



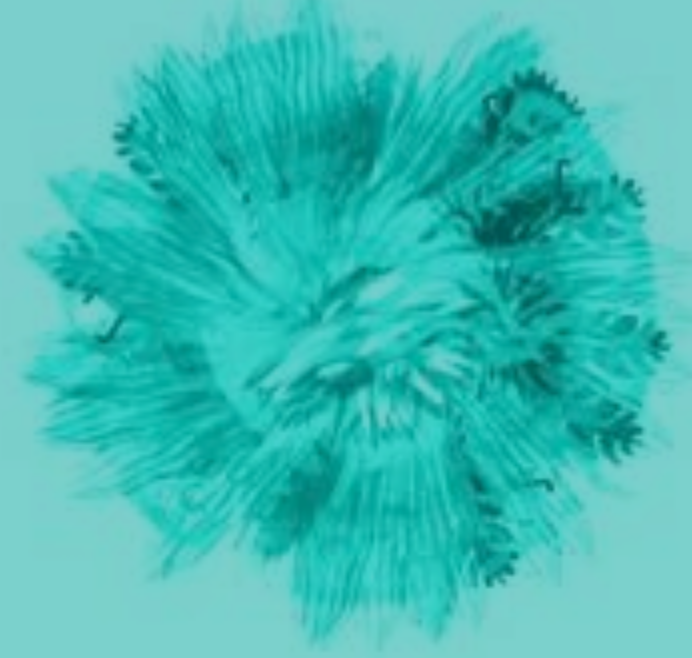
NEANDERTHAL

HOMO SAPIENS NEANDERTHALENSIS
MICROCEPHALIN GENE, PARTIAL CDS



MELICOPE

MELICOPE SP. WOOD 866 PARTIAL
NIA GENE INTRON, SPECIMEN
VOUCHER PTBG:WOOD 866



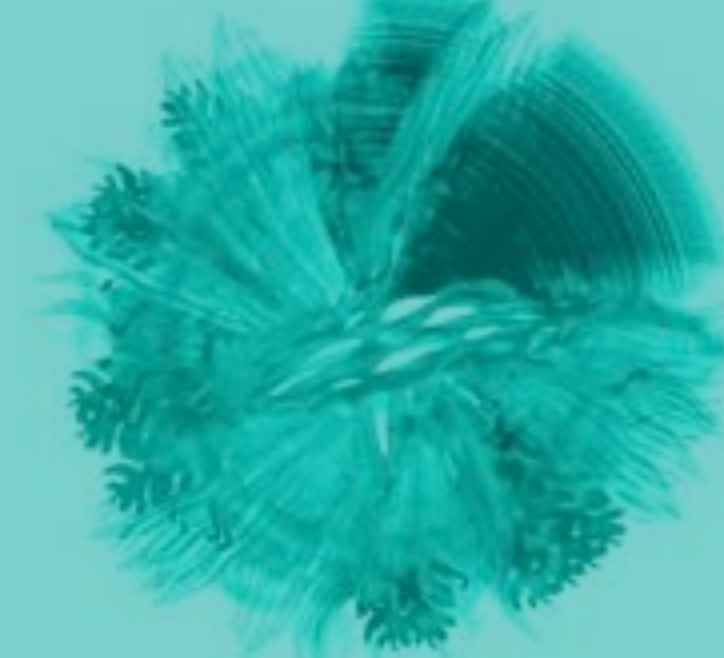
Y CHROMOSOME

M. MUSCULUS (CBA/CA) Y
CHROMOSOME SPECIFIC REPETITIVE
DNA (CLONE M-/90)



E. COLI

ESCHERICHIA COLI O57:H7 STR.
SAKAI DNA, COMPLETE GENOME



ANOLIS

JAA0F0.Y ANOLIS SAGREI LIMB BUD
ANOLIS SAGREI cDNA 5', mRNA
SEQUENCE



RATTUS

UI-R-CN-CMO-P--O-UI.3 UI-R-CN
RATTUS NORVEGICUS cDNA CLONE
UI-R-CN-CMO-P--O-UI -, mRNA
SEQUENCE

Visualizing Biodesign

Transforming Research Through Interactive Technology

Pat Pataranutaporn (ppataran@asu.edu),
Aura Ontiveros Valencia (Aura.Ontiveros@asu.edu),
Kenro Kusumi (kenro.kusumi@asu.edu)



Bio design

Bio

=

Life

Biology

Biological

**[creation of a
plan, object,
or a system]**

=

design

Biodesign

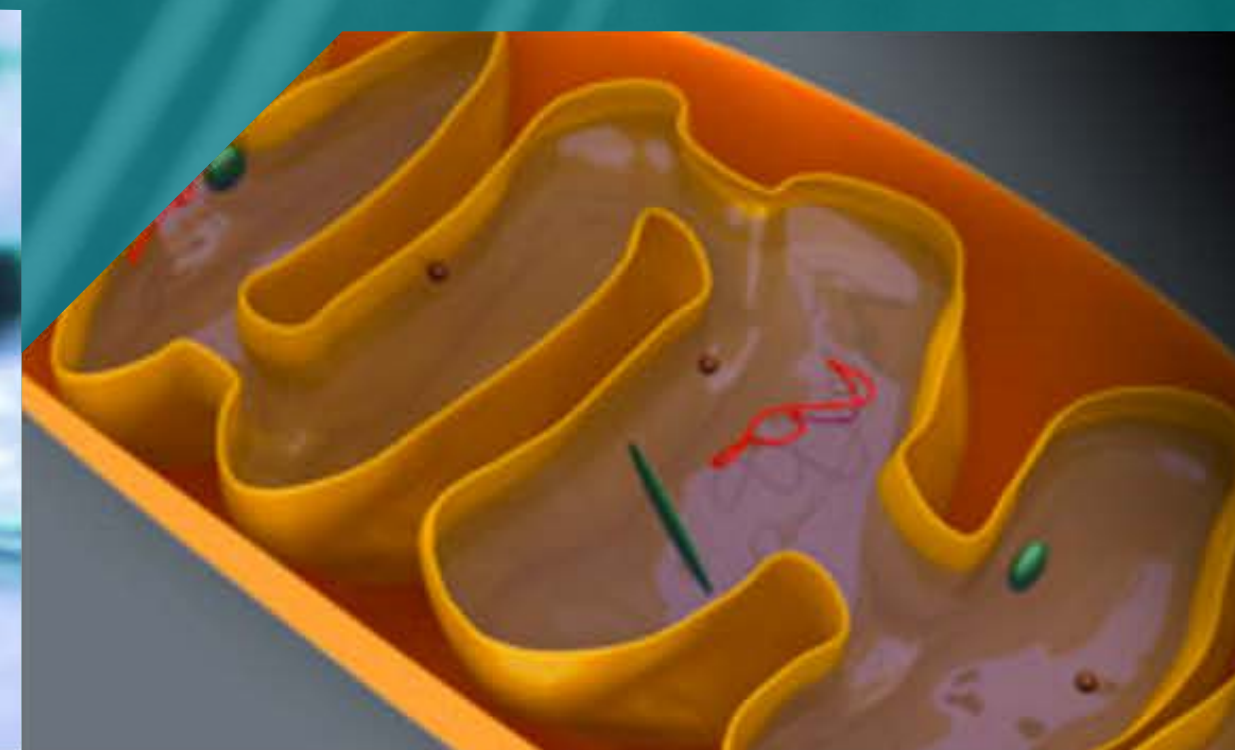
Understanding & Designing biological system to solve global challenges



