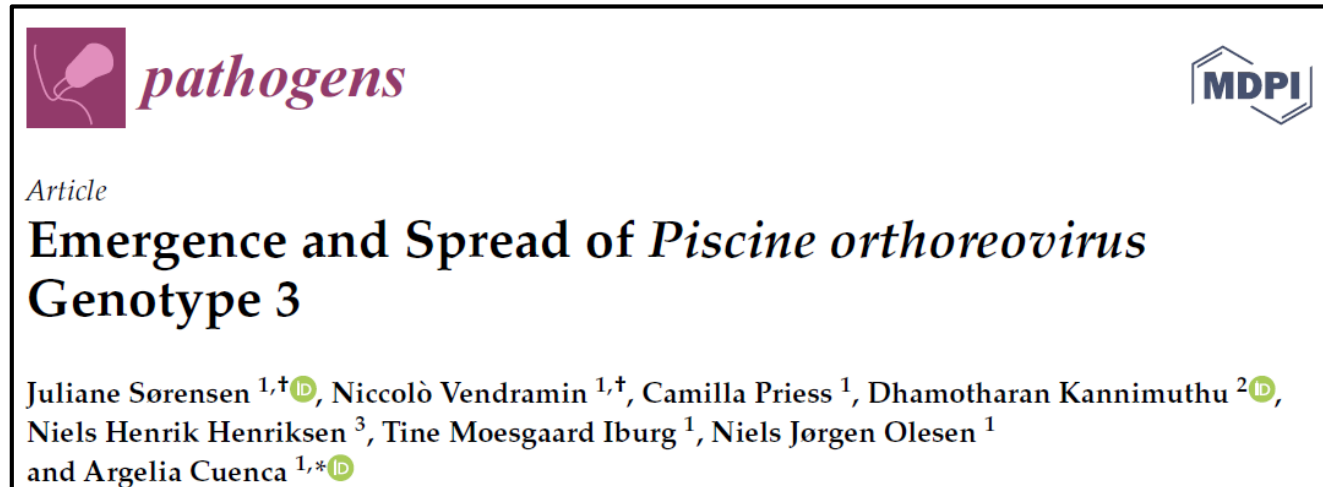
Trination 2021

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# **Epidemiology and Pathogenesis of *Piscine orthoreovirus* Genotype 3**

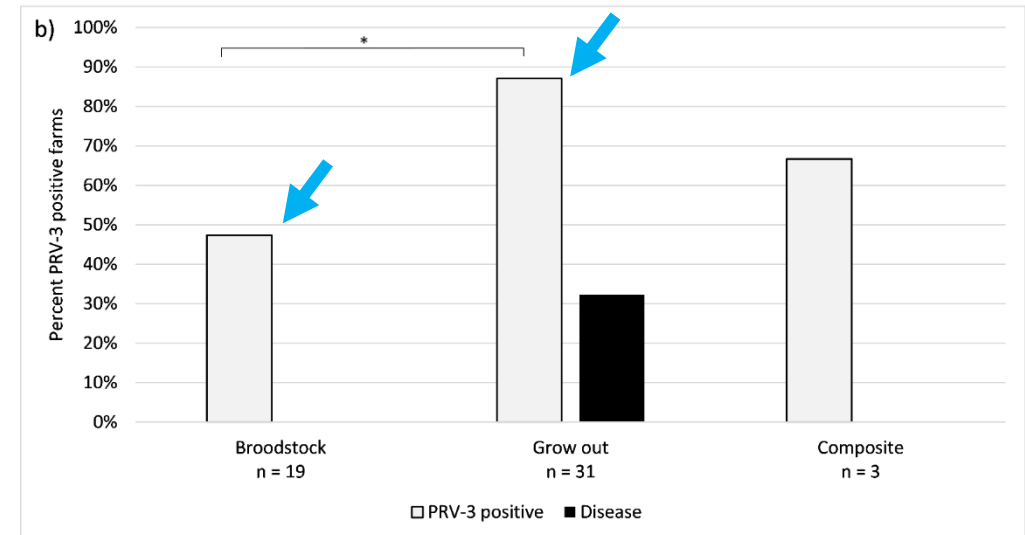
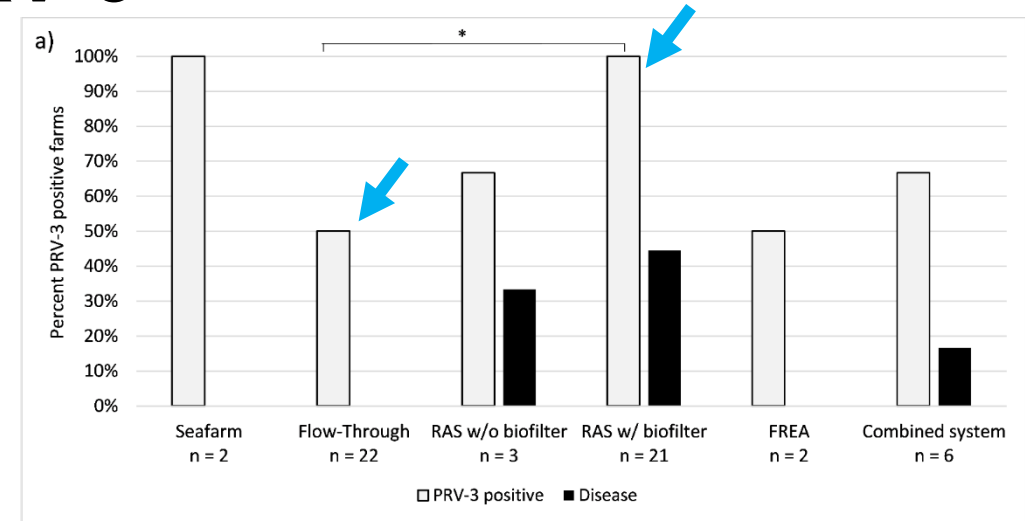
# Emergence and Spread of *Piscine orthoreovirus* Genotype 3

