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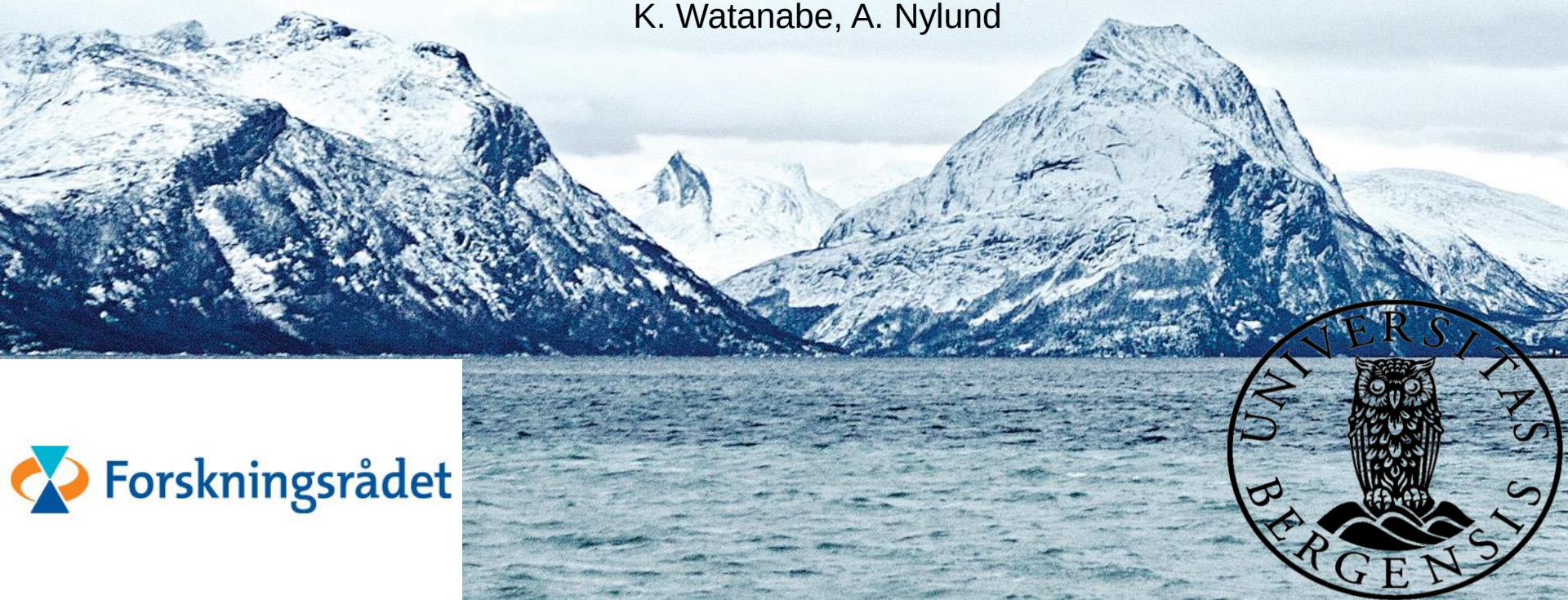
Norske *Tenacibaculum* spp. årsak til sårsykdom i norsk lakseoppdrett?

Øyvind Brevik, S.Småge, K. Frisch, V. Vold, H. Duesund, K. F. Ottem, K. Watanabe, A. Nylund

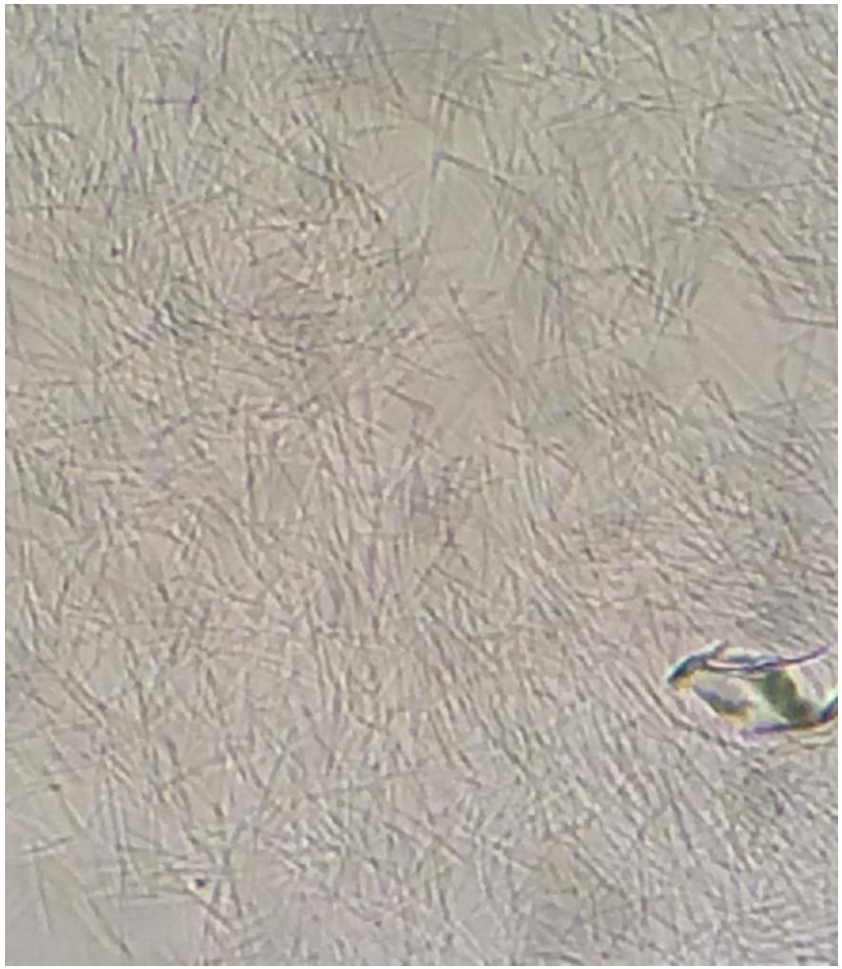


Forskningsrådet

UNIVERSITAS BERGENSIS

Tenacibaculosis on" Postsmolts" First confirmed case in 2011

- "Post smolt" production site
- Full seawater in tanks on land
- Water inlet 20 and 80m
- Size 70-130 gr.
- Outbreak in February
- More severe in some tanks
- 5% mortality
- Reduced survival after transfer to sea cages
- Problem solved with new UV-system



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2013
Challenge experiment with two field isolates

- Reproduced clinical disease as observed in field
- Shedders developed tenacibaculosis within 9 dpc
- Three cohabitants developed tenacibaculosis
- Re-isolated and identified as genetically identical as challenge material

Industry ph.d started in 2014

Antonie van Leeuwenhoek (2016) 109:273–285
DOI 10.1007/s10482-015-0630-0

ORIGINAL PAPER

Tenacibaculum finnmarkense sp. nov., a fish pathogenic bacterium of the family *Flavobacteriaceae* isolated from Atlantic salmon

Sverre Bang Småge · Øyvind Jakobsen Brevik · Henrik Duesund · Karl Fredrik Ottem · Kuninori Watanabe · Are Nylund

