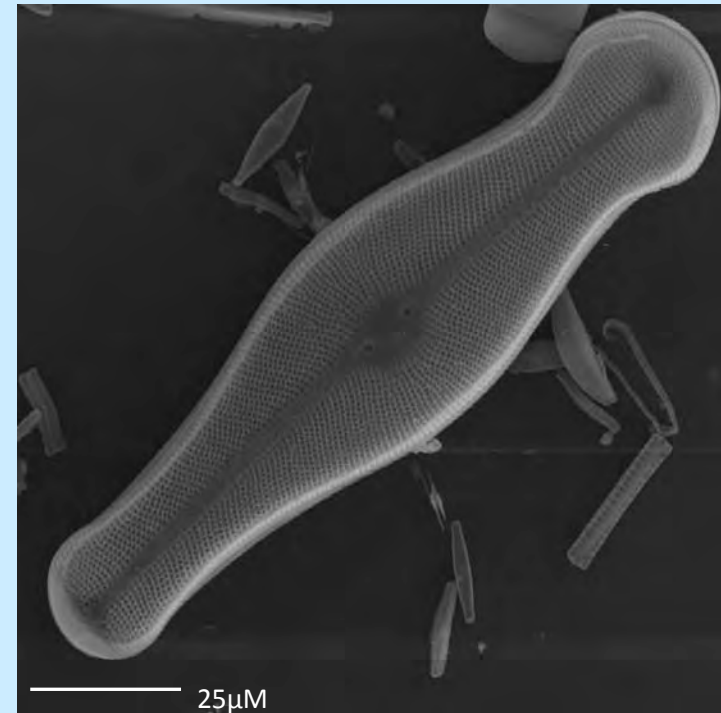


The Effects of Disturbance and Nutrient Addition on a Stream Community Dominated by *Didymosphenia geminata*

Nicholas Bach



Bach



Bach and Kostman

Introduction

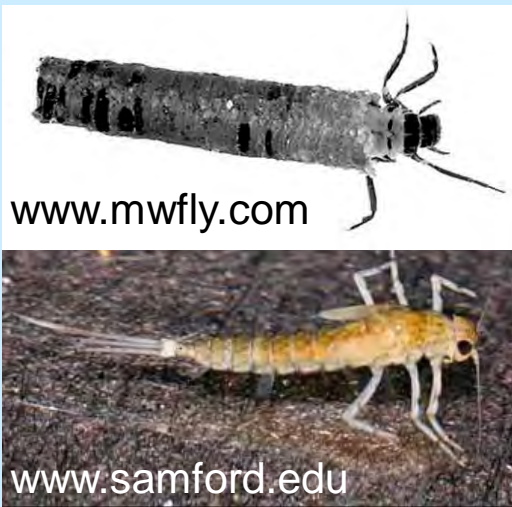
- *Didymosphenia geminata*
 - Large, single celled
 - Only in freshwater habitats
 - Northern hemisphere/low-nutrients
 - Stalk, attaches to stones/plants
- Historically
 - Low numbers
 - Expanding its range

D. geminata in Rapid Creek

- Rapid Creek, South Dakota 2002
 - 30 to 100% streambed coverage by *D. geminata*
 - Decrease in large brown trout (>8")
 - 60% decrease in brown trout biomass

Potential Effects of Invasion

- Loss of biodiversity
- Invertebrate community shift



www.cockburn.wa.gov.au

- Trout decline due to:
 - Change in food source
 - Gill irritation by sloughed algae

