



waag society

institute for art, science and technology



BioHack Academy

Introduction into Microbiology

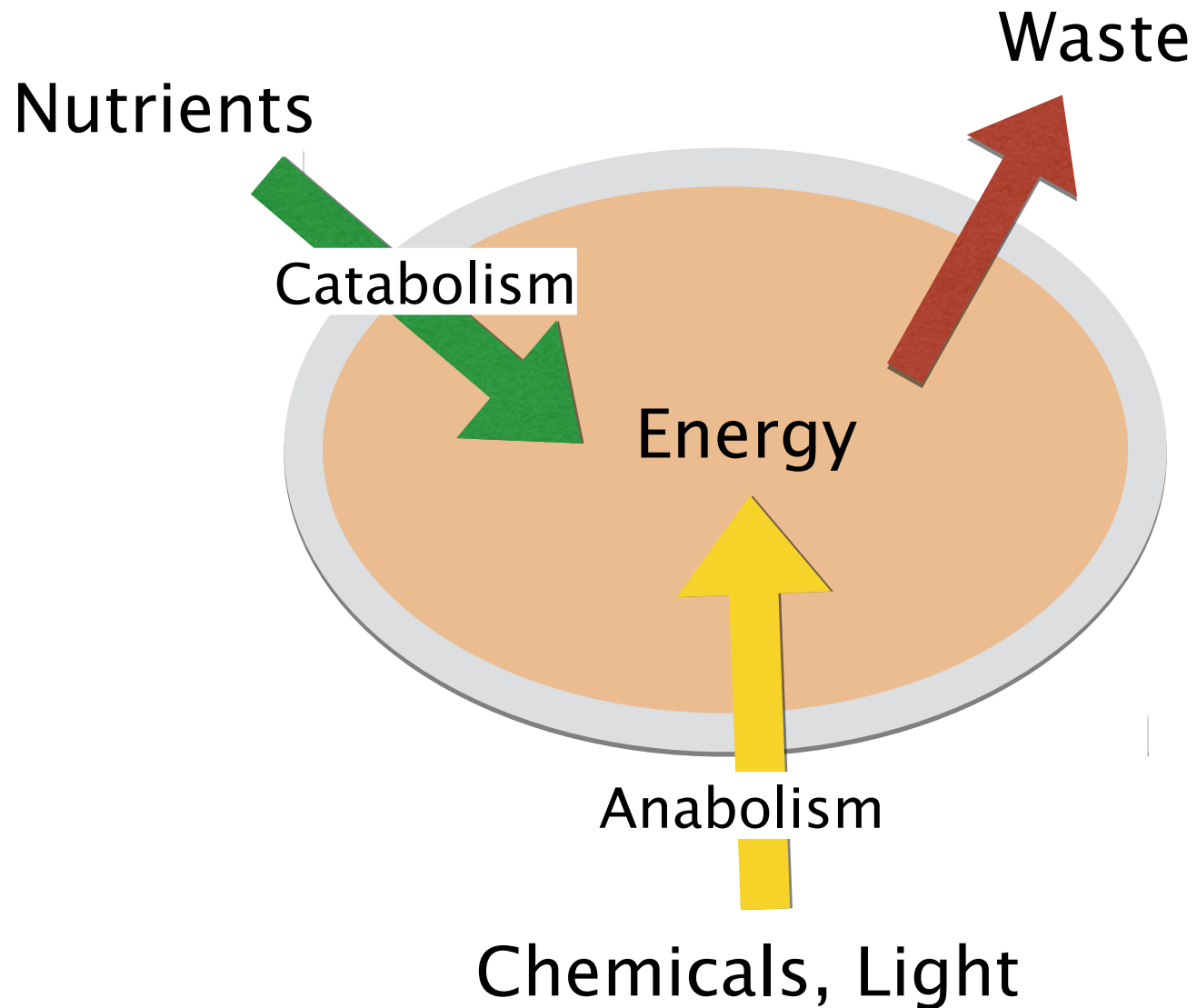


What is life?



What is life?

- Metabolise





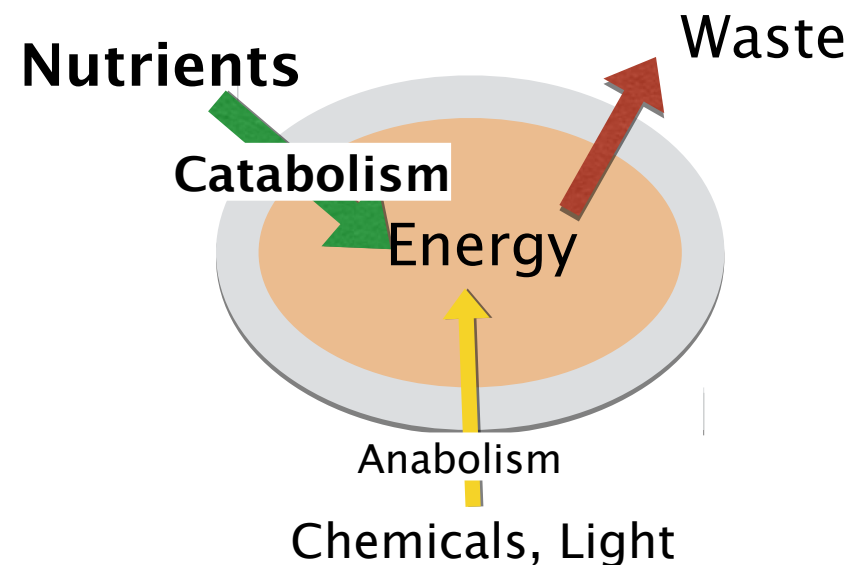
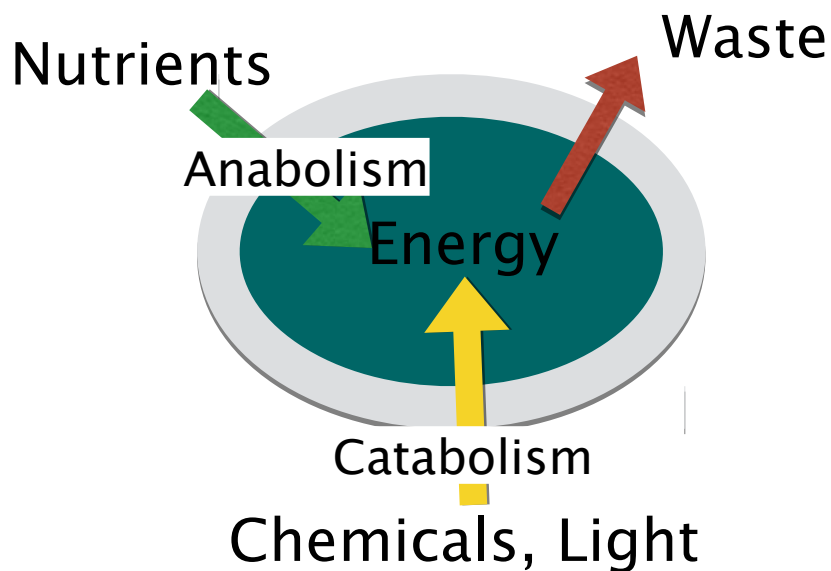
What is life?

