

Prevalence of Disease, Tissue Abnormalities and
Tissue Metal Contents in Eastern Oysters from
Connecticut's Long Island Sound Coastline

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The question is: Do heavy metals present in Long Island Sound oyster tissue increase the prevalence of disease and pathologic changes?

Methods

5 Seed Beds, 50 Oysters Each

- 3 Lower Housatonic
- Inner New Haven Harbor
- Westbrook

30 to BoAq for Pathology/ Histology Analysis

- NOAA Protocols (Howard et al, 2004)
- Mallory's Hematien Stain (10 Re-sectioned / Site)

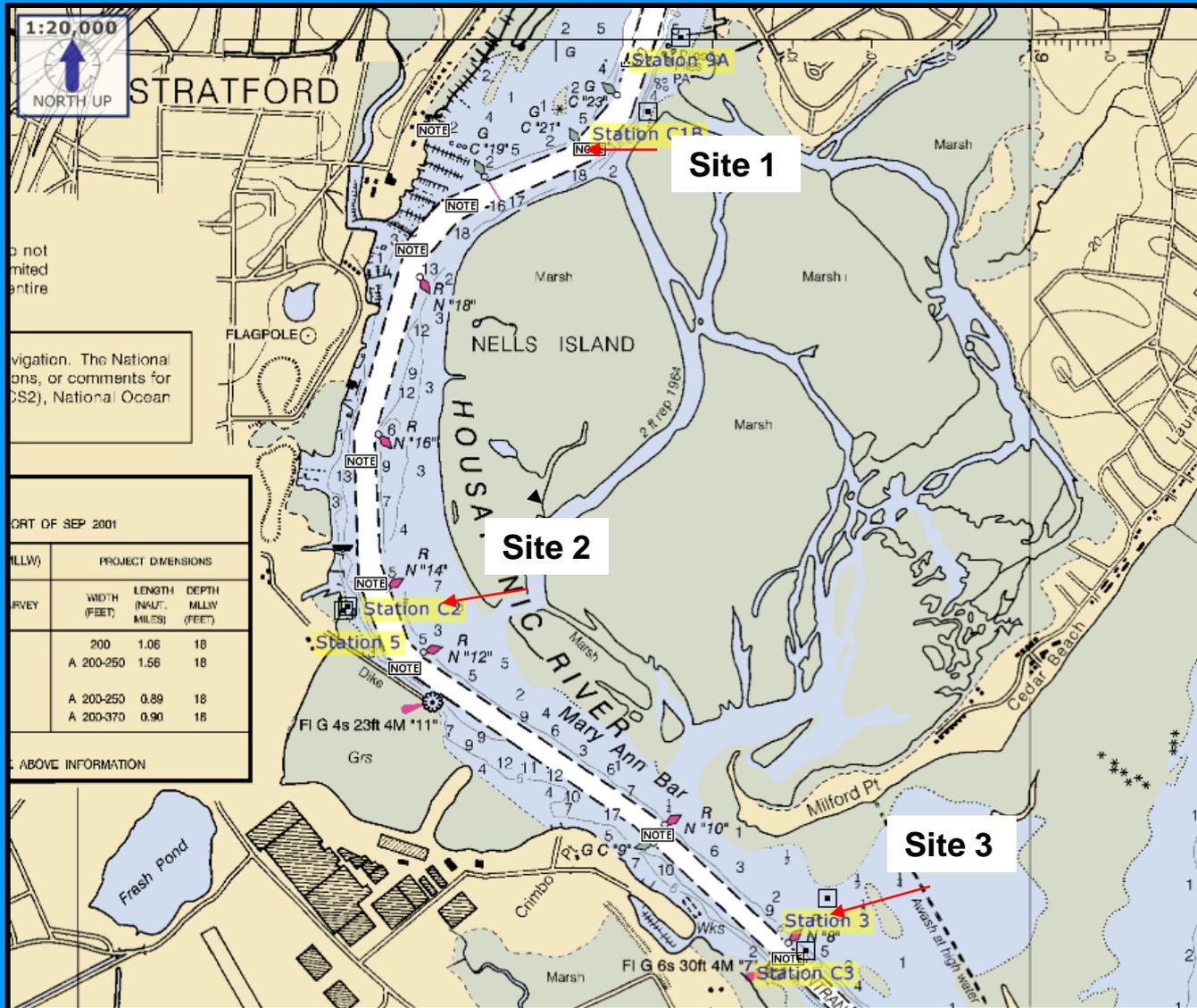
20 to SCSU for Tissue Metals Analysis

- Nitric Acid Digestion/ Atomic Absorption Spectrophotometry

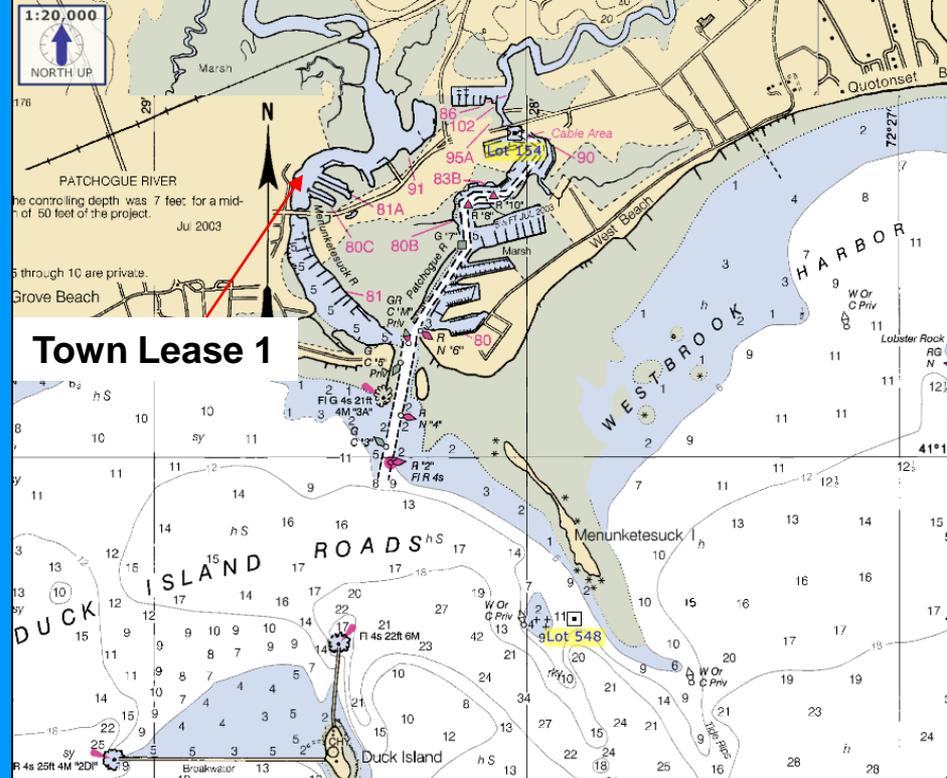
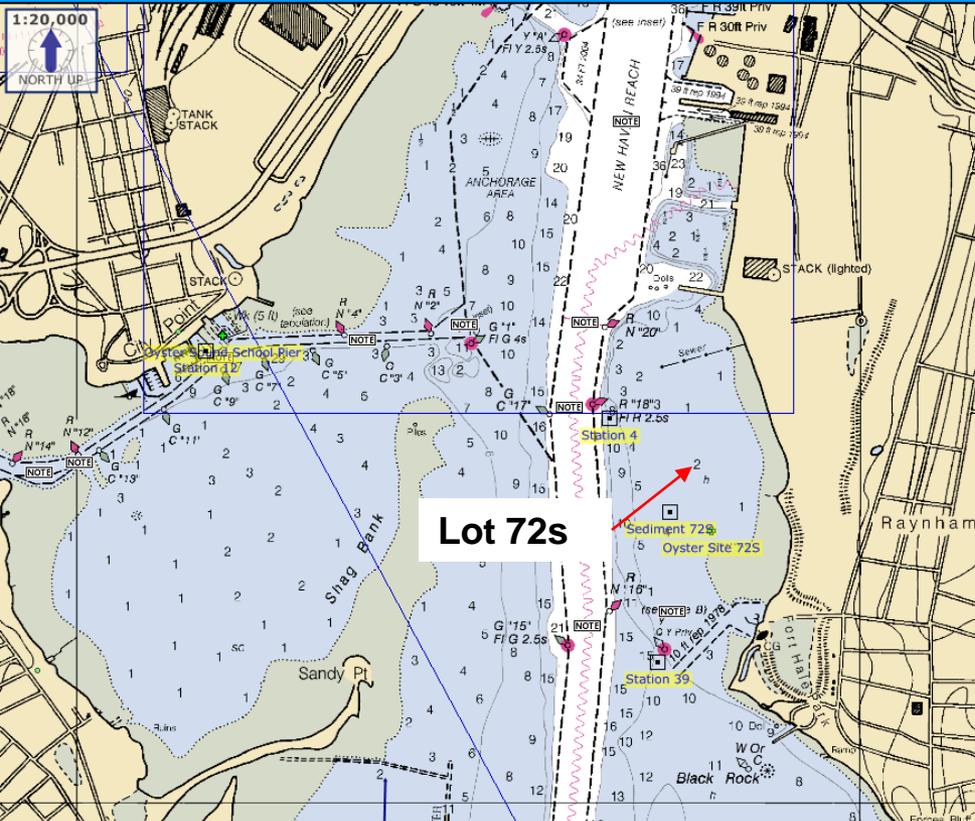
Salinity Data Also Collected



