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Investigating potential inhibitory roles of organic copper and zinc in CWD prion protein misfolding and propagation

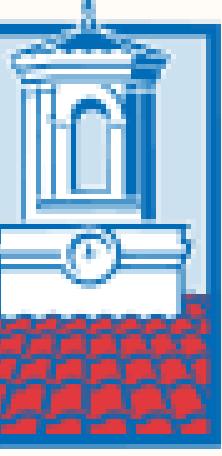


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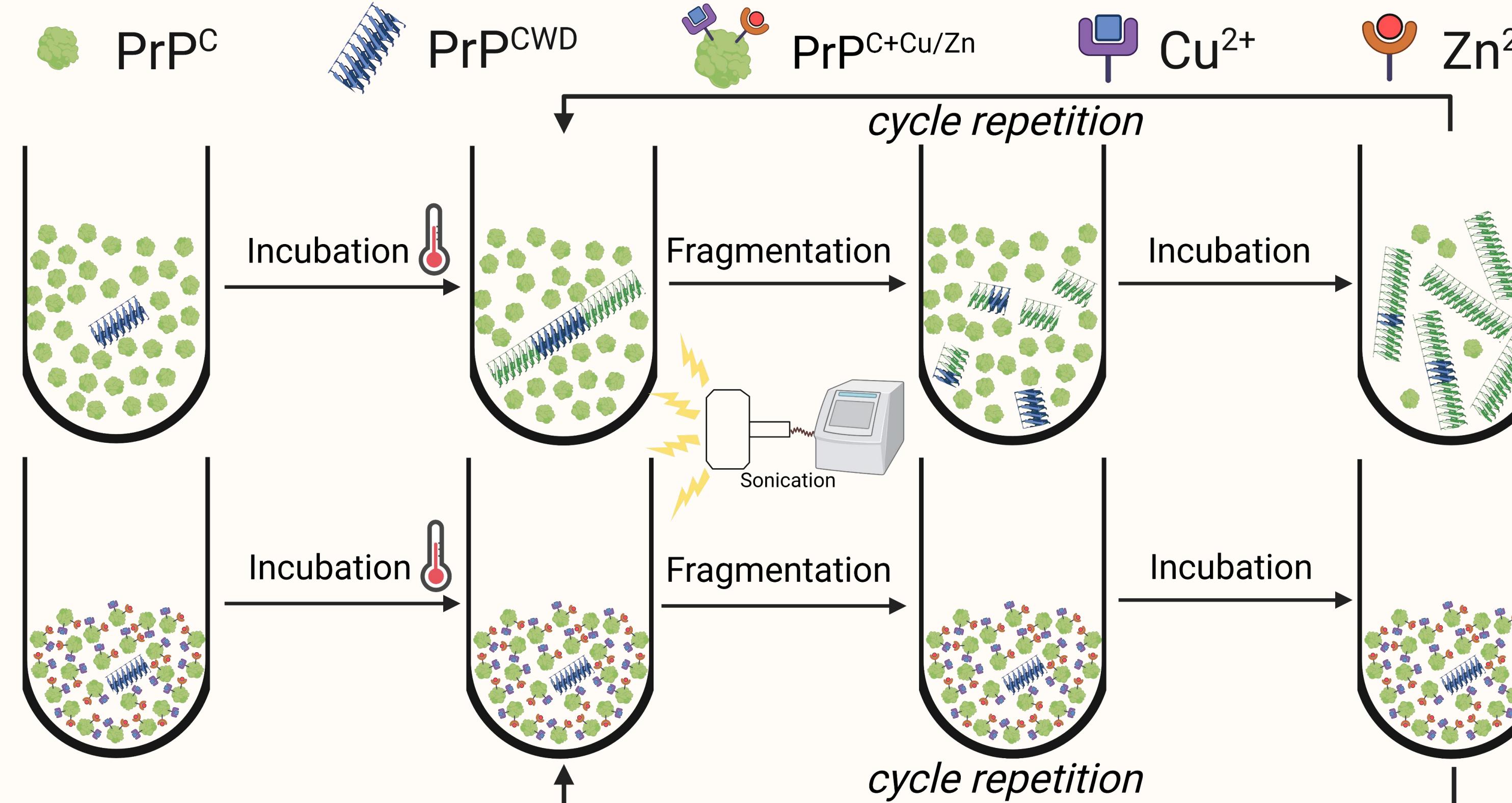
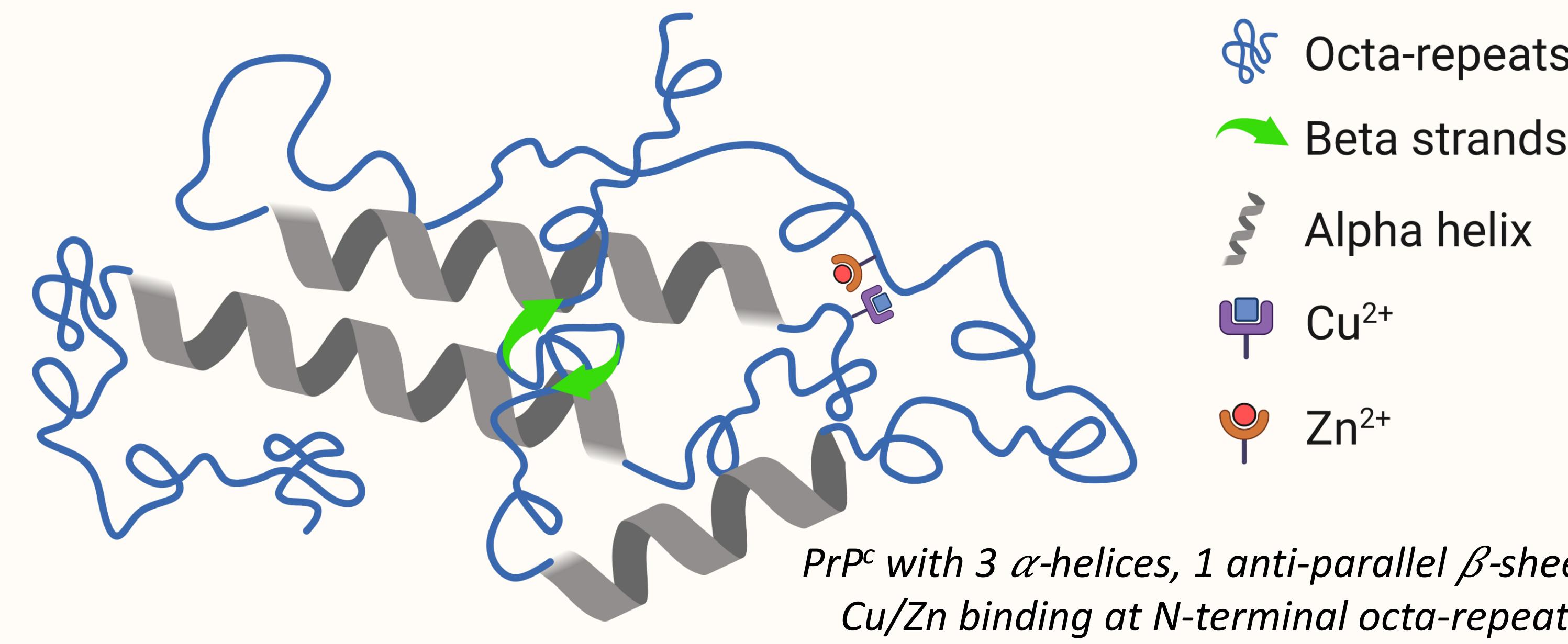
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Introduction

