

Pathogenic *Vibrio parahaemolyticus*
Strains and Total Population Dynamics in New
England Shellfish Harvest Areas

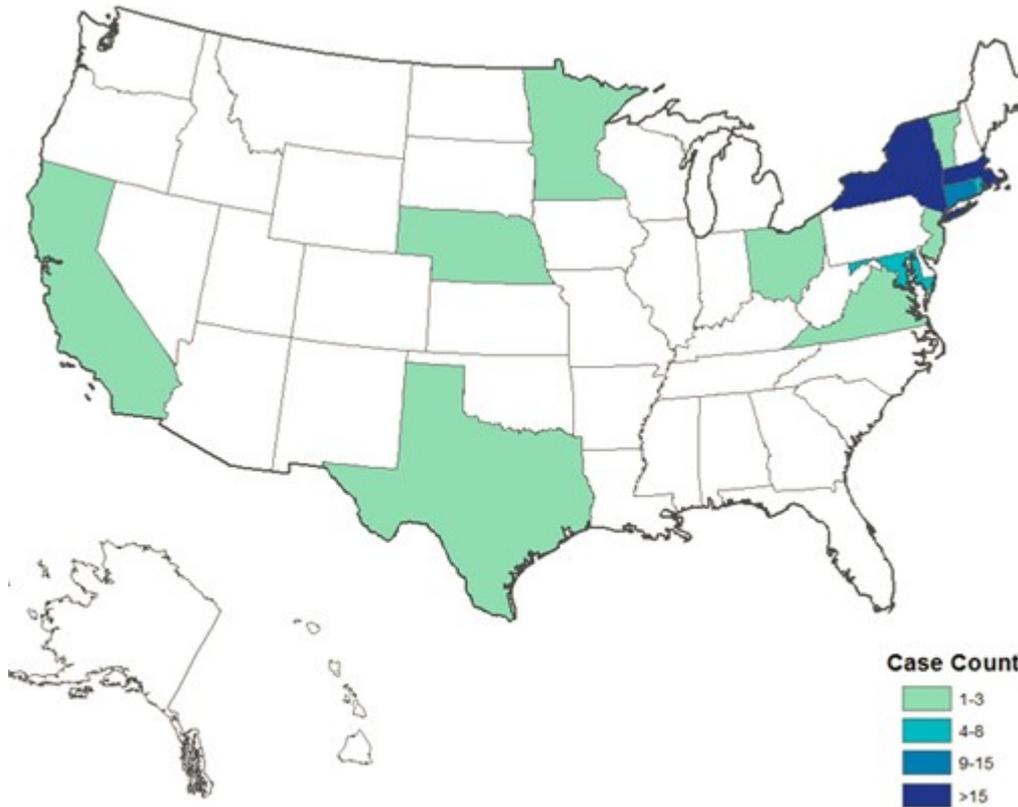
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Overview

- Infections caused by contaminated shellfish harvested in cooler regions are becoming more common



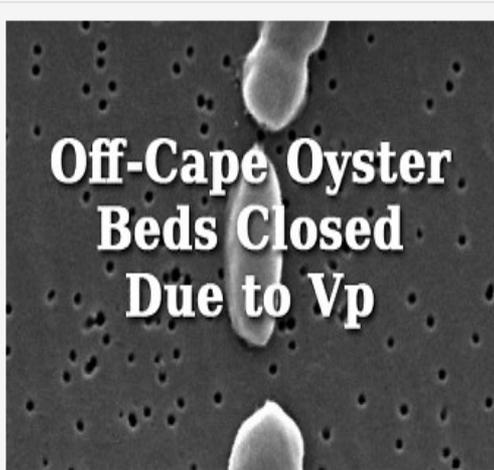
CDC 2013

Significance to the New Englanders

Vp outbreak shuts down Plymouth County commercial oyster harvest

Closure effects 39 grant holders

ARTICLE | NEWS | AUGUST 31, 2013 - 9:21AM | BY MAGGIE KULBOKAS



MA DPH has ordered the closure of commercial oyster beds in Plymouth County due to an outbreak of Vp. Photo courtesy of Wikimedia Commons.

Commercial oyster harvesting in parts of Plymouth County have been shut down due to an outbreak of *Vibrio parahaemolyticus* or Vp. The state's Division of Marine Fisheries made the announcement that commercial harvesting in certain parts of Plymouth, Kingston, Duxbury and Marshfield was suspended effective Friday.