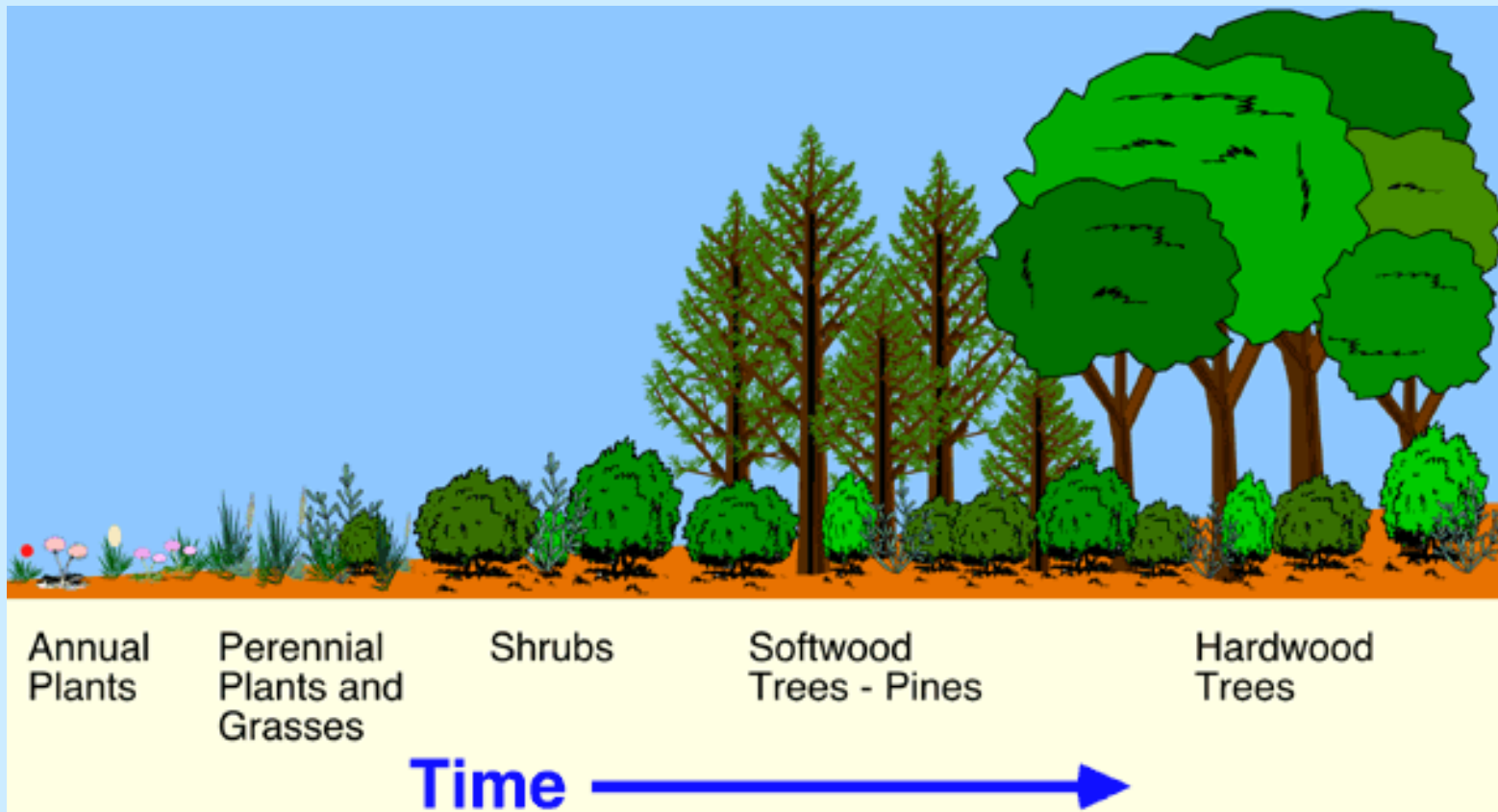
Intro

- Previous research
- Our work focuses on early stages



Succession

- Succession
- Prairie → forest



Disturbance

- Rapid change in environment
- Ex: forest fire or flooding



Pillsbury



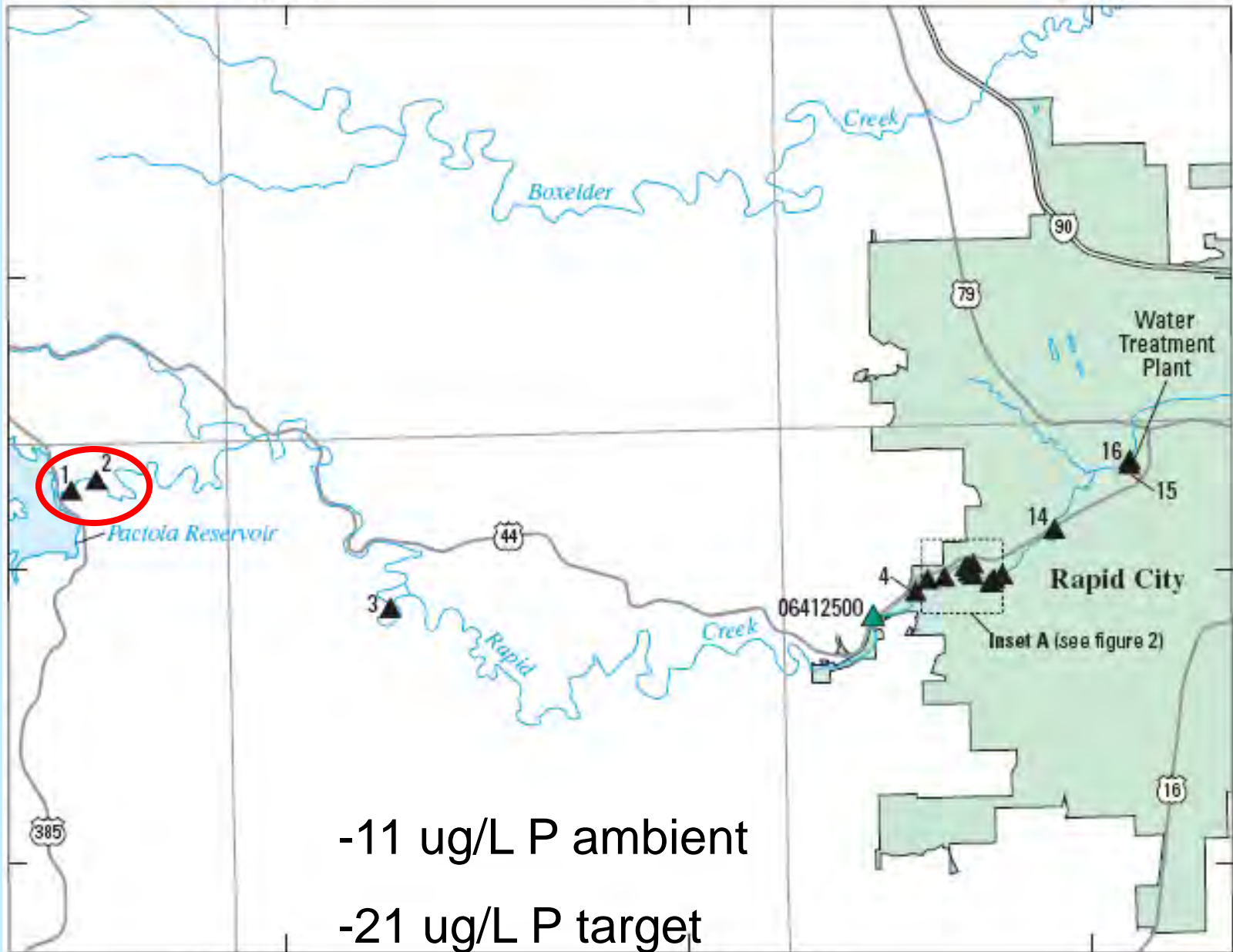
Bach

Objectives

- Periphyton community's response to:
 - Physical disturbance (scouring)
 - Nutrient enrichment (Nitrogen, Phosphorus)
 - Presence/absence of *D. geminata*

Hypotheses

- H1: Scouring events can effect colonization of *D. geminata*
- H2: Increased nutrient loads inhibit *D. geminata* and promote native algae
- H3: Patterns of community composition will differ with/without *D. geminata*

