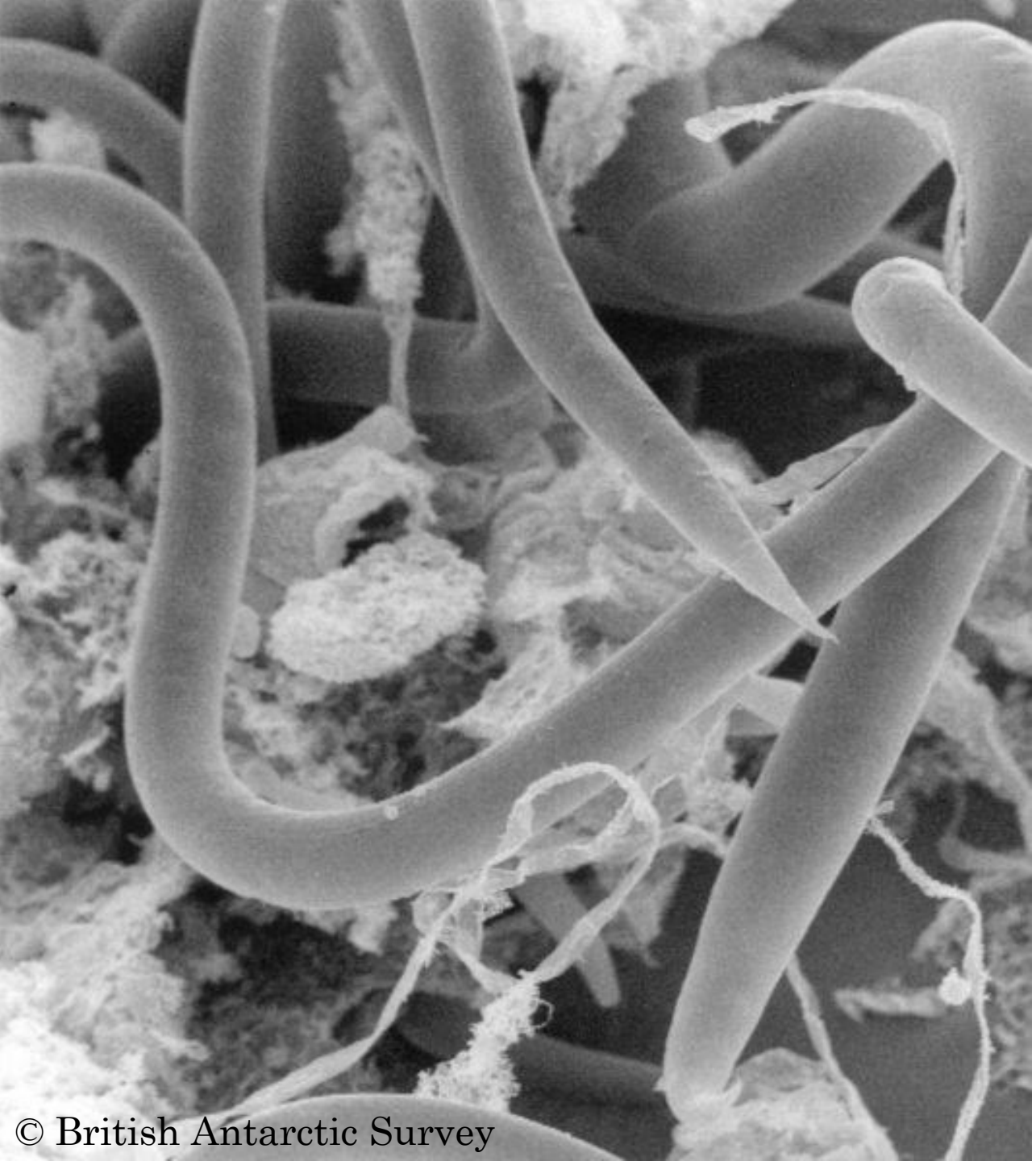
Assessing Nematode Invasion Potential between the McMurdo Dry Valleys and Cape Royds

Andrew Blakemore and Byron Adams

Brigham Young University



Nematode communities

Nematode communities in Antarctica

- Tolerate extreme environmental stress
- Slow growth and reproduction
- Low species diversity