Environmental Biotechnology



Innovations in Medicine



Bioenergetics



Sustainable Health

global challenges

Scientist

Public

Politician

Reporter

Engineer

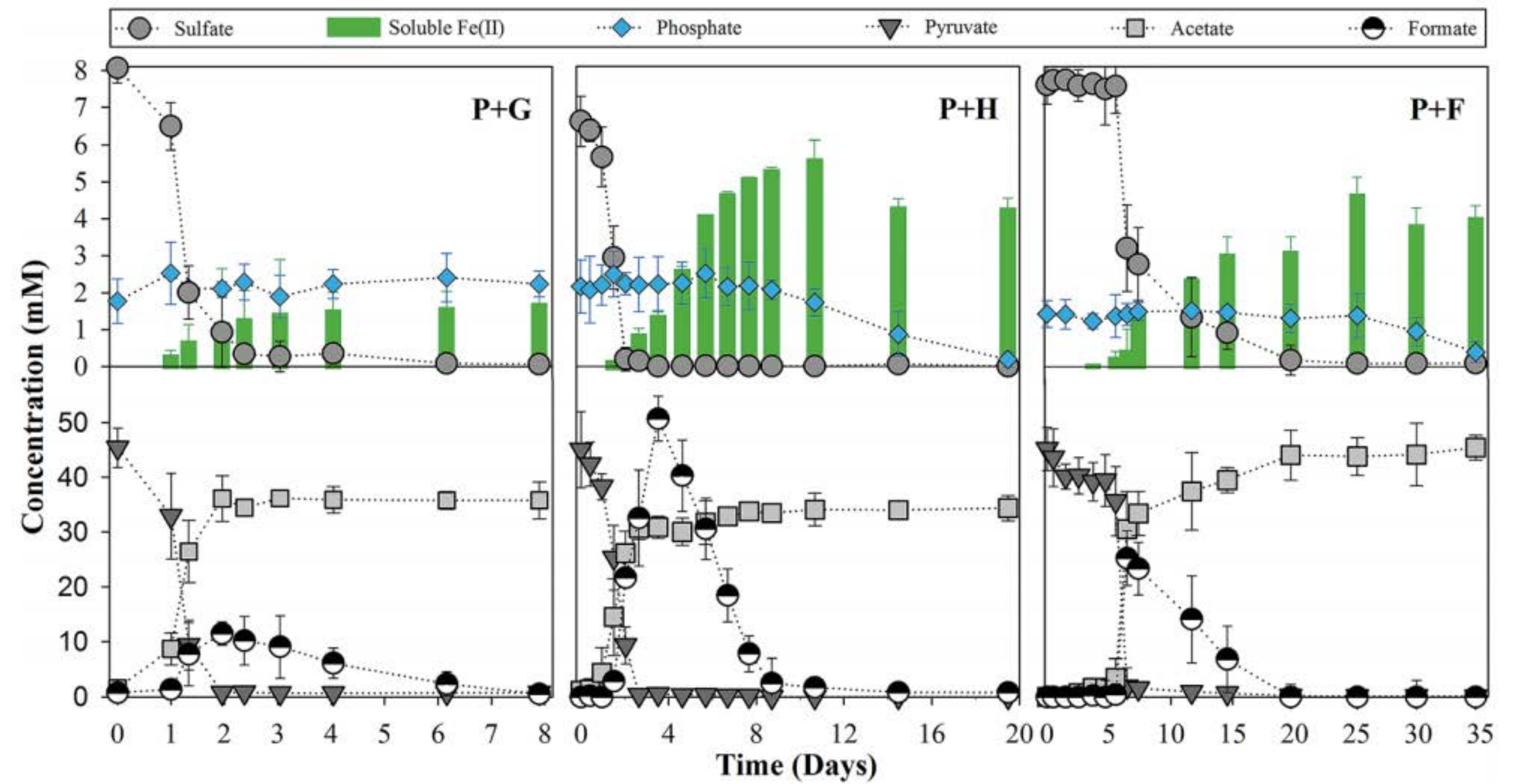
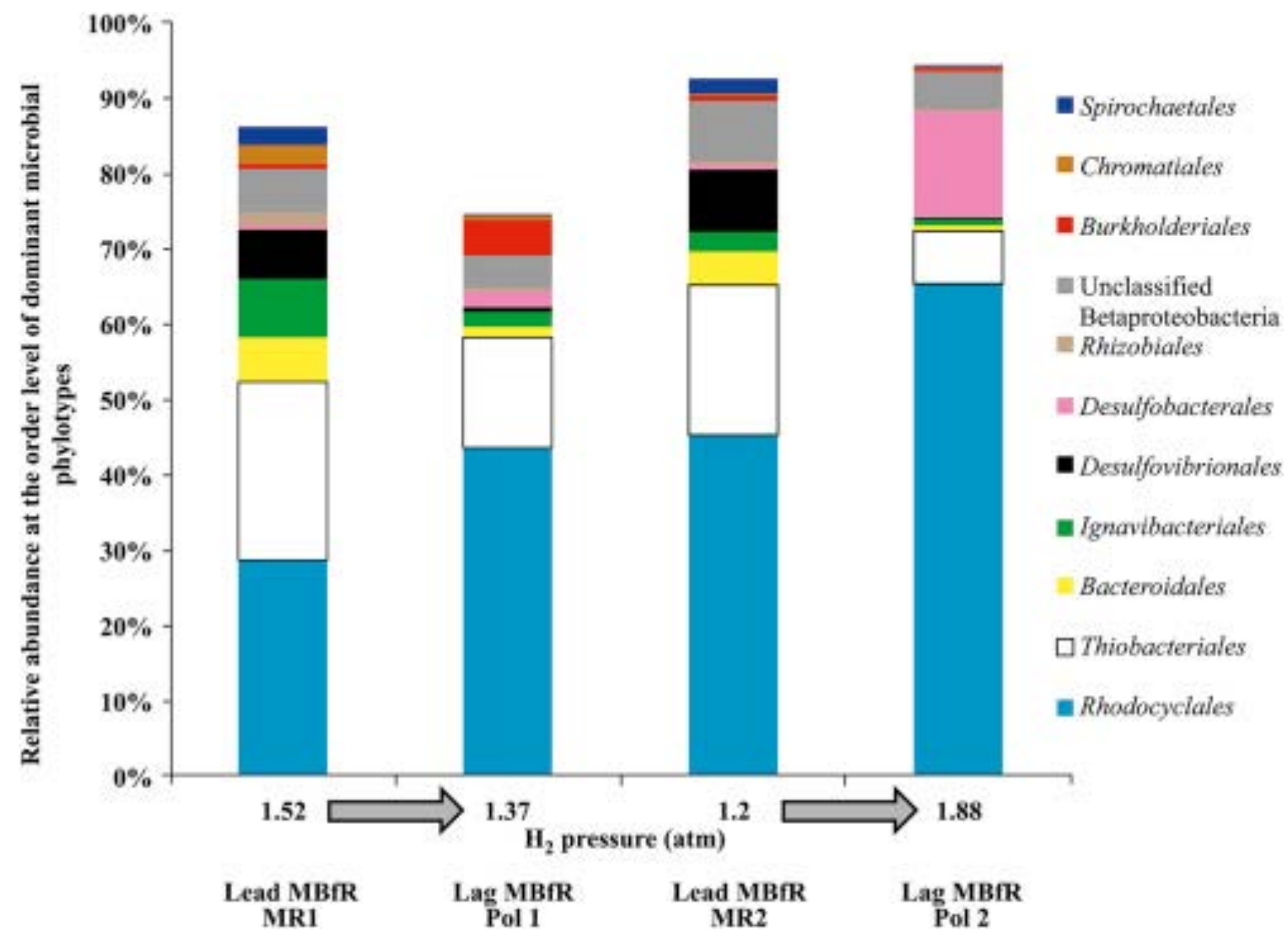
Business person

Educator

Researcher

[Academia]

