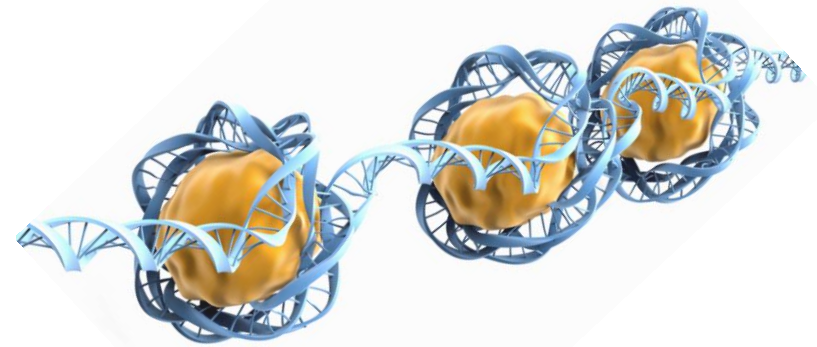


Gene by environment considerations for bio-restoration

Christina R. Steadman & Shawn R. Starckenburg
Bioscience Division, LANL

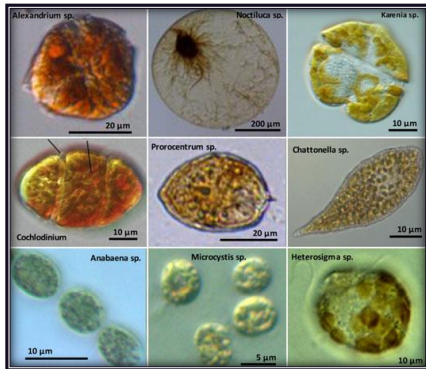
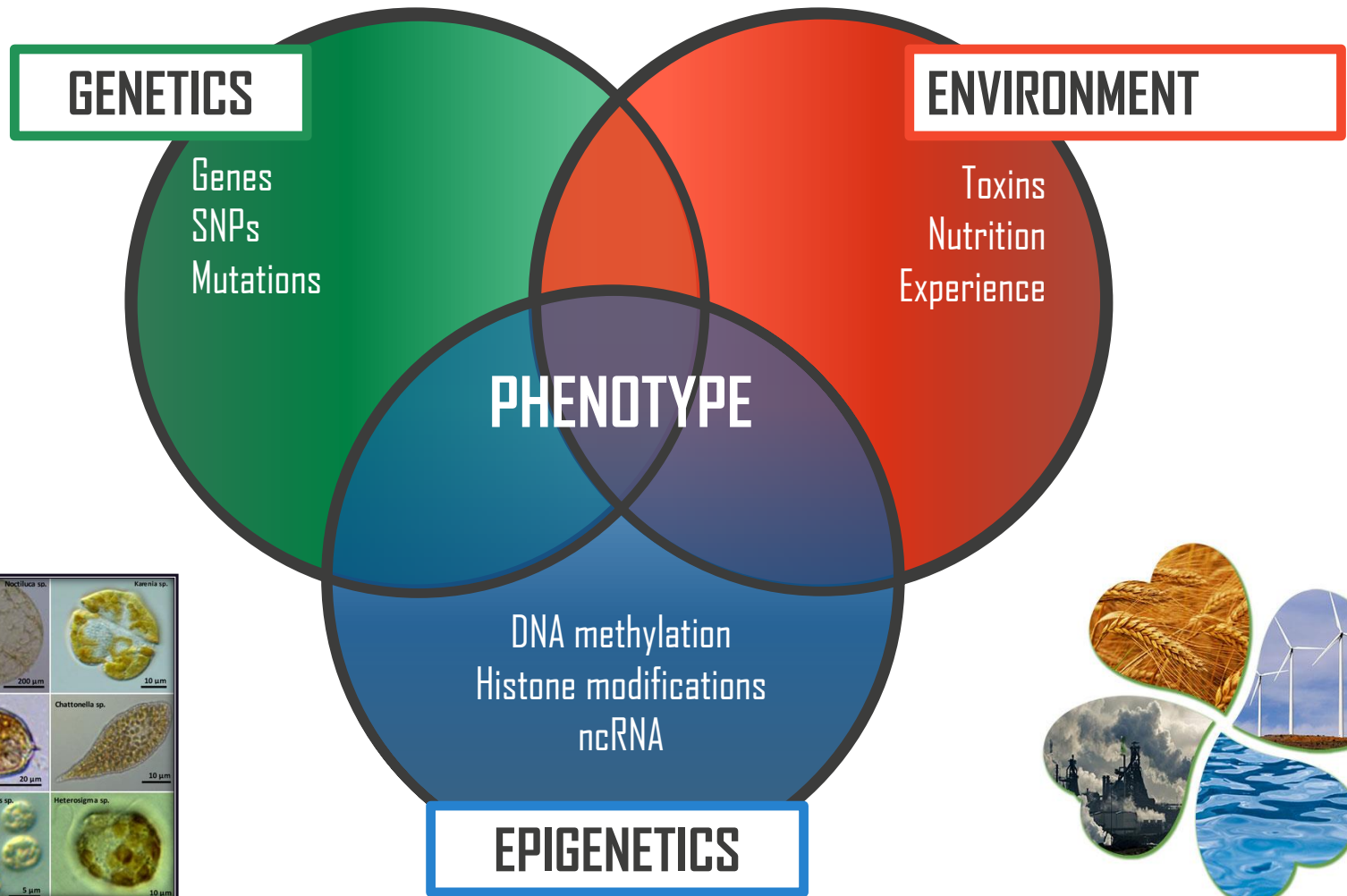