The decision to suspend the harvest came at the request of the Massachusetts Department of Public Health after consulting with the Federal Food and Drug Administration



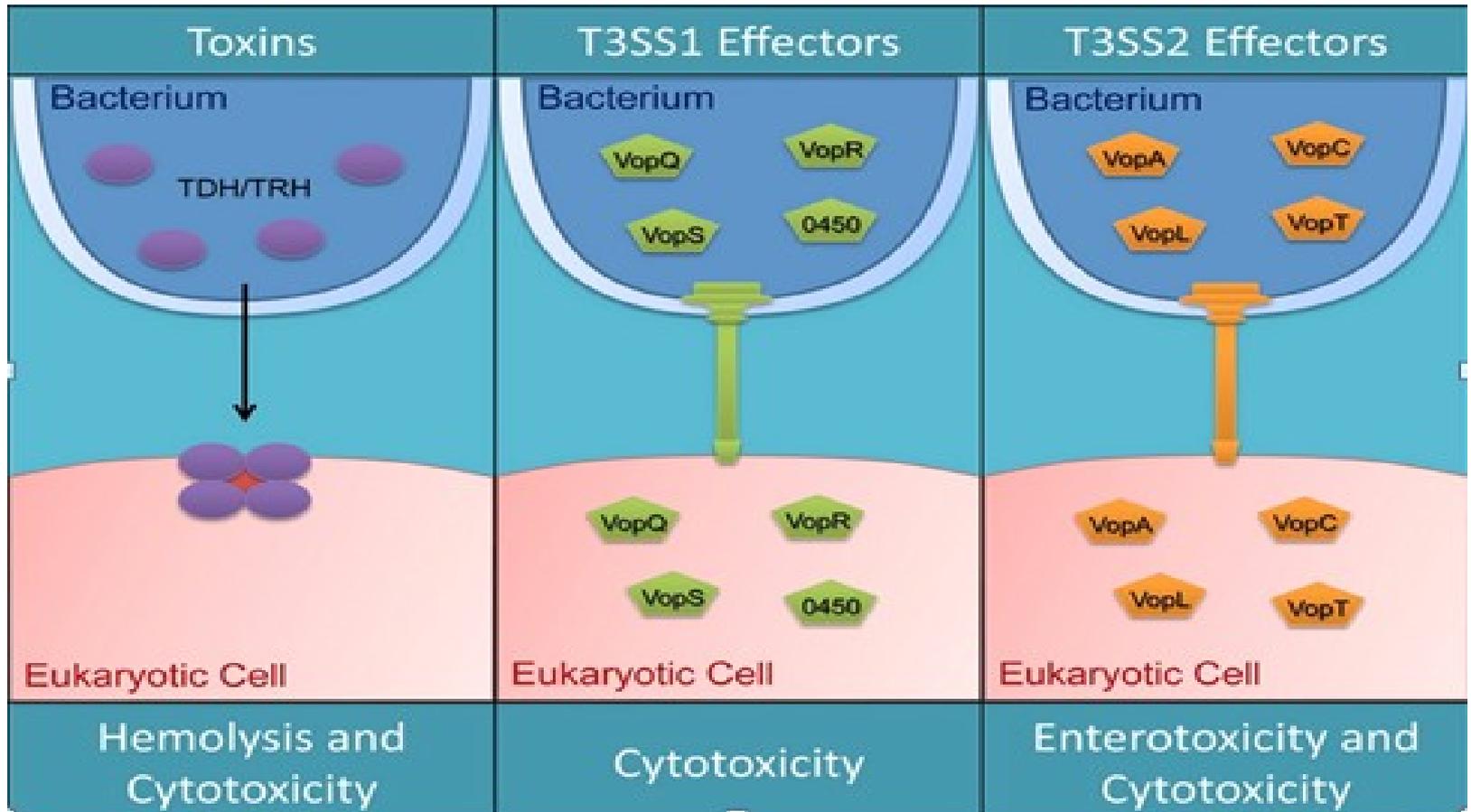
Major Points from Our Ongoing Work

- The Endemic population of Vp in a given estuary, made up mostly of harmless bacteria, is extremely diverse.
- Pathogens are very rare in the environment, and nearly never detected even during outbreaks.
- Disease is Polyphyletic, which means any detection methods need to account for multiple pathogen lineages which may have distinctive molecular signatures.

There Are Significant Challenges Our Studies Address:

- There are few genetic markers with some predictive power but no identified markers definitively distinguish relevant pathogenic strains from non-pathogens.
- Significant challenge to predict health risk

Virulence Factors for Use in Diagnostic Detection



Broberg *et al.* 2012

Research Questions

1. Are outbreaks caused by emergence of the endemic strains or invasion of pandemic strains?

2. Which environmental lineages:
 - a) are most closely related to the endemic pathogens and
 - b) can be used as references to help identify diagnostic virulence traits?

Approaches

- ❖ Determine the relationship between local clinical isolates and environmental strains
 - Genotyping
 - Phenotyping
 - Multi-locus sequencing analysis (MLSA)
 - Virulence testing in an animal model
- ❖ Genome sequencing and analysis