Contributions to ecosystem function

- Food source
- Decomposition
- Ecological interactions

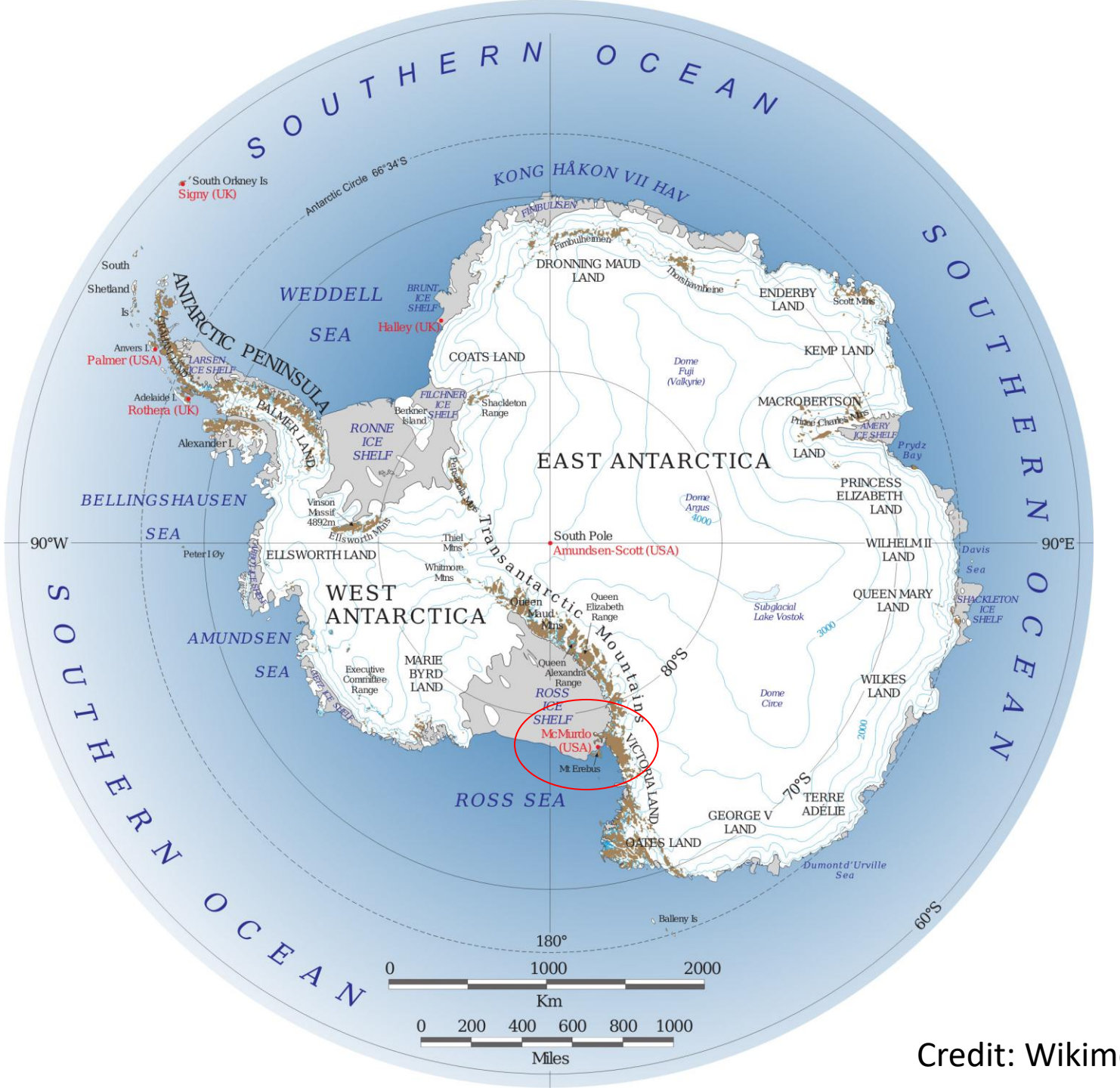
Nematode communities

Nematodes can persist in many different environments

- Soil/sediment
- Moss/lichen
- Lake and pond waters
- Subglacial environments
- Microbial mats

Nematodes can disperse from one site to another

- Many kinds of dispersal



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McMurdo Dry Valleys

Credit: Judit Hersko

Credit: Wikimedia Foundation, Inc.