- Metabolise
- Respond to stimuli → Homeostasis (balance)
- Adapt to environment by evolution



What is life?

- Metabolise
- Respond to stimuli → Homeostasis (balance)
- Adapt to environment by evolution





The advantage of being small

- Large surface to volume ratio
- Simple structure
- Quick distribution
- Short generation time
- Huge metabolic diversity
- Ability to swab genes



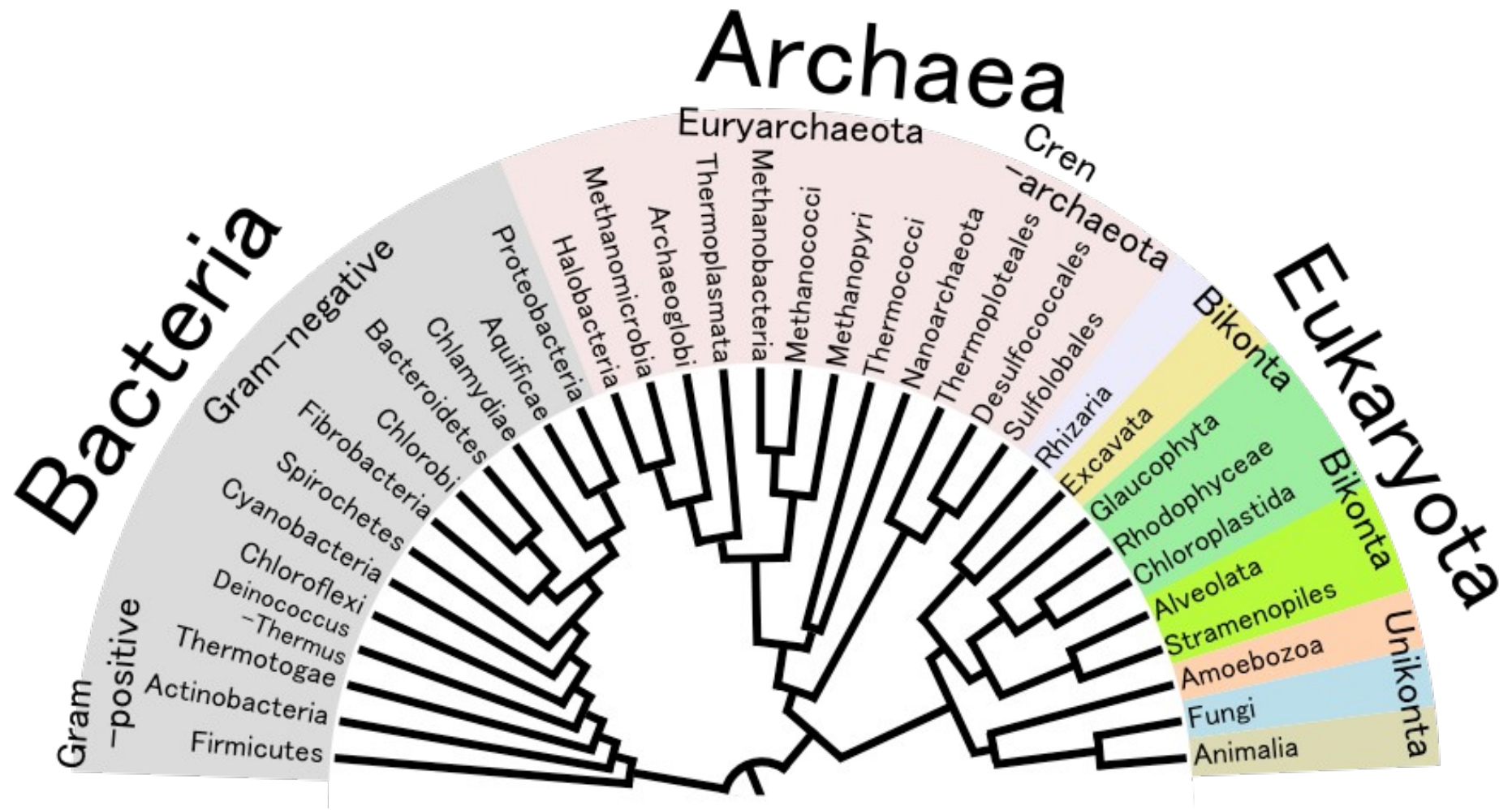


Sex pilus





Phylogeny of the living world





What is life?

