

# **Gut & Grain Microbes: new pathways to health**

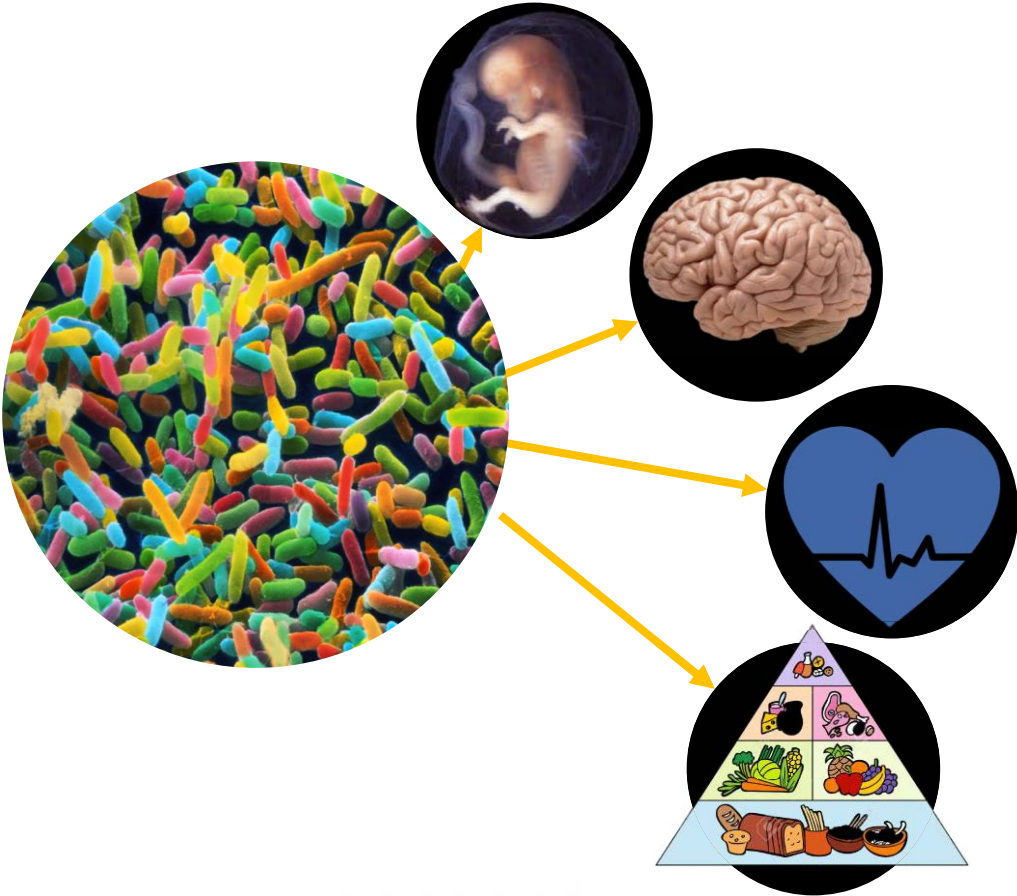
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North Carolina State University