When nematodes from one region disperse into a different region, are they be able to acclimate and survive?

Potential for invasion

If acclimation occurs, significant ecological ramifications could result

- Dispersed nematode species may become invasive

Invasive species would disrupt many aspects of nematode communities

- Food web
- Competition
- Habitat alteration

These impacts can severely damage an ecosystem

When nematodes from one region disperse into a different region, are they be able to acclimate and survive?

Objective

Using soil samples obtained from the field, transplant nematodes from the McMurdo Dry Valleys and Cape Royds into each other's soil environments.

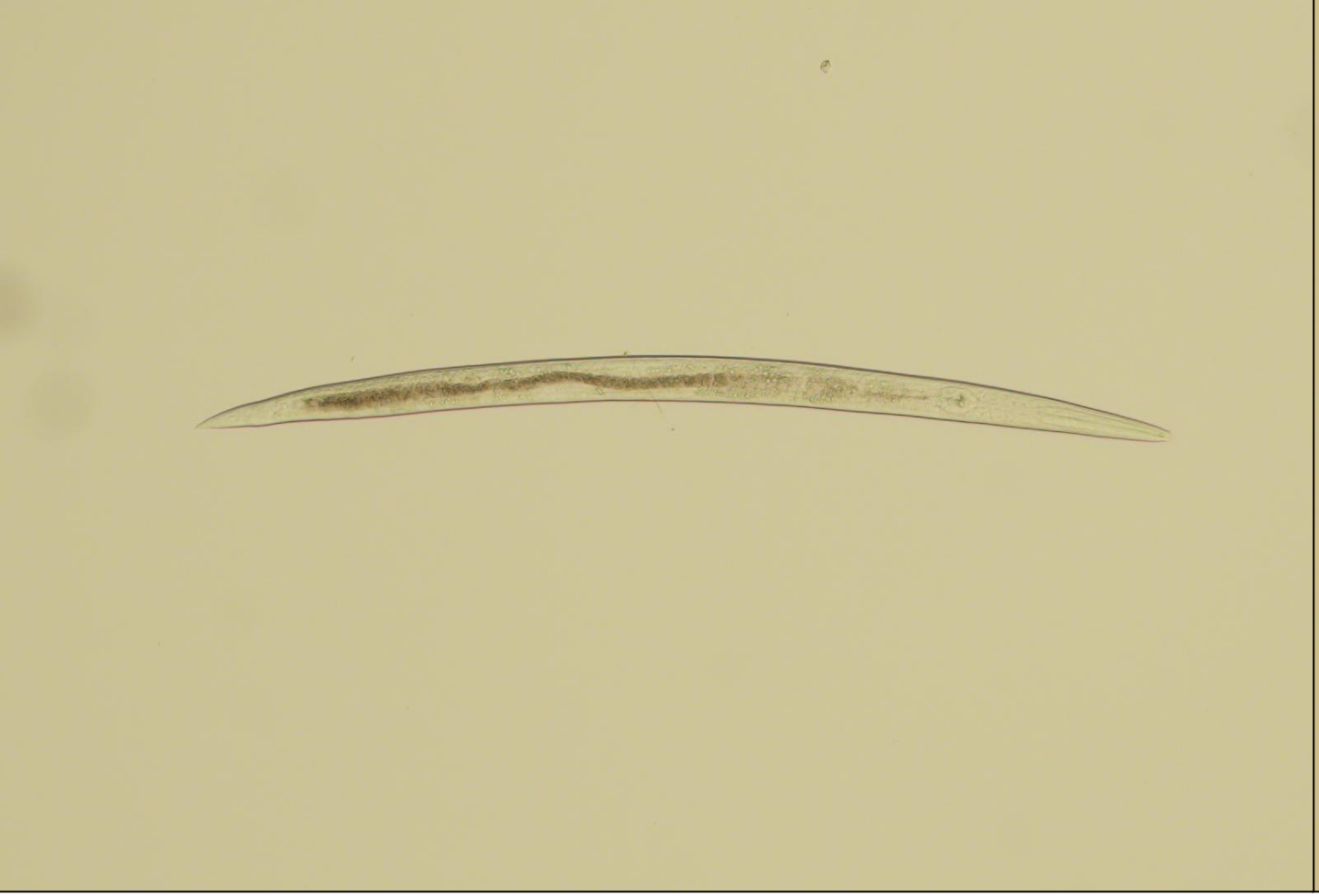
Methods

Determine locations of transplant sites

- One site at Cape Royds
- One site at McMurdo Dry Valleys ⇨ Lake Bonney basin

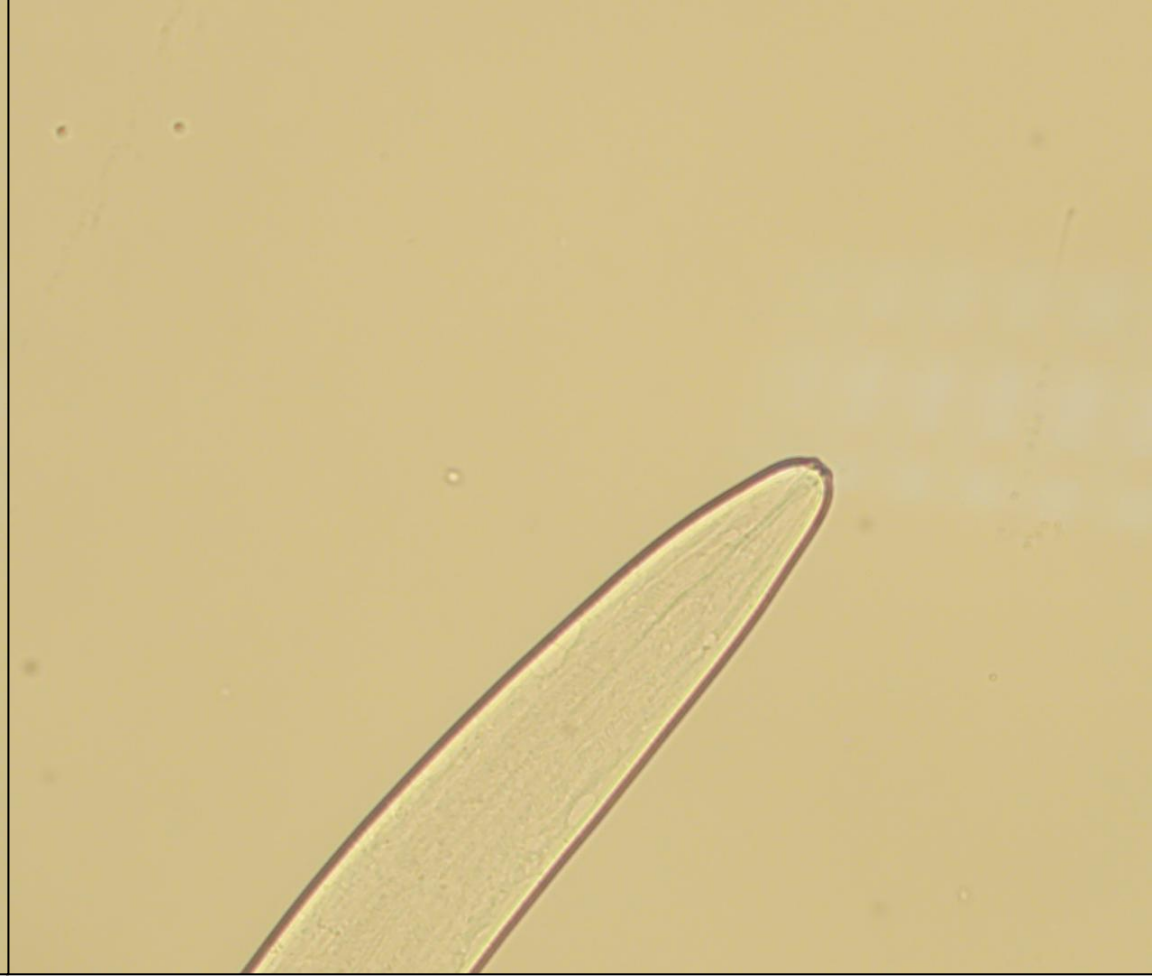
Identify species to transplant

- Cape Royds
  - *Panagrolaimus davidi*
- McMurdo Dry Valleys
  - *Plectus murrayi*