Housatonic River Study Sites



Inner New Haven Harbor



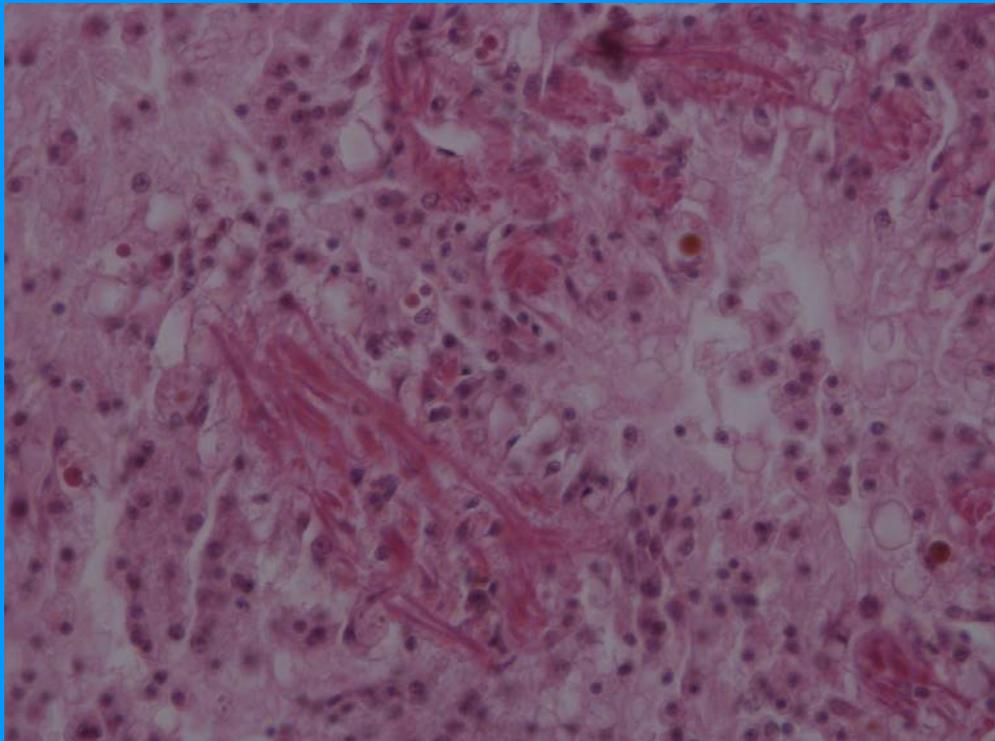
Westbrooke

Metals

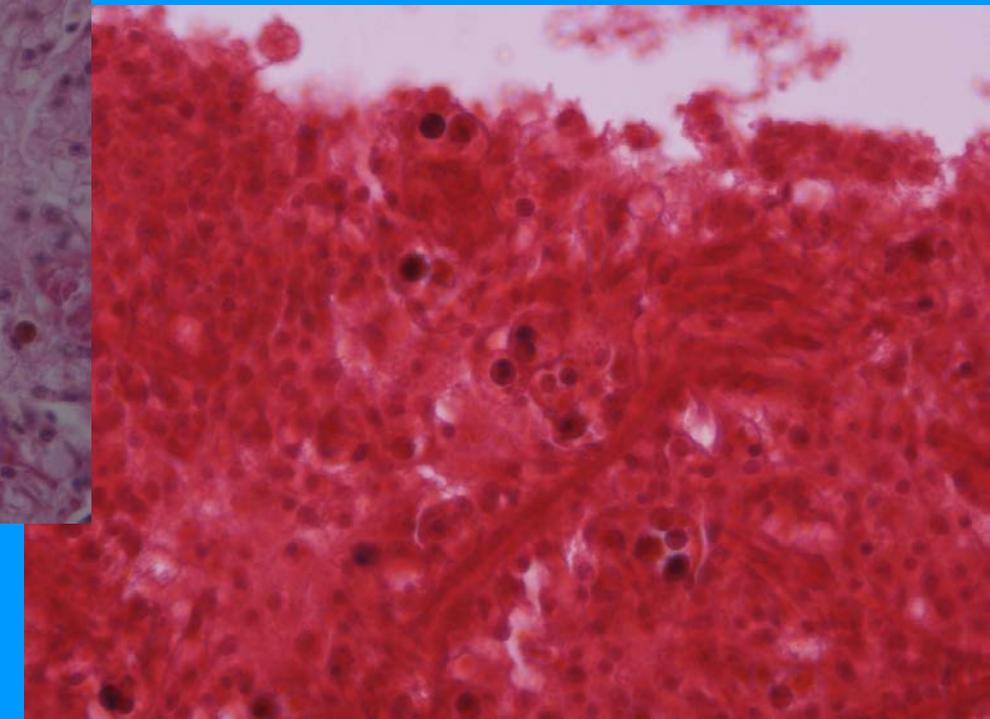
- Affinity For Organic Matter
- Metal Species Behavior: More Likely to Interact at Lower Salinity
 - Co-variance Cu, Zn, Cd
 - Crustal Abundance
- Observed Concentrations ERL-ERM

Mallory's Hematien Metal Localization

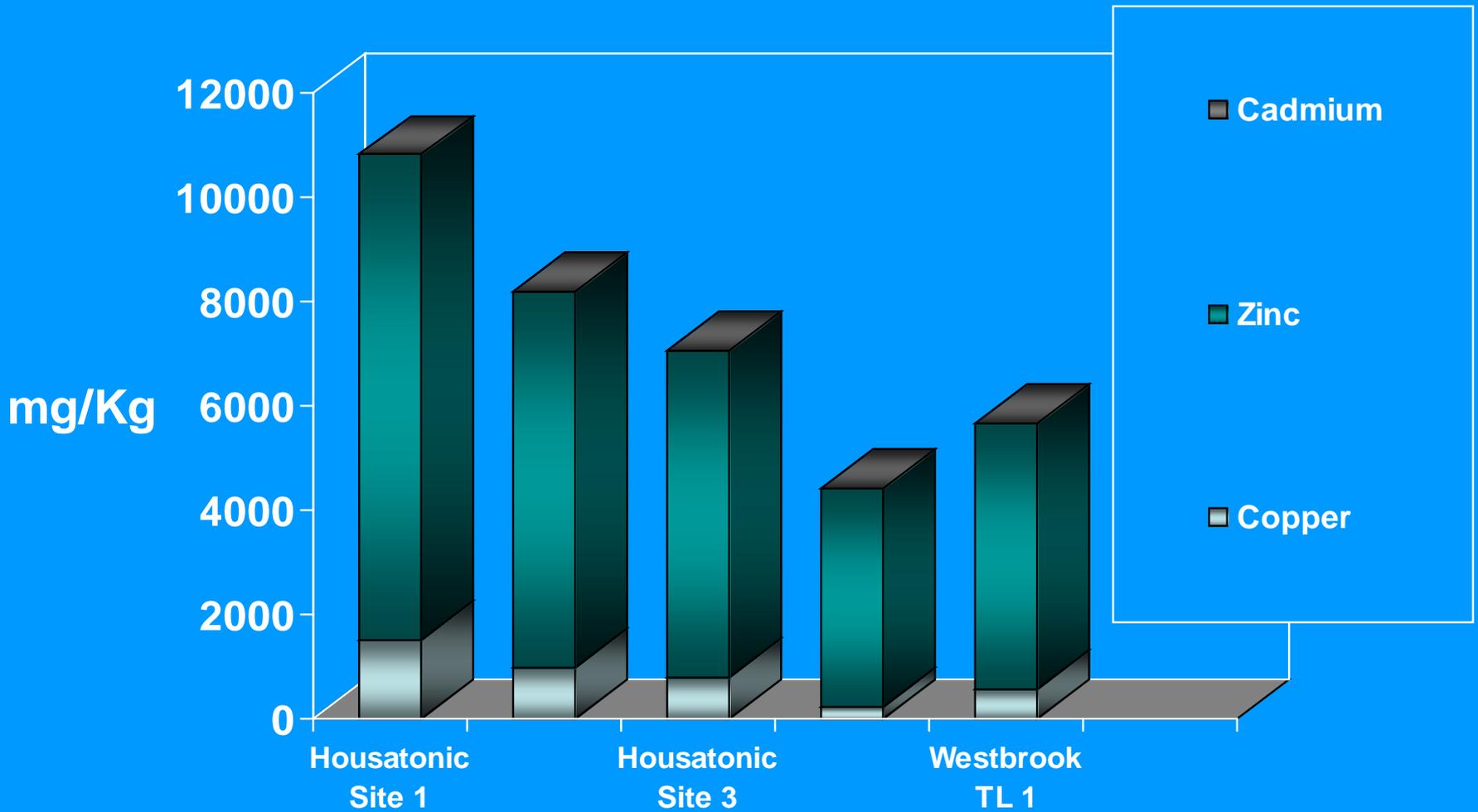
Site1 Oyster with Ceroid Droplets H&E 40x



