

20.109 MOD1

Genomic Instability

Fall 2021
Day 7

Bevin P. Engelward, *Sc.D.*
Professor of Biological Engineering

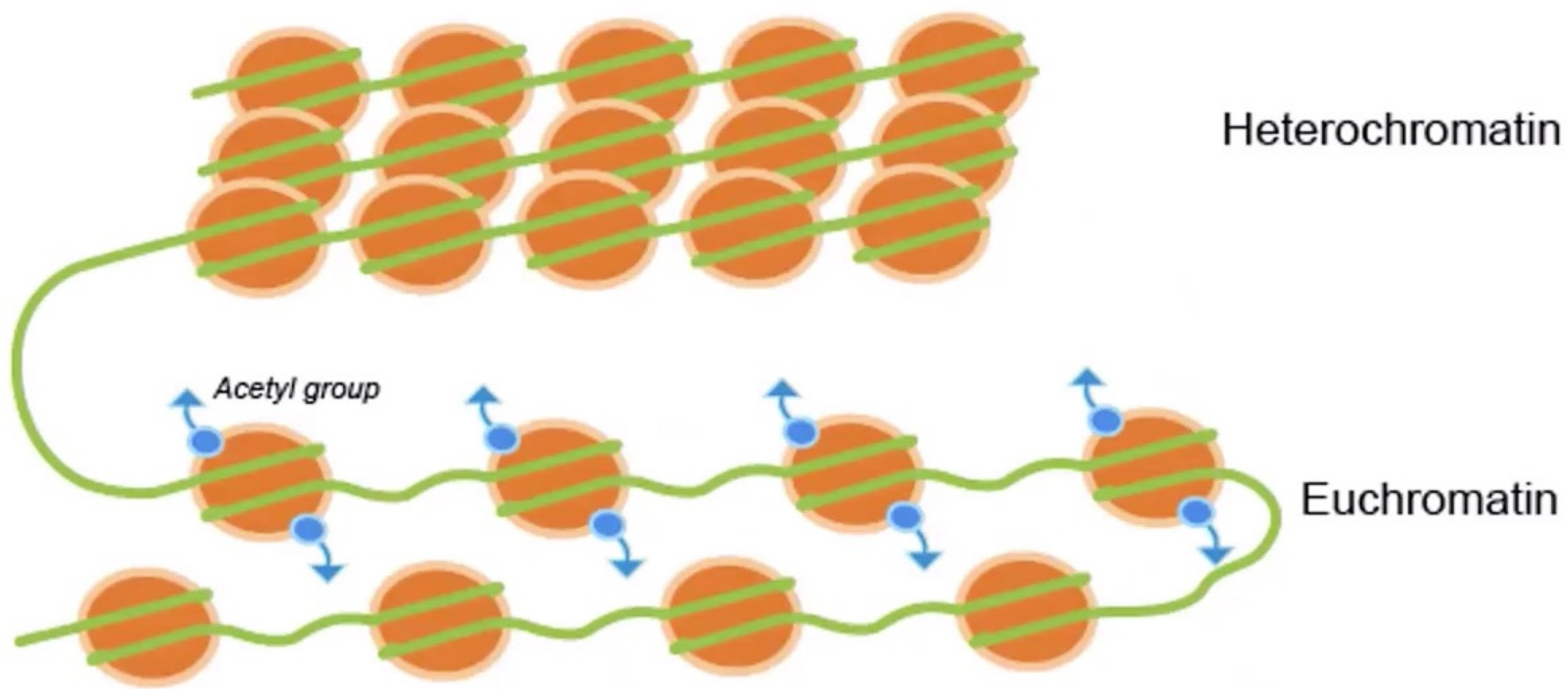
Gene Silencing

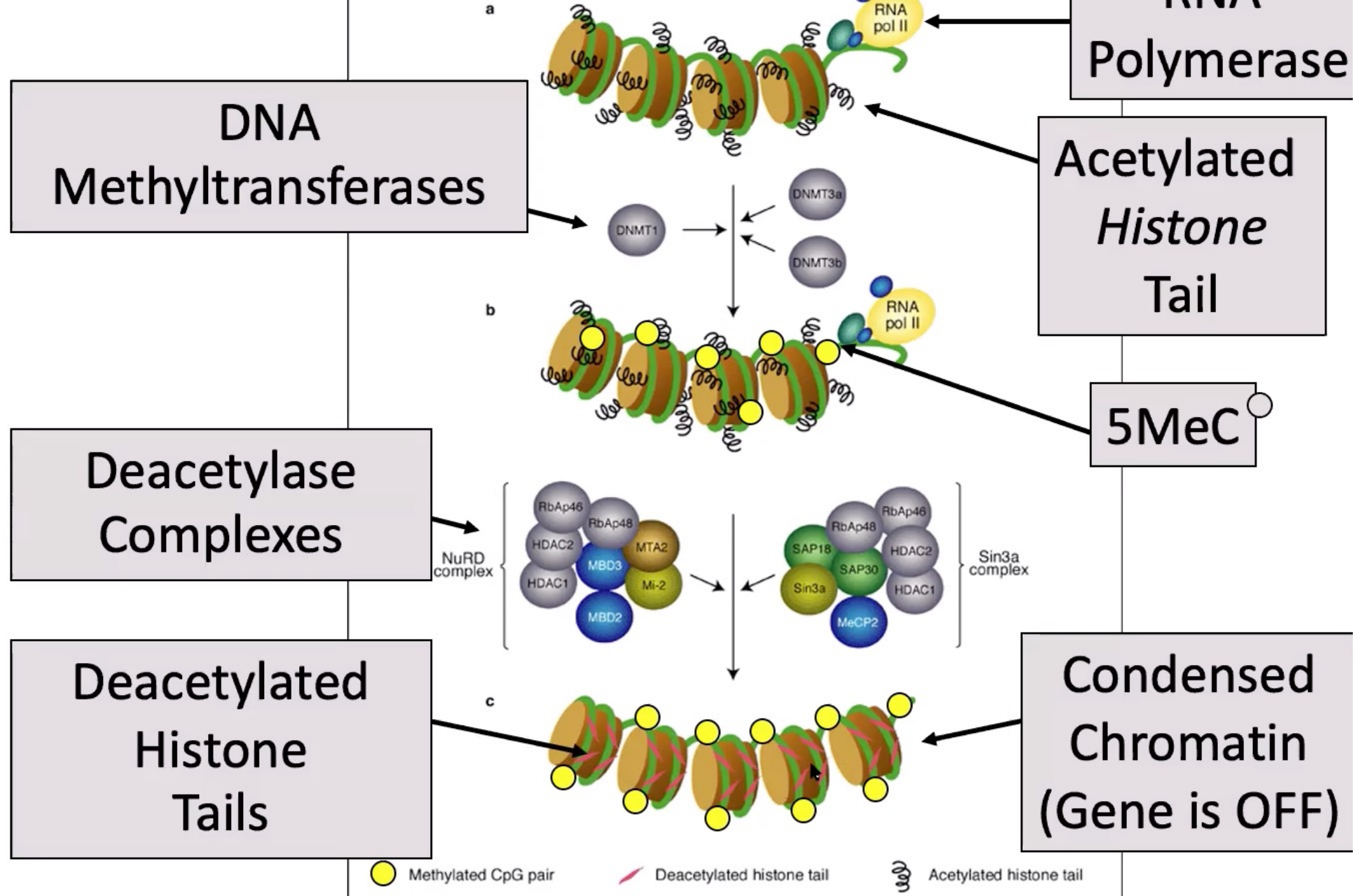
