Assessment of immune function response to Little Brown bats on the South River, Virginia - 2008

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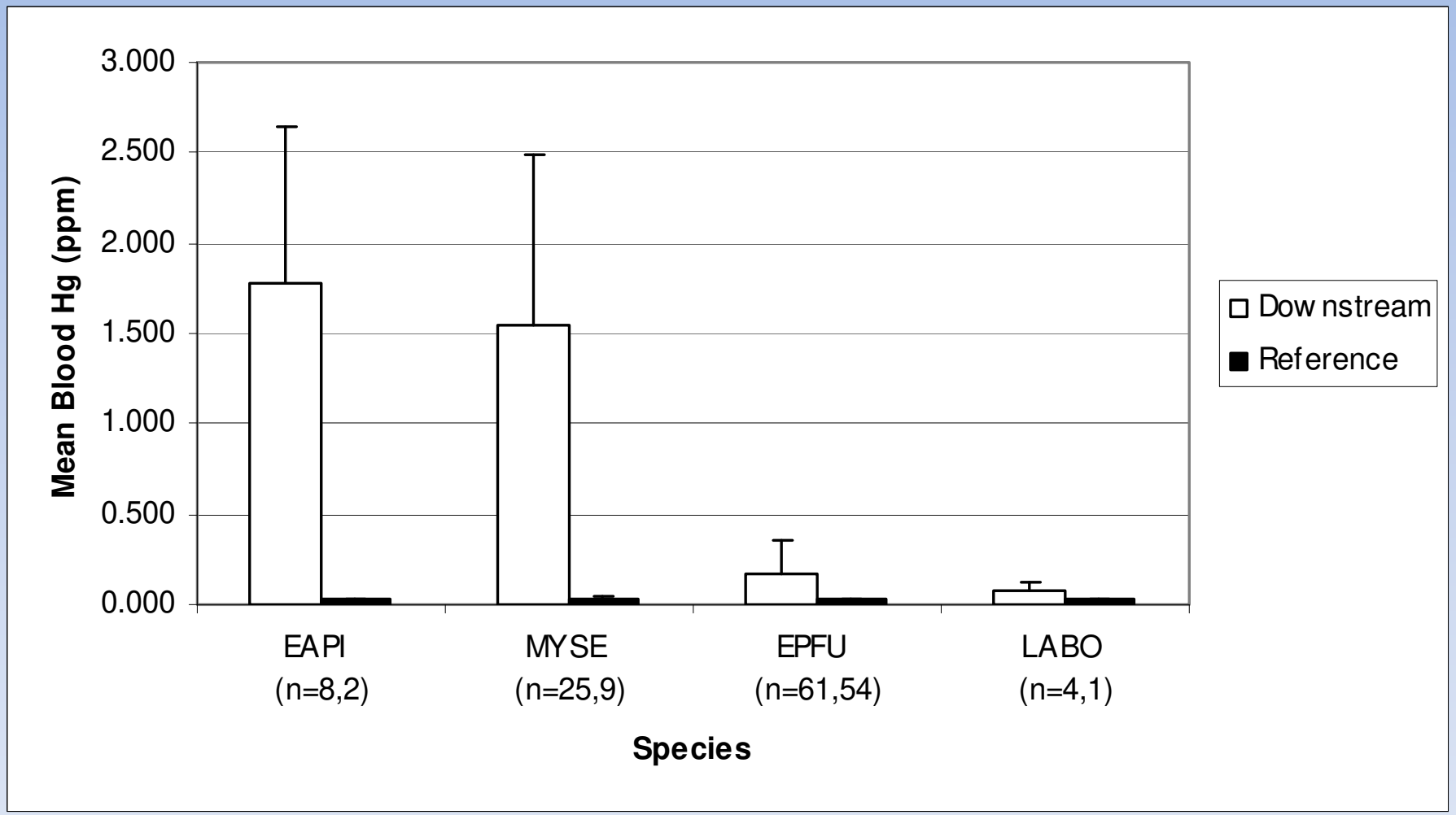
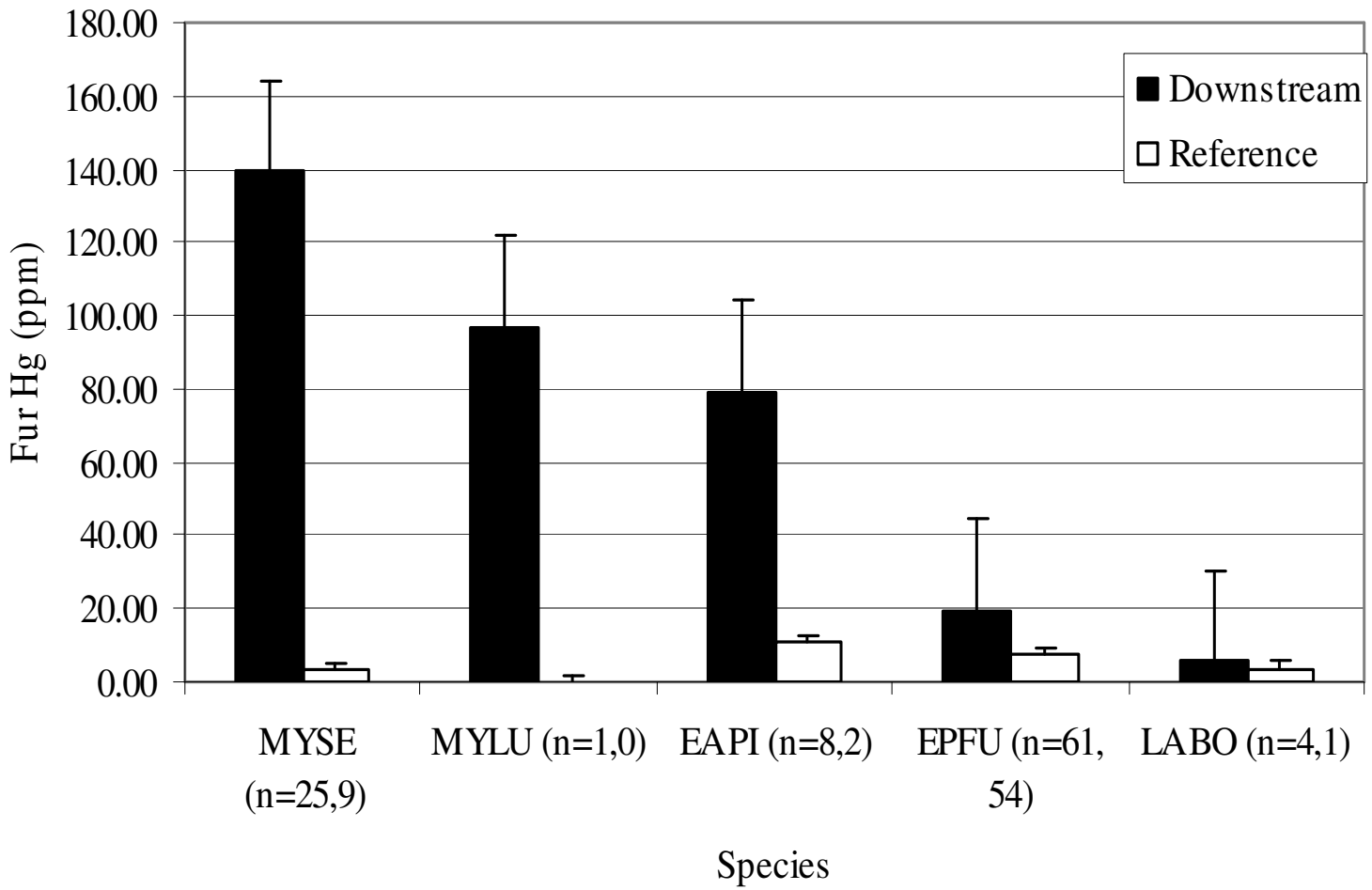
What we know?