EERE BETO BioRestore Workshop
September 25, 2019



Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

The paradigm for understanding gene by environment interactions to control phenotype



Synthetic ecology: engineering biotic communities

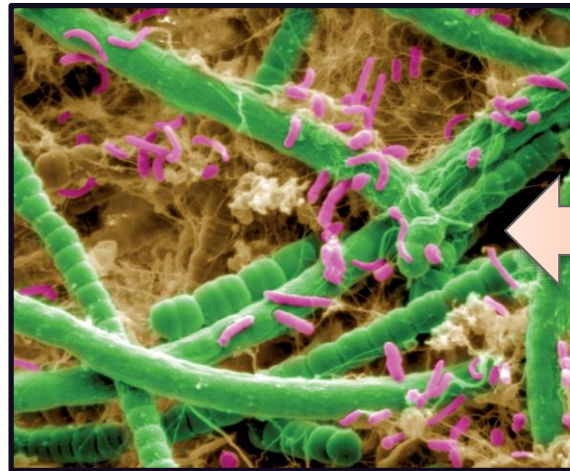
- Terrestrial restoration
- Create biotic communities with specific properties to maximize:
 - Yield/NUE
 - Stress tolerance
 - Remediation

(*bio- phyto- phyco-*)

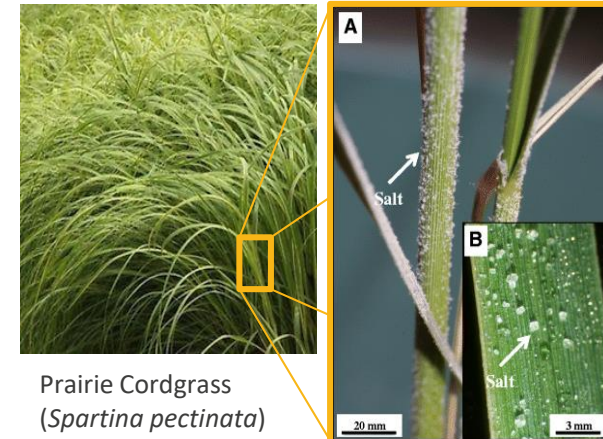
... May require rational design of entire biotic community