Drawing the DNA Bases

Public Health Support for the
Navajo Tribe

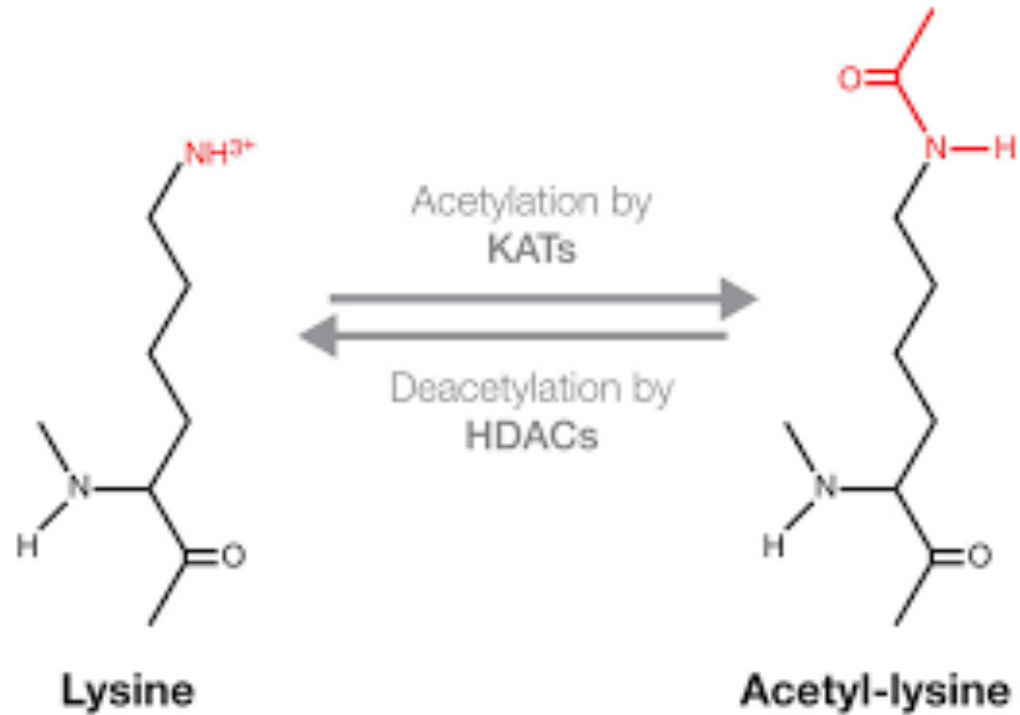
Overview and Thanks

Philosophy

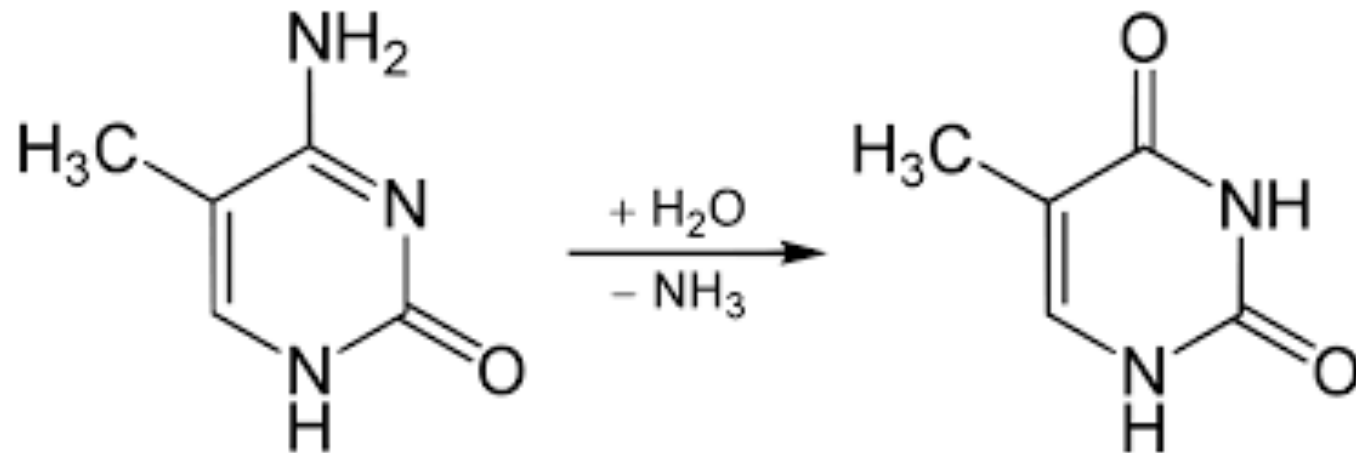




Acetylation of Lysine



Deamination of 5meC



Hydrolysis Converts
Amine to Carbonyl

To turn 5MeC back into C, the cell purposefully damages it and then removes the damaged base using BER!