# Gut microbes, good health



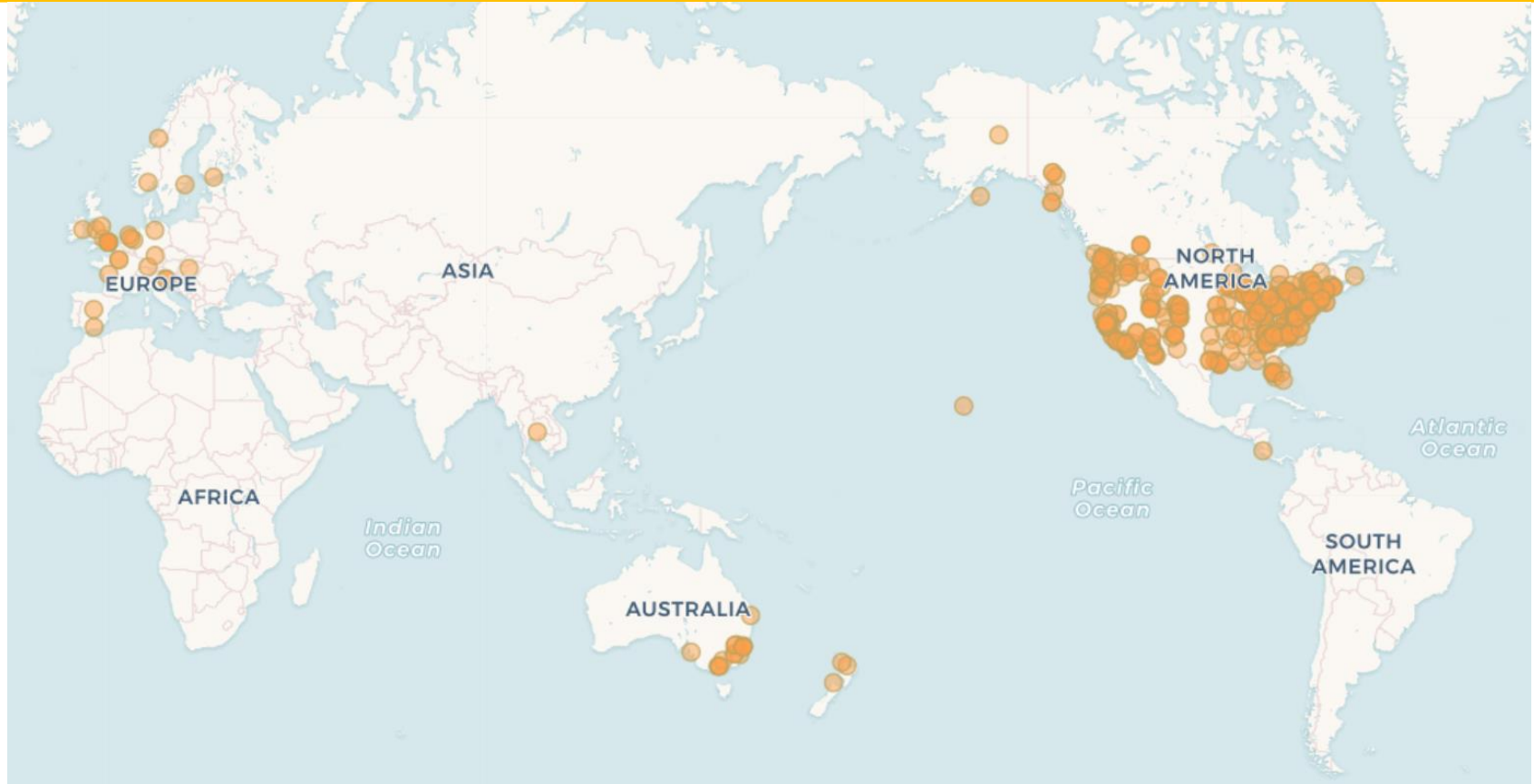
# Human culture = microbial cultures



photo credit: Erin McKenney (breads) and Lauren Nichols (fermented foods)