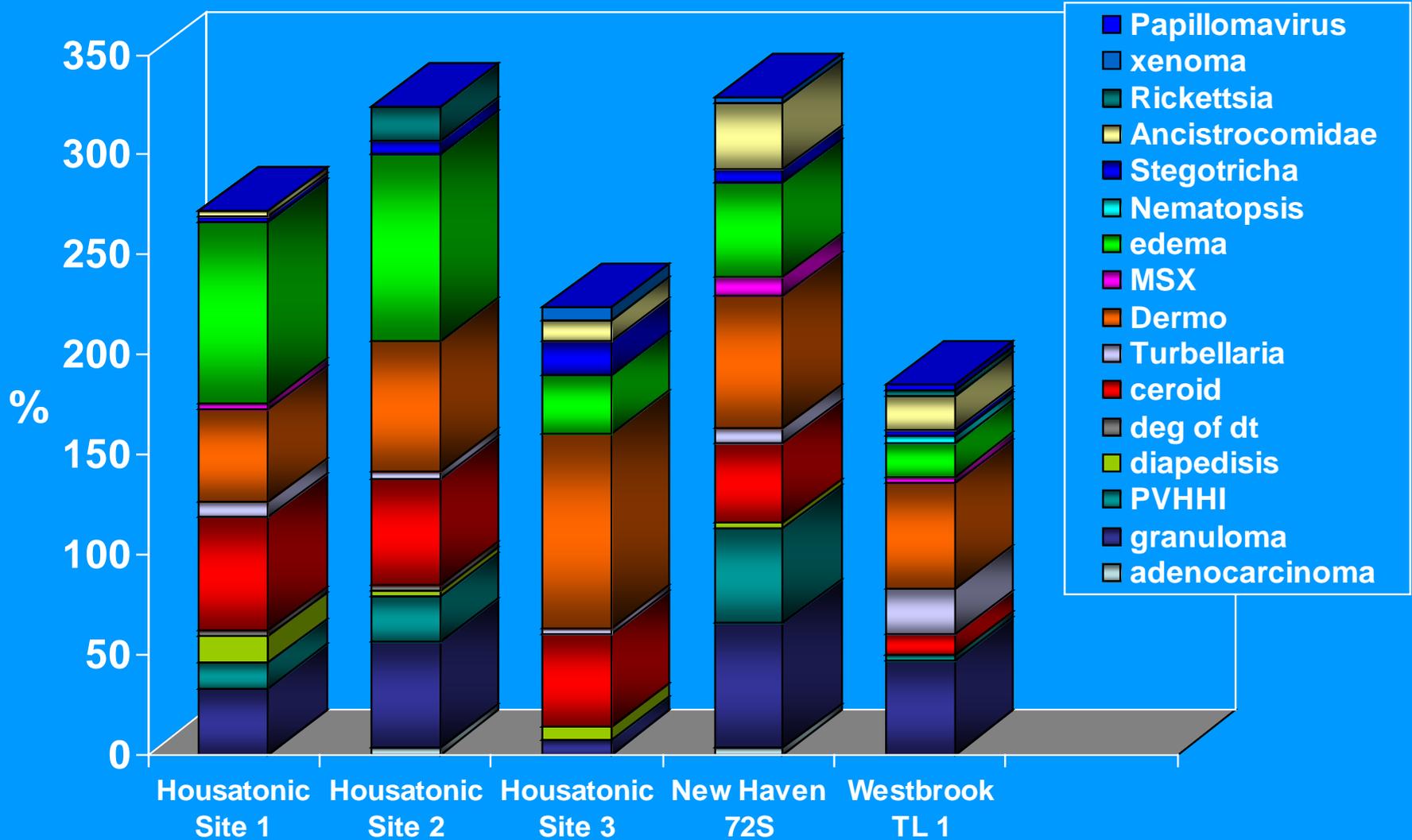
Same Oyster Re-sectioned and Stained With Mallory's Hematien



Tissue Metal Content Trend-Digestion/Absorption



Prevalences of infectious agents and pathological conditions observed at different sites

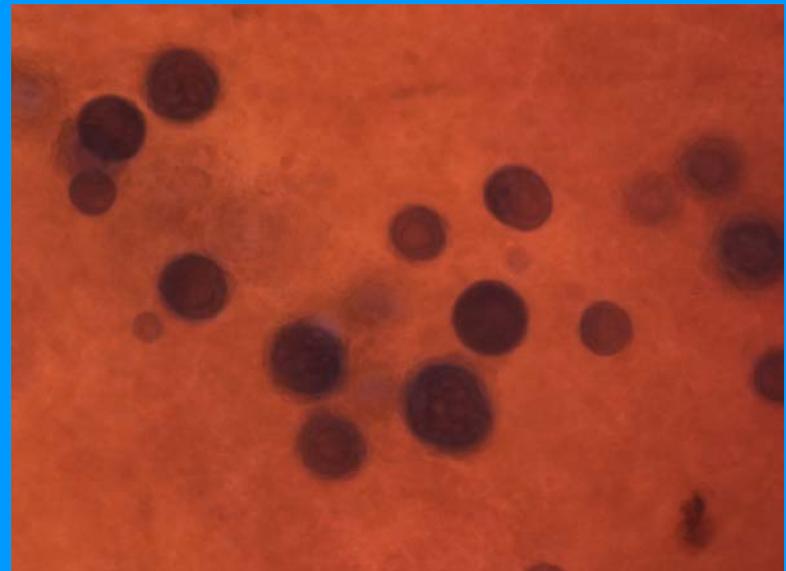


Results

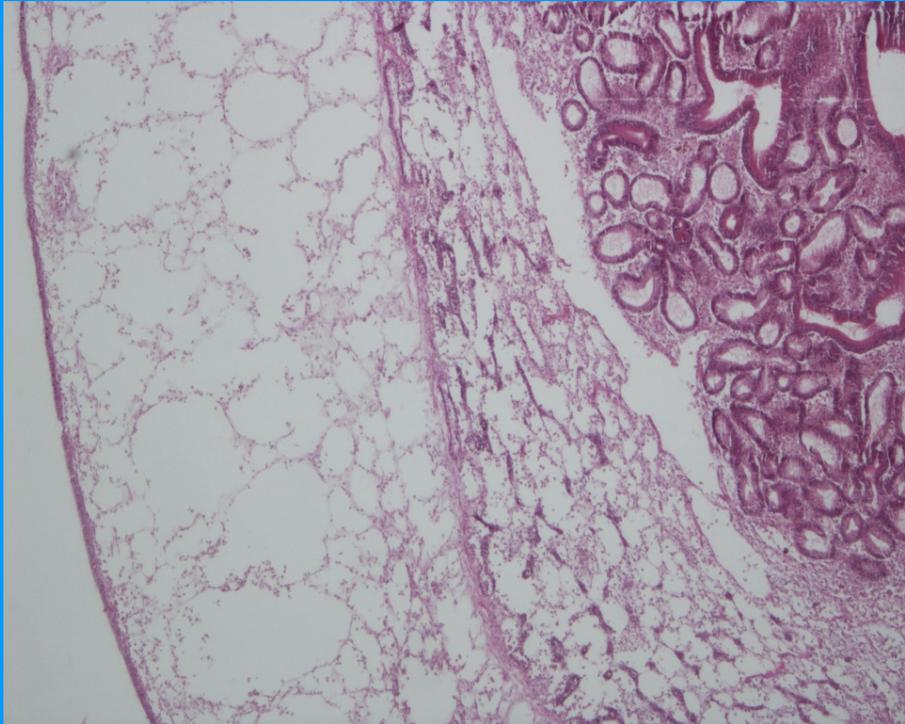
The four most prevalent pathologic change observations found across all five sites were:

- Edema (Mantle)
- Ceroid
- Granuloma (Heart Tissue)

Dermo (*Perkinsus marinus*) was the only infectious agent found throughout the study sites.