- Metabolise
- Respond to stimuli → Homeostasis (balance)
- Adapt to environment by evolution
- Reproduce



Growing bacteria



Microbes are everywhere – Sonja Baumel





Microbes are old – Fossil Stromatolite





Buse lake – Sulfur (purple) bacteria bloom





Yellowstone nat. park – Cyanobacteria





Laguna Colorada – Dunaliella Salina





Roles in our daily life





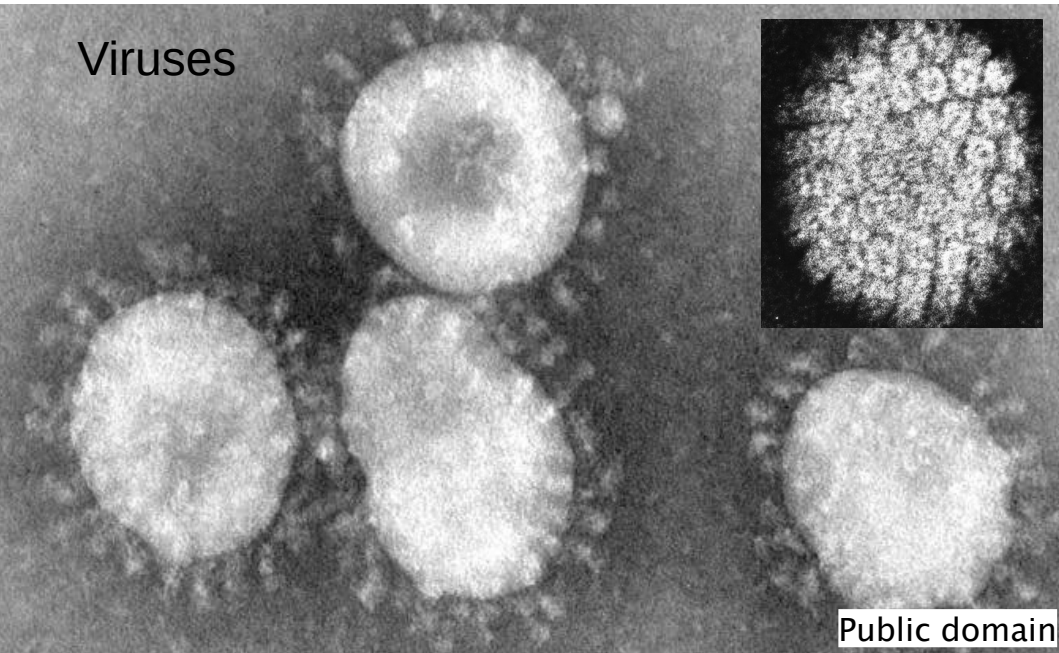