# The Sourdough Project



November 2018  
#WholeGrains2018

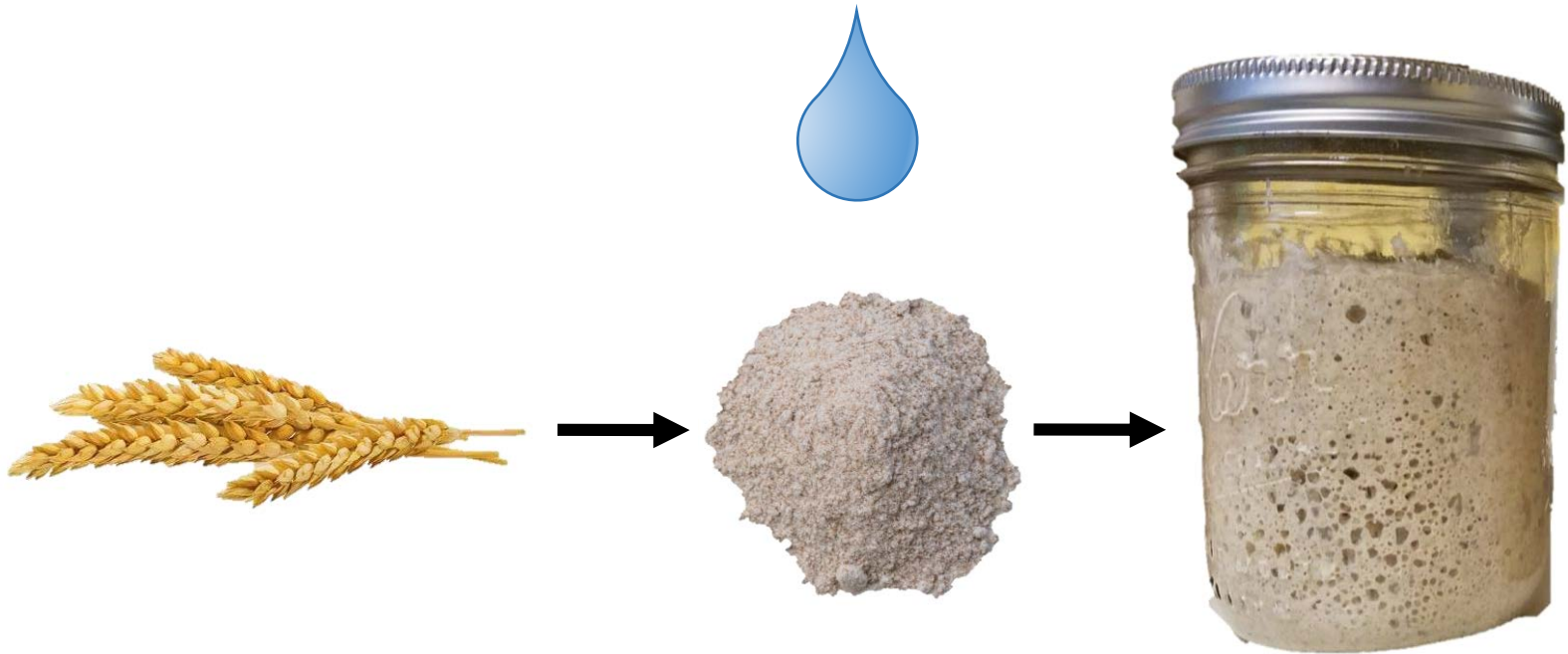




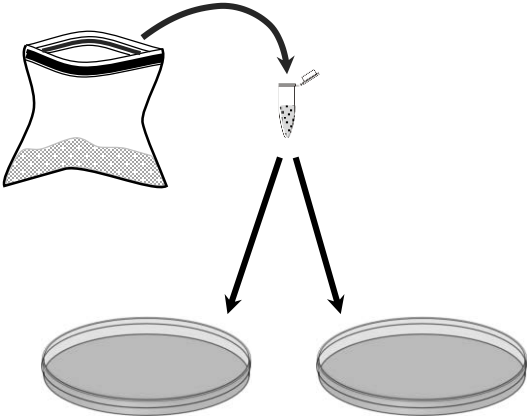
# Starters harbor untold diversity



# Where do the microbes come from?

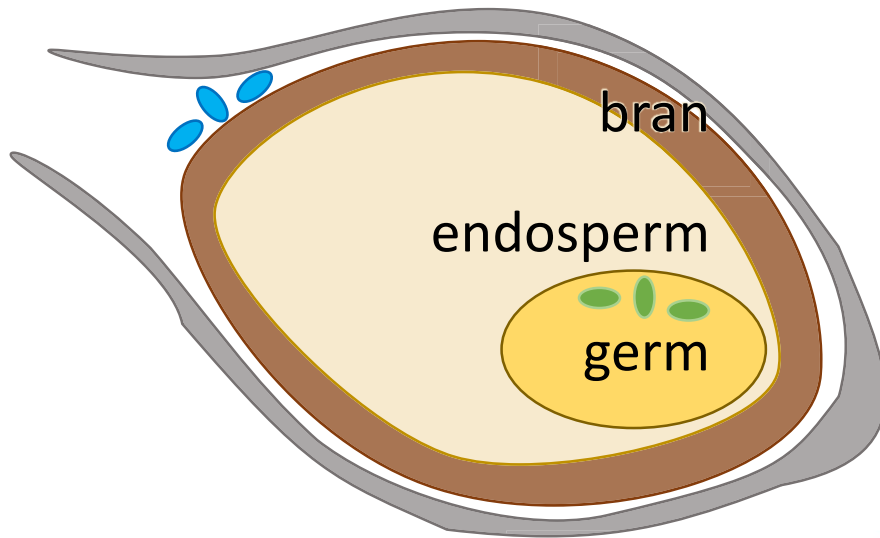


# Flour power: citizen science



November 2018  
#WholeGrains2018

# What's in a grain?



fiber

microbes

starch

protein

microbes