- CWD spreads rapidly with no treatment in sight
- Copper (Cu^{2+}) and zinc (Zn^{2+}) prevent PrP^{C} misfolding
- Mineral status related to CWD progression is unknown



Top: lack of Cu^{2+} and Zn^{2+} , PrP^{C} misfolds and propagates with PMCA
Bottom: PrP^{C} bound Cu^{2+} and Zn^{2+} , no PrP^{C} misfolding

Sample collection

- Harvested 165 mature, white-tailed deer in Texas, USA
- Brain, lymph nodes, tongue, liver, ileum
- Groups: 1) natural nutrition, 2) feed enhanced with Cu^{2+} and Zn^{2+} , 3) feed not enhanced with Cu^{2+} and Zn^{2+}

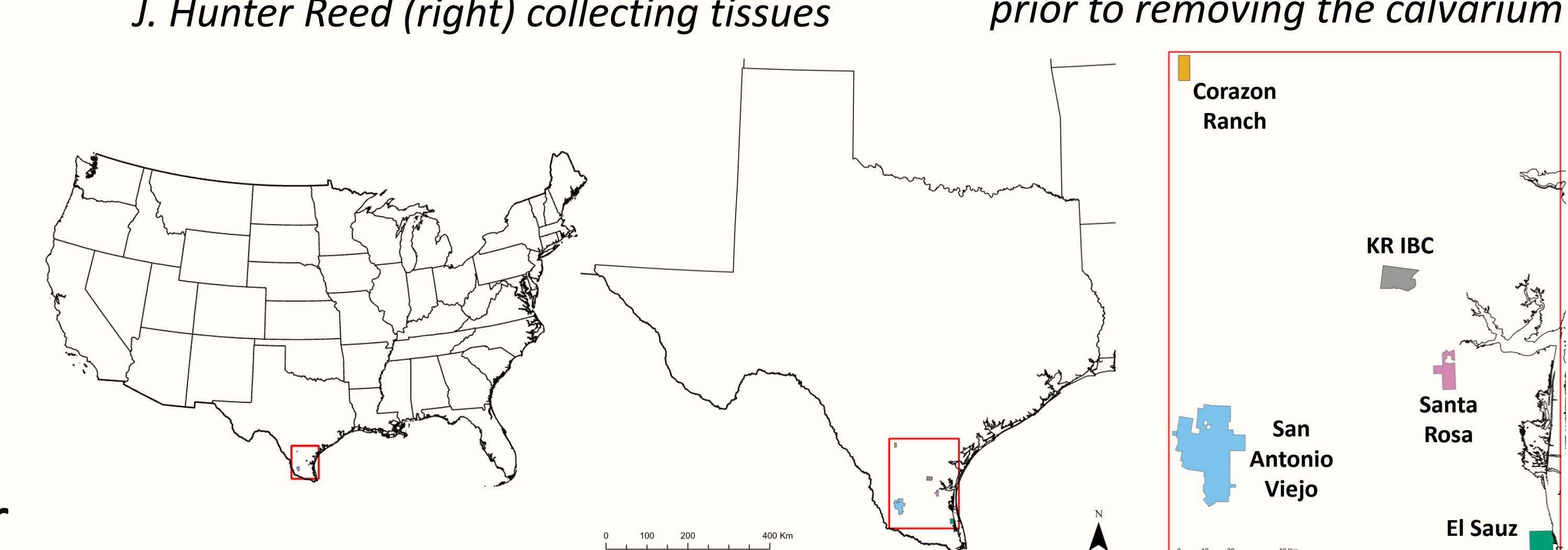


Left: PrP^{CWD} binds PrP^{C} leading to misfolding, continuing spread

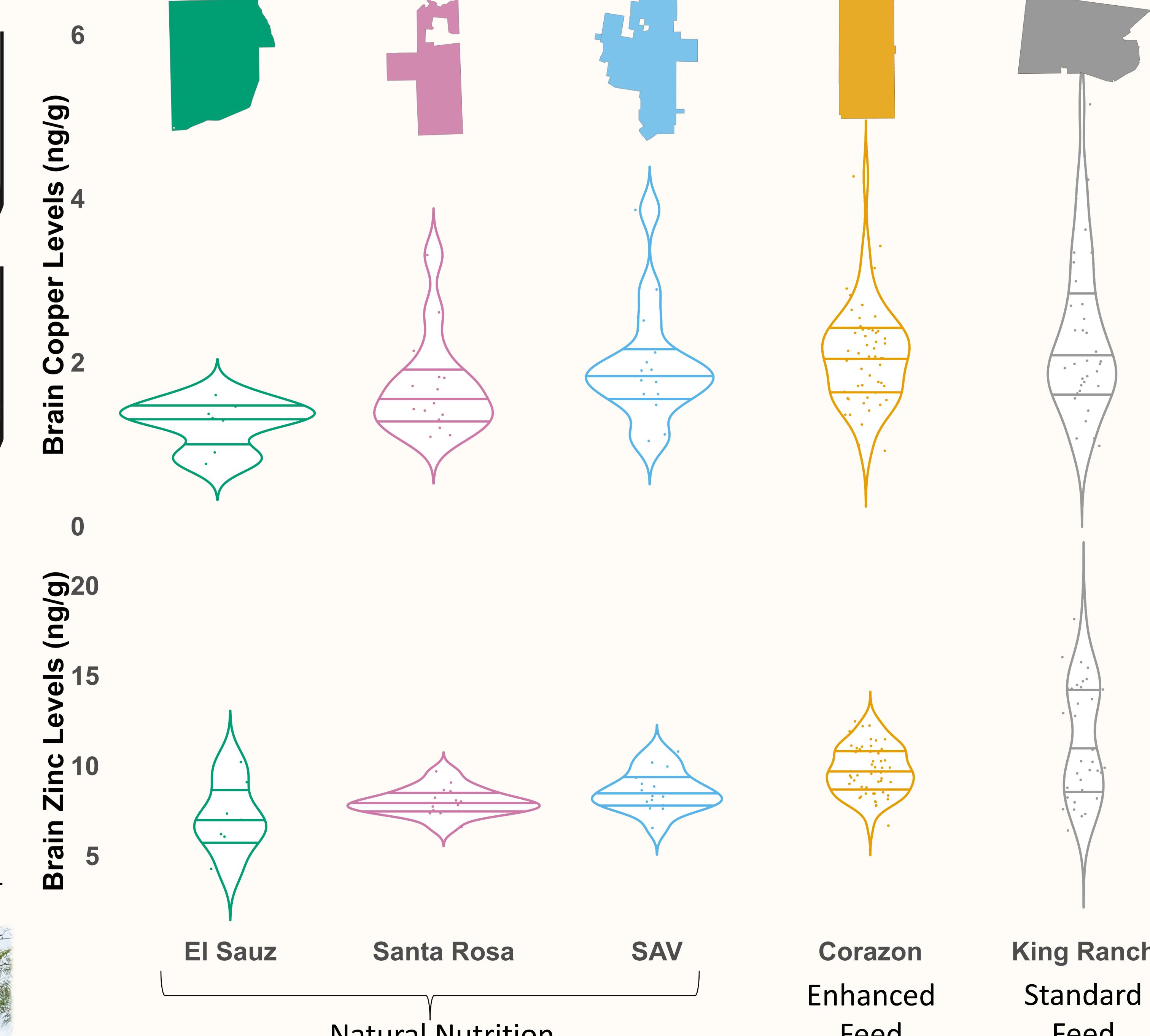
Right: Cu^{2+} and Zn^{2+} binding to PrP^{C} , no misfolding, no spread

Objectives

- Collect brain, ileum, lymph nodes, & liver from deer
- Genotype single nucleotide polymorphisms