~1/3 of All Point
Mutations are C to T at
CpG Sites

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DNA Base Drawing Competition

Rings

N's

Decorate

Double

Bonds/Hydrogens

Gene Silencing

Drawing the DNA Bases

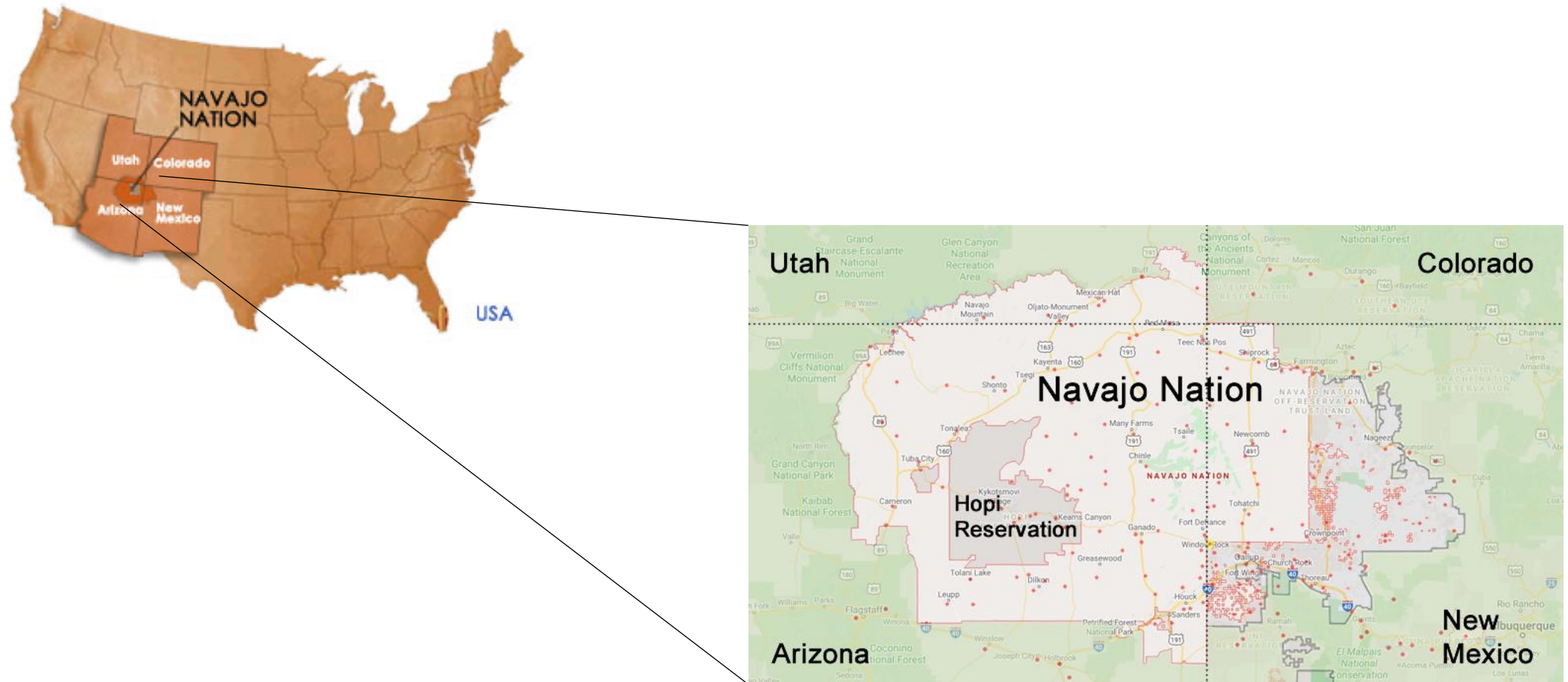
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Navajo Tribe