Roles in our daily life





Types of microbes

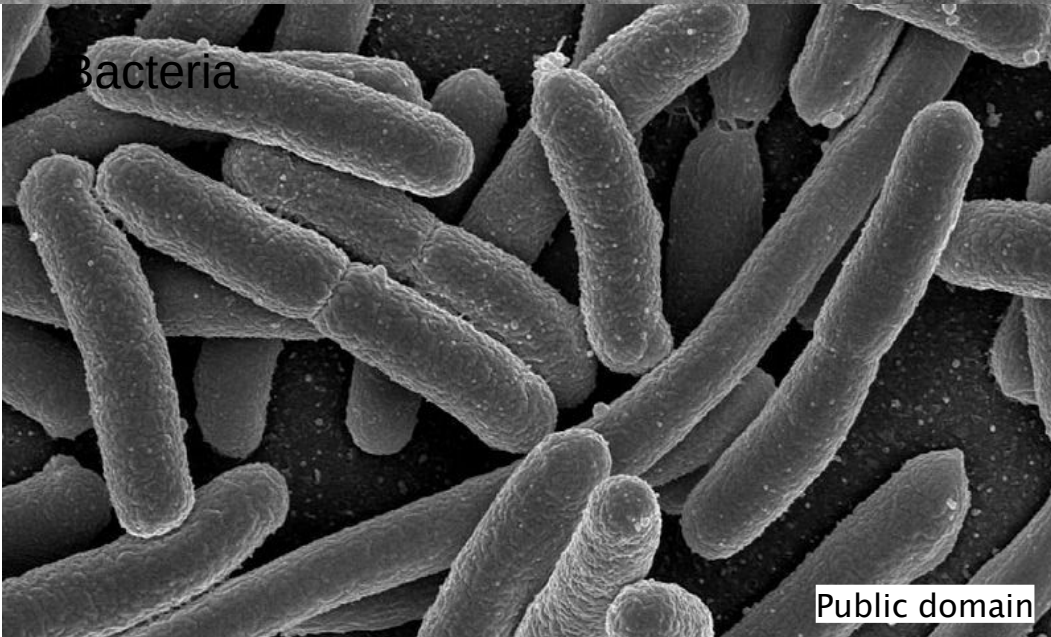
Viruses



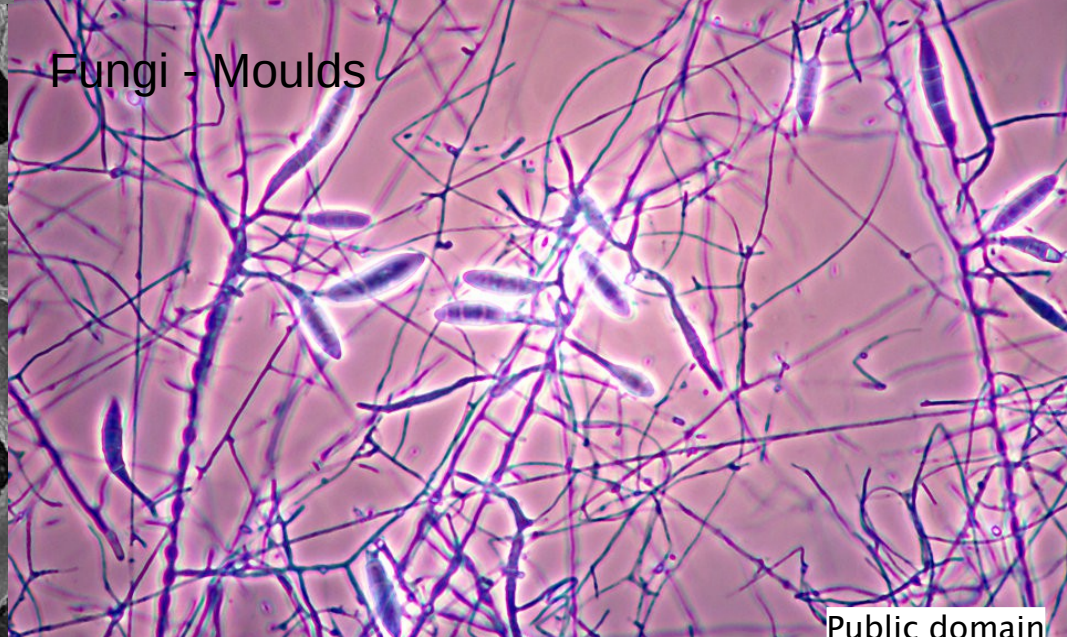
Fungi – Yeasts



Bacteria



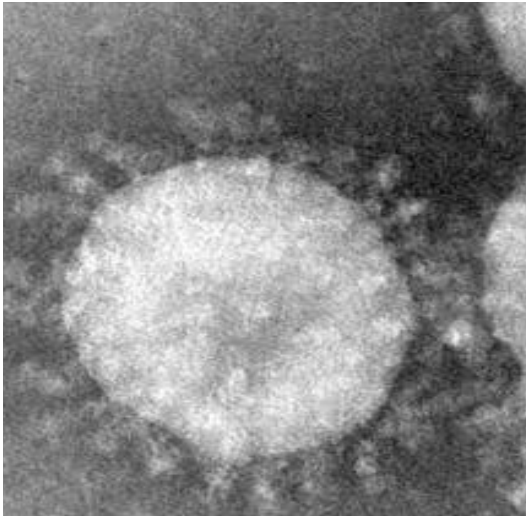
Fungi - Moulds



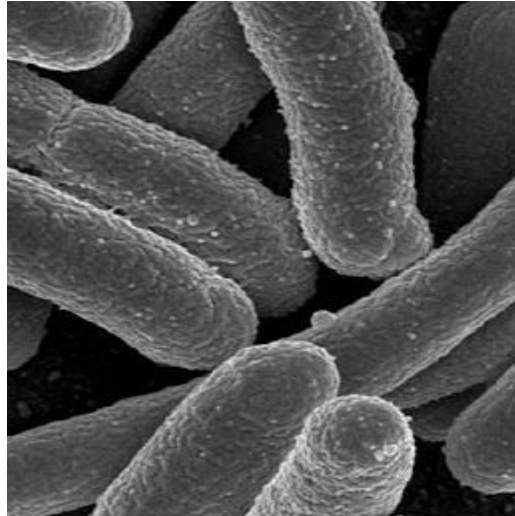


Classification of microbes

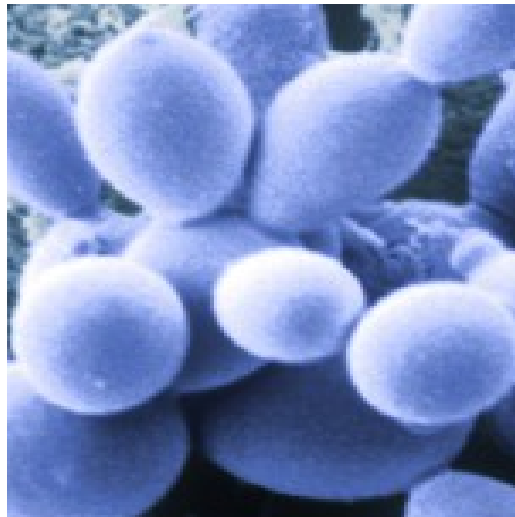
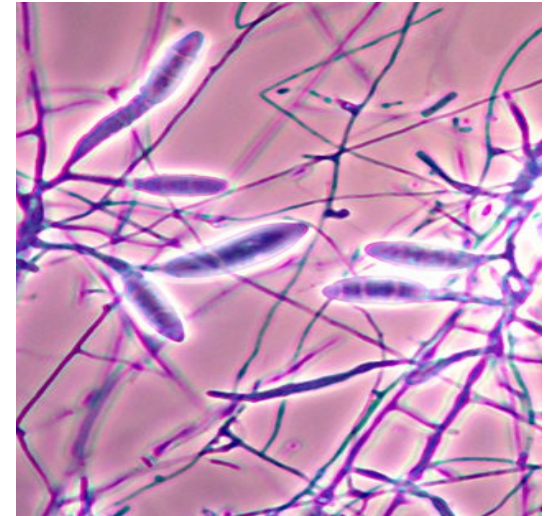
Acellular