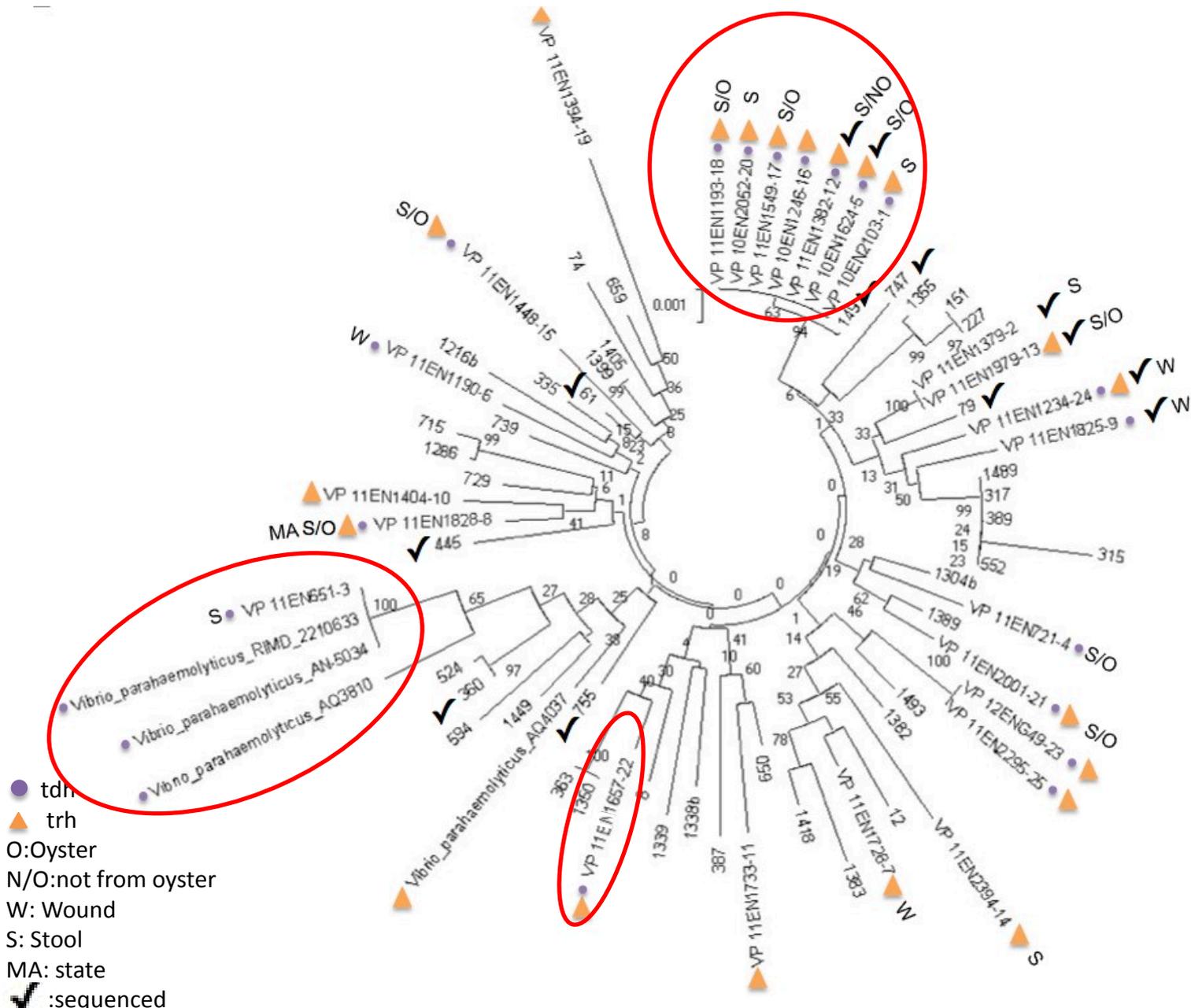
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Examination of phylogeny among clinical and environmental Vp strains



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 - Genotyping
 - Phenotyping
 - Multilocus sequencing Analysis (MLSA)
 - Animal model
- ❖ **Genome sequencing and analysis**

Conclusions and Future Directions

- Vp strains are very diverse
- Majority of the pathogens from local infections prior to 2013 are endemic strains
- There is the potential for invasive strains, such as ST36
- We hope to identify more definitive markers through our genomics analysis

Acknowledgements

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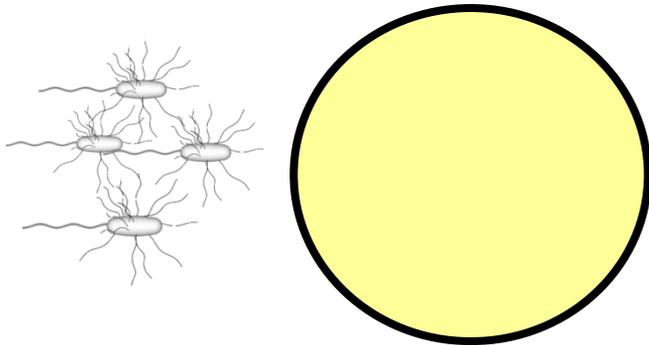
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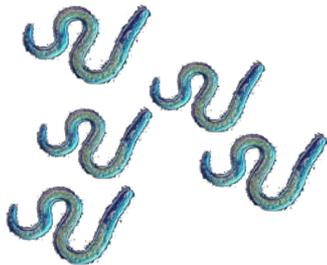


Nematodes Infection Model



Incubate at 37°C
for 8 hrs.

Incubate at 28°C for the
duration of the assay



Monitor:

1. Survival
2. Activity (mobility)



Virulence of selective strains