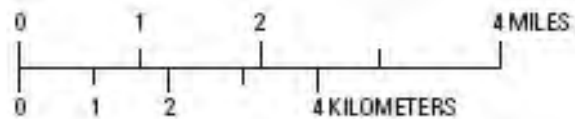


-11 ug/L P ambient

-21 ug/L P target

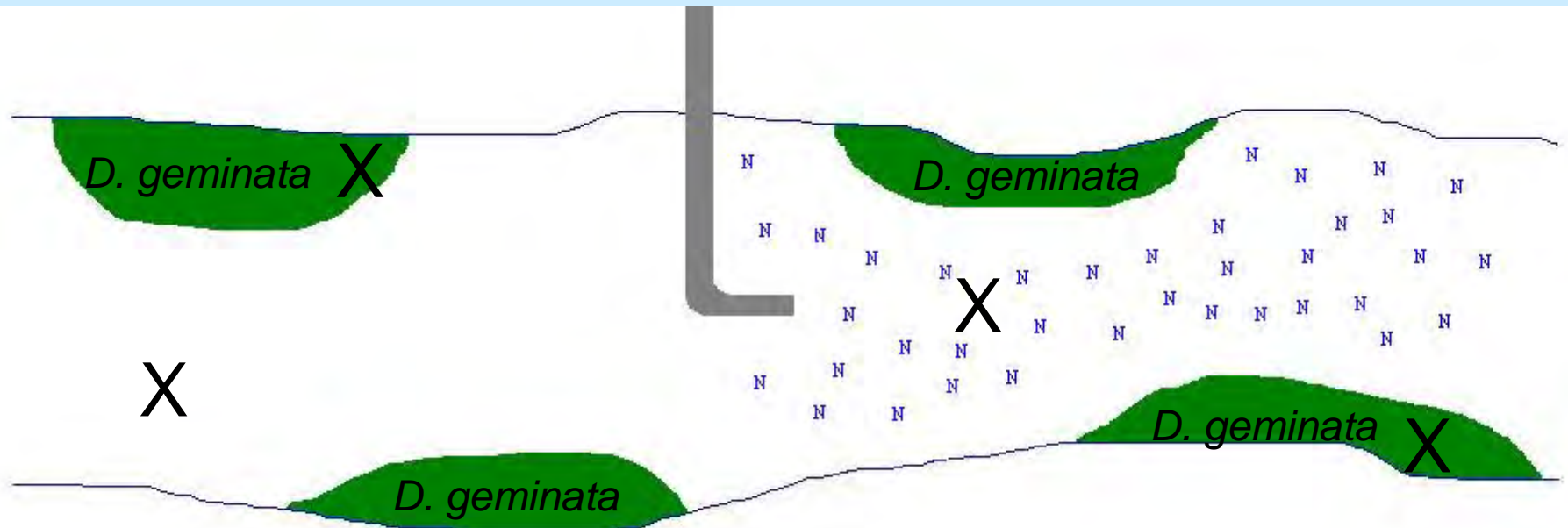
R. 5 W. R. 6 W.

Base from U.S. Geological Survey digital data, 1:100,000, 1977
 Rapid City Office of City Engineer map, 1:18,000, 2005
 Universal Transverse Mercator projection, Zone 13



Test Site

- Disturbance (scouring) treatments
 - No disturbance (C)
 - Medium disturbance (weekly) (M)
 - High disturbance (3 days) (H)



Experiment Setup

- 24 blocks with 6 tiles each
- 2 of each of the 3 treatments (C, M, H) randomly placed
- Unglazed ceramic tiles