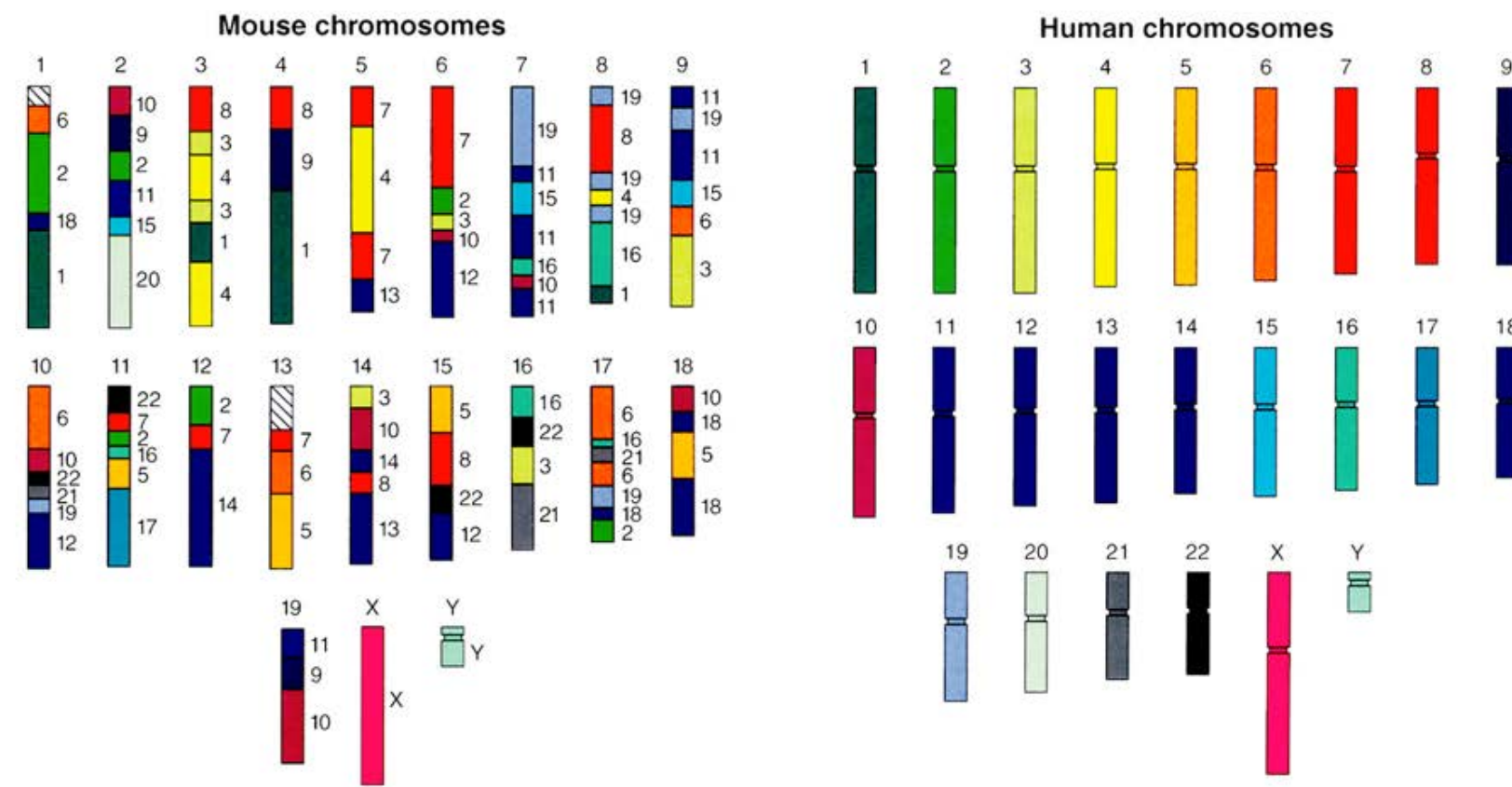
[Academia]



Aura Ontiveros-Valencia^{a, b}, Youneng Tang^{a, 1}, Rosa Krajmalnik-Brown^{a, c},  , Bruce E. Rittmann^{a, c}, 

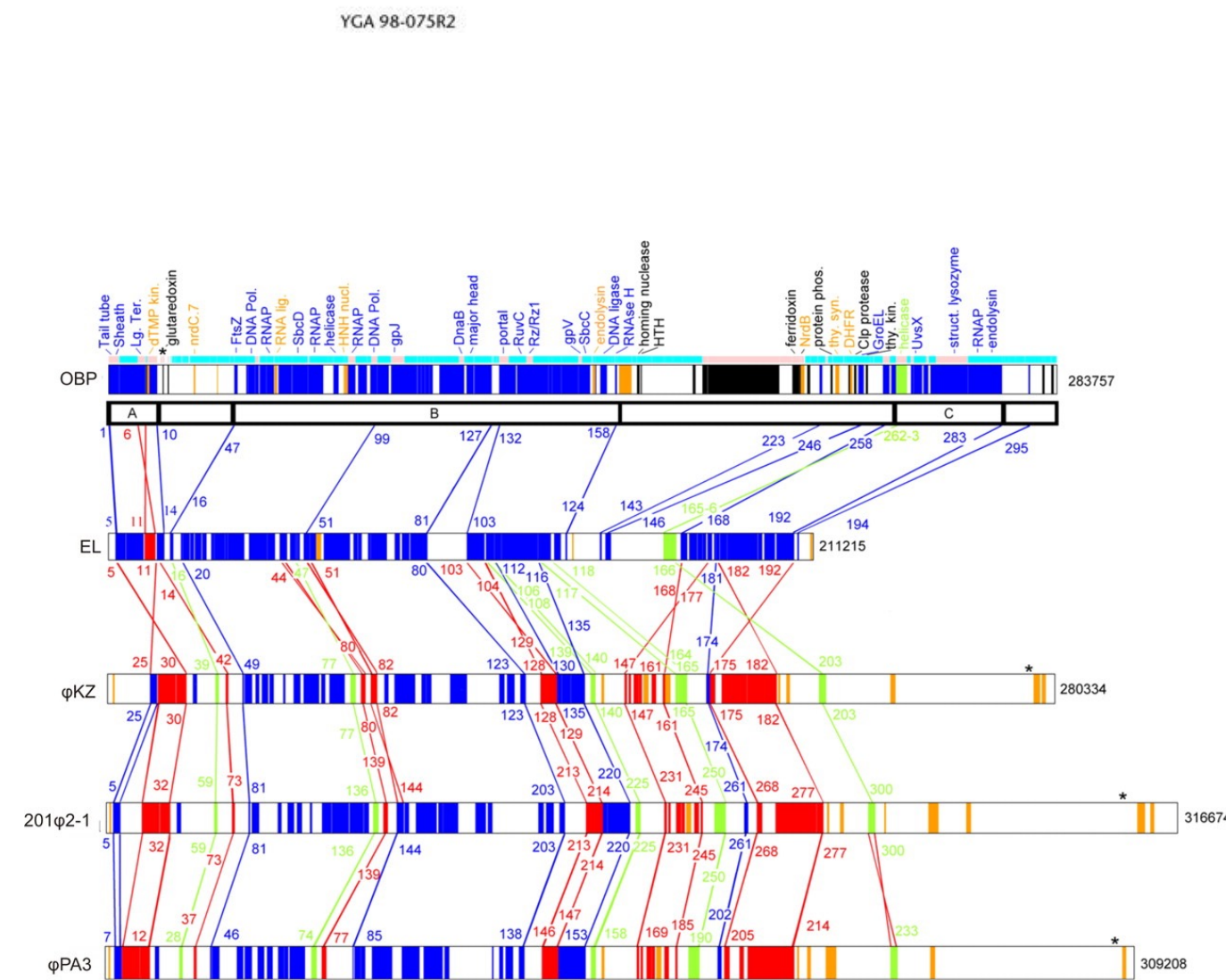
Chen Zhou,^{*a} Zhuolin Liu,^a Pat Pataranutaporn,^a Raveender Vannela,^a Kim F. Hayes^b and Bruce E. Rittmann^a