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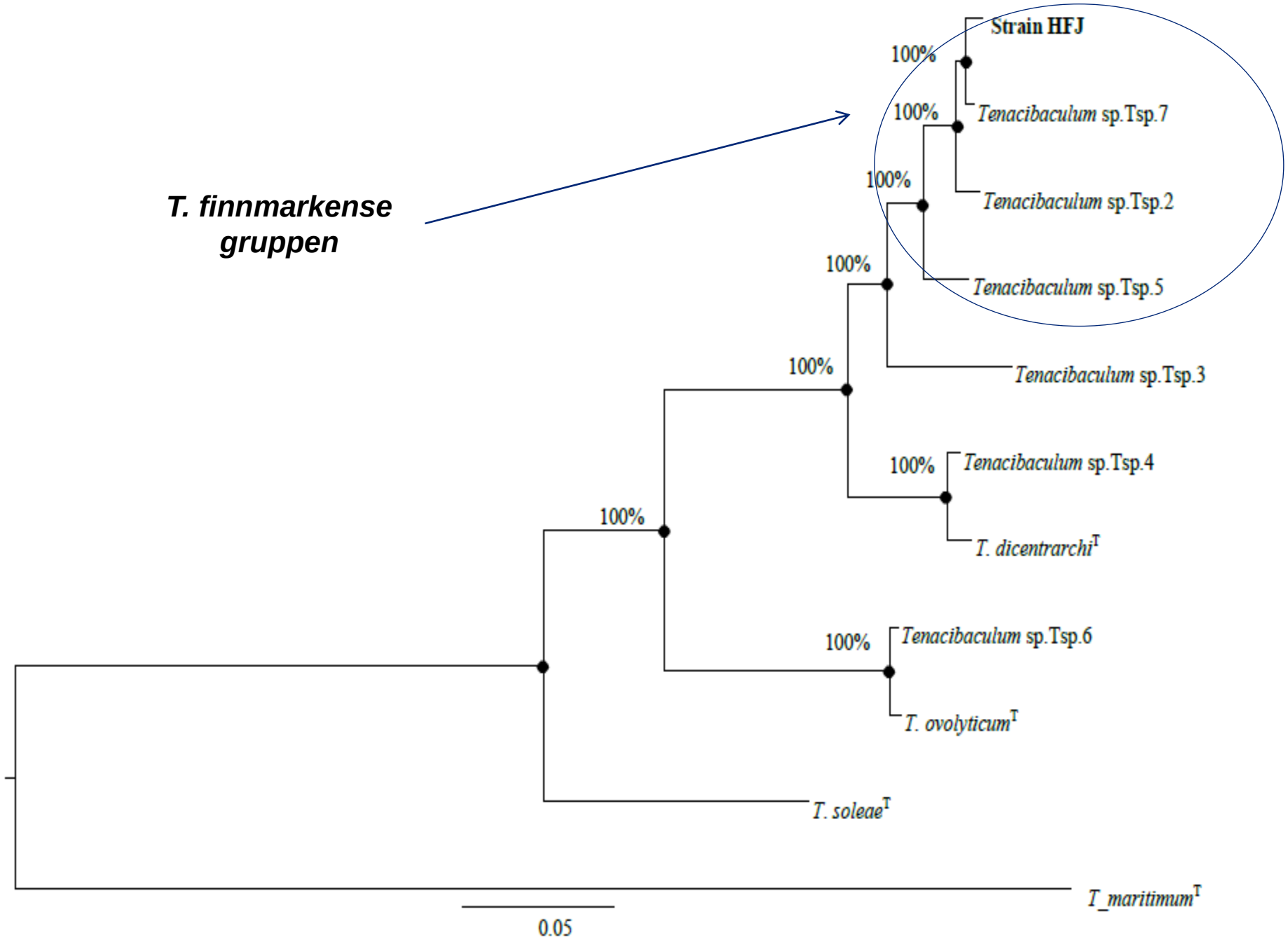
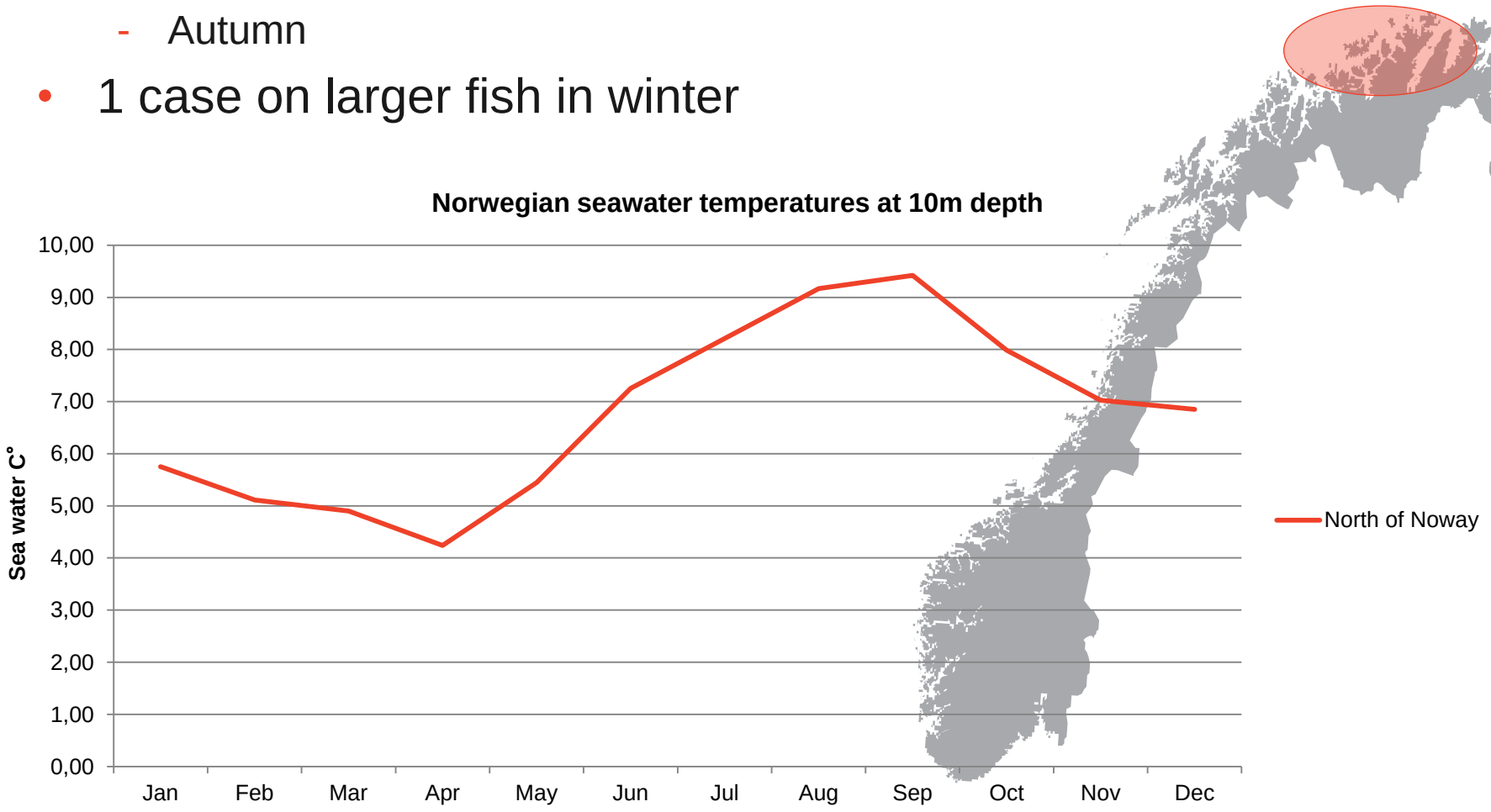