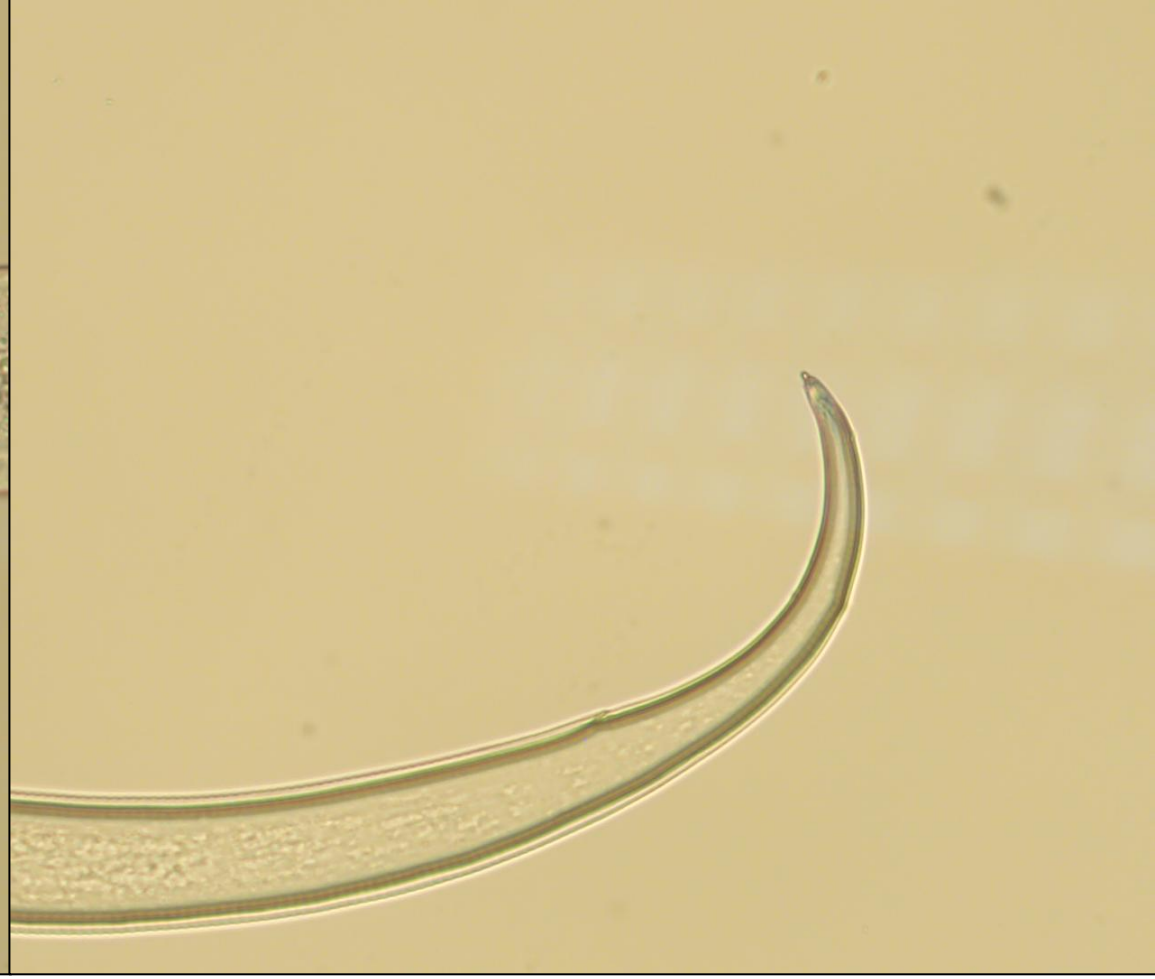
Panagrolaimus sp.

Plectus sp.



Panagrolaimus sp.

Plectus sp.