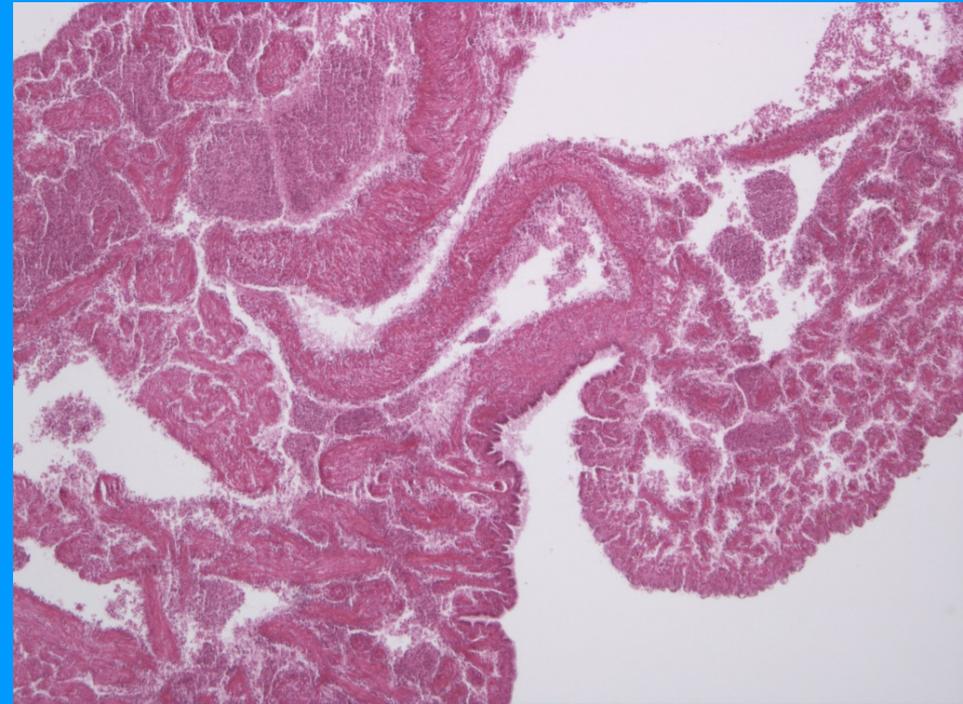


Tissue Abnormalities

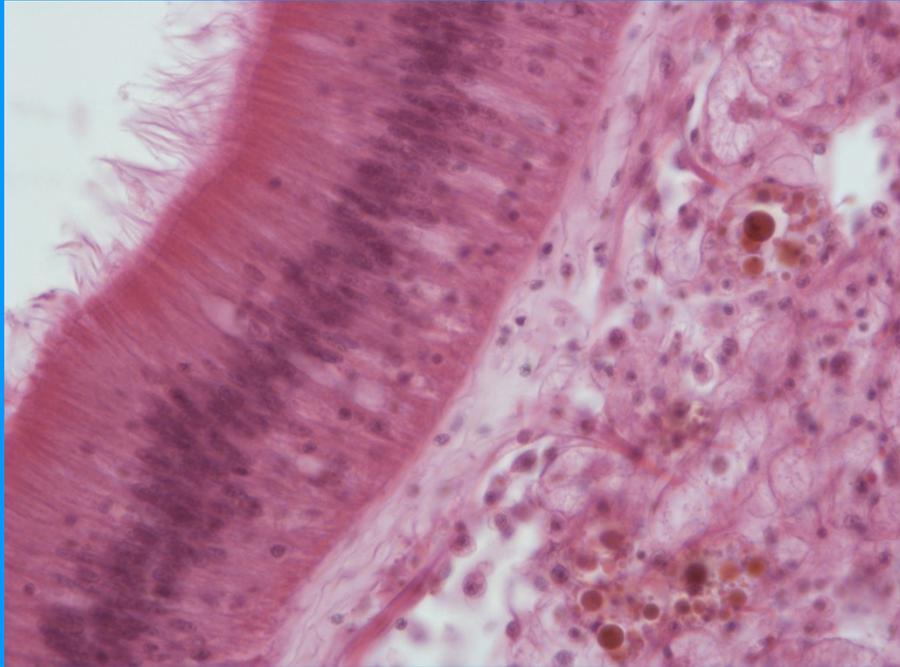


Moderate Mantle
Edema

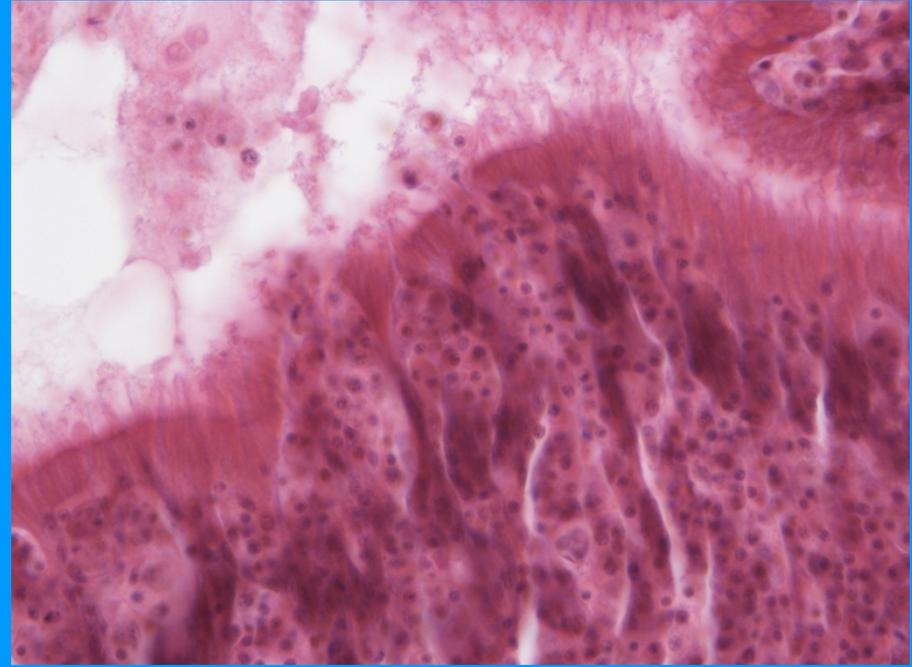
Granuloma in Heart
Tissue



Examples of Ceroid and Dermo