- Detected in Norway in 2015, and in Denmark in 2017 in relation to complex disease outbreaks in rainbow trout farms.
- Surveillance study from late 2017 to early 2019:
  - Covered 53 farms, both flow through and recirculating aquaculture systems (RAS)
  - Primarily rainbow trout, but brown trout were also included
  - Wild Atlantic salmon and brown trout screened in 2016, 2018, and 2019



# Emergence and Spread of PRV-3

- PRV-3 detected in 38 farms of the 53 farms screened (71.7%), with highest prevalence in RAS and grow out.
- Disease observed in 10 farms (26%), and only observed in RAS and in rainbow trout.
- Archived material from 1995 positive for PRV-3: Found in 38% of the tested samples (11 out of 29 samples representing 25 farms).

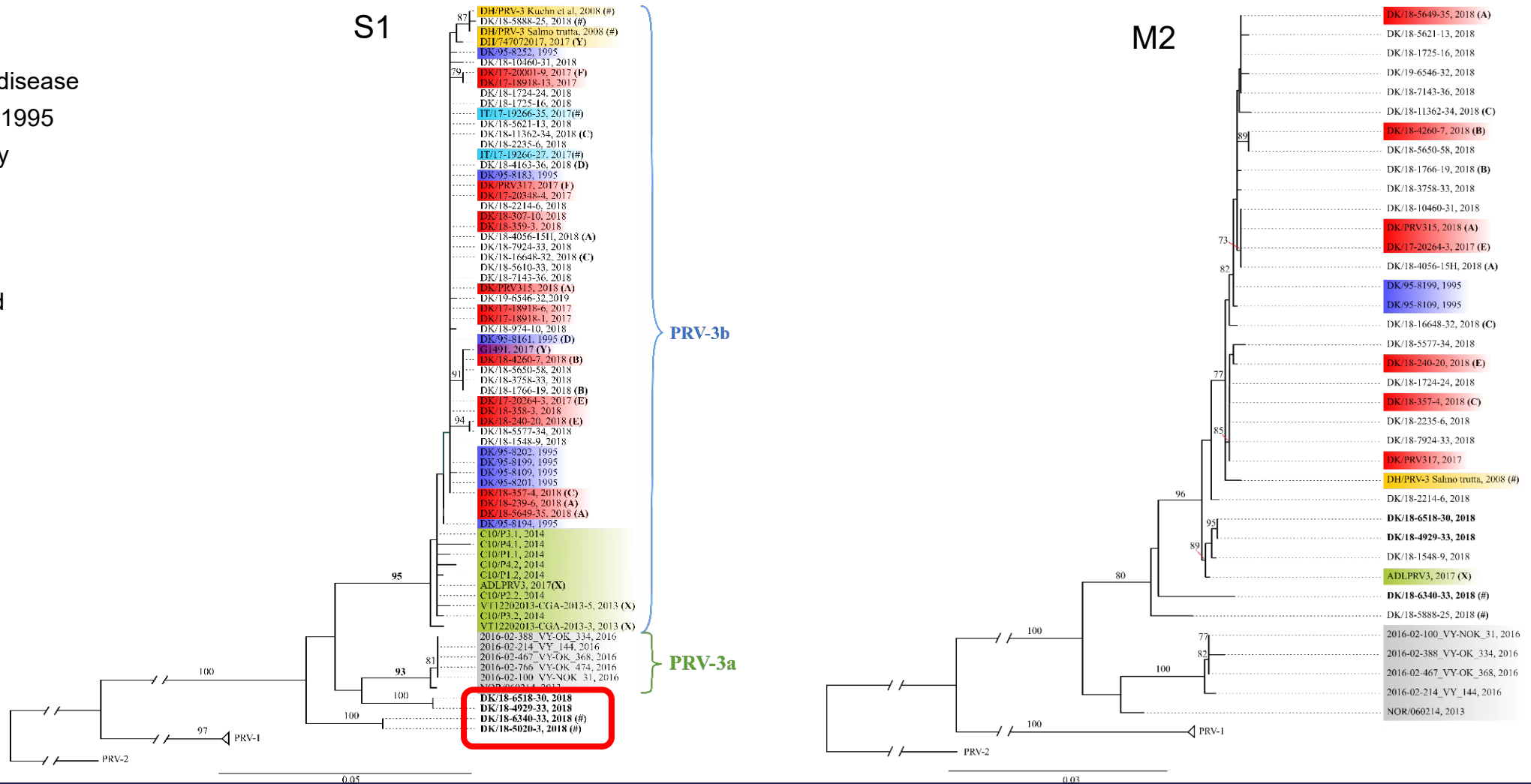


# Emergence and Spread of PRV-3

- Sequence analyses to look for virulence markers
- S1 and M2 segment selected based on study on PRV-1, in which isolates causing disease grouped together (Dhamotharan et al., 2019: Evolution of the *Piscine orthoreovirus* Genome Linked to Emergence of Heart and Skeletal Muscle Inflammation in Farmed Atlantic Salmon (*Salmo salar*)).
- Phylogenetic analyses based on 51 and 34 surveillance samples for S1 and M2, respectively.

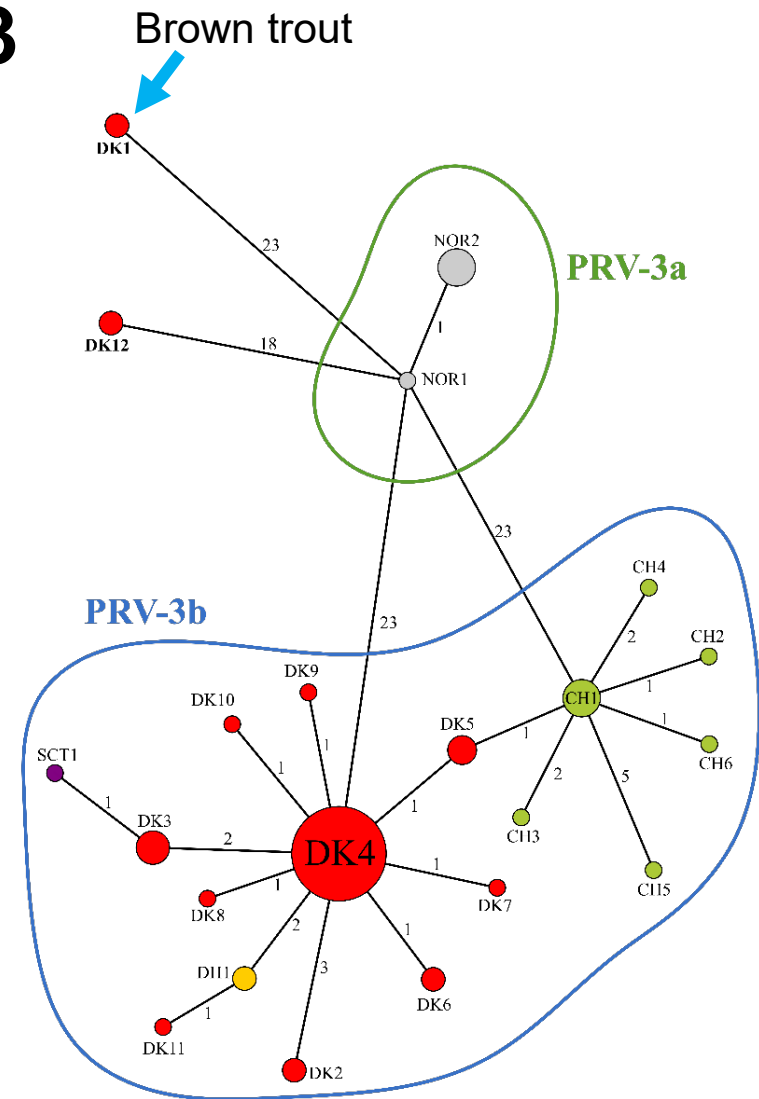
# Emergence and Spread of PRV-3

- Red: Denmark, disease
- Blue: Denmark, 1995
- Yellow: Germany
- Green: Chile
- Light blue: Italy
- Grey: Norway
- Purple: Scotland