Unicellular



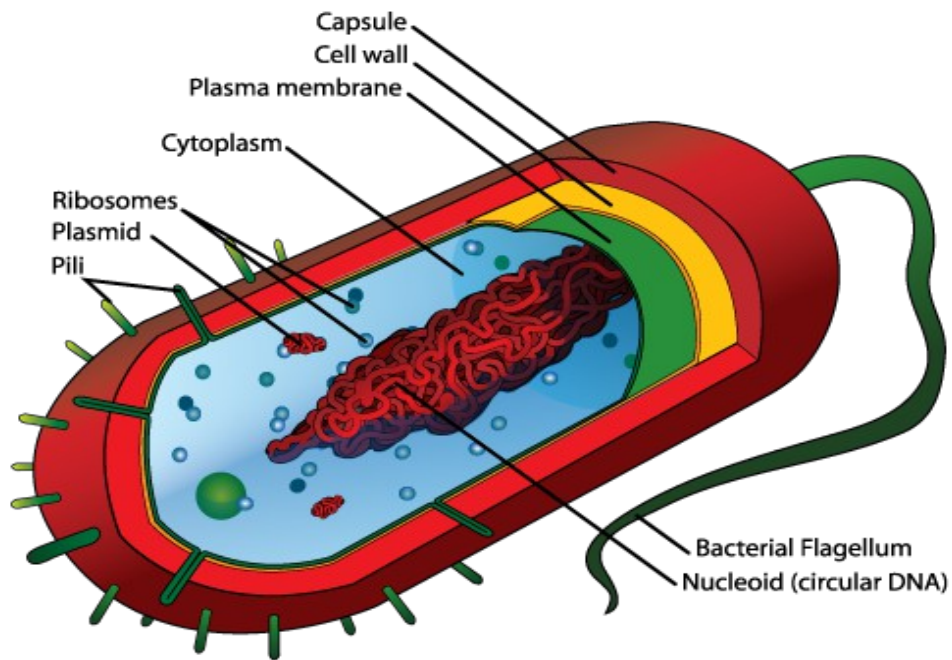
Multicellular



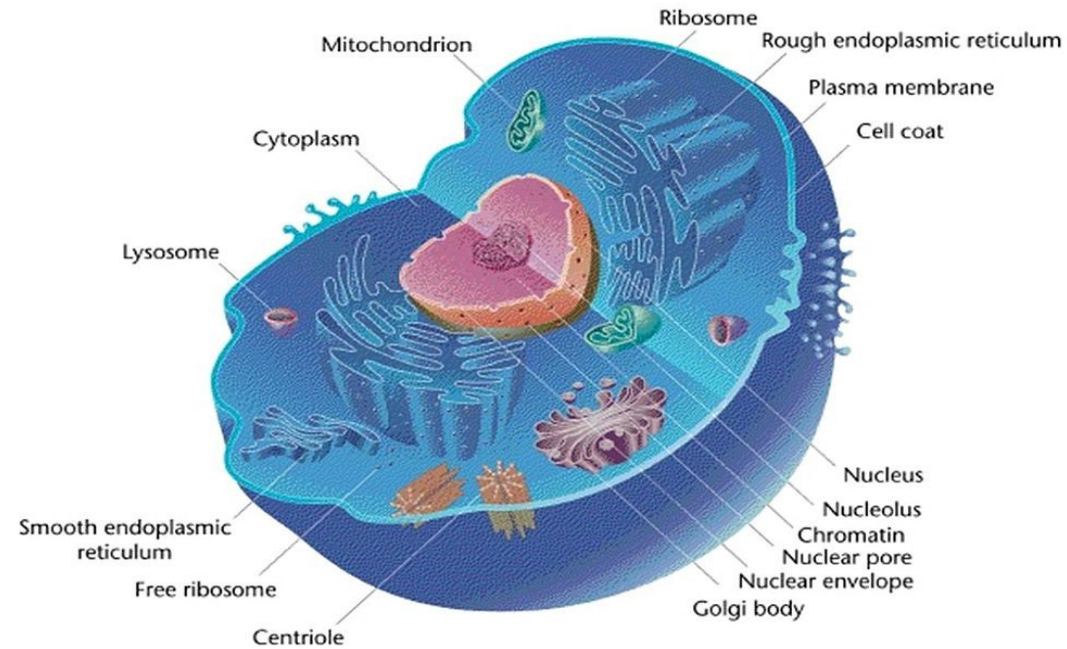


Classification of microbes

Prokaryotic



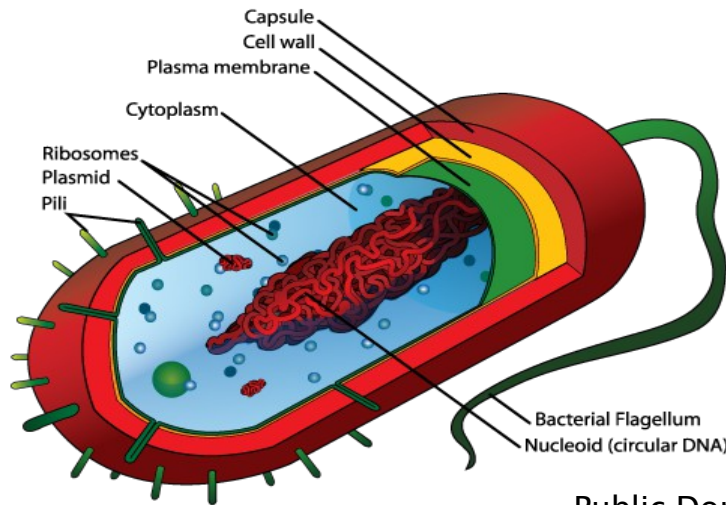
Eukaryotic





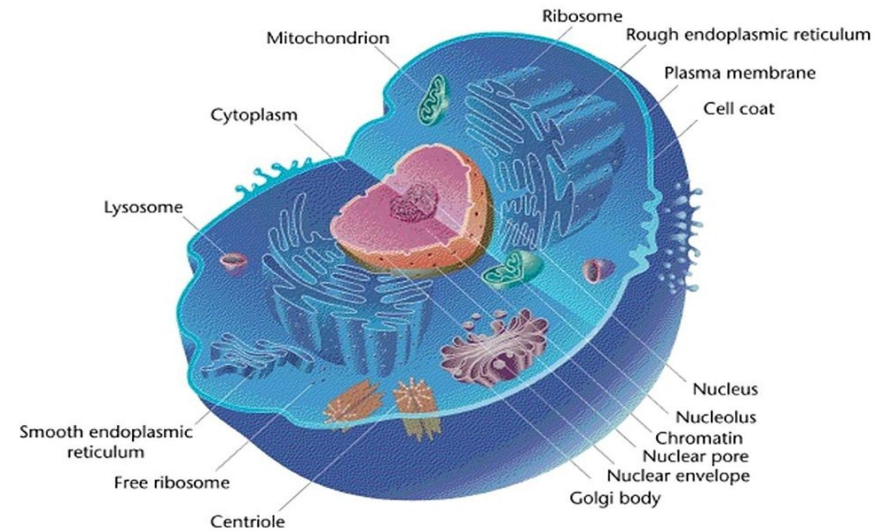
Classification of microbes

Prokaryotic