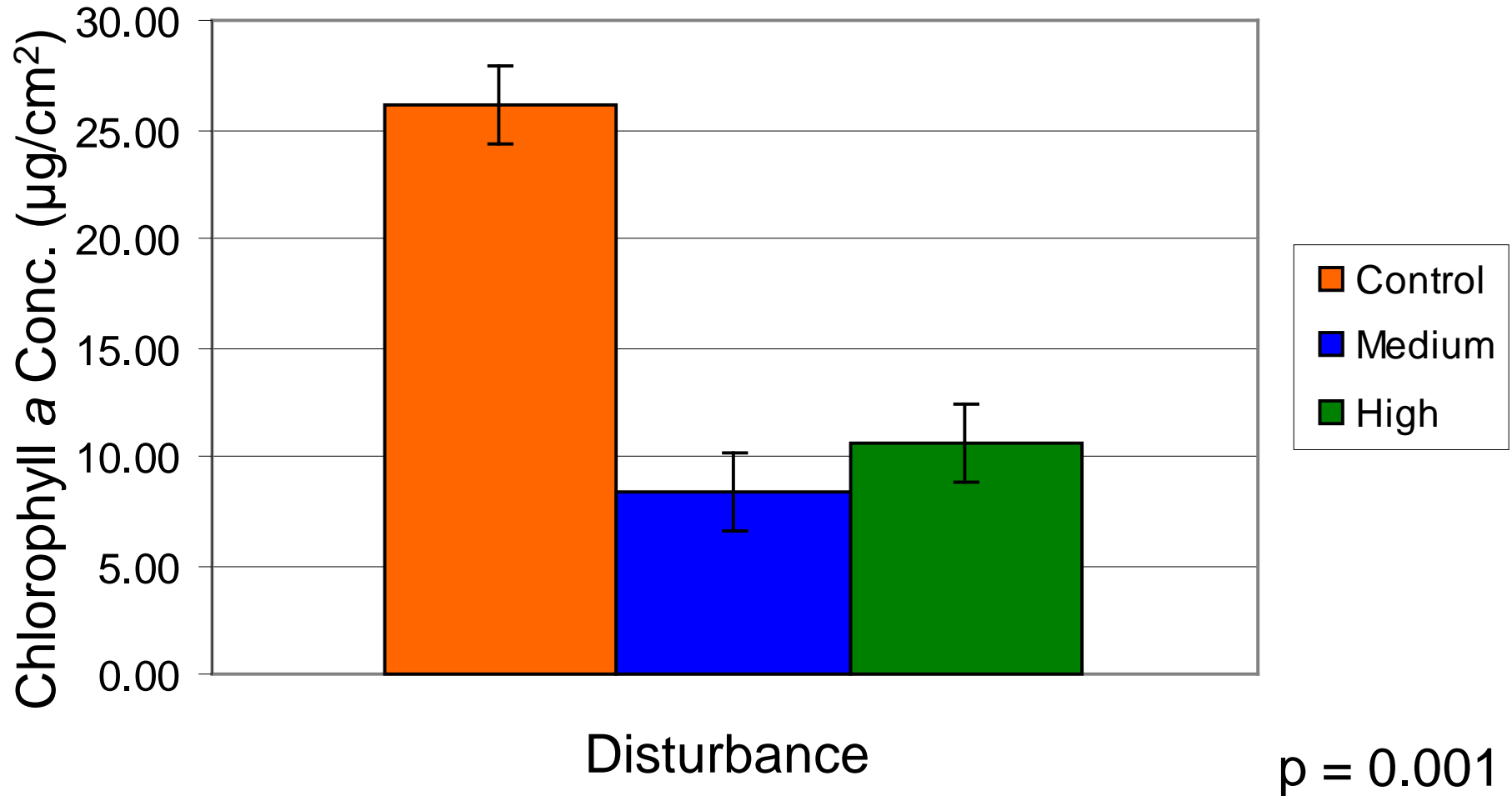


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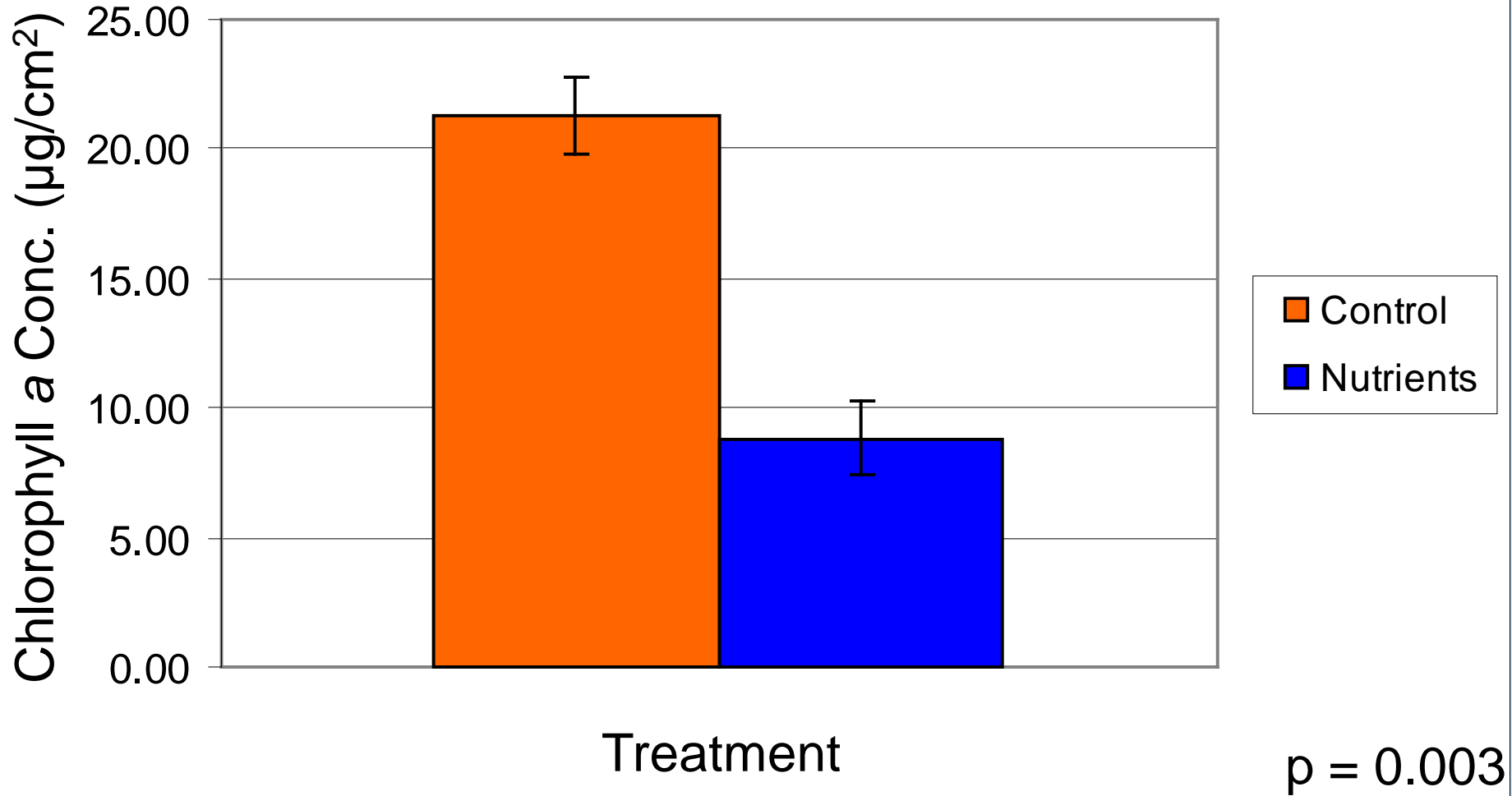