Mouse and Human Genetic Similarities

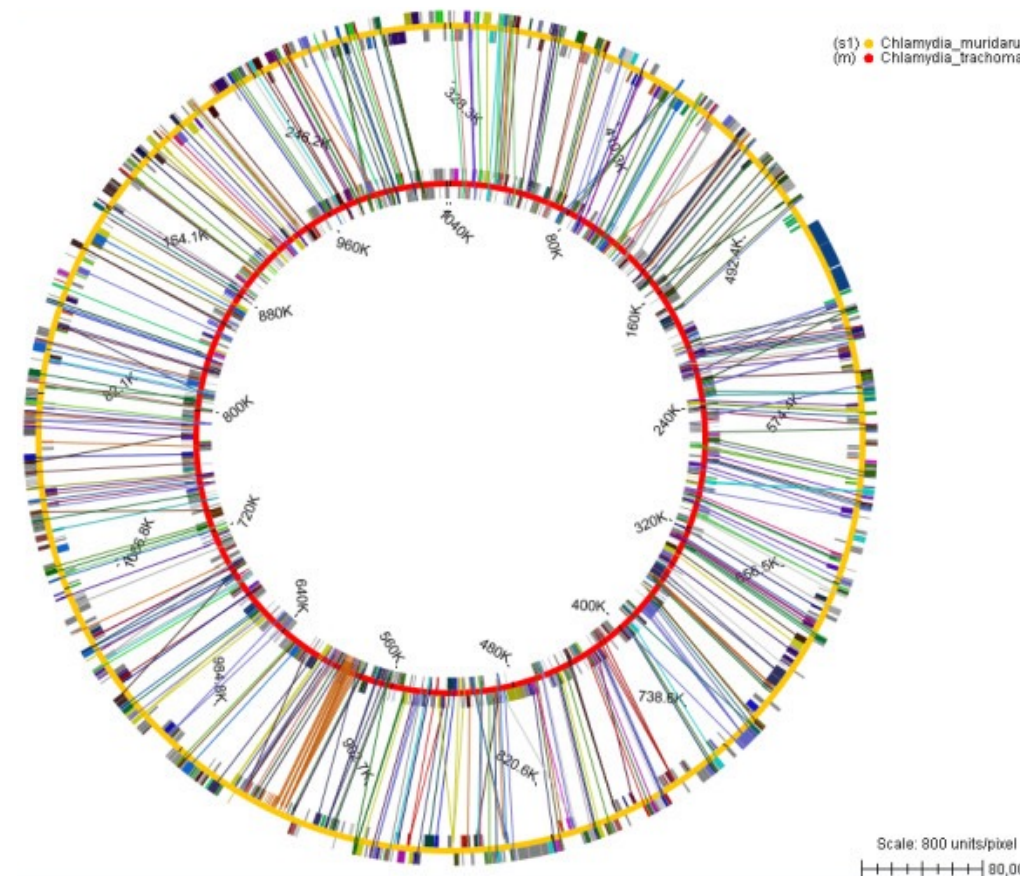


Courtesy Lisa Stubbs
Oak Ridge National Laboratory

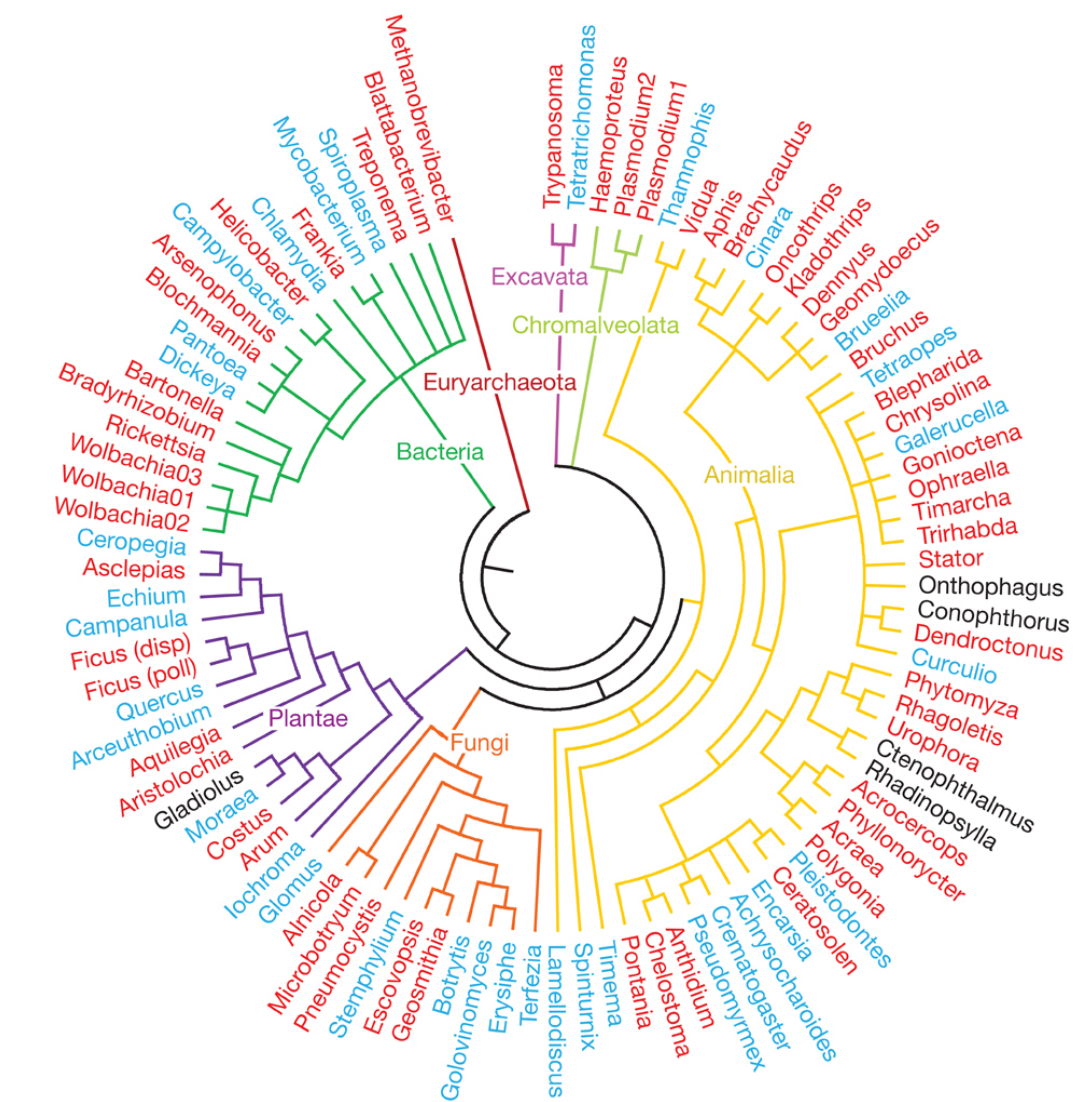
Bioinformatics Visualization



Complete Genome Sequence of the Giant Virus OBP and Comparative Genome Analysis of the Diverse ϕ KZ-Related Phages



Bacterial genome comparison. The comparison of two bacterial genomes (*Chlamydia trachomatis* and *Chlamydia muridarum*)



Ecological interactions are evolutionarily conserved across the entire tree of life.

Objectives of this work

We explore the potential of interactive media towards advancing the public awareness of environmental biotechnology research.

Interactive media



Interactive media can increase learning, ability to explore, and positive experience through feedback (Hoffman and Novak, 1995) The use of this media thus indirectly influence the perceived the benefits of searching for different types of information, based on interactions between media and user characteristics (Klein, 1998).

Interactive media



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Gamification

PHYTO VOLATILIZATION:

Some plants take up volatile contaminants and release them into the atmosphere through transpiration. The contaminant is transformed or degraded within the plant to create a less toxic substance before and then released into the air.



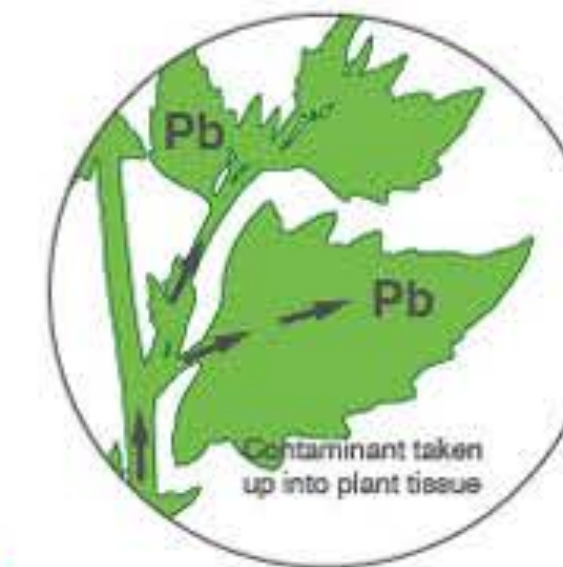
PHYTO DEGRADATION:

Plants take up and break down contaminants through the release of enzymes and metabolic processes such as photosynthetic oxidation/reduction. In this process organic pollutants are degraded and incorporated into the plant or broken down in the soil.