T. finnmarkense gruppen
Strain HFJ
100%
100%
100%
100%
100%
100%
100%
100%
Tenacibaculum sp.Tsp.7
Tenacibaculum sp.Tsp.2
Tenacibaculum sp.Tsp.5
Tenacibaculum sp.Tsp.3
Tenacibaculum sp.Tsp.4
T. dicentrarchi^T
Tenacibaculum sp.Tsp.6
T. ovolyticum^T
T. soleae^T
T_maritimum^T
0.05

qPCR screening results from three cases of ulcerative disease in northern Norway

- 3 cases occurring after after sea transfer
  - Spring
  - Autumn
- 1 case on larger fish in winter



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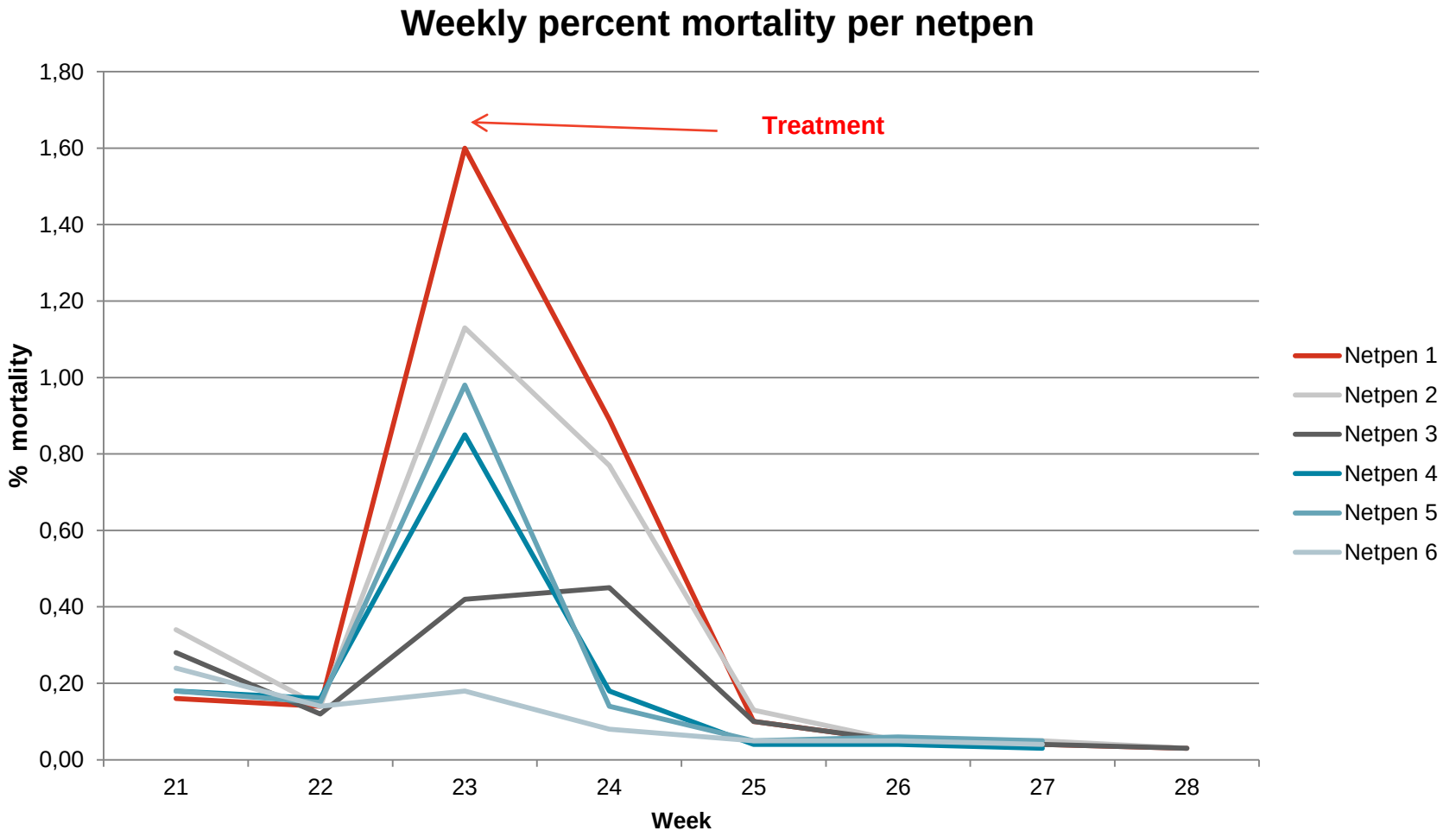
Tenacibaculosis on smolts transferred to sea in spring -Mortality



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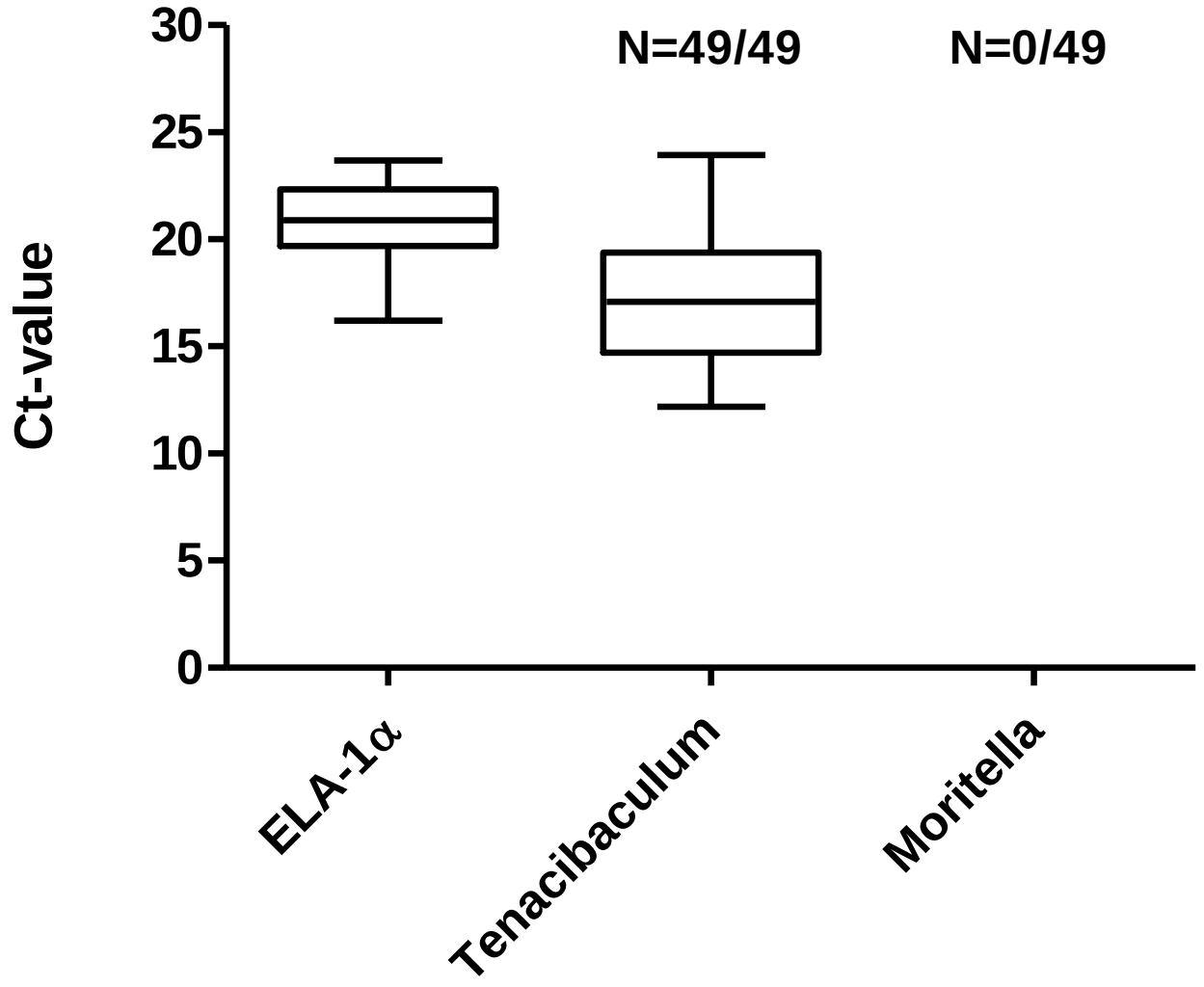
Tenacibaculosis on smolts transferred to sea in spring -qPCR results