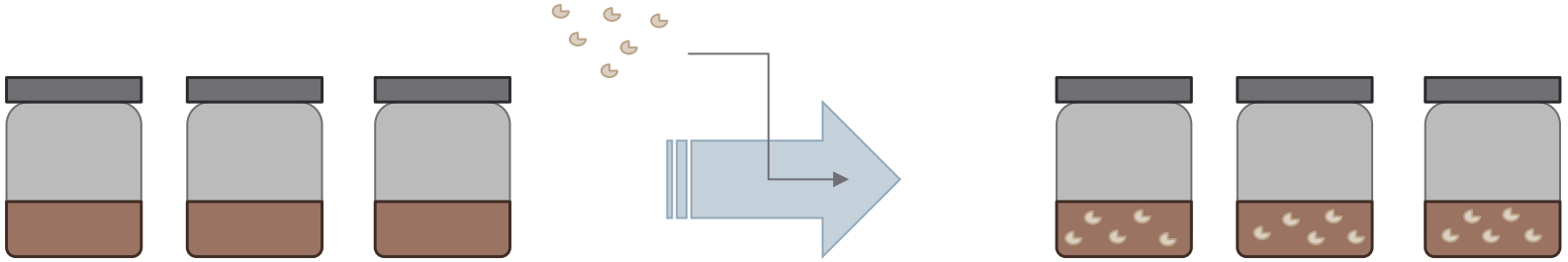
Panagrolaimus sp.

Plectus sp.

Methods

Group 1:

Panagrolaimus sp.

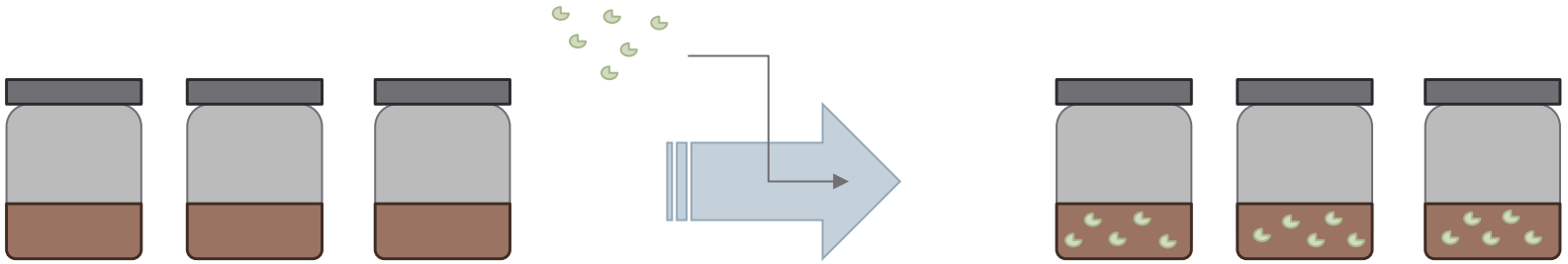


Cape Royds soil

Cape Royds soil with *Panagrolaimus*

Group 2:

Plectus sp.



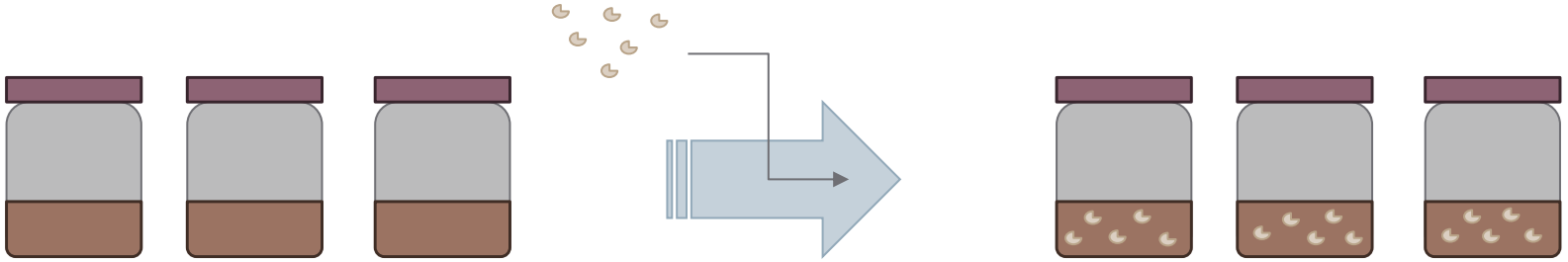
Cape Royds soil

Cape Royds soil with *Plectus*

Methods

Group 3:

Panagrolaimus sp.