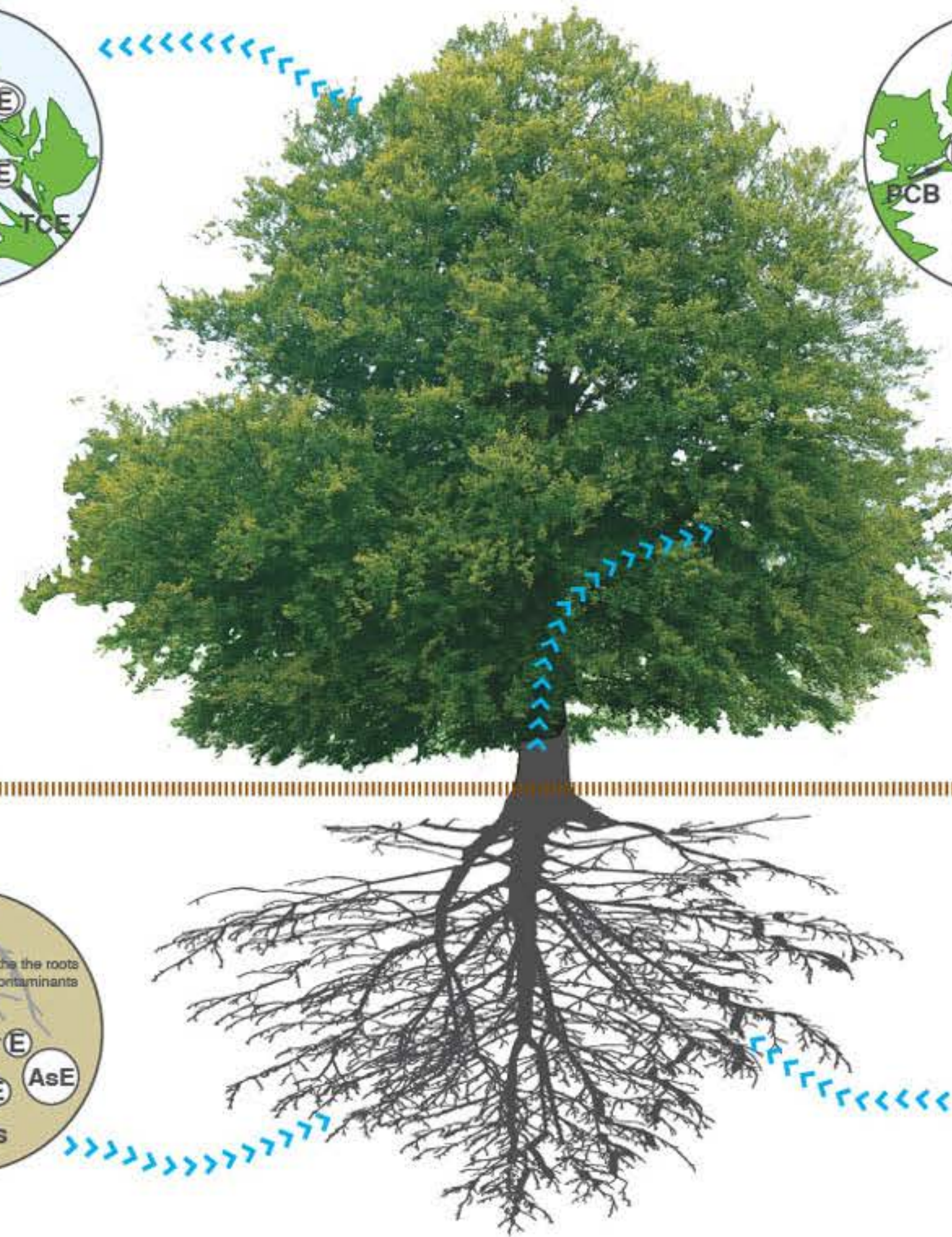
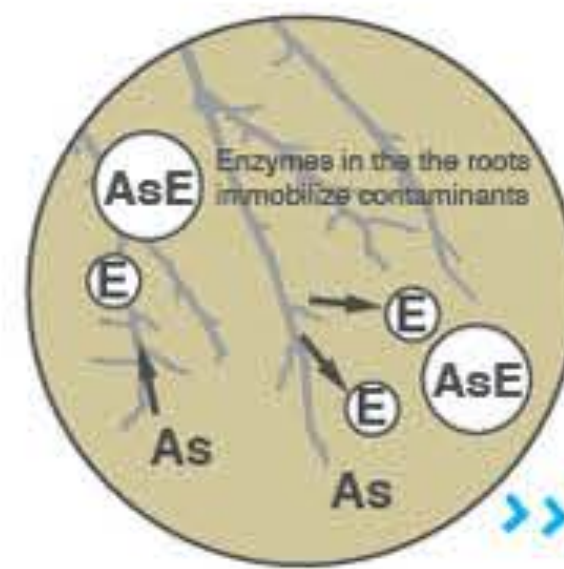
PHYTO EXTRACTION:

Plants take up contaminants - mostly metals, metalloids and radionuclides- with their roots and accumulate them in large quantities within their stems and leaves. These plants have to be harvested and disposed as special waste.



PHYTO STABILIZATION:

Some plants can sequester or immobilize contaminants by absorbing them into their roots and releasing a chemical that converts the contaminant to a less toxic state. This mechanism limits the migration of contaminants through water erosion, leaching, wind, and soil dispersion.



Character mapping



The green mission game

http://web.pathai.org/Green_mission



TO WIN THE GAME

GET THE OXYGEN

PLANT ! TO DEGRADE TOXICS

PROTECT THE HOUSE FROM THE MONSTERS.



Bioremediation

Destroy the monster

Biodegradation

Microbe bomb

Styrofoam invasion

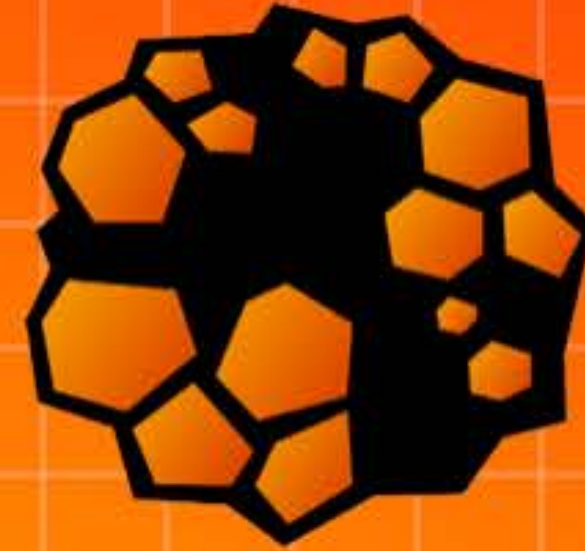
TOXIC CHEMICALS



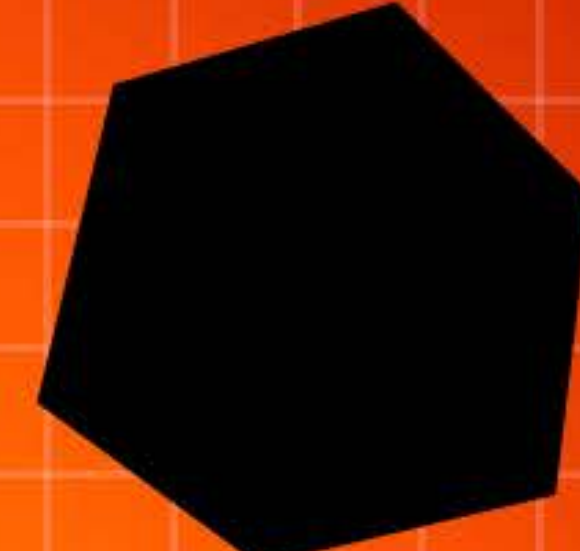
Arsenic(As)



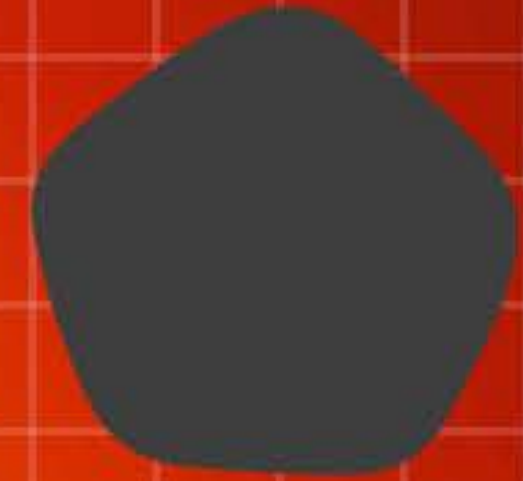
Lead(Pb)



Copper(Cu)