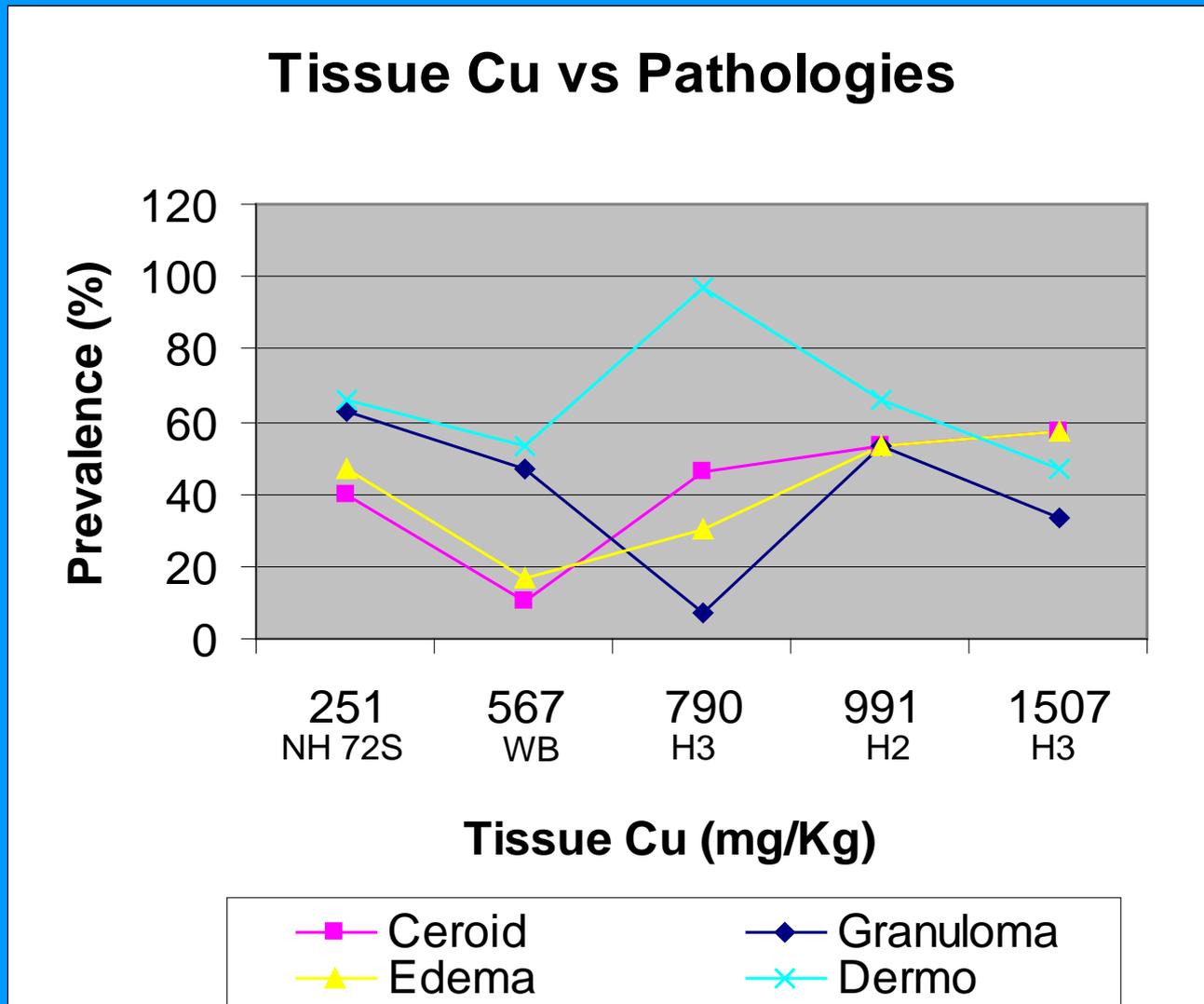


Ceroid Droplets



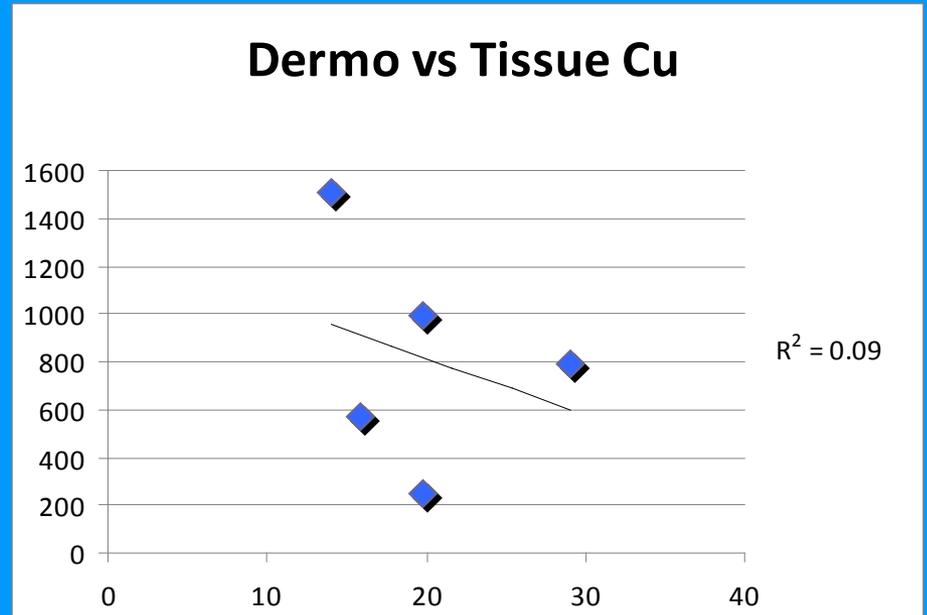
Dermo/ Diapedesis across
Stomach Epithelium

Cu Concentrations and Total Observations



Correlations?