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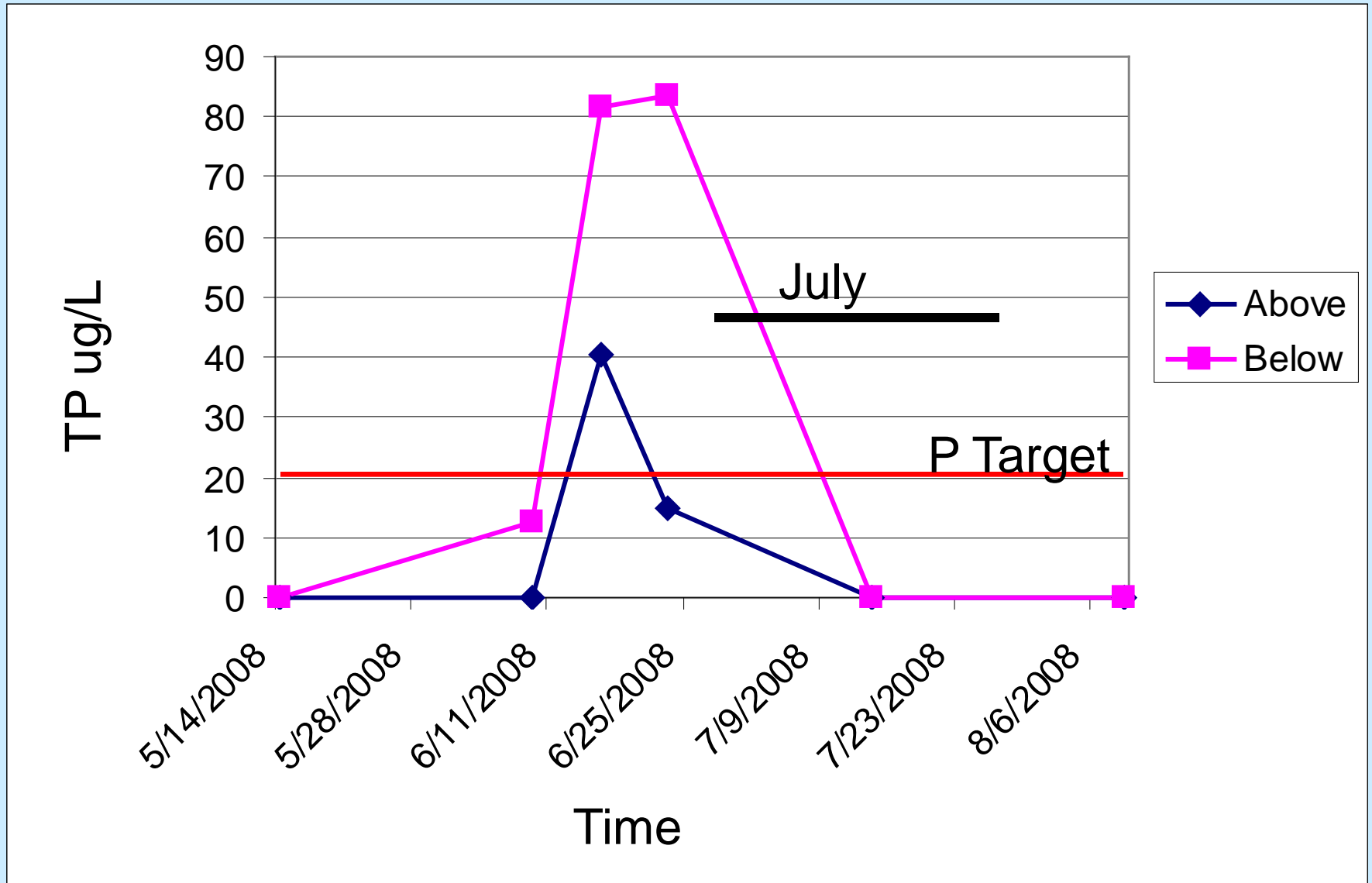
Disturbance Results



Nutrient Addition Results



Nutrient Addition to Rapid Cr.



D. geminata Cell Density

- 21 days in stream
- Enumerated in zooplankton chamber

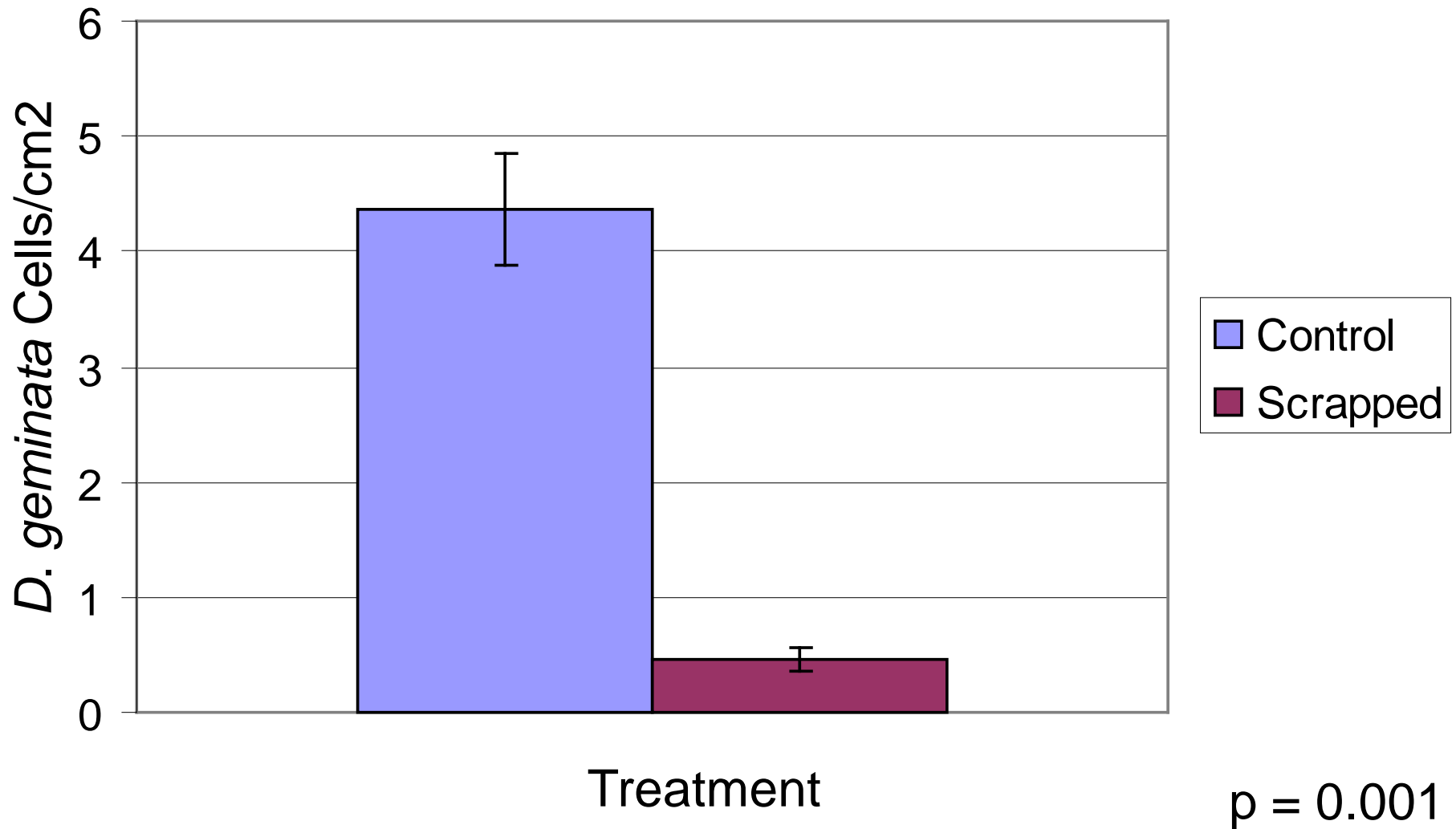
Disturbance Treatment	<i>D. geminata</i> Cells/cm ²
Control	2.36
Medium (7 days)	2.04
High (3 days)	1.36