# Whole grains have more nutrients.

white

starch

whole wheat

fiber\*  
protein\*  
starch

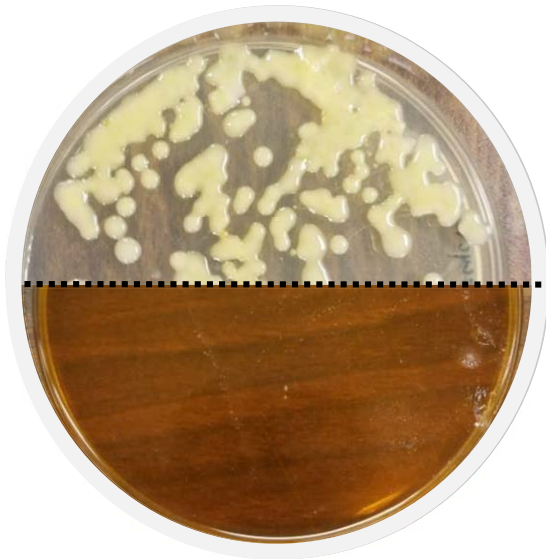
rye

fiber\*  
protein\*  
starch

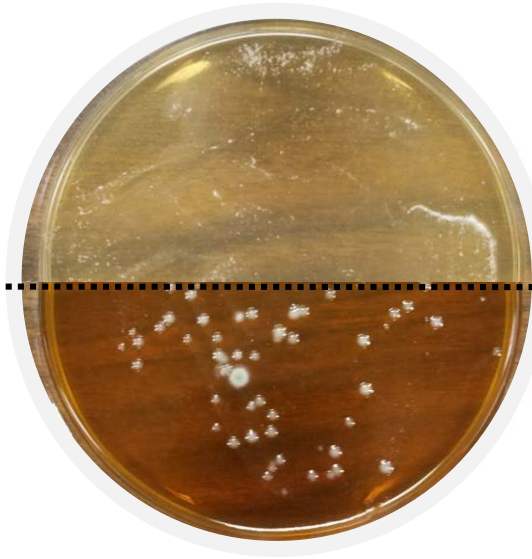


# Different flours have different microbes.

white



whole wheat



rye

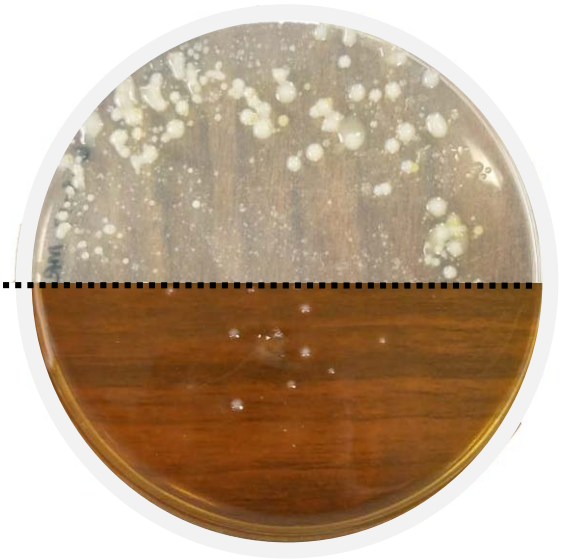
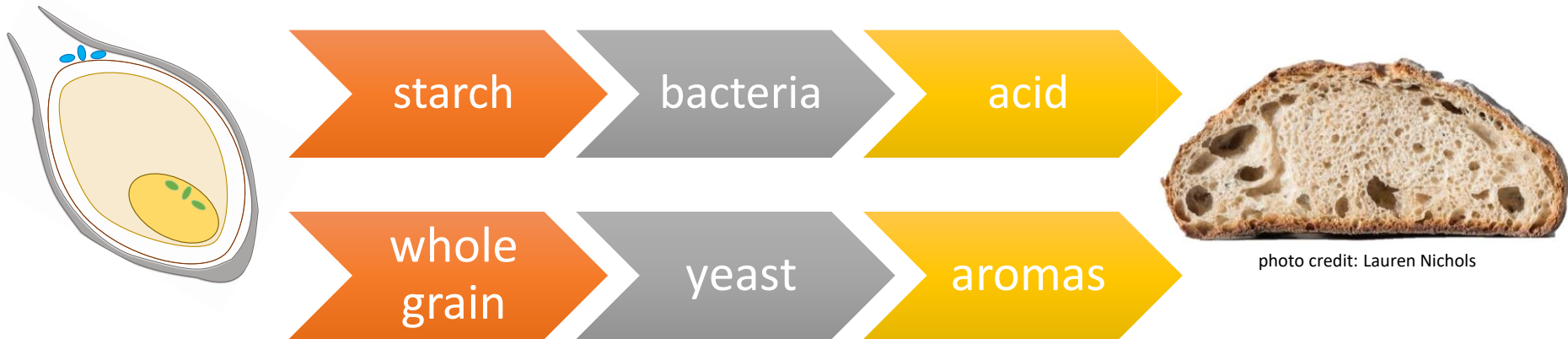
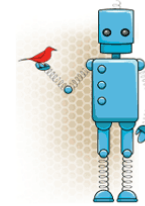