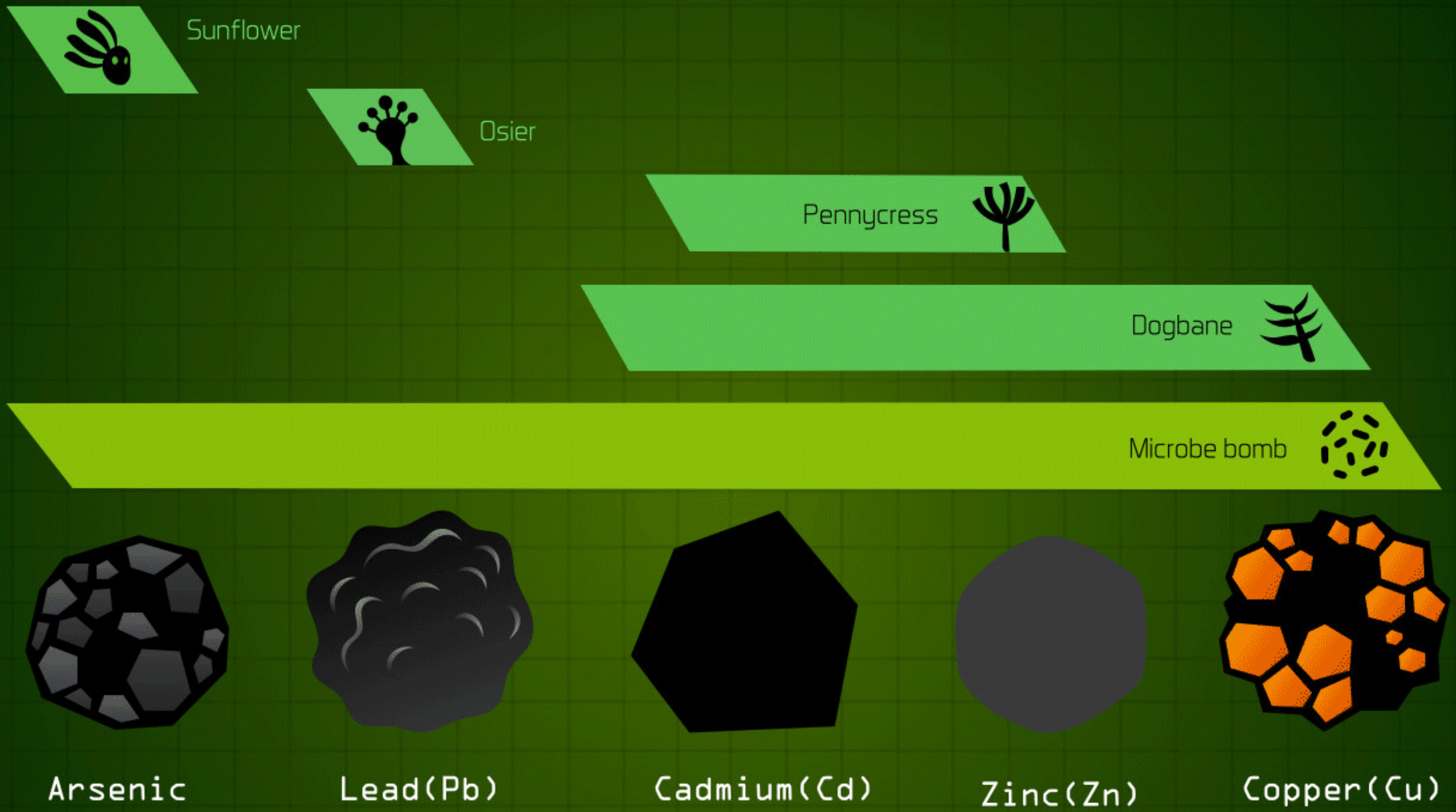


Cadmium(Cd)



Zinc(Zn)

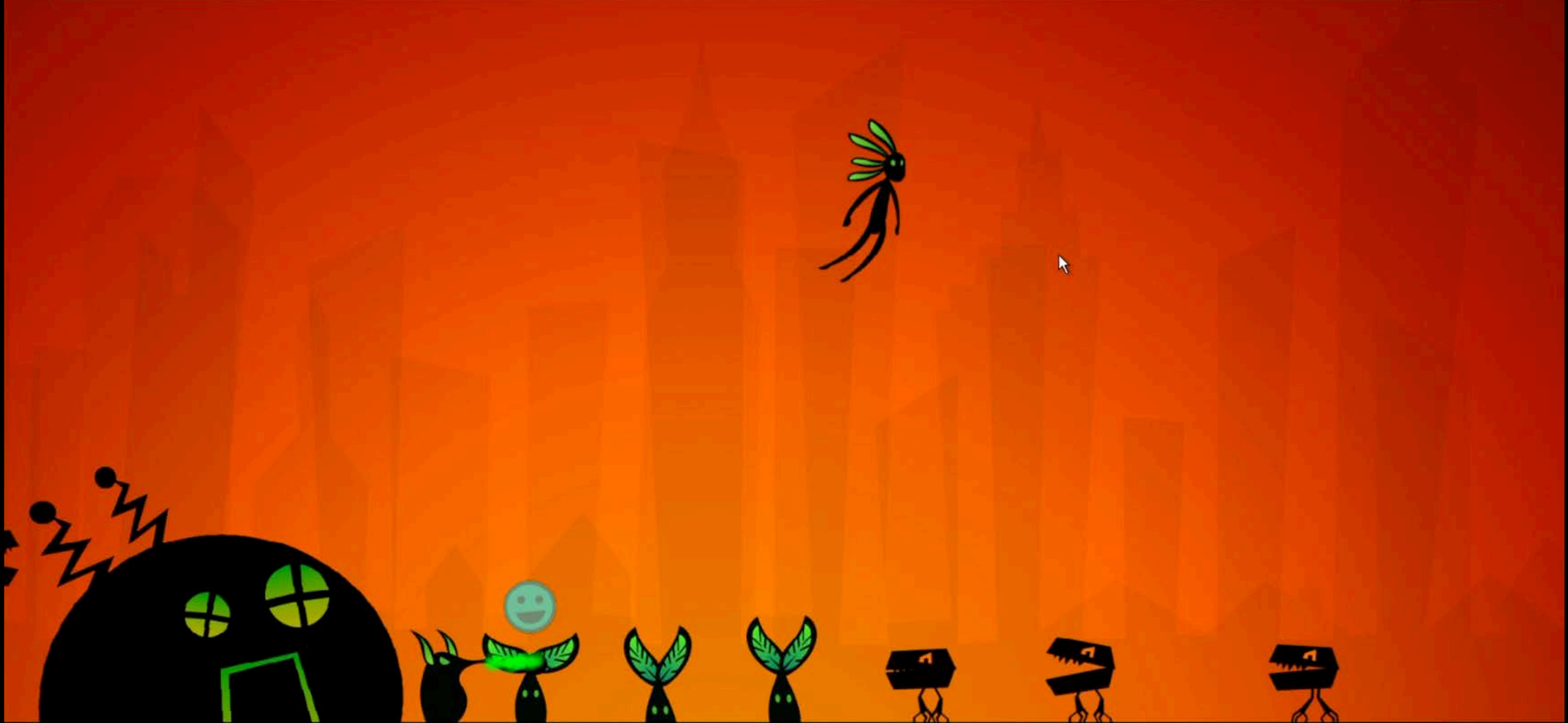
These are the toxic chemicals that are dangerous to human and plants, to destroy them you need to use the special plant call "hyperaccumulators"



BIODEGRADABILITY CHART



Power plant Bamboo Dogbane Osier Pennycress Shooter Sunflower Microbe bomb Remove O₂ 50 TOXICITY 100 MISSION TIME 00:01 10 Save Exist



Power plant 20 Bamboo 25 Dogbane 40 Osier 30 Pennycress 30 Shooter 30 Sunflower 30 Microbe bomb 50 Remove

O₂ 470 TOXICITY 100 MISSION TIME 00:03 56 Save Exist



| | | | | | | | | | | | | |
|--------------|----|----|----|----|----|----|----|--|----|----------|--------------------|-------|
| 20 | 25 | 30 | 40 | 30 | 30 | 30 | 50 | | 95 | 93 | MISSION TIME 00:01 | Save |
| OXYGEN POINT | | | | | | | | | | TOXICITY | | Exist |