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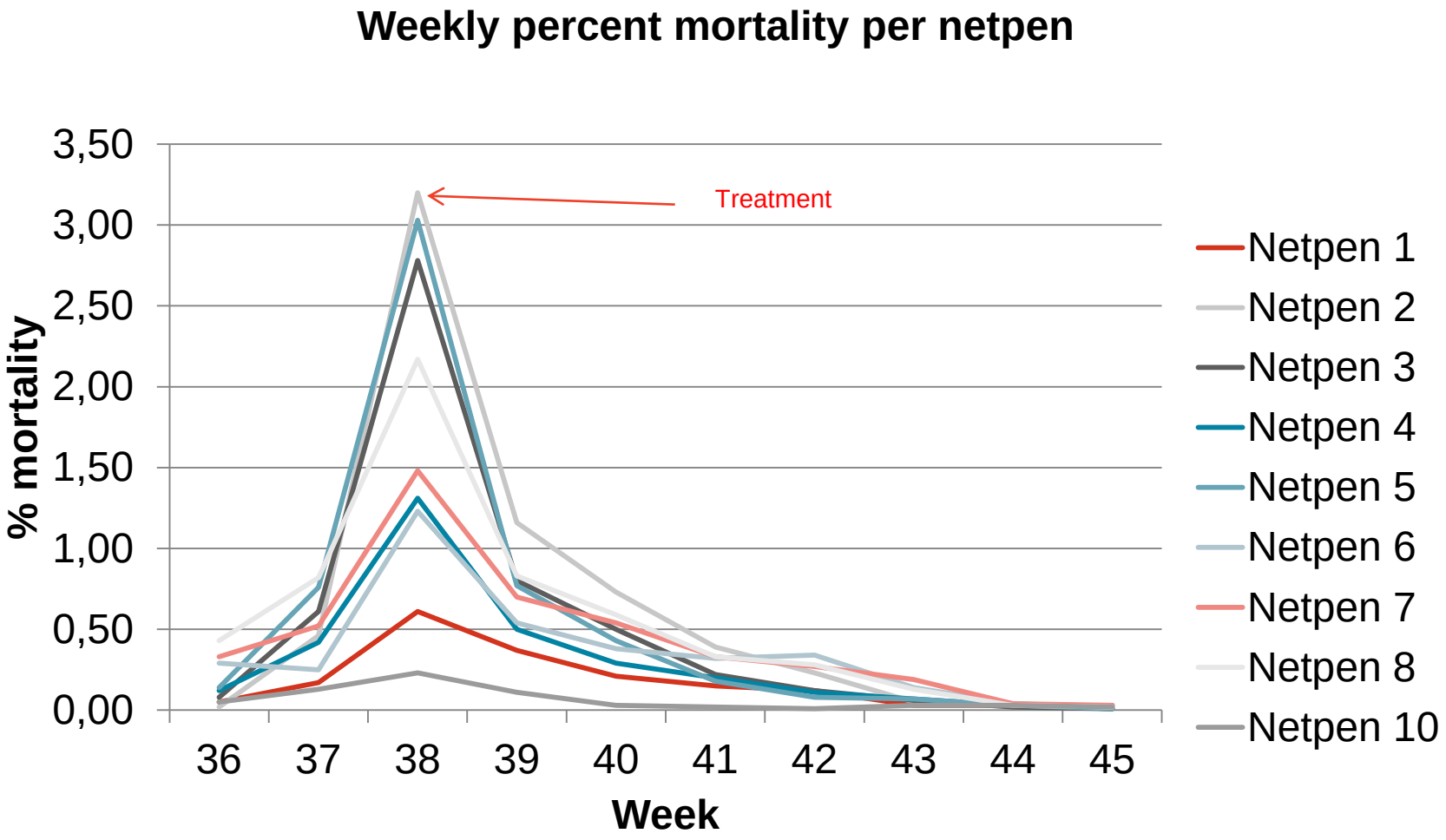
Tenacibaculosis on smolts transferred to sea in autumn -Mortality