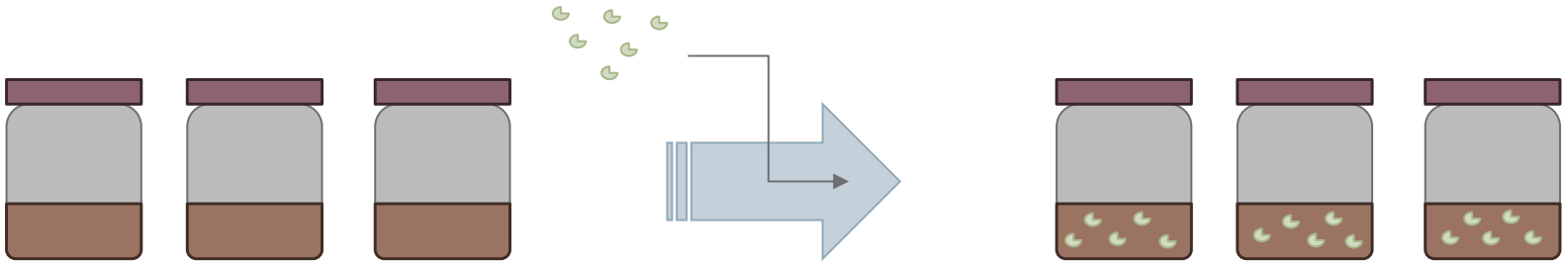


Lake Bonney basin soil

Lake Bonney soil with *Panagrolaimus*

Group 4:

Plectus sp.



Lake Bonney basin soil

Lake Bonney soil with *Plectus*

Methods

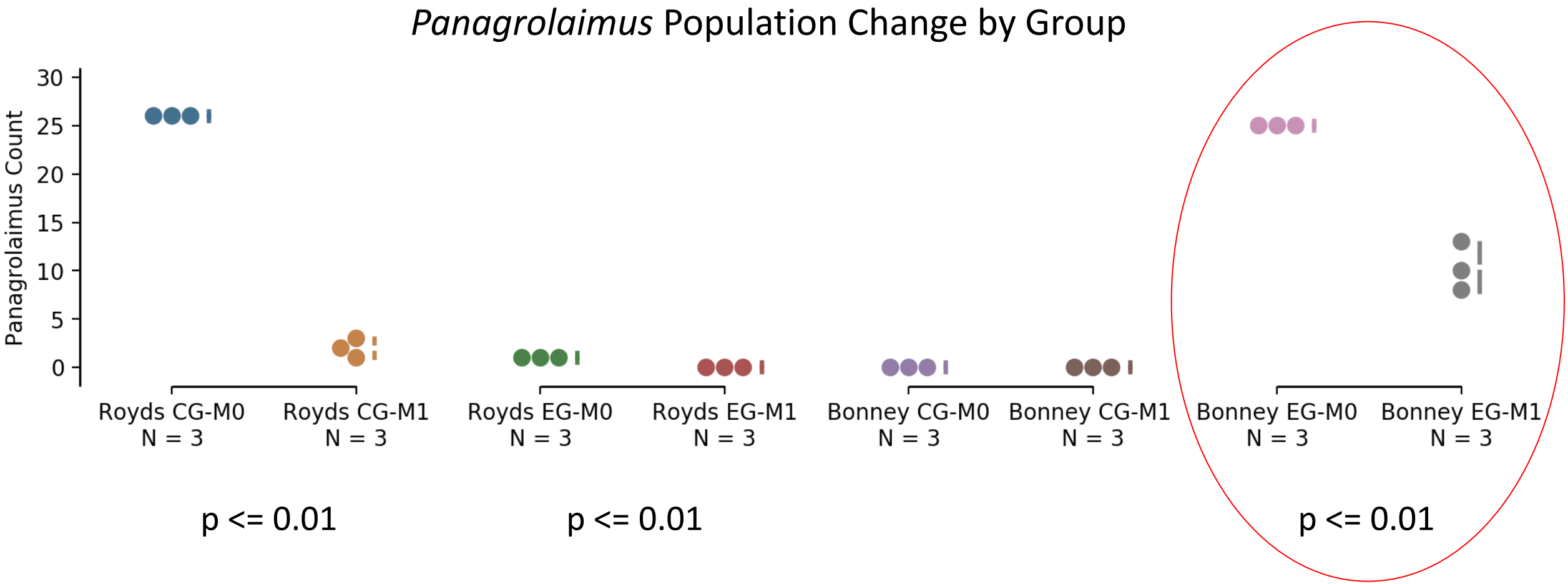
Setting it up

- 40 g of soil in each sterile jar
- Added water equal to 10% of soil weight
  - To maintain field conditions
- Extracted *Panagrolaimus sp.* and *Plectus sp.* (sugar centrifugation)
- ~ 25 individuals of a species added to each jar
- Jars stored at 15°C for one month