photo credit: Erin McKenney



# What's the big picture?



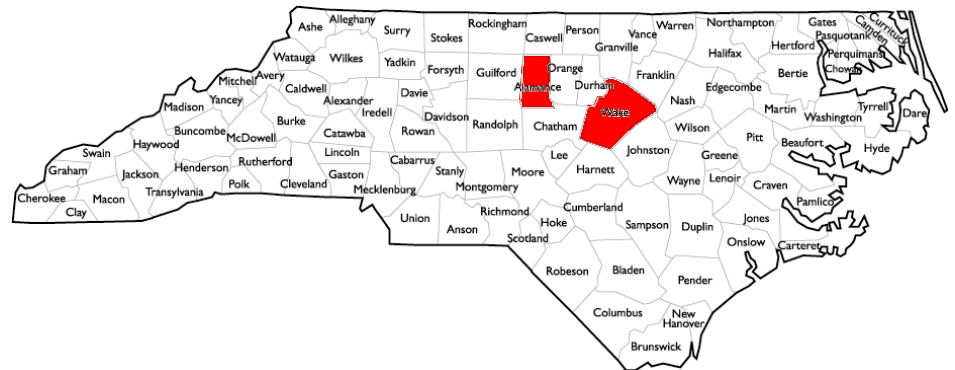


scistarter.com  
People-powered science.

# Sourdough for Science



Over 200 students in 2 counties!