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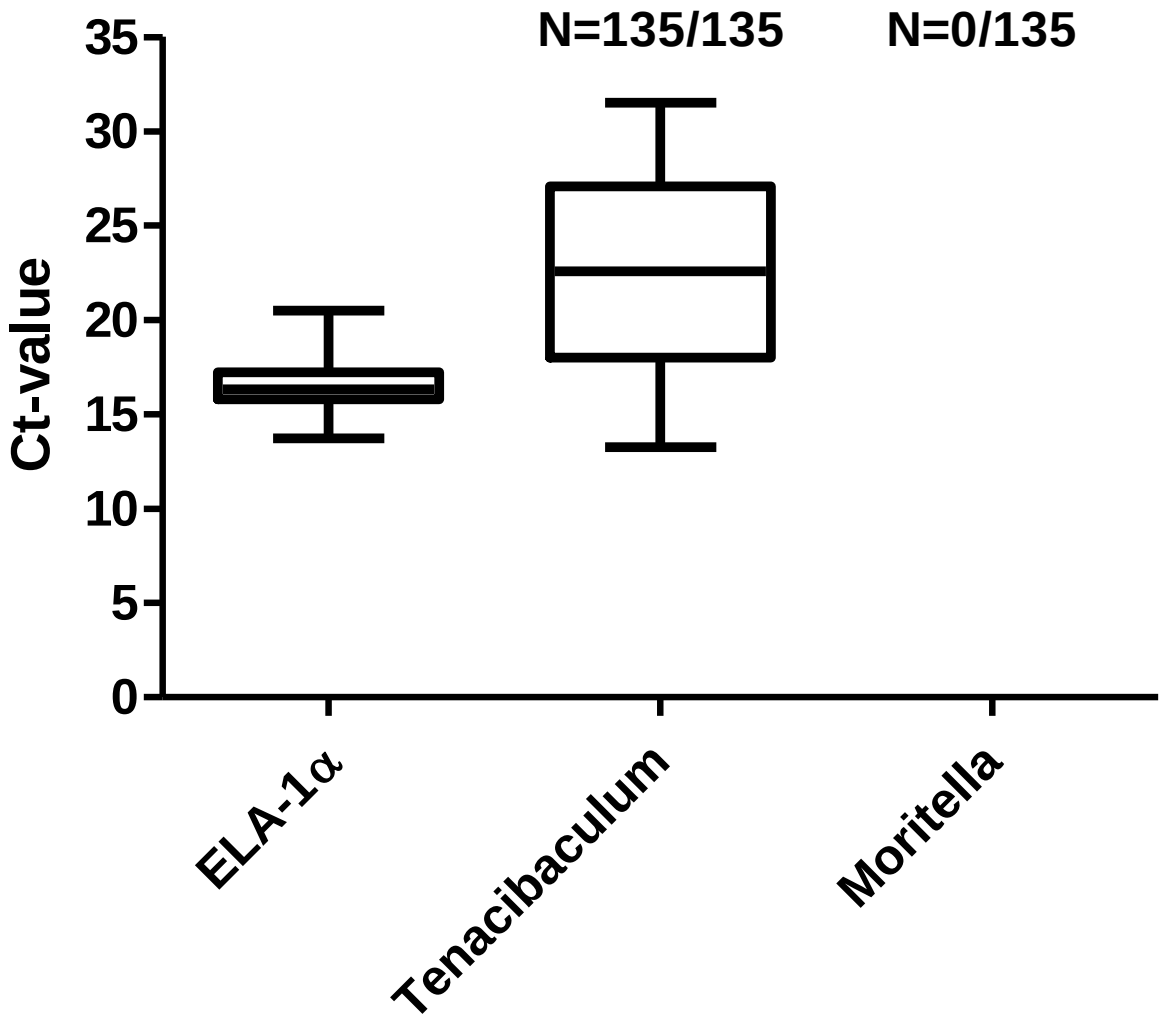
Tenacibaculosis on smolts transferred to sea in autumn



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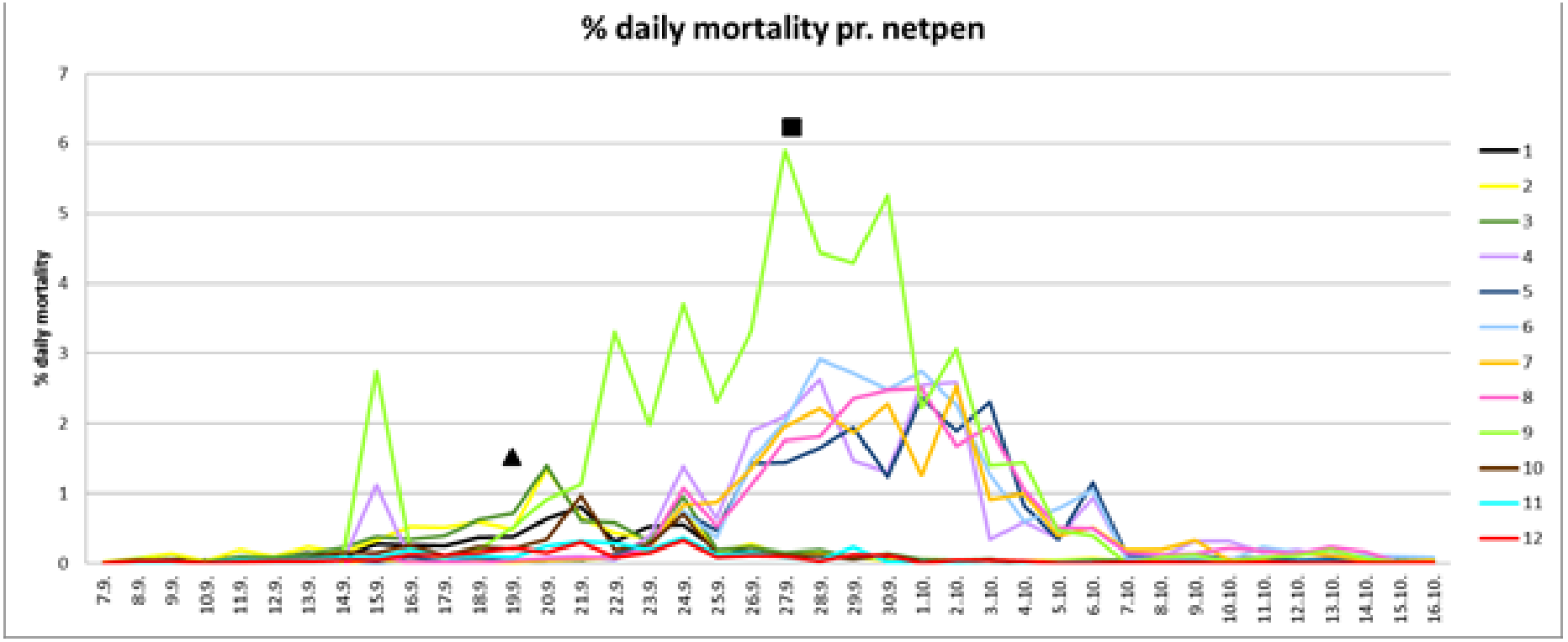
Tenacibaculosis on smolts transferred to sea in autumn –Large study