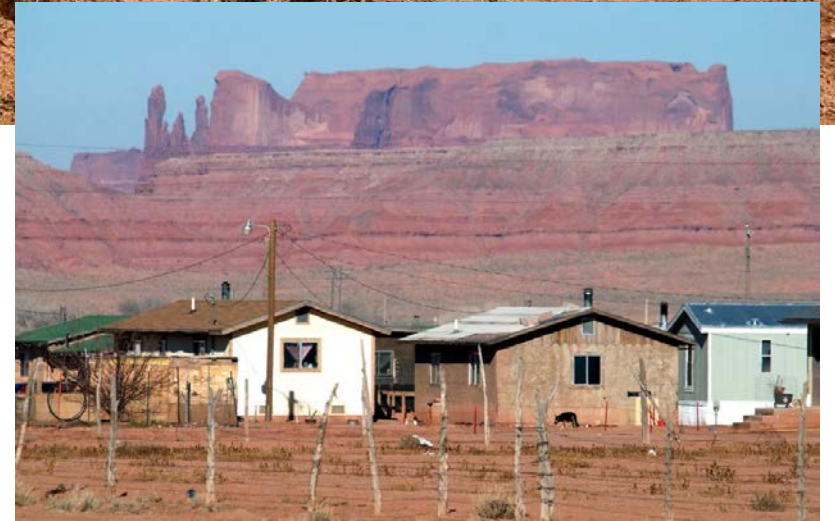
Overview and Thanks

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Use of the CometChip for
helping an Environmental
Justice Community:
The Navajo Tribe

166,826 Navajo/Native Americans live on the Reservation





The Navajo Nation is the
Second largest tribe.

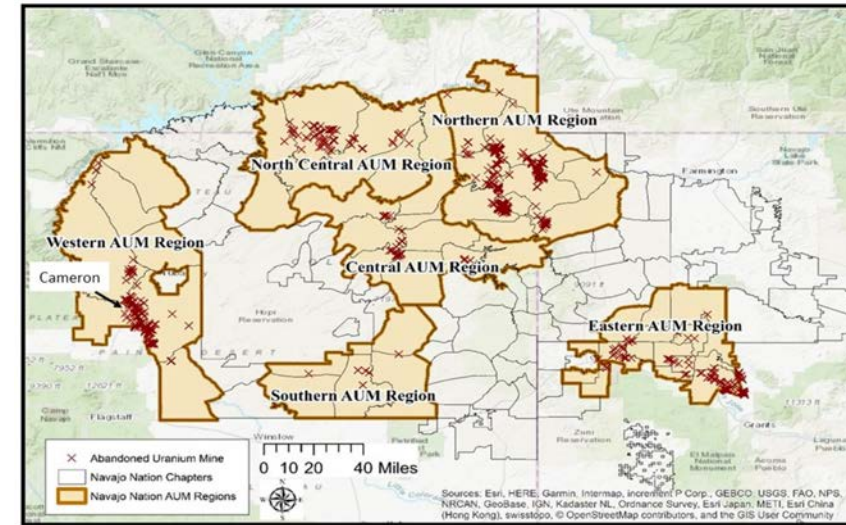


Office of the President and the Vice President

Tribal Council



There are over 500 abandoned uranium mines on Navajo Land
30 Million Tons of Uranium were Extracted



Gold King Mine Spill of 2015

3 million gallons of toxic waste were released.



Thousands of Navajo people can no longer use their land for farming.