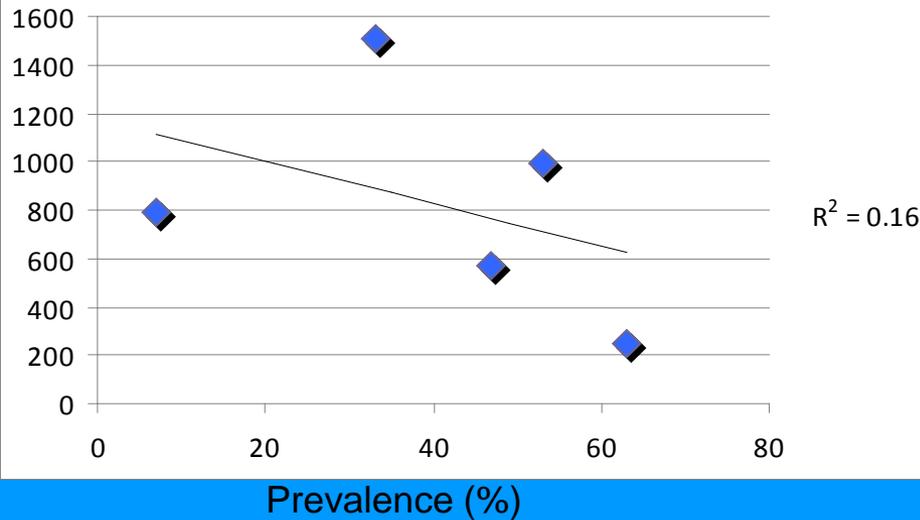
mg/Kg



Prevalence (%)

Granuloma vs Tissue Cu

mg/Kg

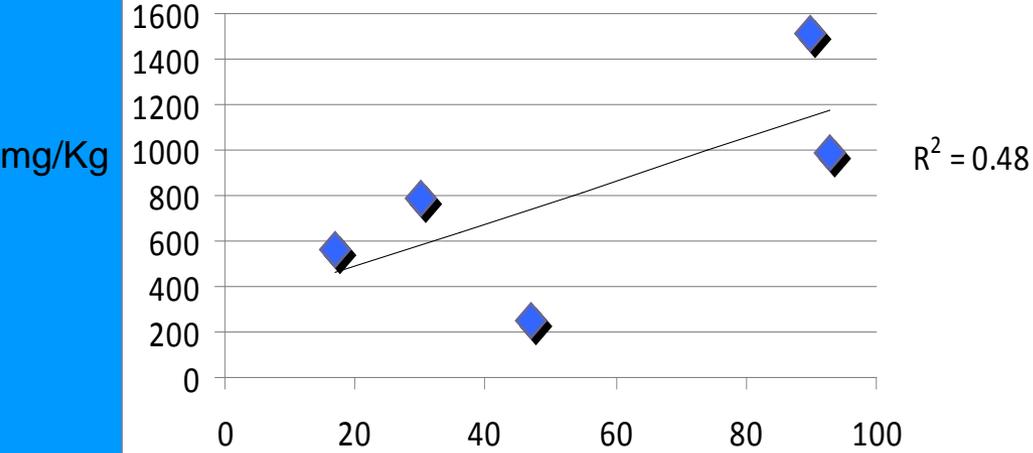


Prevalence (%)

Very Little Evidence
of Any Relationship
Between Tissue
Metals and
Granuloma/ Dermo
Prevalence

Correlations?

Edema vs Tissue Cu

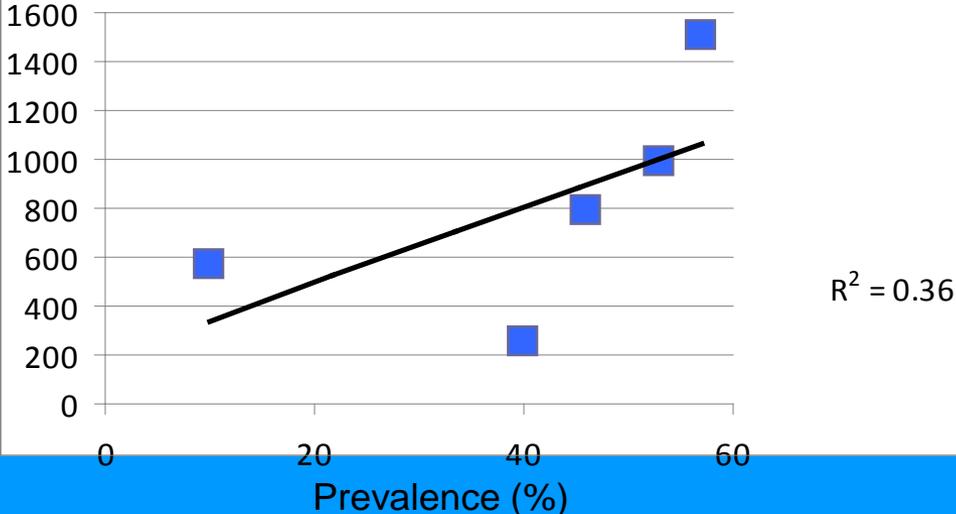


Prevalence (%)