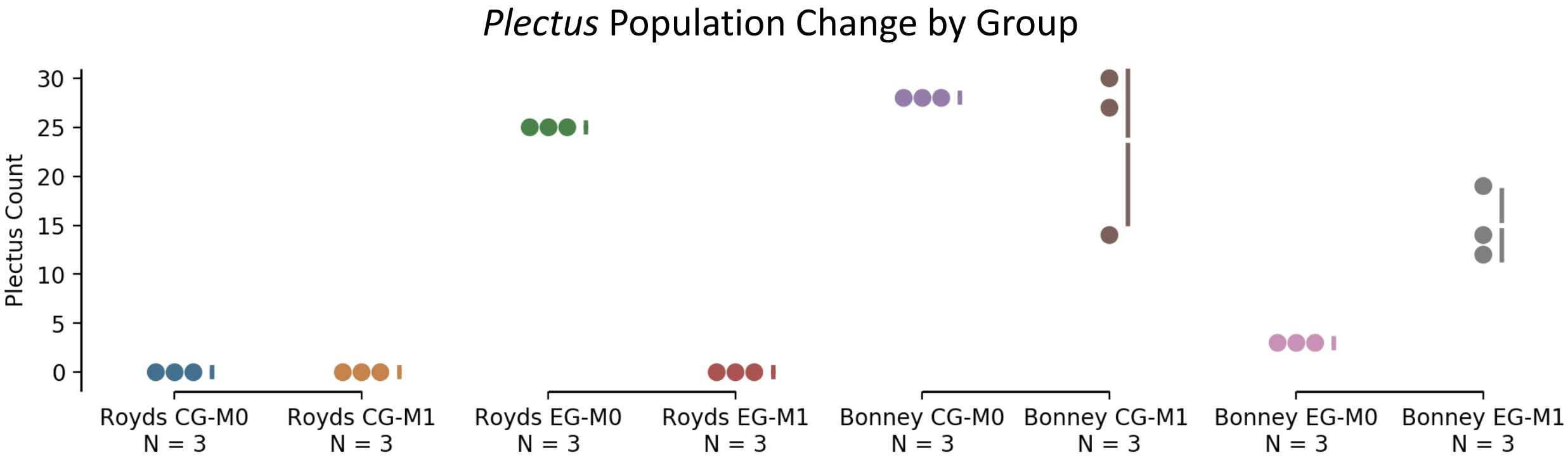
Collecting results

- Extract nematodes from all samples
- Determine amount of each species present

Results


Panagrolaimus Population Change by Group
Panagrolaimus Count
30
25
20
15
10
5
0
Royds CG-M0
N = 3
Royds CG-M1
N = 3
Royds EG-M0
N = 3
Royds EG-M1
N = 3
Bonney CG-M0
N = 3
Bonney CG-M1
N = 3
Bonney EG-M0
N = 3
Bonney EG-M1
N = 3
p <= 0.01
p <= 0.01
p <= 0.01

Results



p <= 0.01

p = 0.607

p <= 0.01

Experimental findings

Cape Royds soil supported little life

- Only *Panagrolaimus sp.*

Lake Bonney basin soil supported much life

- *Panagrolaimus sp.* and *Plectus sp.*
- Other microfauna

Why is soil from the Lake Bonney basin capable of sustaining more life?

- Soil chemistry
- Biodiversity

Potential for Invasion

Could *Panagrolaimus sp.* become invasive in the McMurdo Dry Valleys?

Further Research

Use molecular tools to identify nematode species

Repeat experiment with only one nematode added

Add experimental groups that introduce new variables

- Type of bacteria present
- Presence of indigenous nematode

Investigate impact of climate change

- Increase soil moisture
- Warmer temperatures

Acknowledgements

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References

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