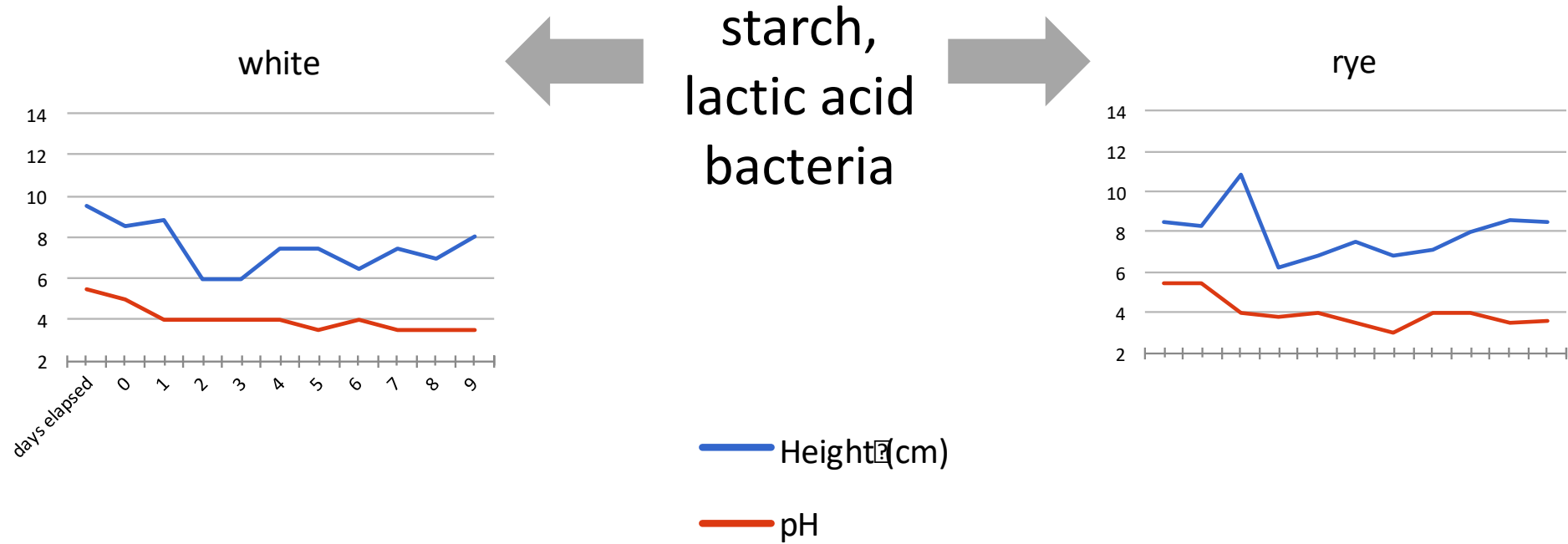


November 2018  
#WholeGrains2018





# Growing starters: citizen science



# 24-hour sourdough time-lapse

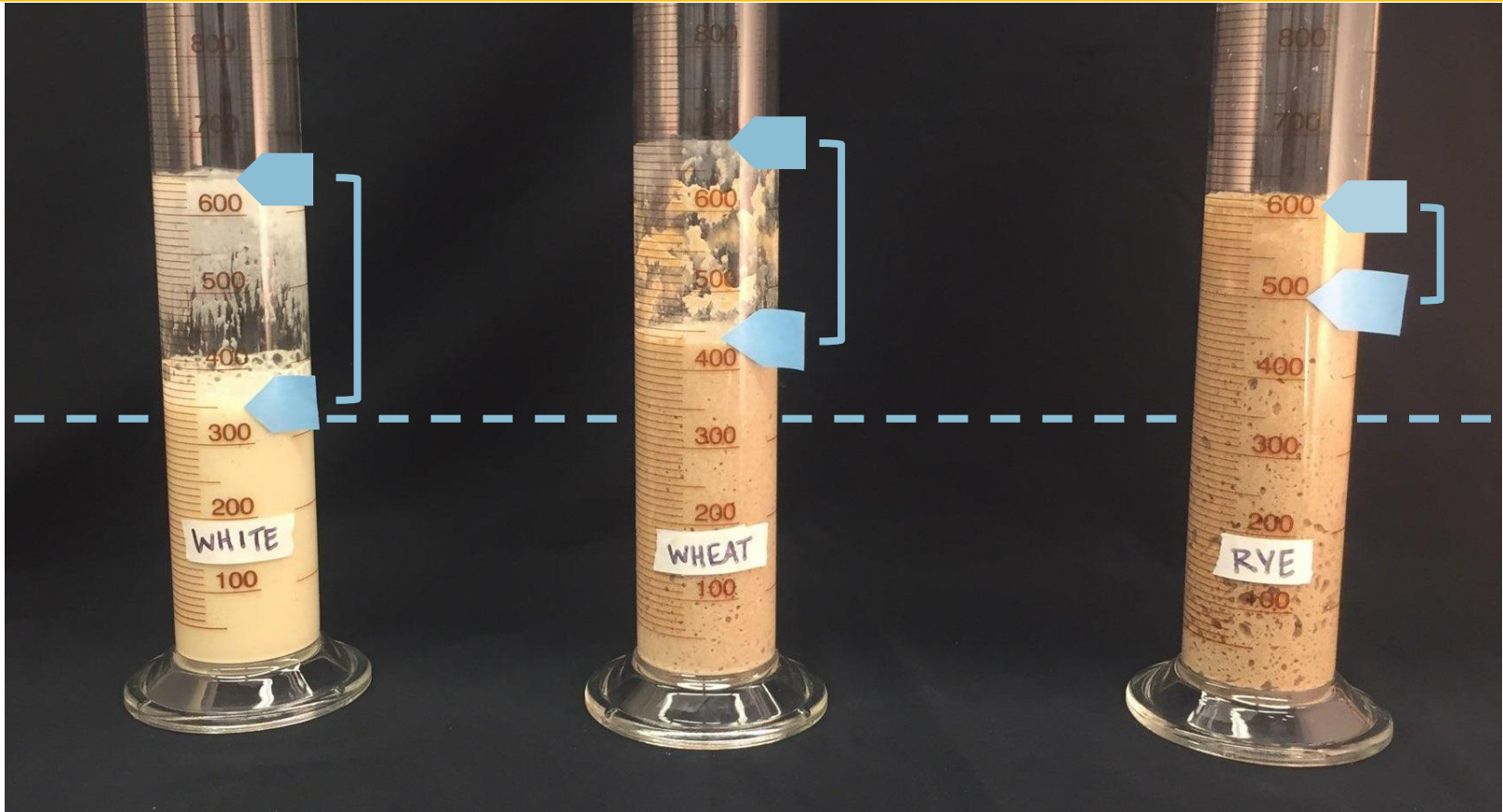


Erin McKenney, Lauren Nichols