WARNING





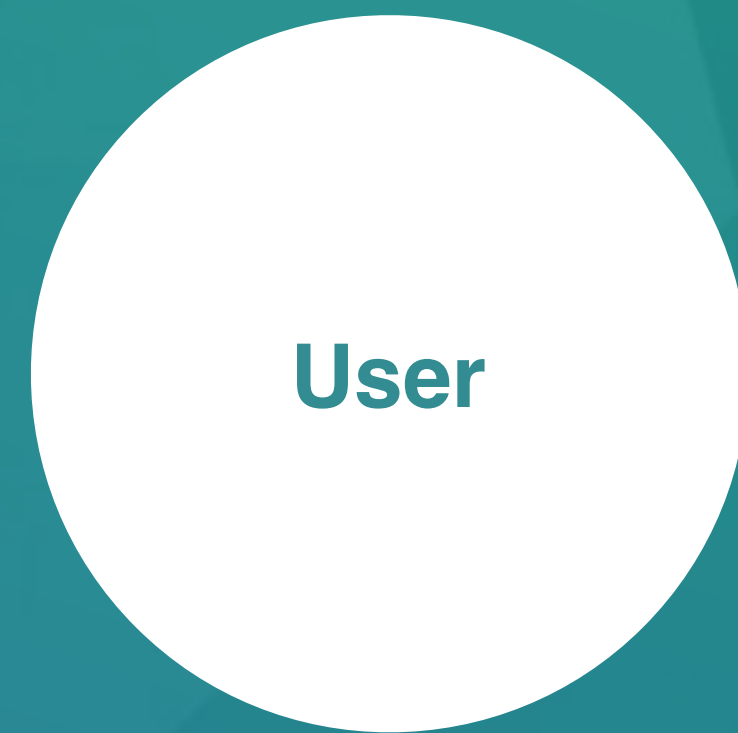
BEST APPLICATION
AWARD

CODEDAY CORVALLIS JAN 18 - 19, 2013



Embodiment Simulation

Character mapping



Bacteria

Good



Uranium

Bad



Remediate



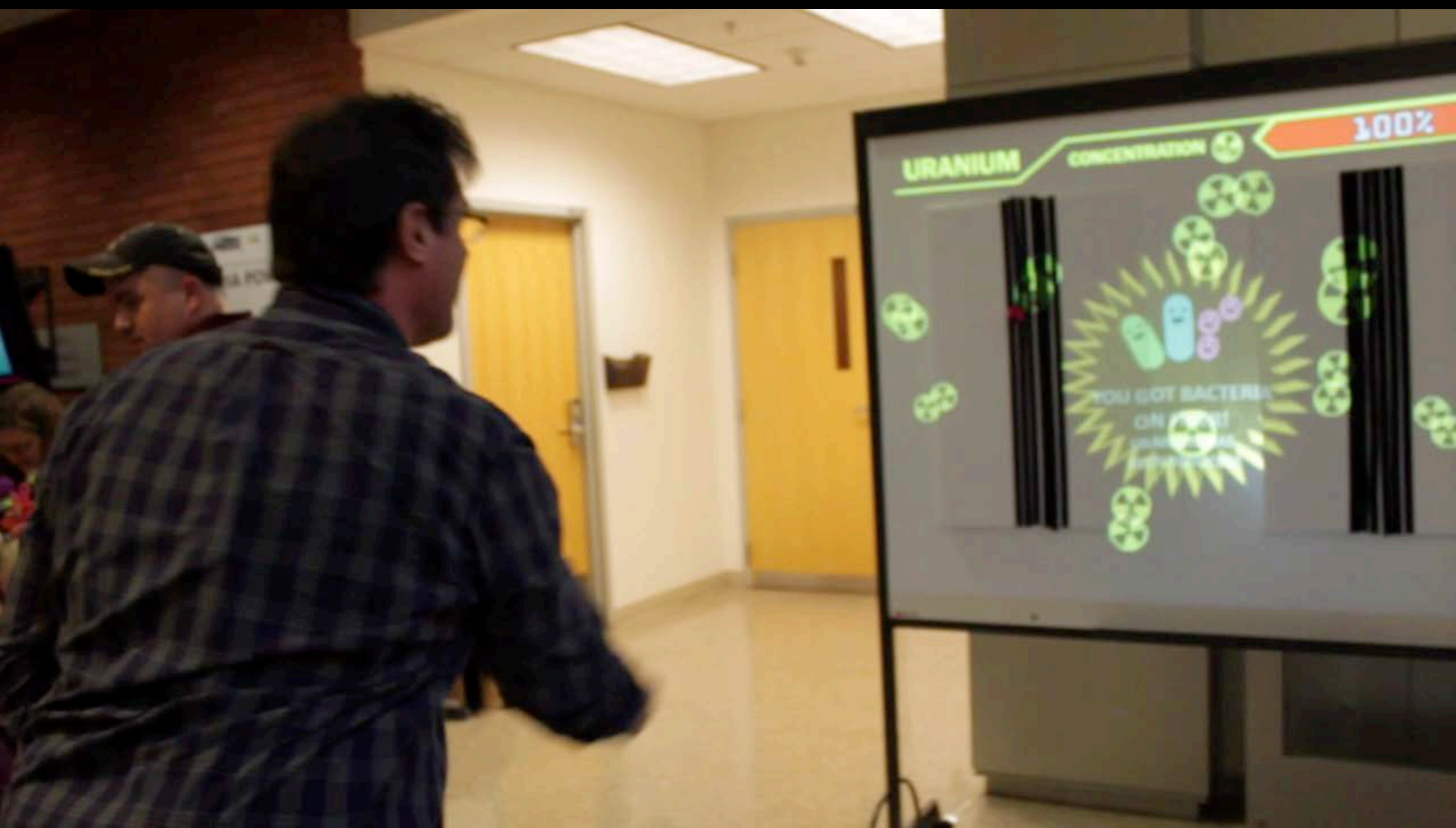
URANIUM

CONCENTRATION



10%













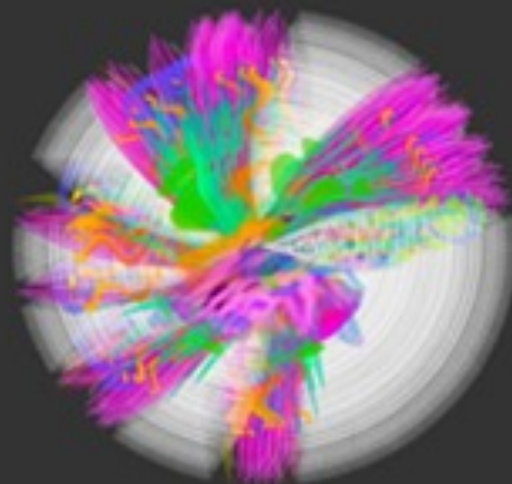
Visualization using arts

Data mapping

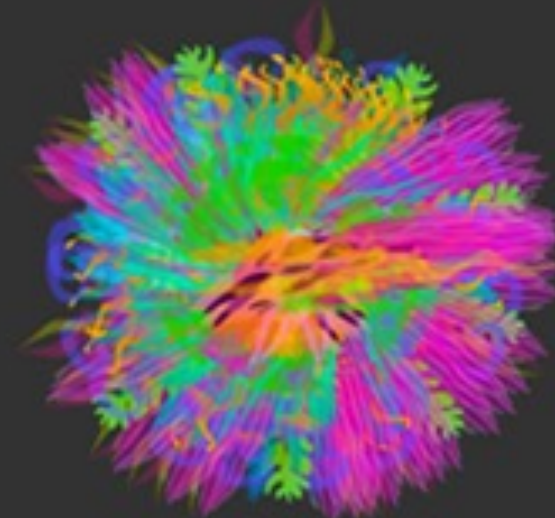




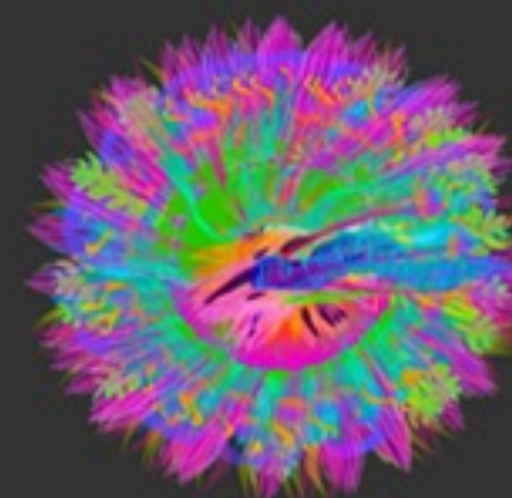
XENOPUS LAEVIS
ENDOGENOUS
RETROVIRUS XEN.
COMPLETE GENOME



HEPATITIS DELTA
VIRUS RNA, COMPLETE
GENOME



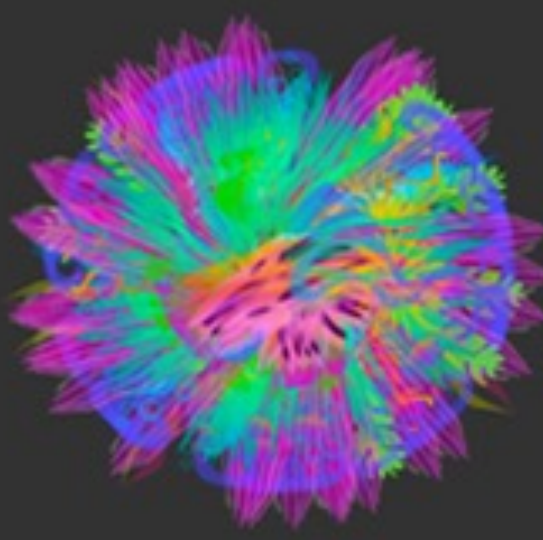
BOMBYX MORI CACTUS
MRNA FOR CACTUS,
COMPLETE CDS



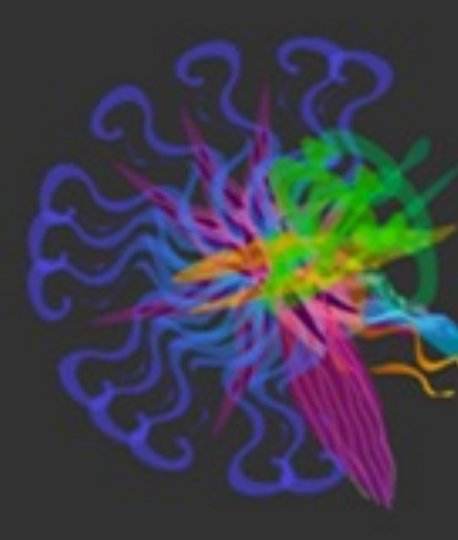
EBOLA VIRUS -
MAYINGA, ZAIRE, 976,
COMPLETE GENOME



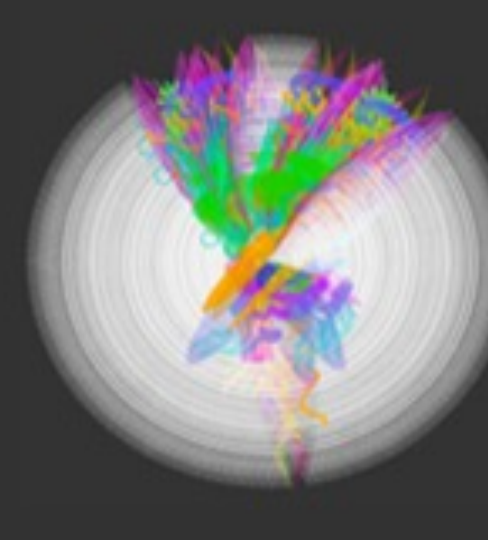
HOMO SAPIENS
NEANDERTHALENSIS
MICROCEPHALIN
GENE, PARTIAL CDS



ANOLIS CAROLINENSIS
MITOCHONDRIAL ND GENE FOR
NADH DEHYDROGENASE
SUBUNIT , HAPLOTYPE: TYPE
B, PARTIAL CDS



ESCHERICHIA
COLI O57:H7
STR. SAKAI DNA



PSEUDOMONAS PUTIDA
STRAIN R 6S RIBOSOMAL
RNA GENE, PARTIAL
SEQUENCE




DNArt Polymerase

DNArt Musicase

DNArt.Patthai.org

DNArt project x Pat

dnart.patthai.org/index.html


DNArt 

[Intro](#) [Science](#) [Art](#) [DNArt Polymerase](#) [DNArt Musicase](#) [Examples](#) [Researcher](#) [Contact](#)