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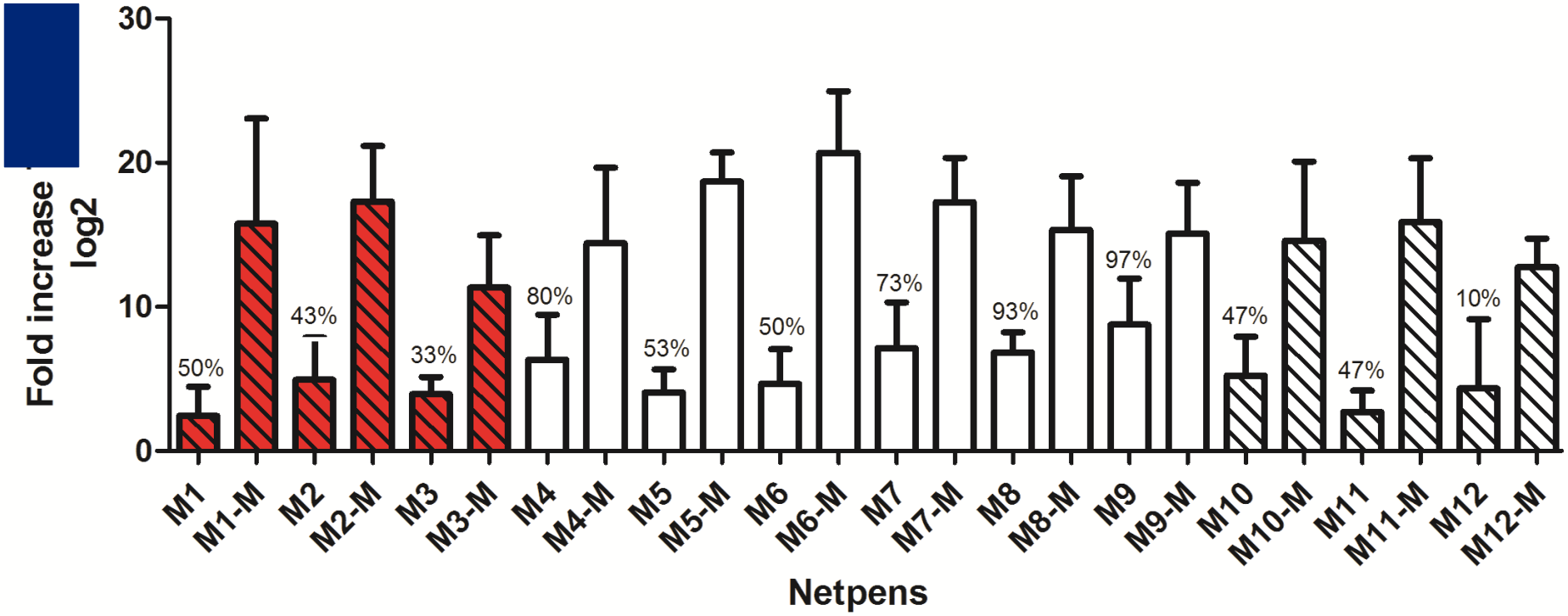
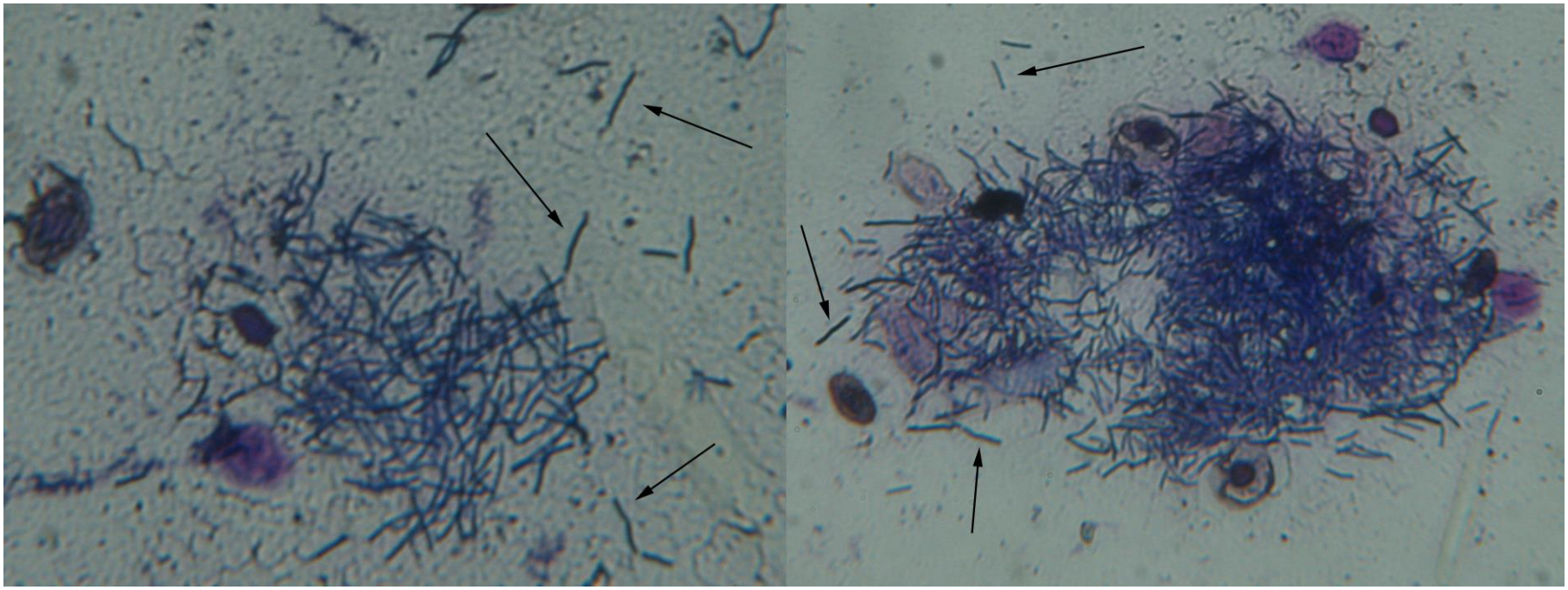
Tenacibaculosis on smolts transferred to sea in autumn –Large study

- All 12 netpens were sampled
- 30 random fish (without clear signs of tenacibaculosis)
- 5 moribound from each netpen.



Tenacibaculosis -”larger fish” case
Clinical signs



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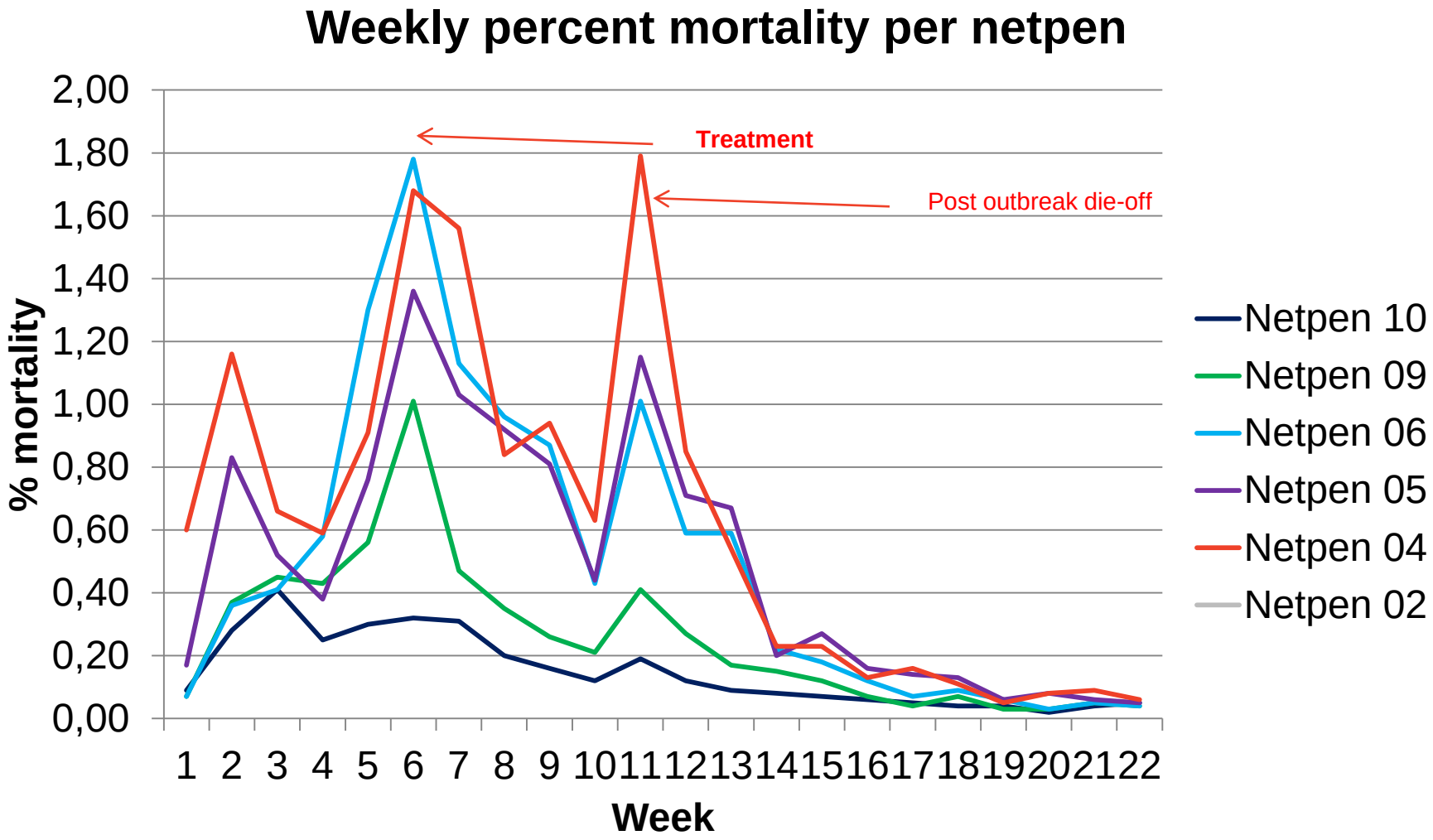
Tenacibaculosis -”larger fish” case -Mortality