...which requires expertise and tech in biotic and epi/genomics

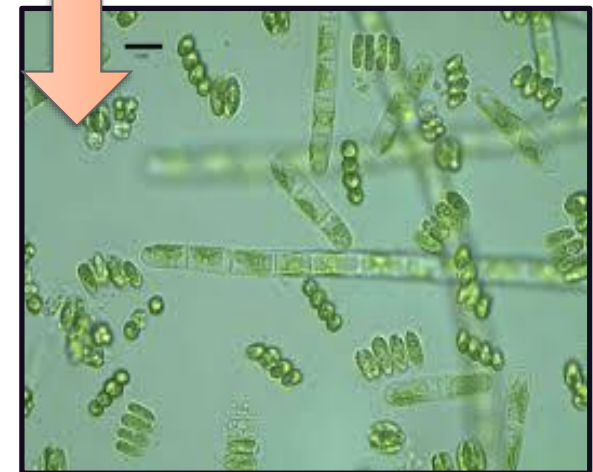
Alternative Feedstocks



Fredrickson *Science* 2015;348

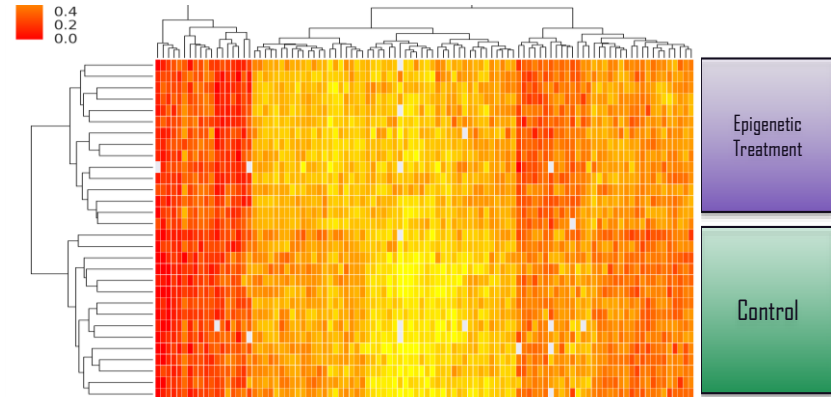
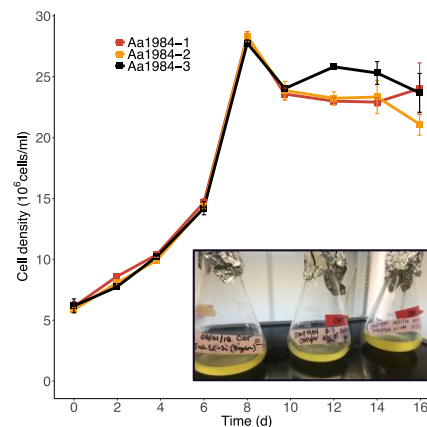
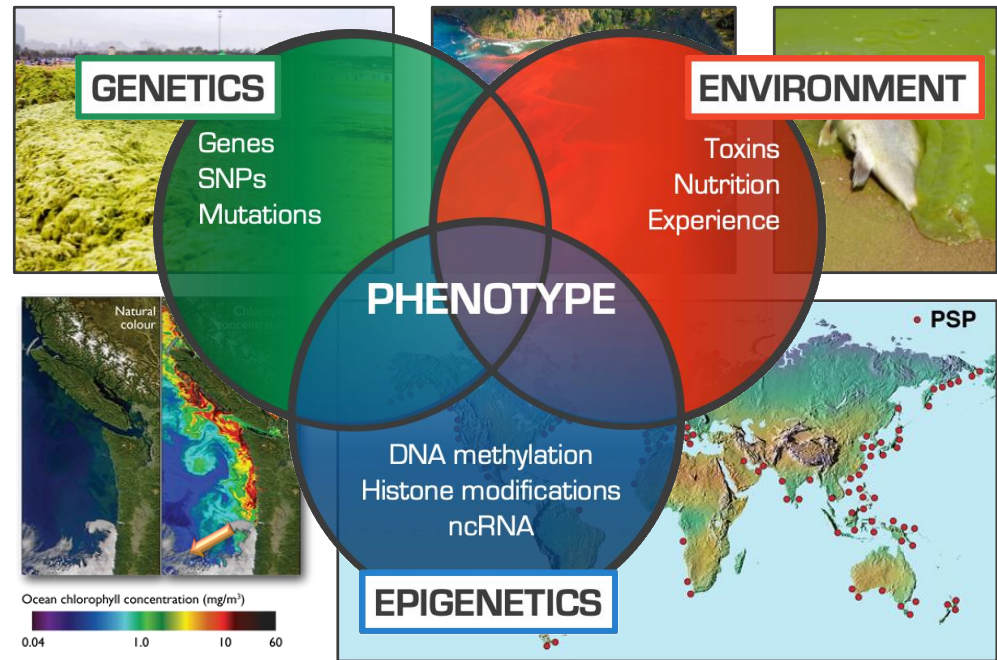


Rationally Designed Microbial Assemblages



Bio-restoration of harmful algae blooms

- Aquatic restoration
- Harmful algae blooms rapidly proliferate in response to environmental triggers
- Restore water quality
 - Environmental contaminants
- Enhance soil health
 - Nutrient uptake
- Create feedstock for bioeconomy
 - Organism growth/development





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Delivering science and technology
to protect our nation
and promote world stability

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