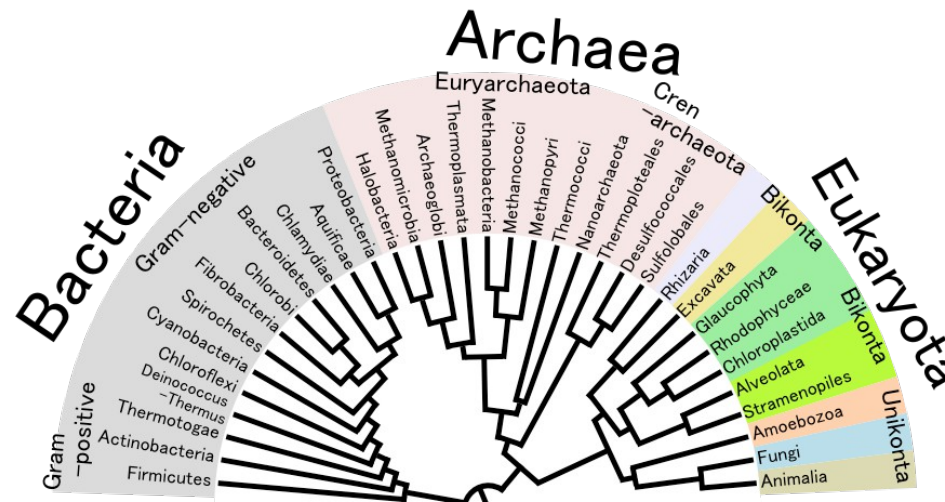


Public Domain

Eukaryotic



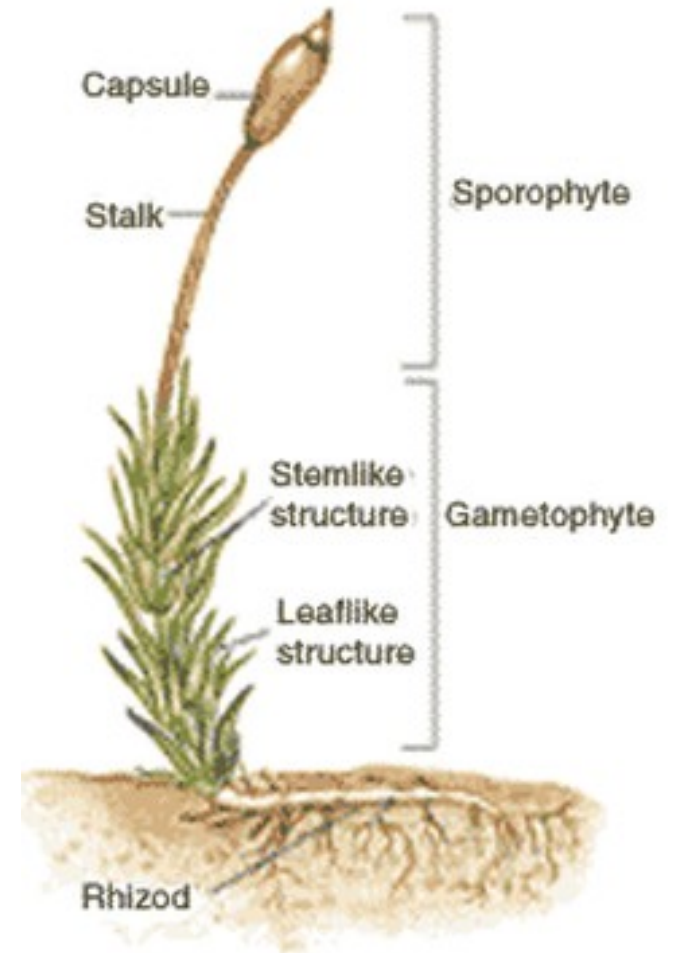
Marion – CC-BY-SA 3.0





Moss

- Plant, flowerless
- No vascular system
- Spores





‘Moss’ – pink moss

Takinoue Park, Hokkaido
Japan



Shibazakura





‘Moss’ – lichen



Lichen (symbiosis)