Waste contains high levels of Arsenic and Cadmium as well as other toxic metals



Waste reaches 60 river miles downstream

Malery Quetawki: Teaching Through Art



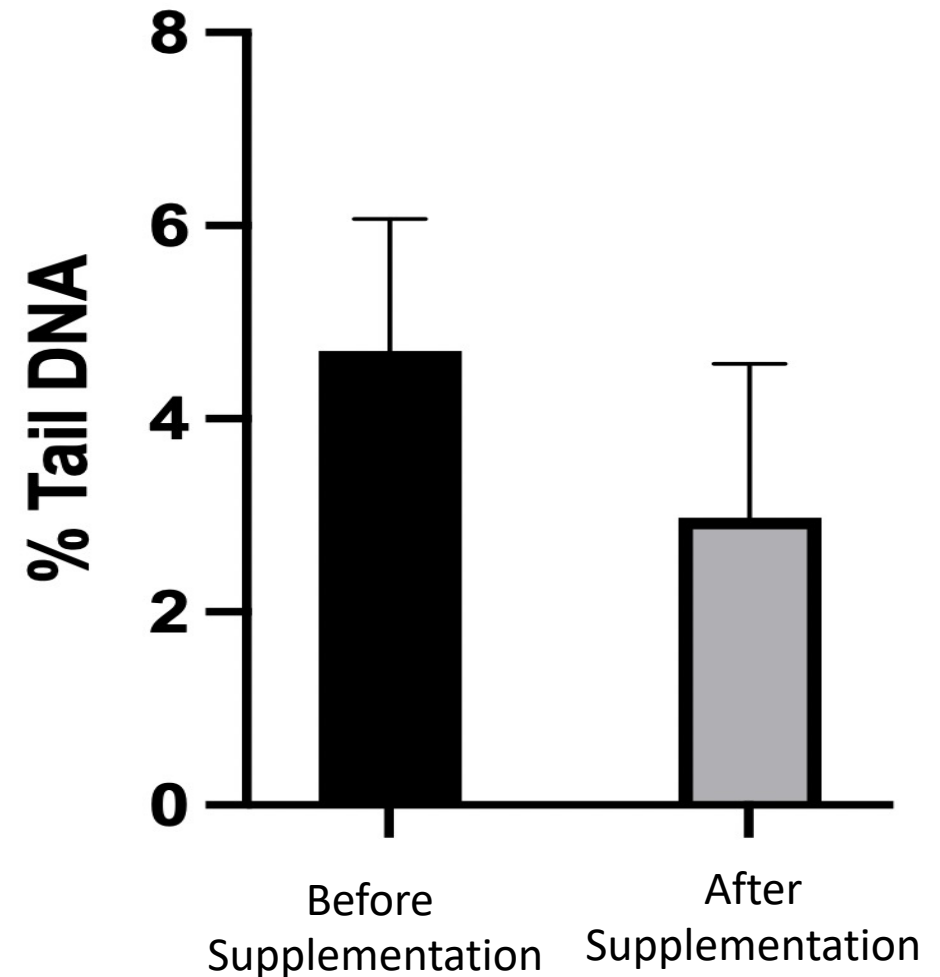


Evidence that Zinc Promotes DNA Repair

“Zinc supplementation
influences genomic stability
biomarkers...in elderly
Australian Population with
Low Zinc Status”

R. Sharif,
P. Thomas,
P. Zalescki,
M. Fenech

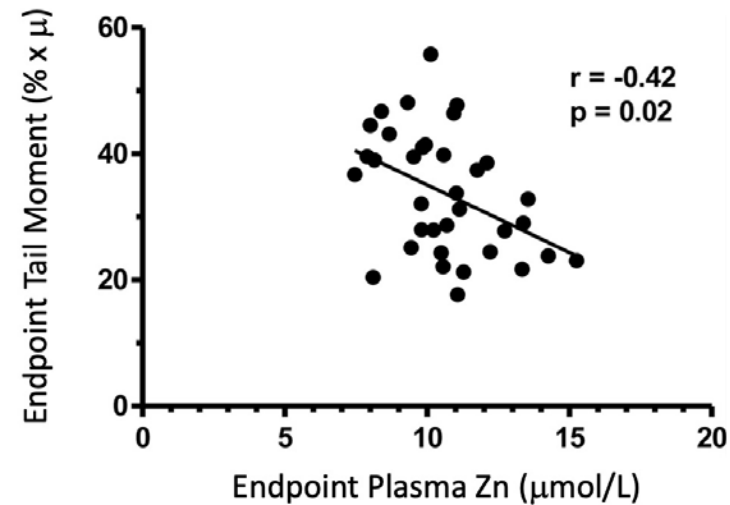
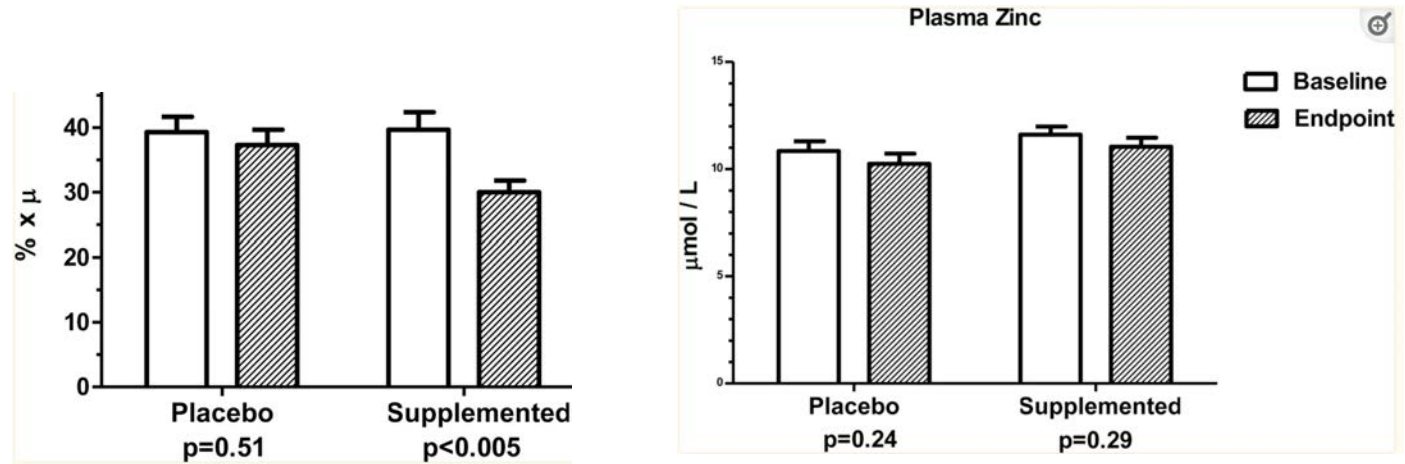
Mol. Nutr. Food Res. 2015