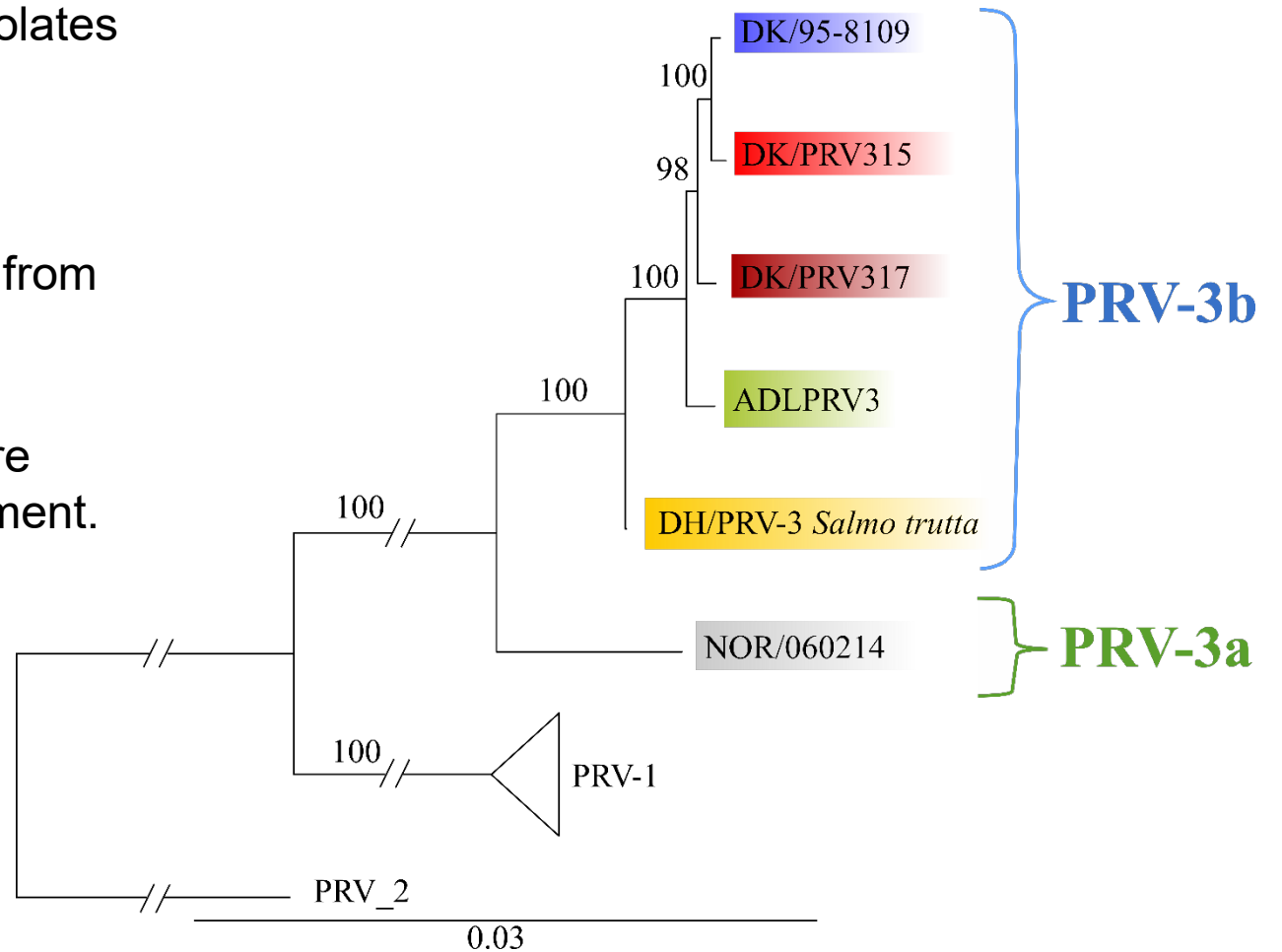
# Emergence and Spread of PRV-3

- Haplotype network also confirms the clustering of isolates
- The most dominant haplotype include 59% of the Danish isolates, spanning from 1995 to 2018.
- The four isolates outside of the subtypes form their own haplotypes



# Emergence and Spread of PRV-3

- Full genome analyses of selected isolates
- Virus propagated *in vivo*
- Blood collected, and RNA extracted from serum.
- Analyses of individual segments were consistent with exception of S2 segment.
- Further confirms the two subtypes



# Emergence and Spread of PRV-3

## Conclusion

- PRV-3 is widespread in Denmark
- No virulence factor discovered yet
- Disease only observed in RAS – external factors required for disease outbreaks?
- Confirmation of two PRV-3 subtypes, 3a and 3b.
- PRV-3 is not a new virus - Has been in Denmark since at least 1995.