Fungus + Algae / Cyanobacterium

Orcinol + ammonia + air = Orcein

Commercial powder (cudbear) / paste

Acid = red

Alkaline = blue



<http://mycopigments.com/>



Examples of biohacks –

Natsai Audrey Chiesa, silk dyed with bacteria



Natsai Audrey Chiesa



Examples of biohacks





Examples of biohacks – anti/probiotics

Penicillin

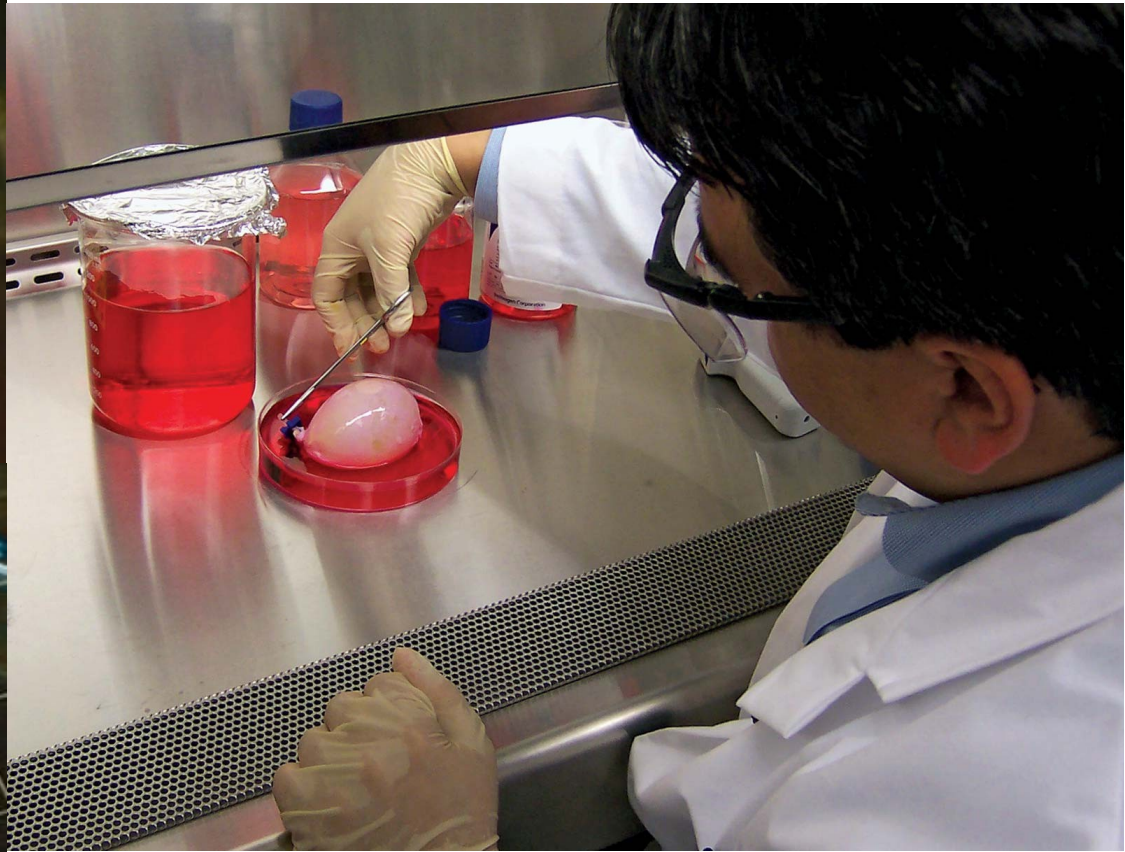


“First ‘Poo Bank’ In The
Netherlands Opens For
Deposits”
Feb 9, LUMC





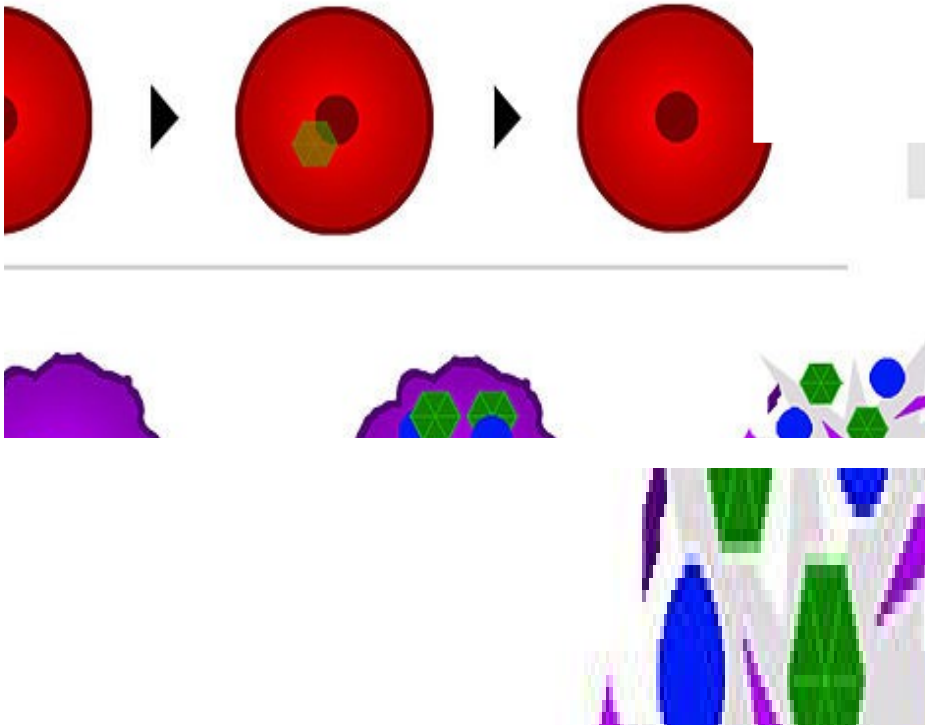
Examples of biohacks – regrow organs



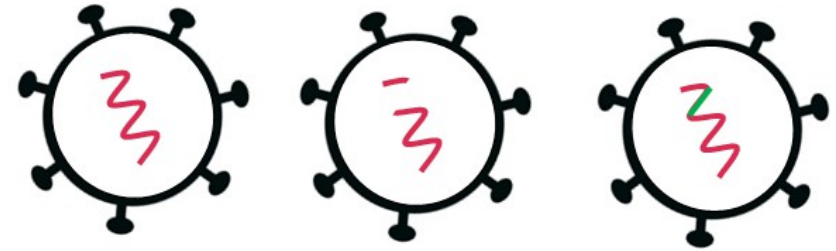


Examples of biohacks – Virotherapy

Cancer



Change gene

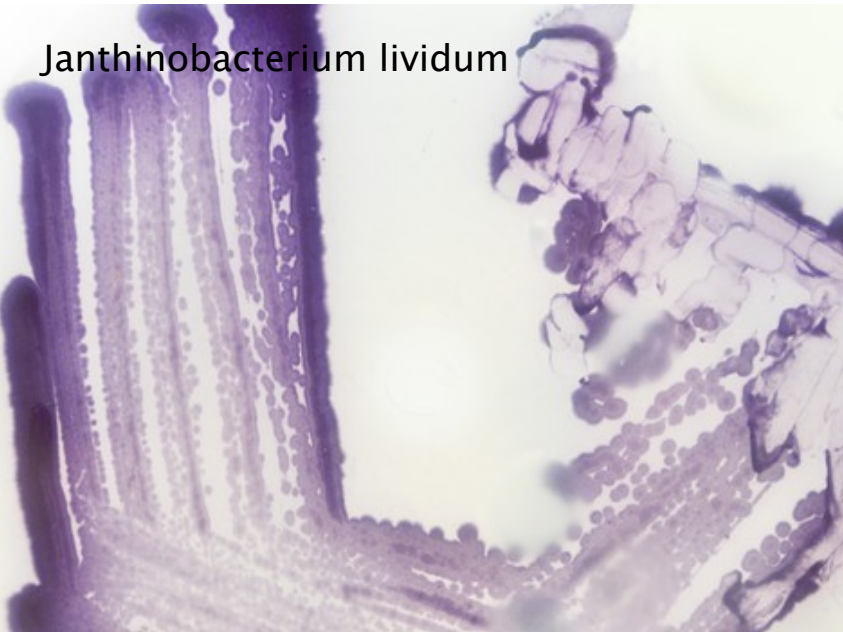




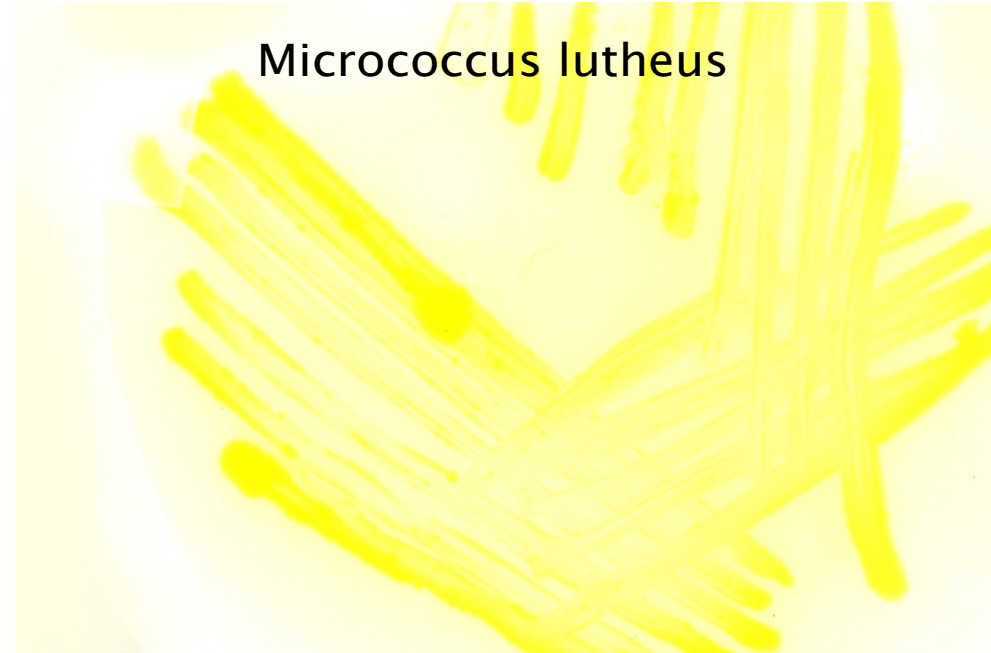
Our BHA microbes

Petshop.bio

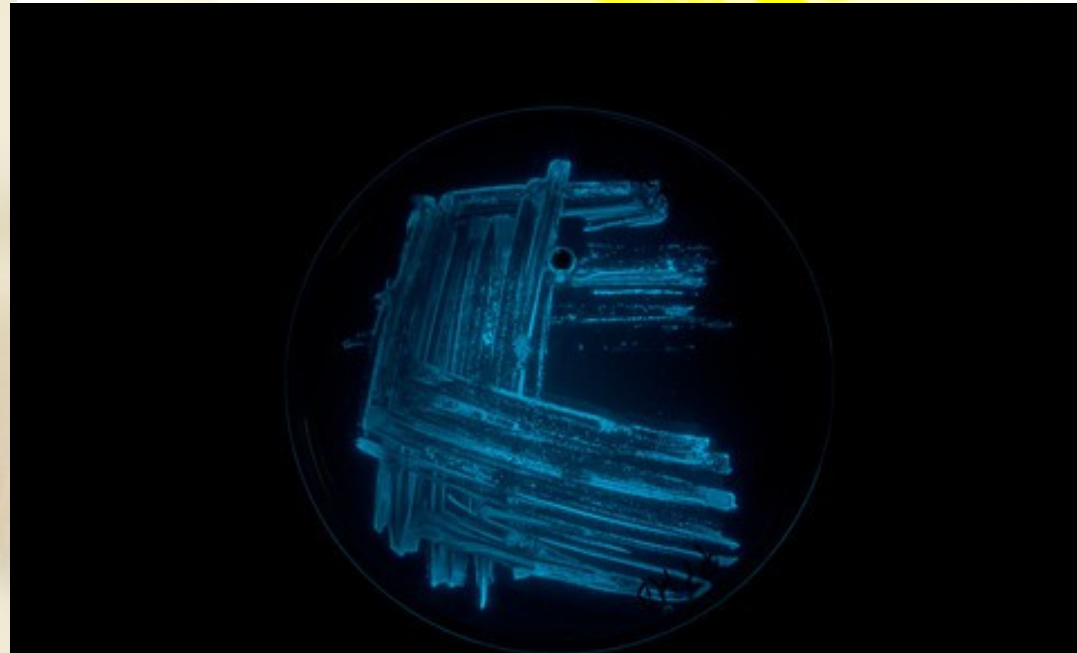
Janthinobacterium lividum



Micrococcus luteus



Arthrobacter agilis





Our BHA microbes



Symbiotic Culture of Bacteria and Yeast =
SCOBY



