

# **Digging Metagenomes With Limited Resources**

Round Table: Can bigger be better  
-- advice as metagenomes grow

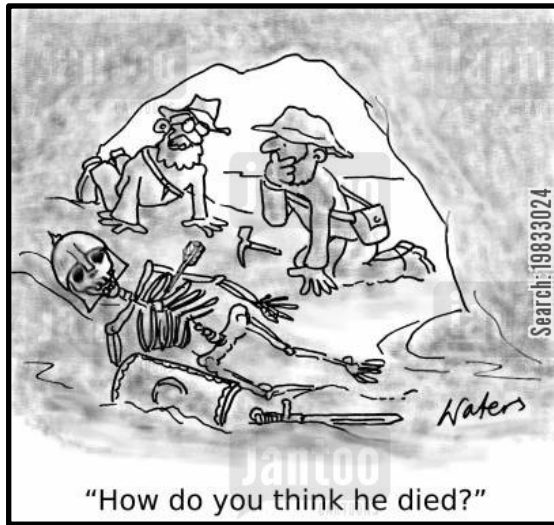
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# Limited resources

- Time limited
- Human power limited
- Need a quick insight on focused research questions



- Archeologist
  - Dig the earth
  - Try to make sense out of data pieces scattered across the world
  - What happened in the past
  - Assemble historical environment



- Metagenomist
  - Dig the data
  - Try to make sense out of data pieces scattered in tubes
  - What is happening, generally
  - Assemble present genomes

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# Consider yourself an archeologist

- The metagenomes are all of the terracotta soldier you have to discover...
- Oh boy...



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# Reconstruct all soldiers ...



- Life back then:
  - Hair styles
  - Costumes
  - Military system
  - Weaponry
  - Political power
- They are still working on it

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# What if one only wants to know about hair styles?

- Wouldn't it be easier to find/reconstruct all of the hair pieces rather than the entire army?



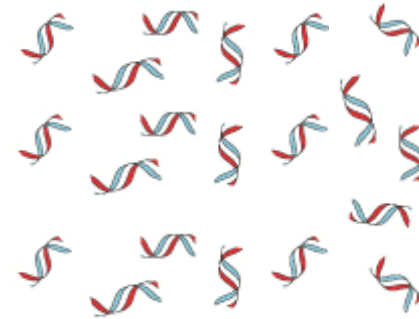
# What if one only wants to know about hair styles?

- Wouldn't it be easier to find records of the hairstyle of the entire



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Gene/function  
specific research  
question



Guided gene  
assembly

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# Xander: Gene Targeted Metagenomic Assembly



- Developed by RDP
  - Dr. James Cole
  - Jordan Fish
- Easy to obtain sequences
- Hard to process them all
- Whole metagenome assembly:
  - Expensive
  - Overwhelming
  - Is just the beginning



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# How is it different from amplicon sequencing?

- Not all genes are equal
  - Universal primers!
- Amplification specificity
  - Differs from primer to primer
  - Skews community distribution
- Sequence length
  - Some genes may not like it short

# Real life example:



- Northern peatland
  - N limited
- Shared metagenomes (Dr. Joel Kostka)
- Organic N?
  - Amino acids?
- Extracellular protease genes

# **What is the genetic potential in organic N decomposition?**

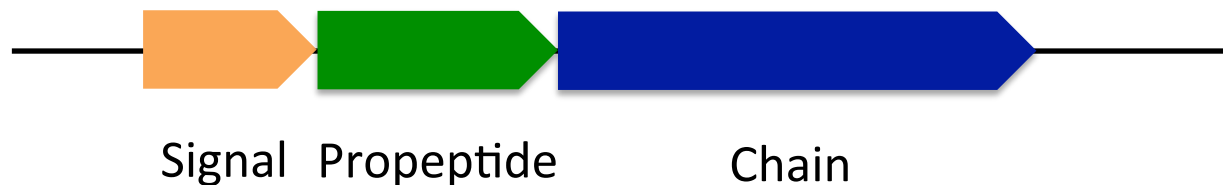
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# Microbial Extracellular Protease Genes

- Genetically diverse
- Similar functionality
- Different protein families
- Various length



# **Peatland is abundant with bacterial extracellular protease genes!**

- Assembled 9 extracellular protease gene groups (tried 21)
- Linking organisms to genetic potentials
  - over 90% were bacterial
  - Some proteases were broadly distributed
  - Some are bacterial/fungal specific
- For more detail: **poster 370B**

# What is my specific research question?

- “Hair style” VS. “Political power”
  - “A brief insight” VS. “The big picture”
- Am I interested in:
  - components of a pathway?
  - Interactions between multiple pathways?
- How many genes am I studying at once?
  - A few
  - A whole database worth

# Acknowledgement

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# **Thank You!**

Questions?

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