3.000
2.500
2.000
1.500
1.000
0.500
0.000
Mean Blood Hg (ppm)
EAPI
(n=8,2)
MYSE
(n=25,9)
EPFU
(n=61,54)
LABO
(n=4,1)
Species
Downstream
Reference

What we know?


180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Fur Hg (ppm)
Downstream
Reference
MYSE (n=25,9)
MYLU (n=1,0)
EAPI (n=8,2)
EPFU (n=61, 54)
LABO (n=4,1)
Species

Objectives

1.Focus on species of bats with the highest Hg levels (Eastern Pipistrelle, Northern long-eared, and Little Brown);

2.Capture bats at sites with highest Hg loads and use telemetry equipment to track bats to maternity roosts;

3.Use biomarker tests on bats at maternity roosts between downstream and reference Hg sites;

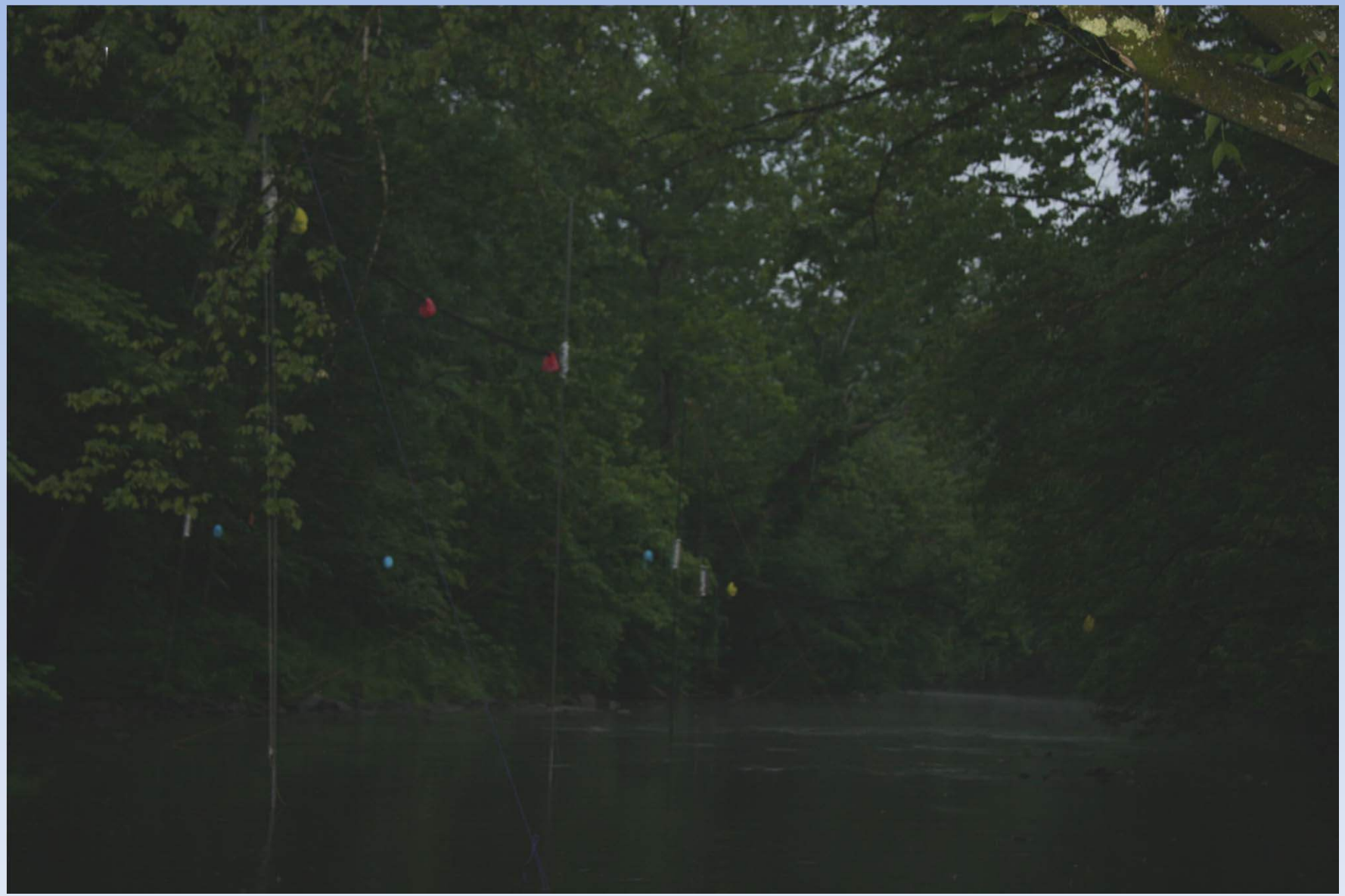
4.Capture 30-35 adult female bats from reference and downstream areas at two different reproductive stages: pregnant and post lactating;

5.Capture 30-35 juvenile female bats from reference and downstream bats

6.Use stable isotope signatures of food web to determine dietary emphasis, trophic level, and percent use of aquatic-based prey items.