Our BHA microbes



Aspergillus niger

- Black fungus
- Goes where it wants and does what it wants

Mycelium

- White fungus
- Fluffy

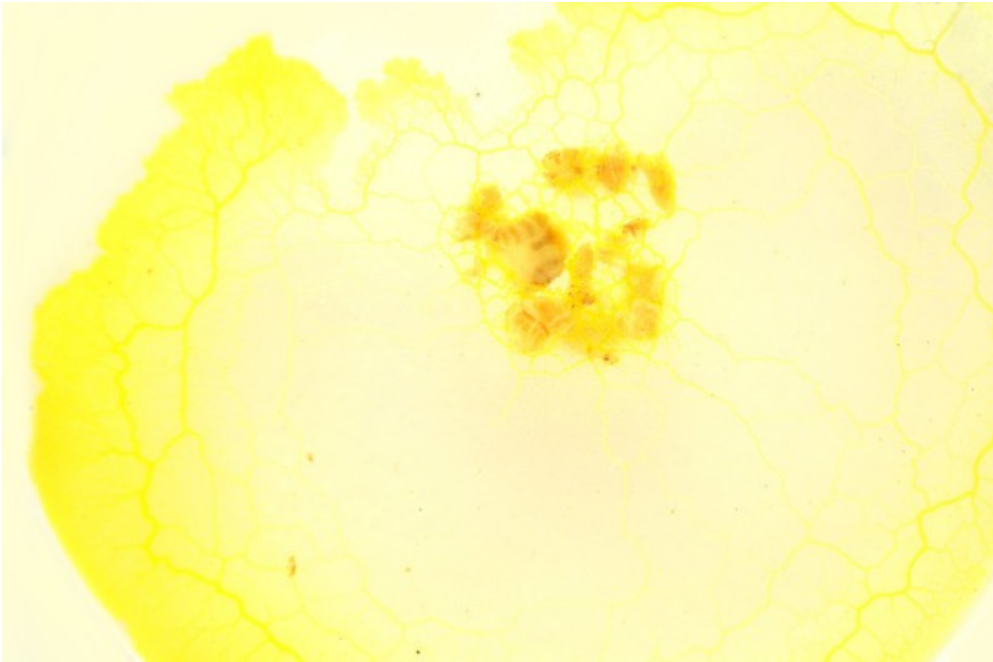




Our BHA microbes

Slime Mould

- Memory



<https://vimeo.com/88166497>



BYOM...but!

- Non-pathogenic
- Class 1



Classification

- Bio safety level number indicates the level of regulations that need to be in place to prevent contamination.
- Types of organisms allowed per level:
 - 1) Well characterized non pathogenic organisms to humans
 - 2) Micro organisms with high infection doses, and known cures
 - 3) Micro organisms with low infection doses, and known cures
 - 4) Micro organisms with extremely low infection doses, severe disease and no cure





Please note

- Only non-pathogenic microbes are used in the Academy
- Wash your hands before and after experimenting
- Do not eat or drink next to the microbes





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