Colonization on Partially-scraped Rocks

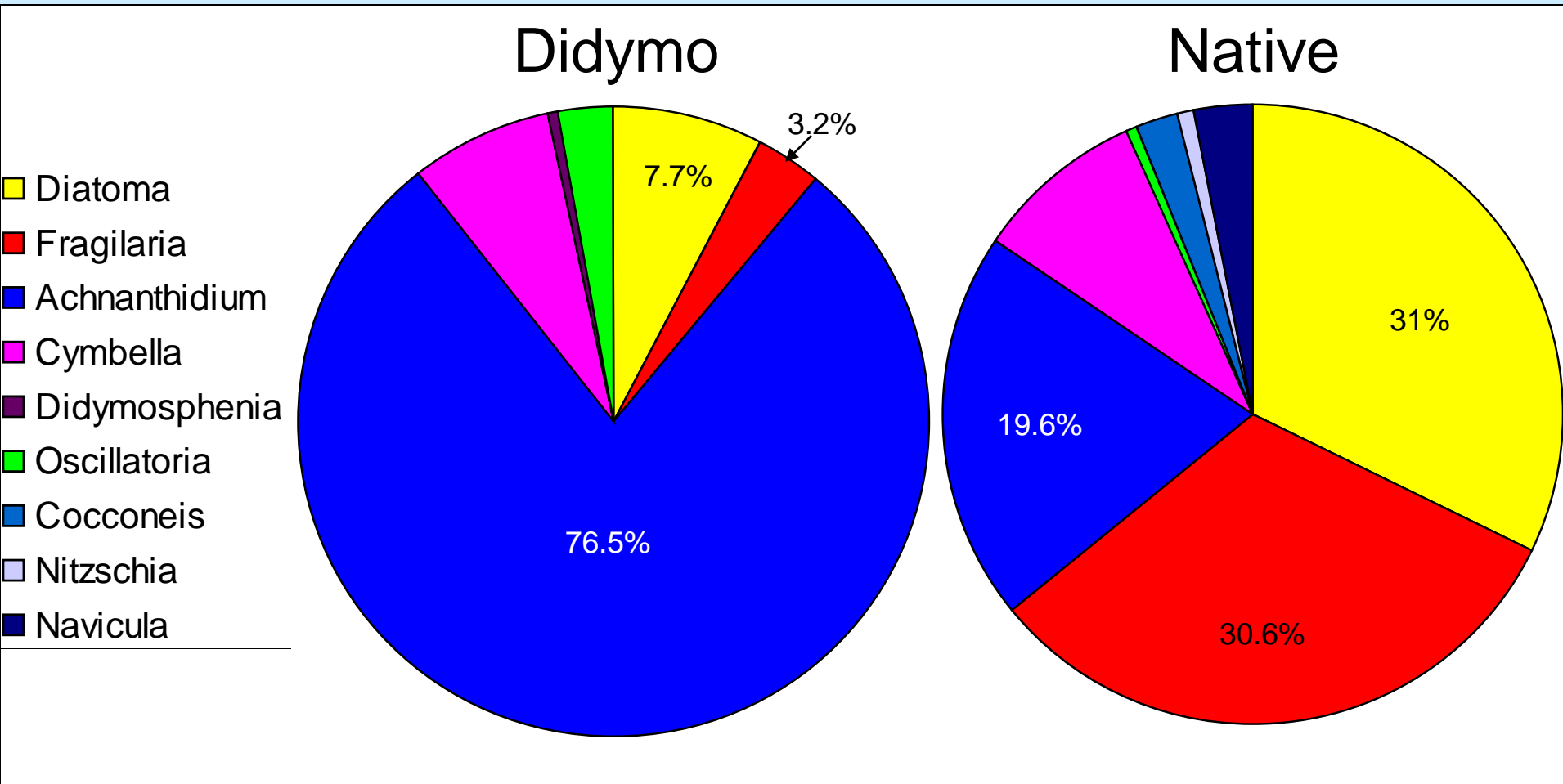
- Collected rocks (12) from Castle Cr.
- Scraped half of surface area
- Harvested after three weeks
- Homogenized