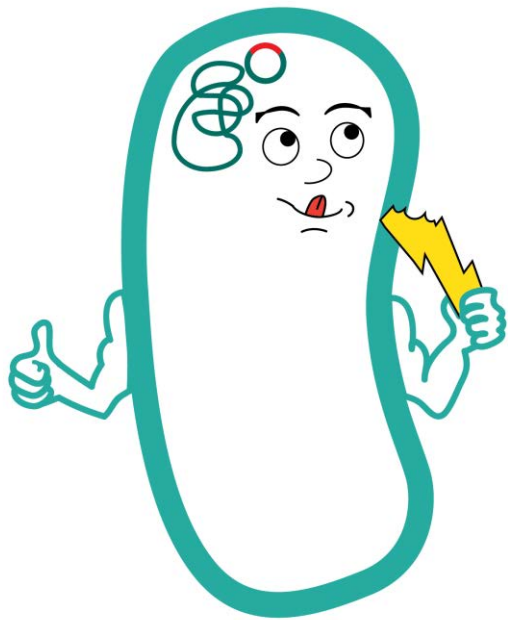


# Different growth patterns

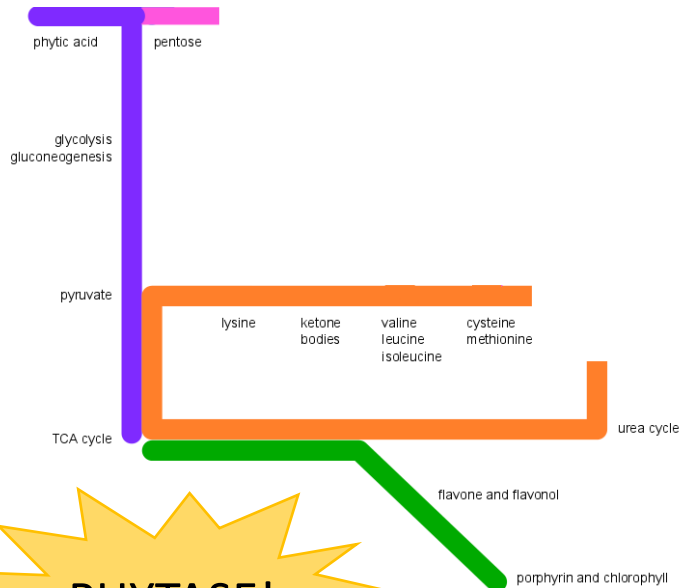




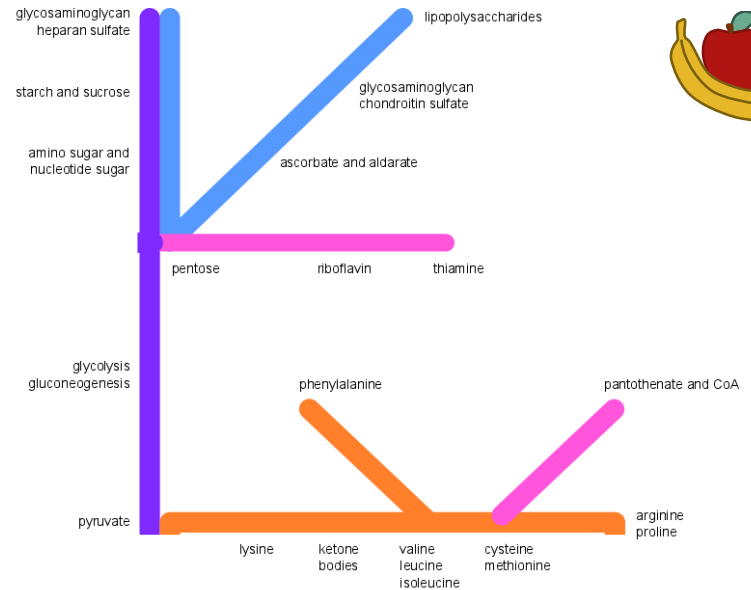
# “Sugar crash” mirrors human metabolism