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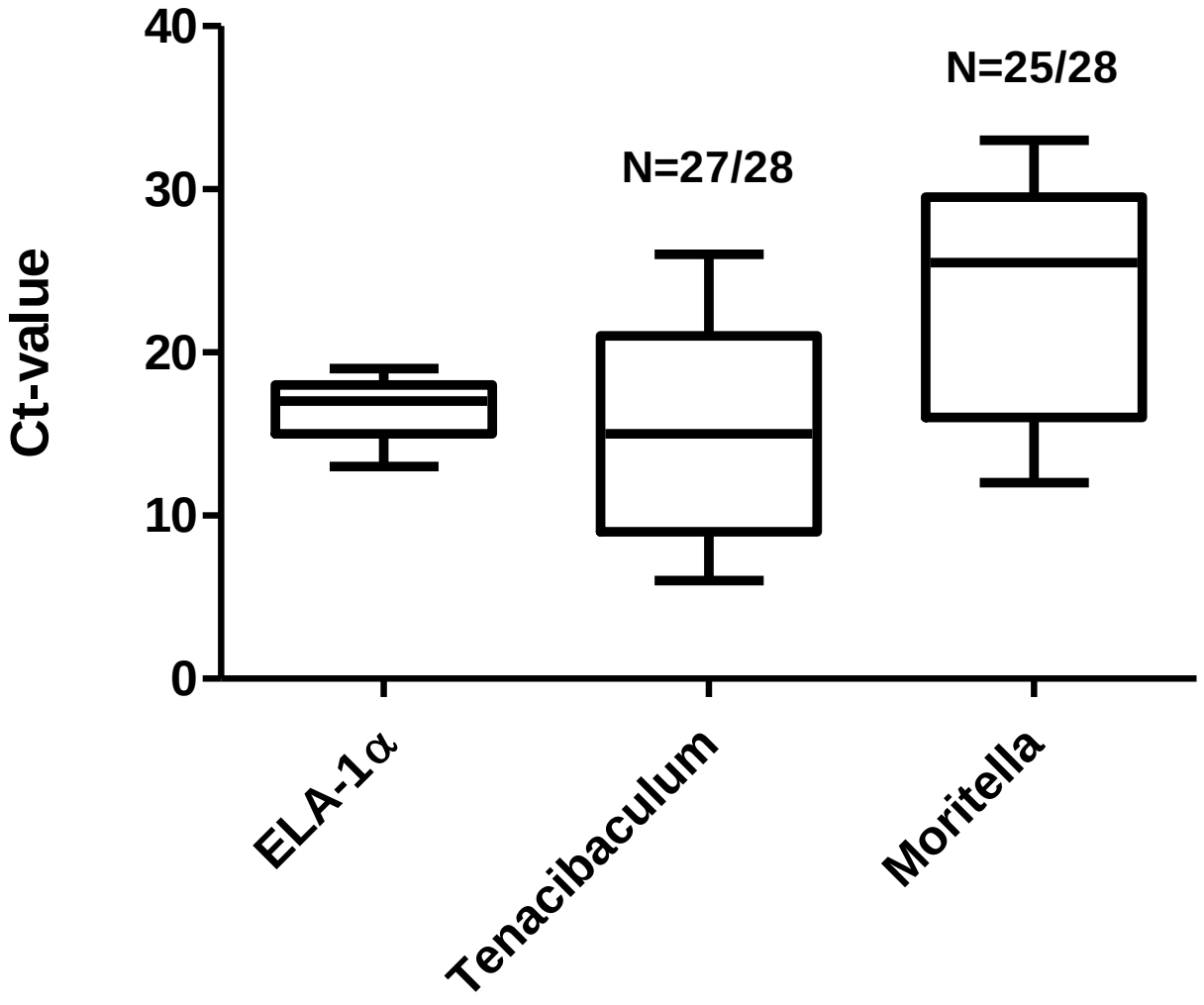
Tenacibaculosis -”larger fish” case