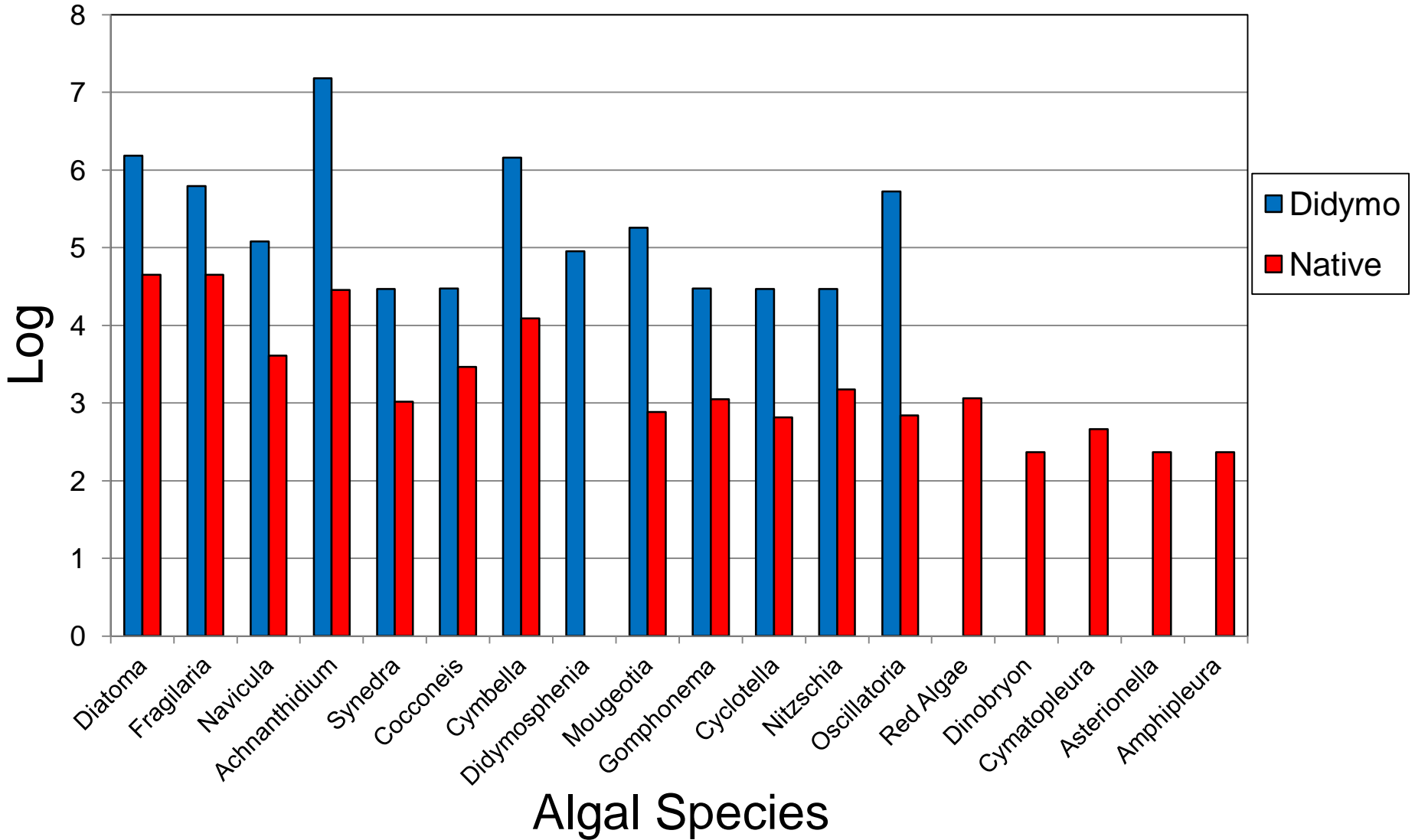
Scrapped VS Existing Community



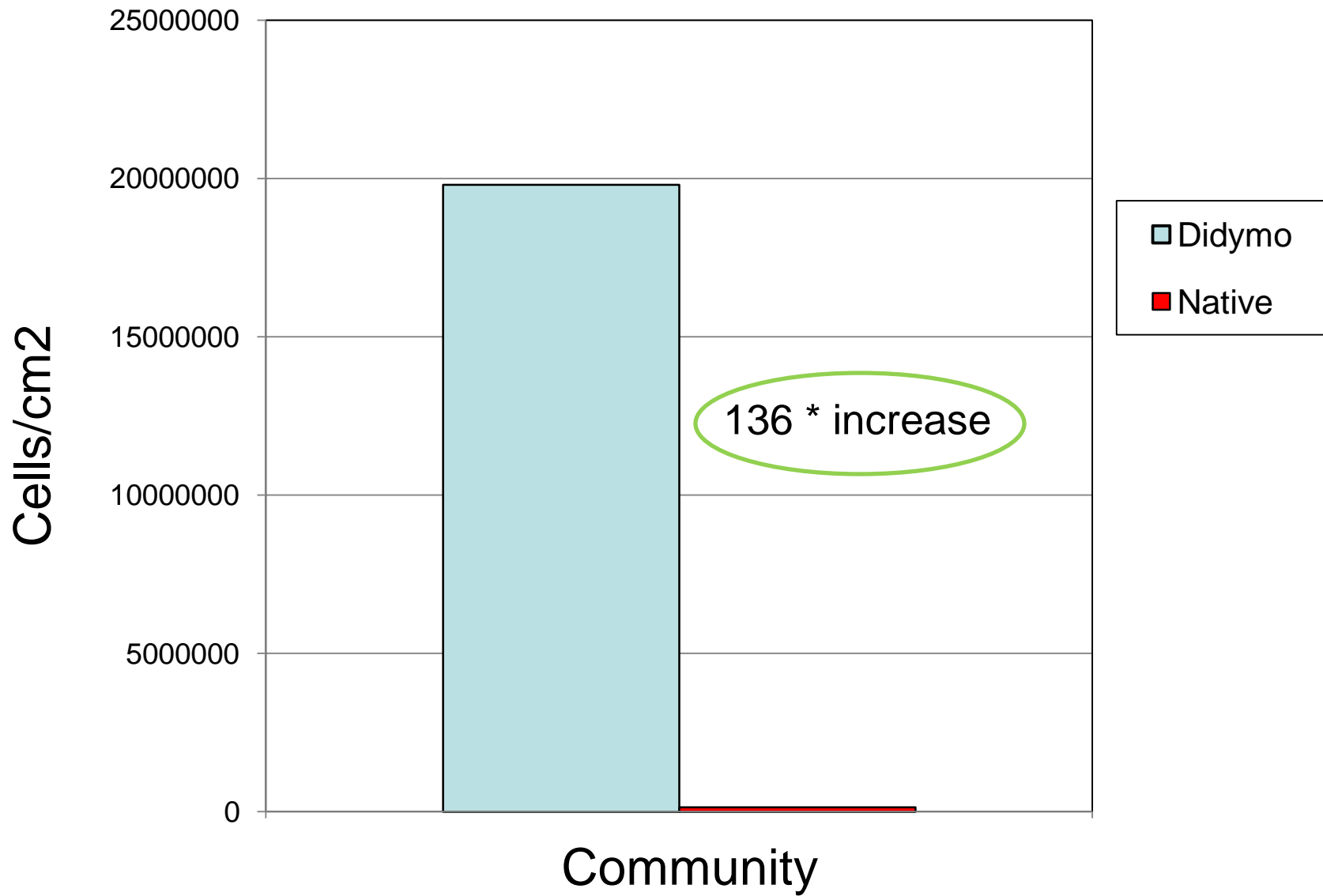
Algal Community Composition



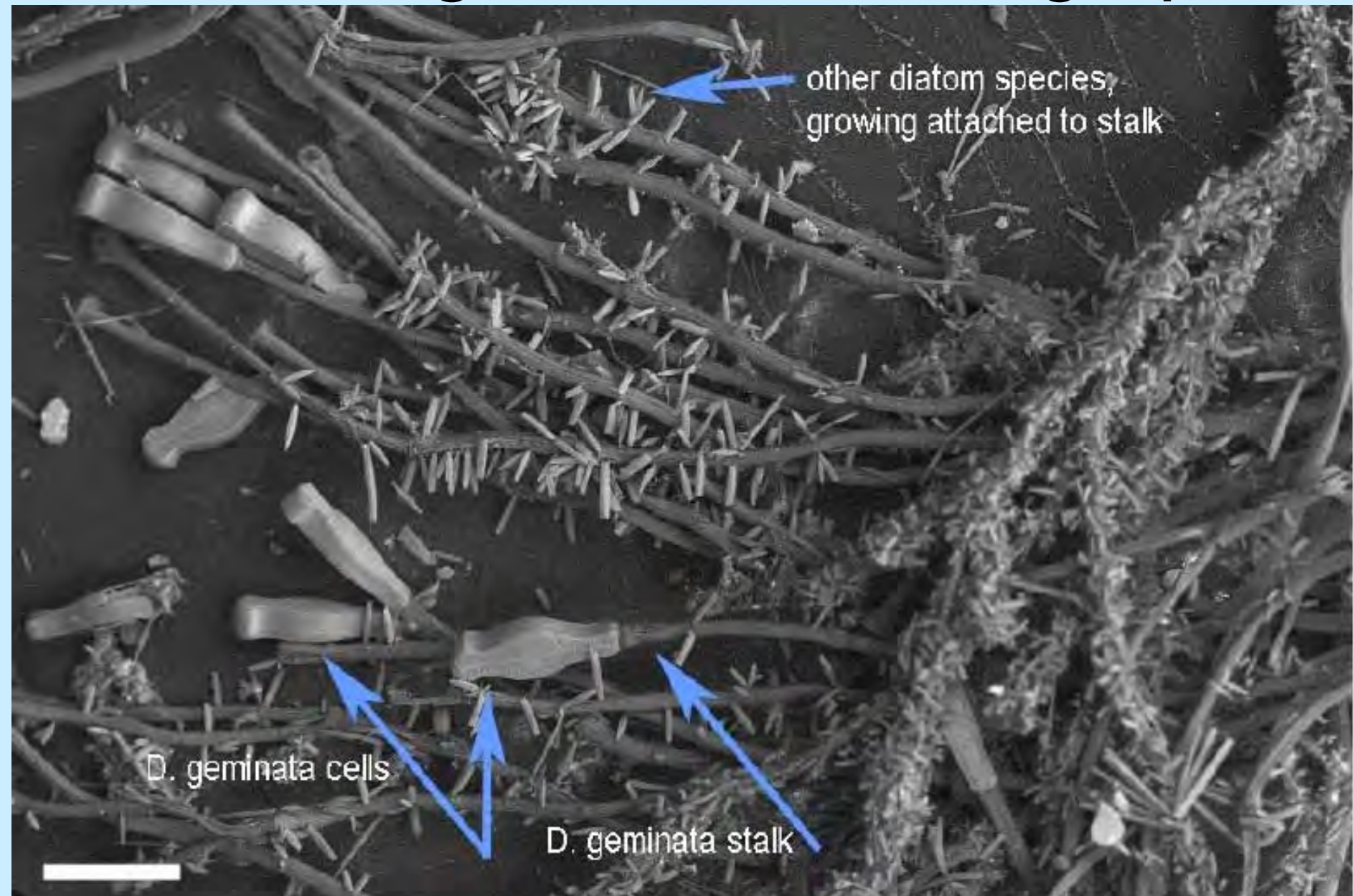
Algal Community Comp and Cell Densities



Cell Densities for *D. geminata* and Native



Scanning Electron Micrograph



Conclusion

- Nutrient addition data is inconclusive
- *D. geminata* prefers to invade established periphyton communities
- Dam conditions favoring *D. geminata*?
- *D. geminata* is slow to establish
- *D. geminata* changes species composition via structural complexity

Acknowledgements

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Questions?