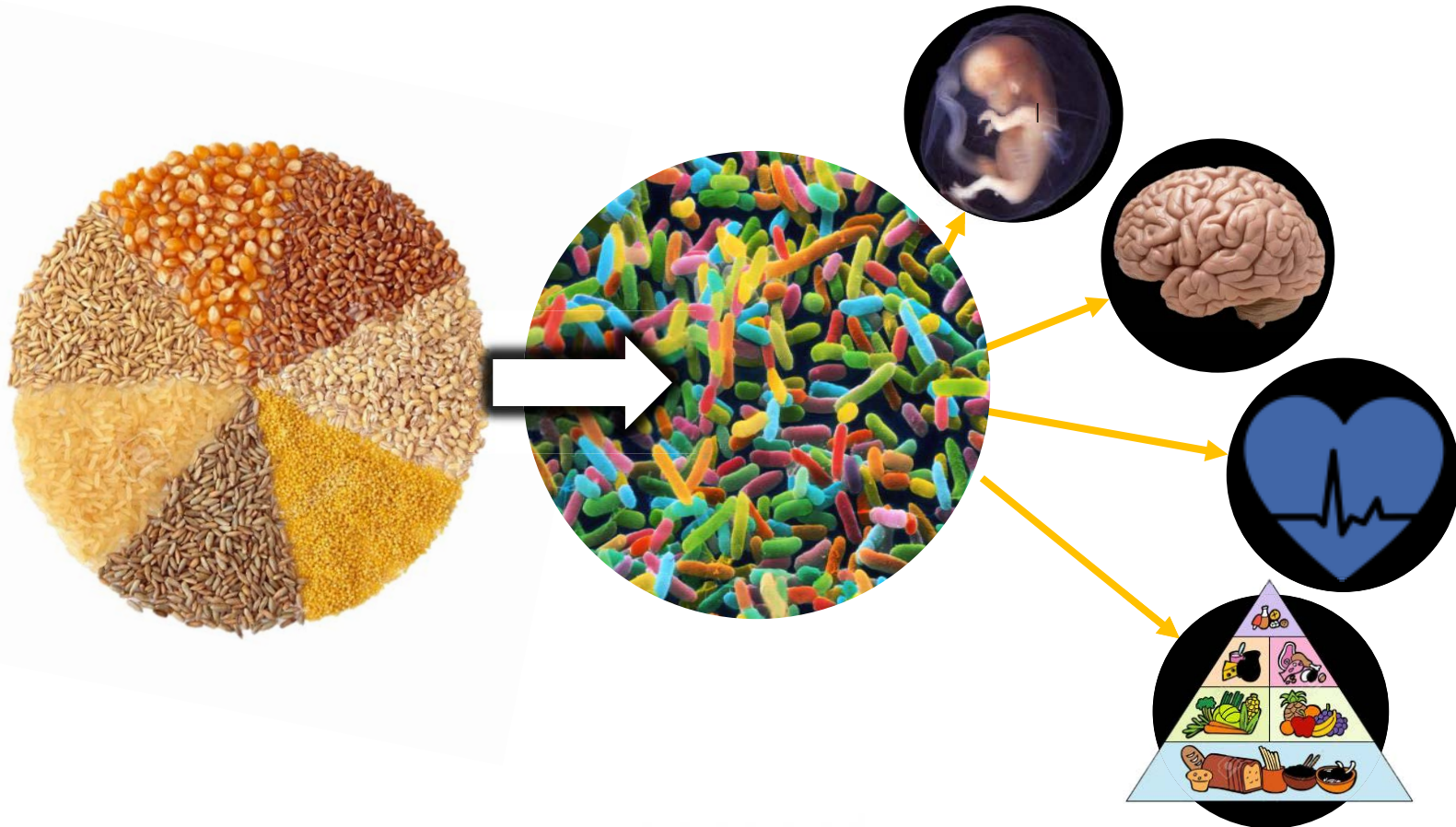
# Fiber feeds “good” microbes



**PHYTASE!**



# Microbes: the whole (grain) story.



# Thank you!

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# Join our citizen science projects!

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- Sourdough for Science
  - [studentsdiscover.org/lesson/sourdough-for-science](https://studentsdiscover.org/lesson/sourdough-for-science)
  - [scistarter.com/project/19378-Sourdough-for-Science](https://scistarter.com/project/19378-Sourdough-for-Science)
  
- New Year, New Bread
  - [studentsdiscover.org/lesson/new-year-new-bread](https://studentsdiscover.org/lesson/new-year-new-bread)
  - [scistarter.com/project/19473-New-Year-New-Bread](https://scistarter.com/project/19473-New-Year-New-Bread)