- Evaluate tissue Cu^{2+} and Zn^{2+} with spectrophotometry
- Confirm CWD status with RT-QuIC on all harvested deer
- Evaluate effect of mineral status on PrP^{CWD} with PMCA



5 ranches spanning a gradient of bioavailable Cu^{2+} , Zn^{2+} in Texas, USA



Violin plots represent the distribution of samples, the points represent individuals, the horizontal lines indicate the 25%, 50%, and 75% quartiles

Discussion

- Large gradient in brain Cu^{2+} and Zn^{2+} levels across South Texas ranches to perform PMCA
- Cu^{2+} and Zn^{2+} of natural nutrition group consistent with historical soil quality metrics

Future directions

RT-QuIC

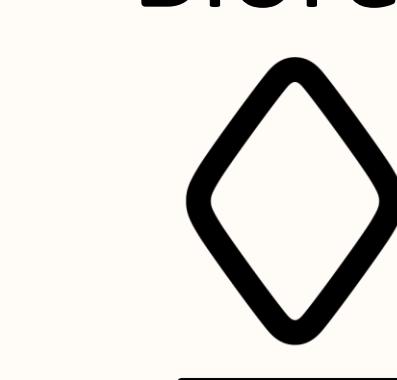
Genotype codon 96S

PMCA

Trace mineral analysis

Acknowledgements

- Texas ranchers and landowners
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- Biorender.com



ABSTRACT