DNArt

DNArt is a multidisciplinary project that is taking an inspiration from functional genomics to create a new type of graphic representation and artwork. DNArt mimics the way that genes encode the proteins that make each organism and species unique.

[DNArt Polymerase](#) [DNArt Musicase](#)





PTB-011F14.F Gon Pan troglodytes

```
laggacataaagagccatcagaatccagccccgactctggagccagg  
agtcccttctaataabltcagcatcatggcctggactcctccttct  
cctttccccgtgtacctcctcacttgct121gcccaggtaataga  
gatttcaaataccagccttggaggattcctgtgtcctcctttc18  
1taattcctaacatgtgtctgtttttgtttcagggtcgaattctca
```

DNA_template_length 551 [Build](#) [Replay](#) [Clear](#)

[Piano](#) [Zen](#) [Drum](#)

[Hide](#)

PTB-011F14.F Gon Pan
troglodytes STS
genomic (chimpanzee)

Samples [Hide](#)

| | | | | | |
|------------|------------|-------------|----------------|-----------------|-------------|
| Human | Chimpanzee | Neandertal | Woolly mammoth | Frog | Lizard |
| Star fish | Jacaranda | Lion | Virus | Chow Chow (Dog) | Cat |
| Jelly fish | Shark | Sun flowers | Lily | Lotus | Ebola Virus |

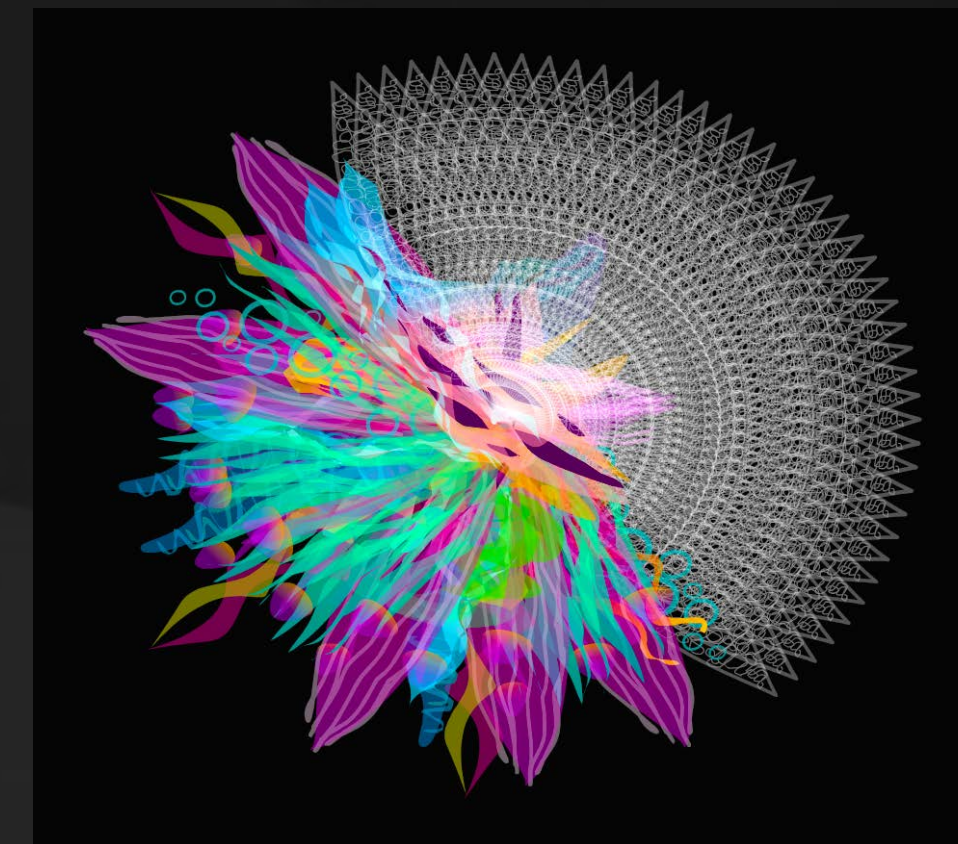
Visualizing Biodesign : Transforming Research Through Interactive Technology



Uranium Reduction



The green mission game



DNArt



**“Bio is the
New Digital”**

Joi Ito, Director of Medialab

Art science