Capture Methods

Mist Nets



Radio Telemetry

Radio Telemetry

Bat Colony Locations

Bat Colony Locations

Bat Colony Locations

Bat Colony Locations

Bat Colony Locations

Harp Trapping Maternity Colonies

Bat Colonies

Mother and Son

Tissue Sample

Blood Sample

Fur Sample

Samples Collected

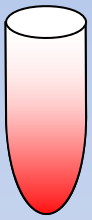
Location/Samples	BKA	PHA	Genotox.	Isotope	Blood	Fur
Crawford Vent Ref	13	13	13	13	13	13
Moscow Barn Ref	117	117	117	117	117	117
Rankin Barn RM 17	51	51	51	51	51	51
Craig Barn RM 22	75	75	75	75	75	75
Total	256	256	256	256	256	256

Methods: relative immune function

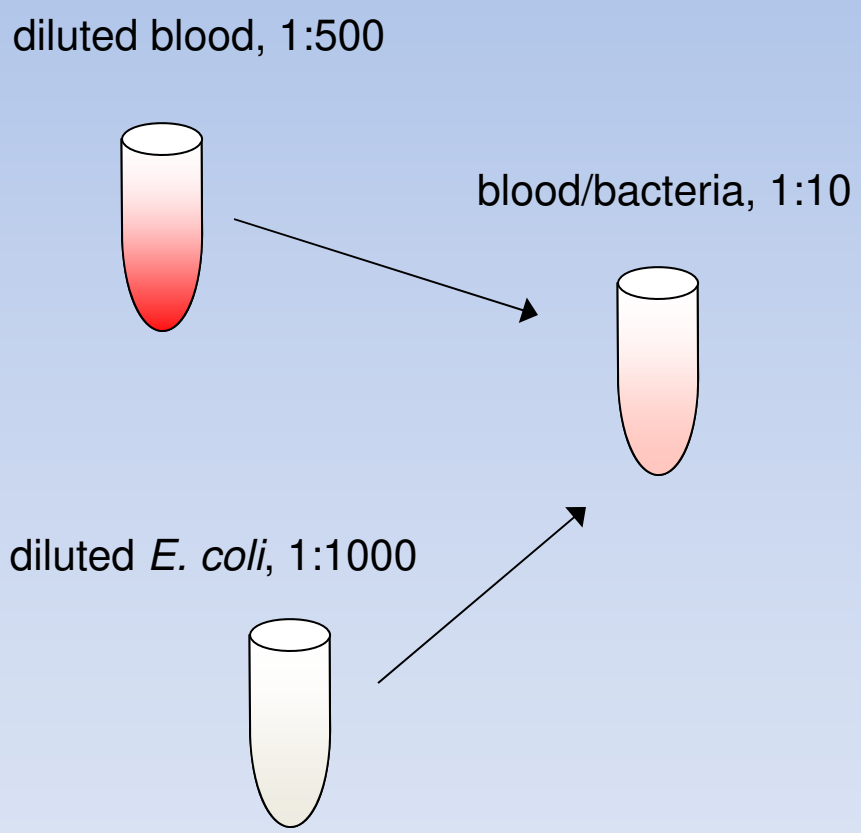
Bactericidal assay (Tielman et al., 2005):