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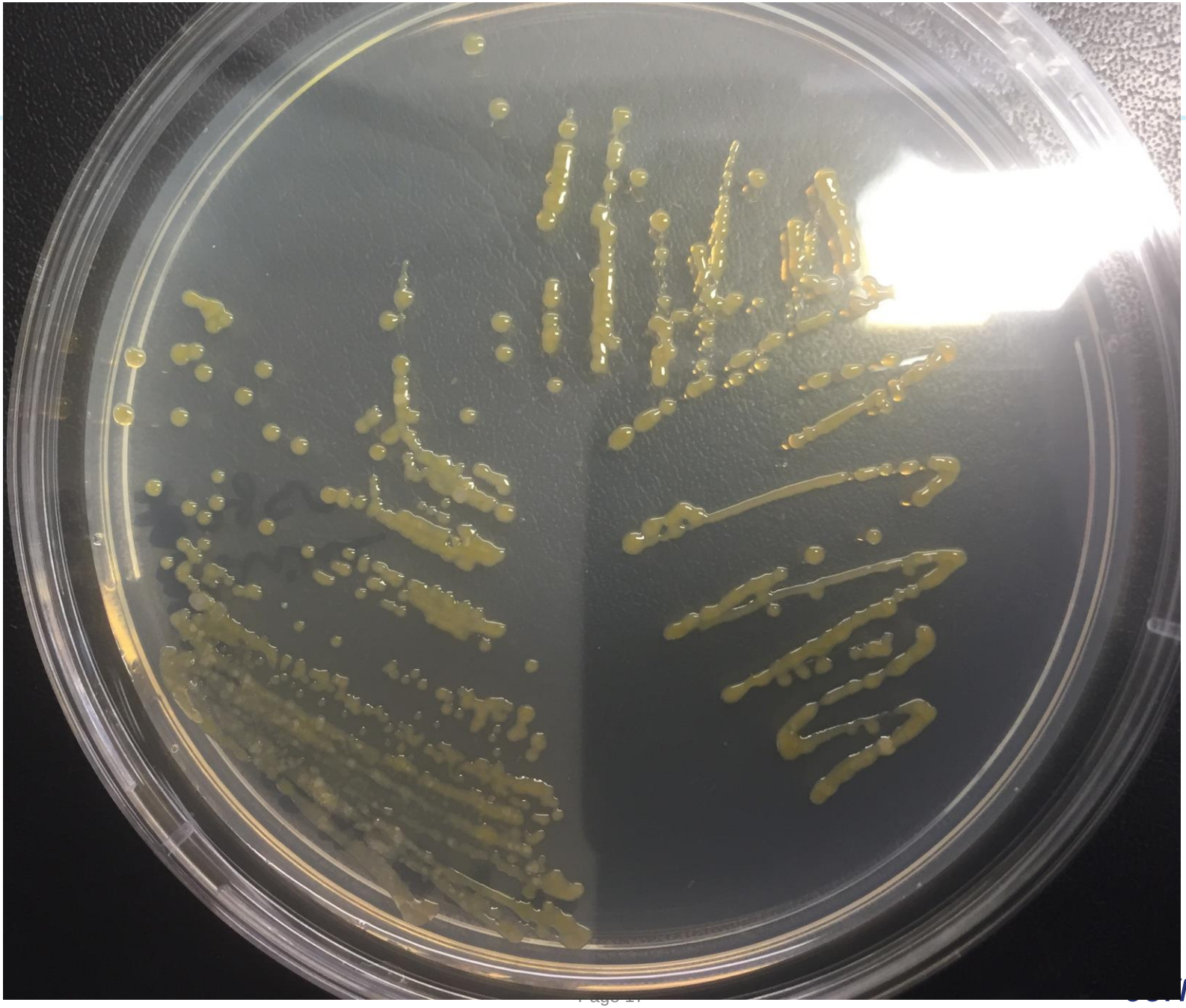

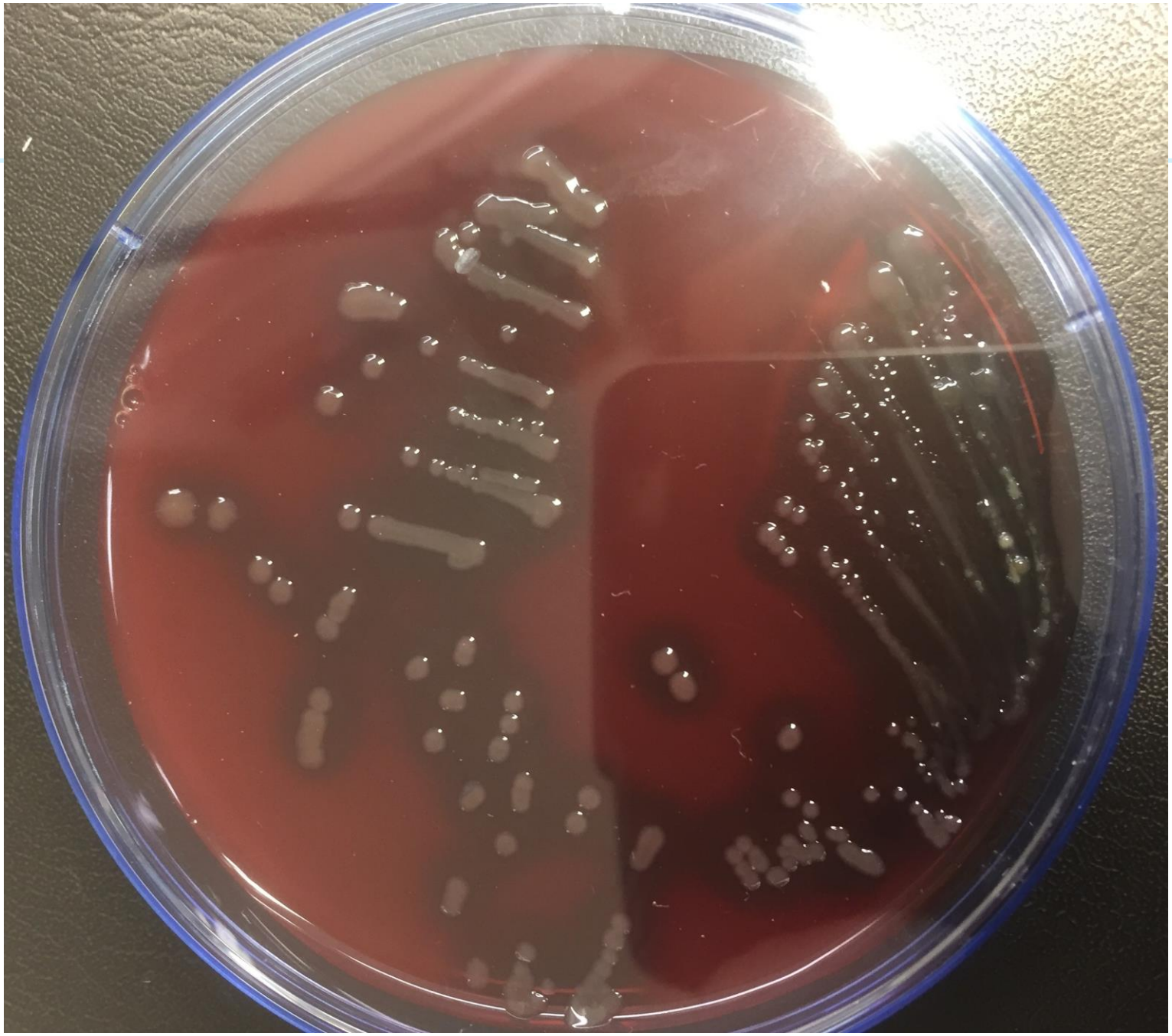

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Tenacibaculosis: Measures and causes

Disease progression

- Starst in one netpen/one group
- Spreads to whole site

Measures:

- Treatment with antibiotics to avoid well fear issues
- Reduce infective pressure by stamping out heavy affected netpens
- Remove moribounds

Causes?:

- Environmental factors
- Handling of the fish
- Quality of the smolt

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journal homepage: www.elsevier.com/locate/aquaculture

First isolation, identification and characterisation of *Tenacibaculum maritimum* in Norway, isolated from diseased farmed sea lice cleaner fish *Cyclopterus lumpus* L

Sverre Bang Småge [a,b,*], Kathleen Frisch [a,b,1], Øyvind Jakobsen Brevik [b,1], Kuninori Watanabe [a], Are Nylund [a]

[a] Fish Disease Research Group, Department of Biology, University of Bergen, Thormøhlensgt 55, Bergen N-5020, Norway
[b] Cermaq Group AS, Dronning Eufemias gate 16, Oslo N-0191, Norway

Conclusion

- *Tenacibaculum finnmarkense* reproduce clinical disease in challenge experiment
- *Tenacibaculum finnmarkense* is the dominating bacteria isolated from all the four presented cases
- Newly sea transferred smolts are at risk for outbreak
- Important to remove infection pressure
- *Tenacibaculum maritimum* assosiated with disease in lumpsucker