Weak Relationships Between
Tissue Metals and
Edema/Ceroid Prevalence

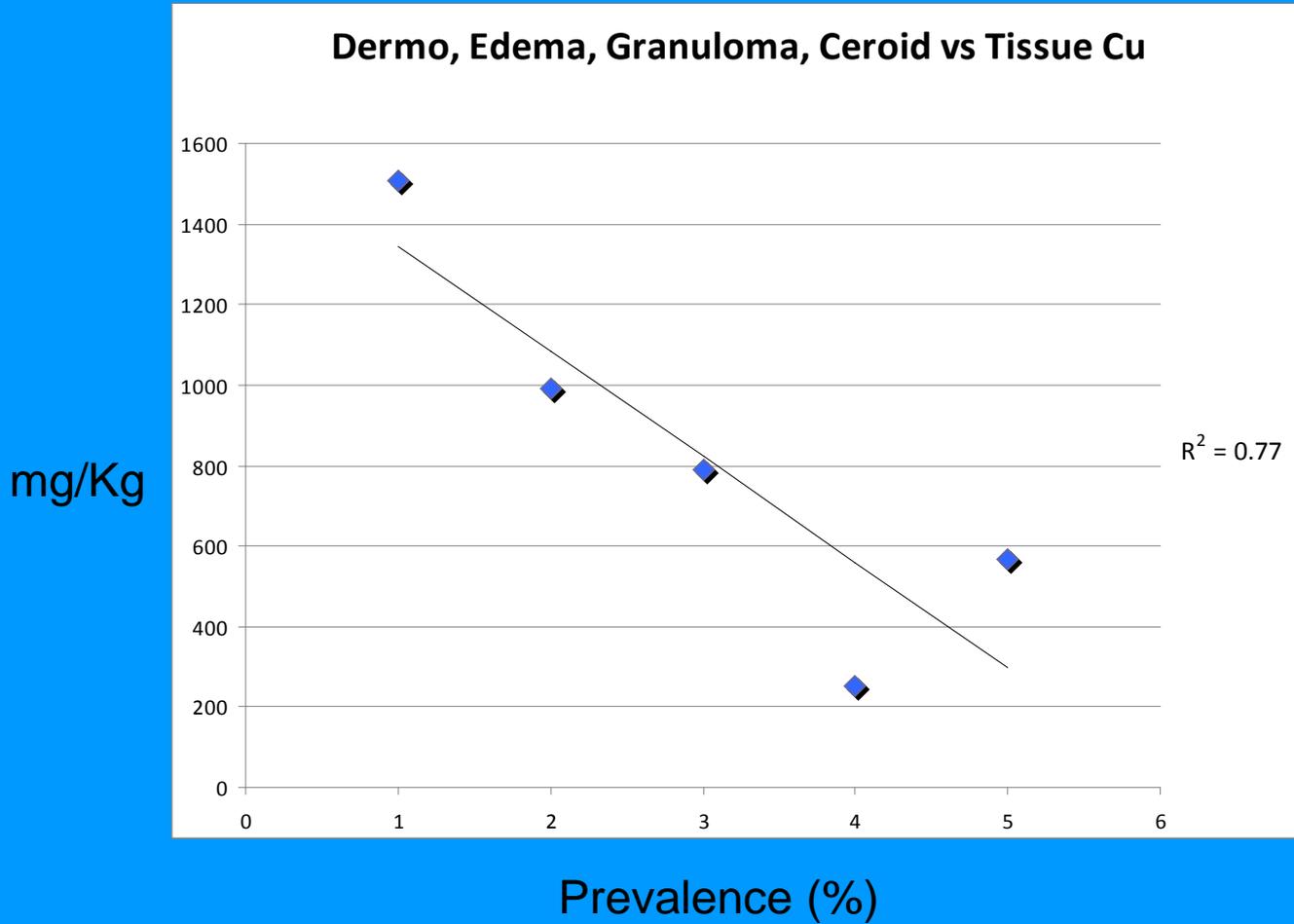
mg/Kg

Ceroid vs Tissue Cu

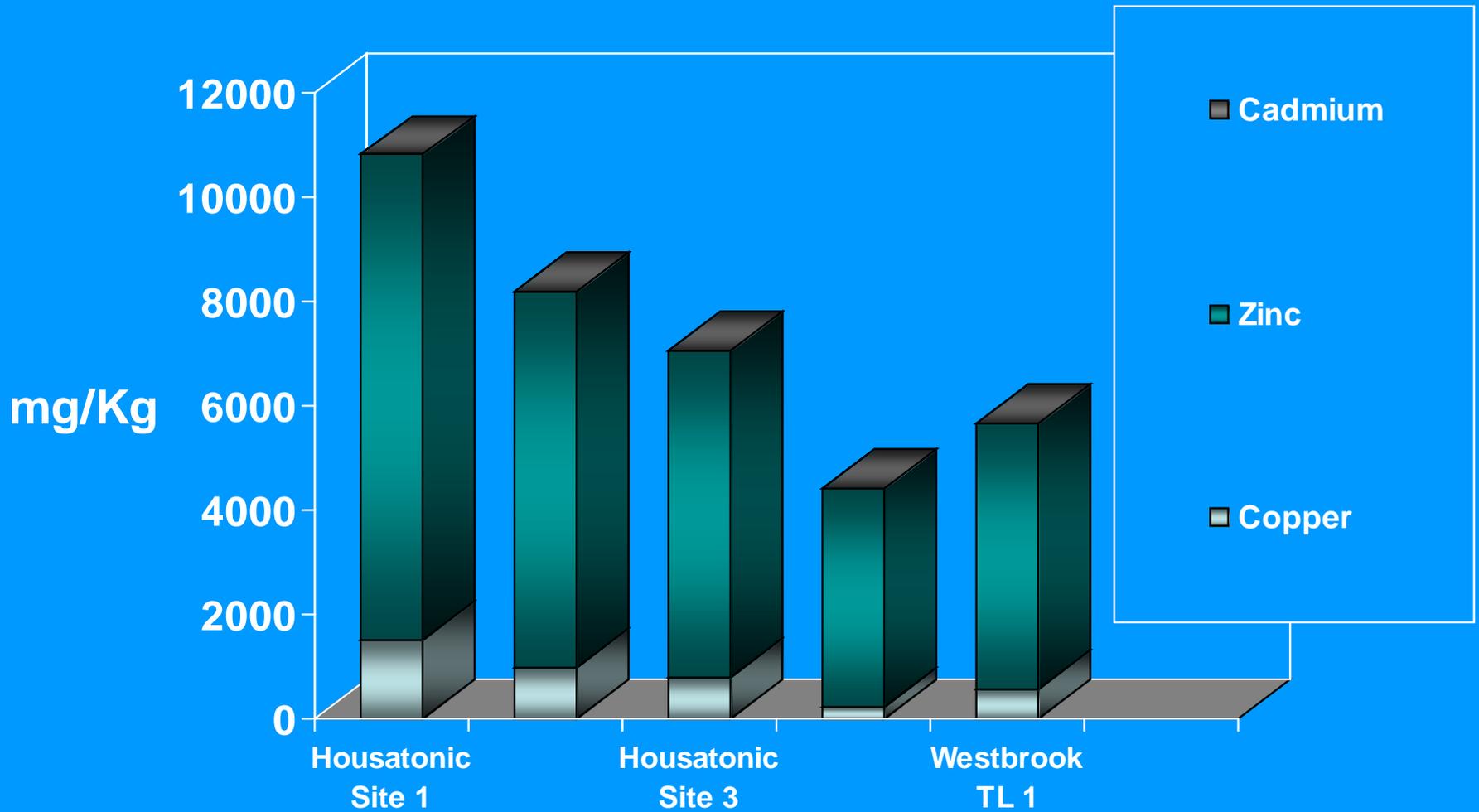


Prevalence (%)

Correlation?



Tissue Metal Content Trend-Digestion/Absorption



What was the question?

(Do heavy metals present in Long Island Sound oyster tissue increase the prevalence of disease and pathologic changes?)

Welll....Maybe..

Confounding Factors Preventing a Definitive Answer:

Lack of Clear 'Acute' Evidence and Lack of Extremely High Metal Concentrations

Other Un-Measured Pollution: Pesticides, PAH's, Endocrine Disrupters, Toxic Algae

Summary

Oysters Were Sampled from 5 Sites Along CT Shoreline
and Processed for Histological Analysis and Tissue
Metal Content

Tissue Metal Content Was Highest in Low Salinity Sites

3 Major Tissue Abnormalities + Dermo Show Weak
Associations With Metal Content When Graphed As A
Whole (Syndrome?)

Confounding Factors Lead to Opportunities for Additional
Investigation

Acknowledgments

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