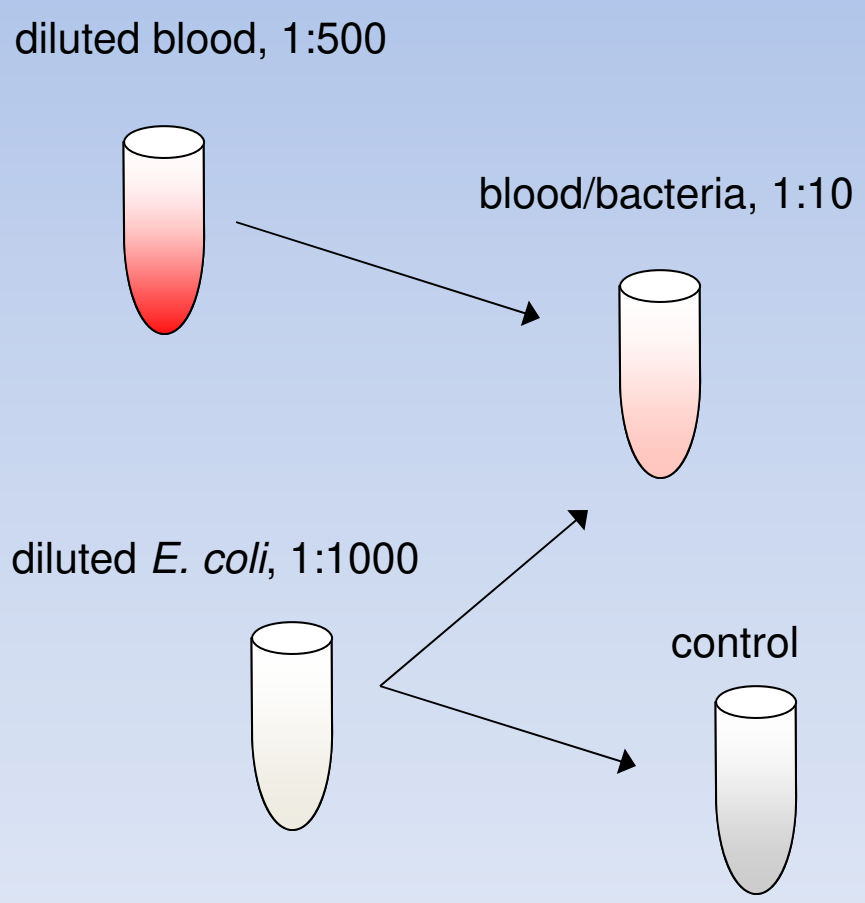
- uses known concentrations of whole blood and *E. coli*, mixed, incubated and spread on agar plates
- tests relative strength of innate immune function

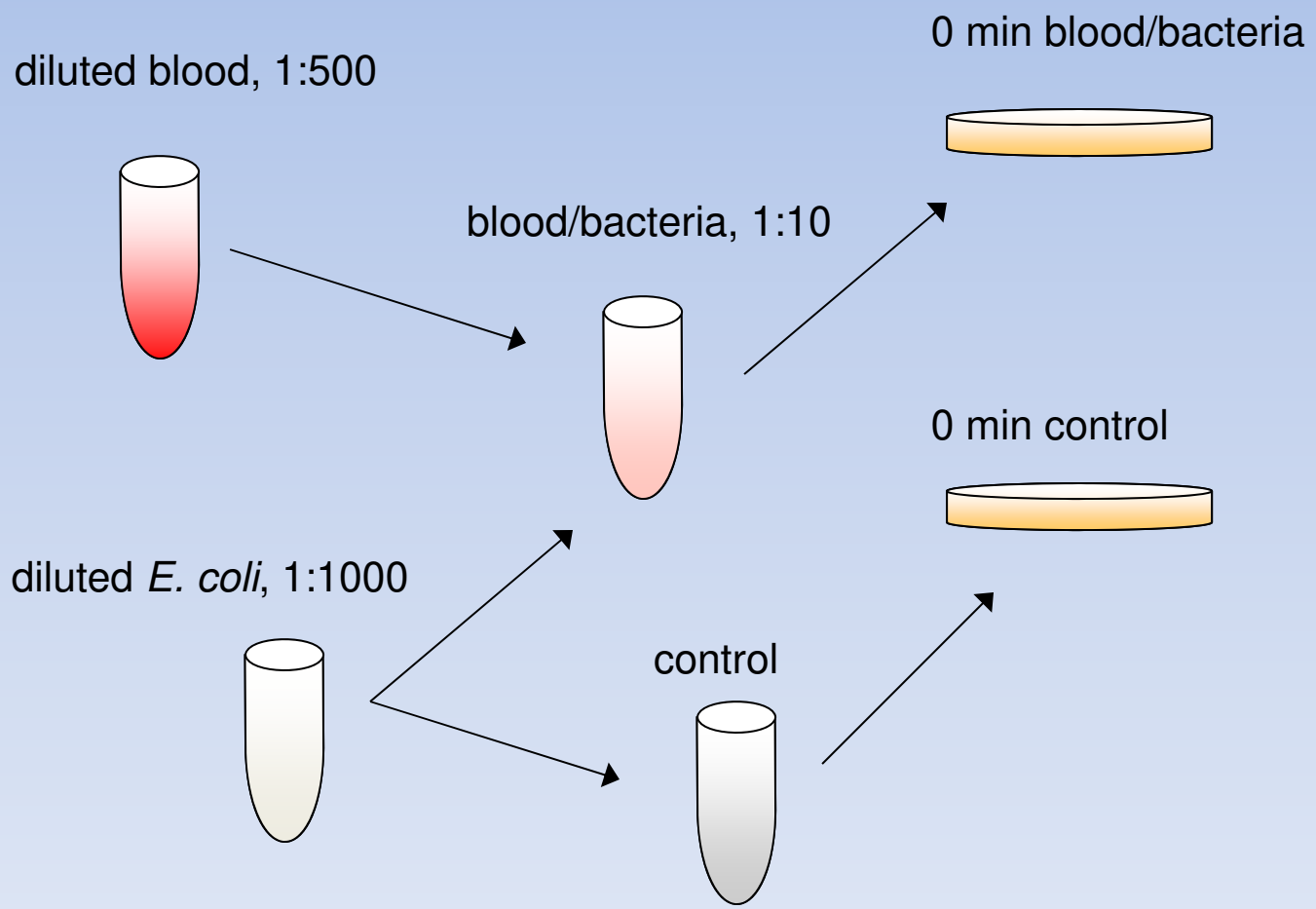
diluted blood, 1:500

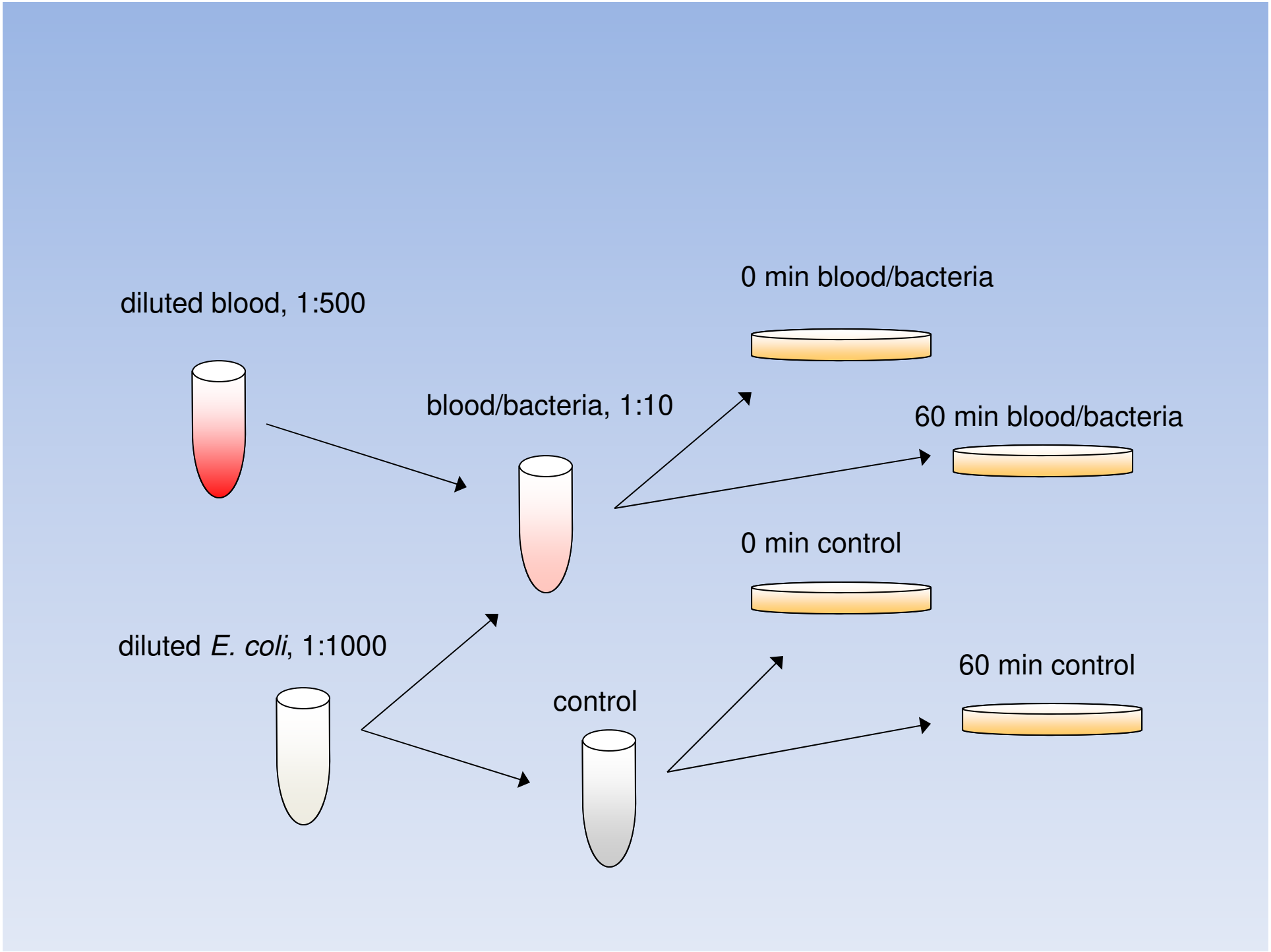


diluted *E. coli*, 1:1000

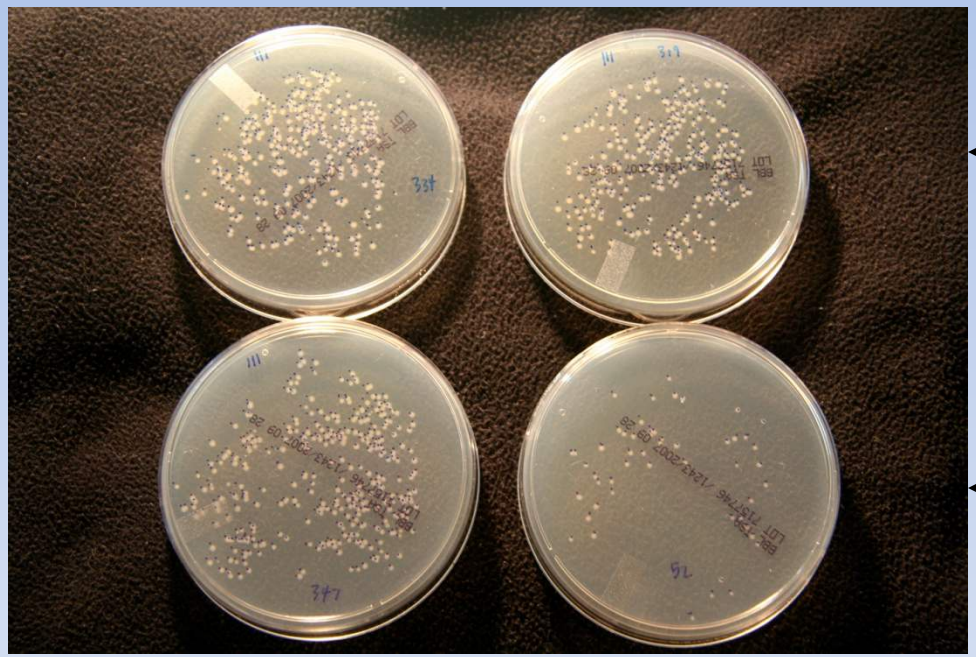

diluted blood, 1:500
blood/bacteria, 1:10
diluted *E. coli*, 1:1000


diluted blood, 1:500
blood/bacteria, 1:10
diluted *E. coli*, 1:1000
control


0 min blood/bacteria
diluted blood, 1:500
blood/bacteria, 1:10
0 min control
diluted *E. coli*, 1:1000
control


diluted blood, 1:500
blood/bacteria, 1:10
0 min blood/bacteria
60 min blood/bacteria
0 min control
60 min control
diluted *E. coli*, 1:1000
control

0 min control



60 min control

0 min exp

60 min exp

Bactericidal ability=% change experimental-% change control

Methods: relative immune function

Phytohemagglutinin (PHA):
challenges innate and adaptive responses through inflammation & T-lymphocyte proliferation

subcutaneous injections

response measured at 10 hours post-injection

$$\text{Index} = \frac{\text{postPHA} - \text{postPBS}}{(\text{prePHA}+\text{prePBS})/2}$$

Brain Receptor Assay

- Collected 30 (15 ref., 15 downstream) adult little brown bats and sent the brains, fur, and blood to University of Michigan (Nil Basu)
- Analyze tissues for Hg
- Examine brains for changes in receptor responses

Crew

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