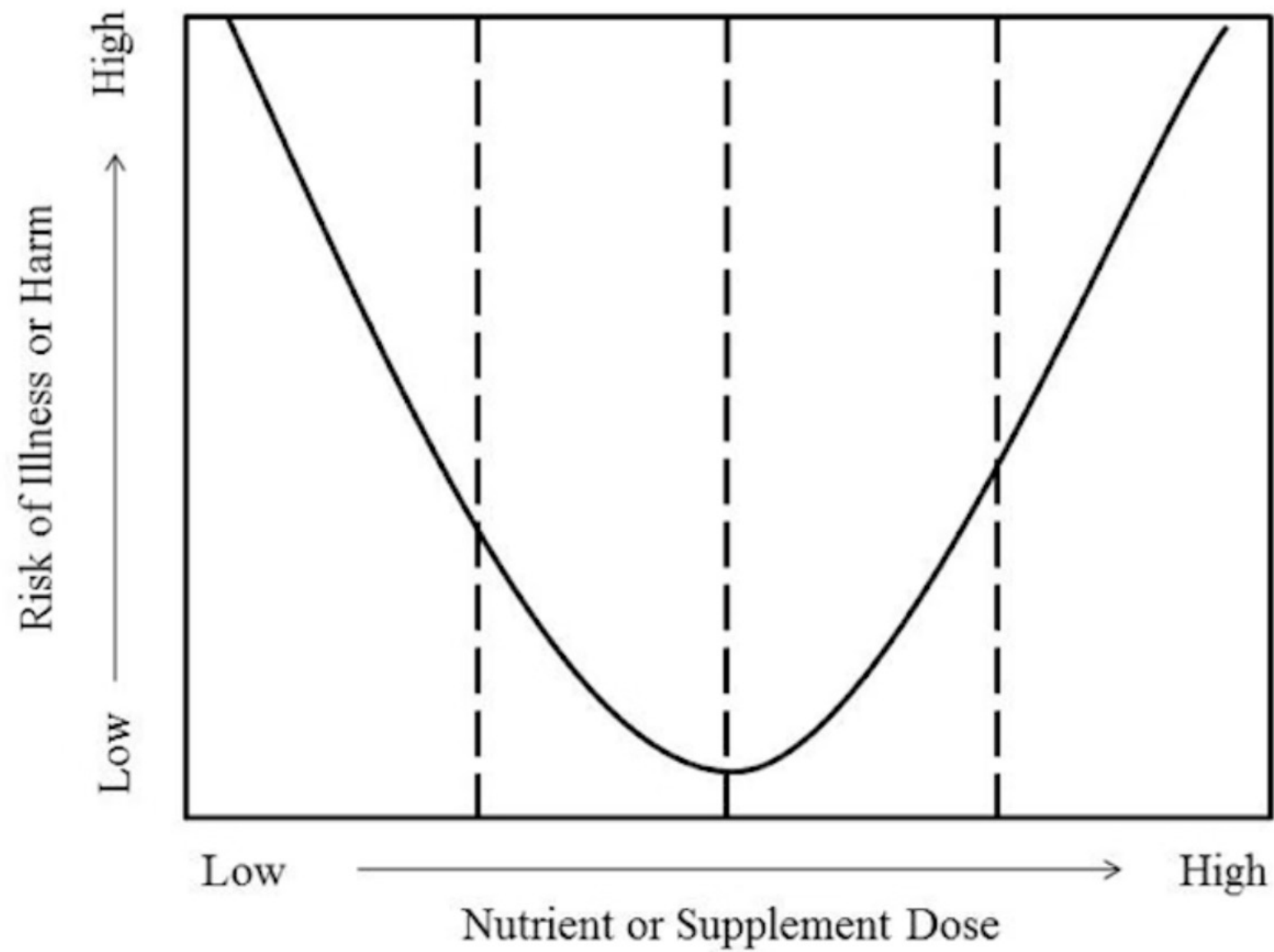


Zinc Supplementation Reduces DNA Breaks in Ethiopian Women

M. Joray, T Yu, E. Ho, S
Clarke, Z Stanga, T.
Gebreegziabher, K.
Hamidge, B. Stoecker

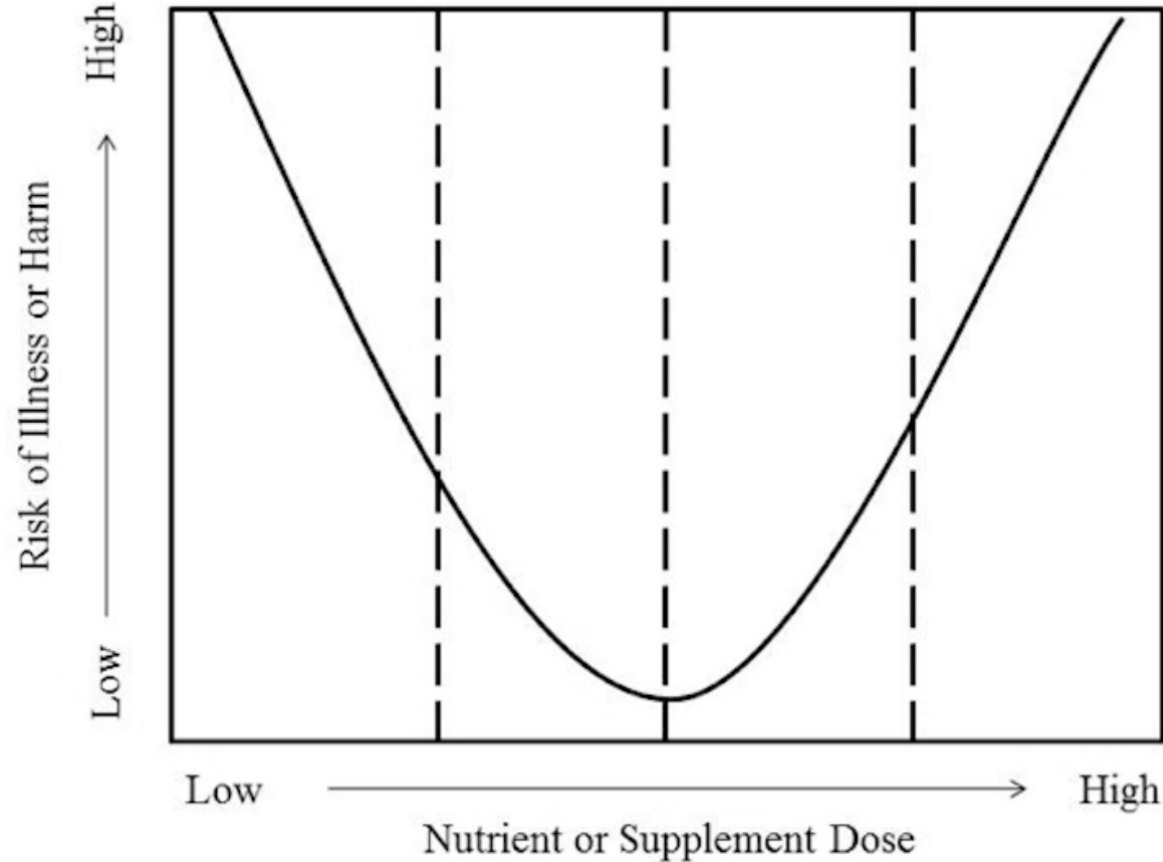
Nutrition Res. 2015





Too Little Zinc:

Hair loss
Lowered immunity
Diarrhea
Loss of appetite
Skin sores



Too Much Zinc:

Nausea
Flu-like symptoms
Loss of taste
Stomach pain
Frequent infections

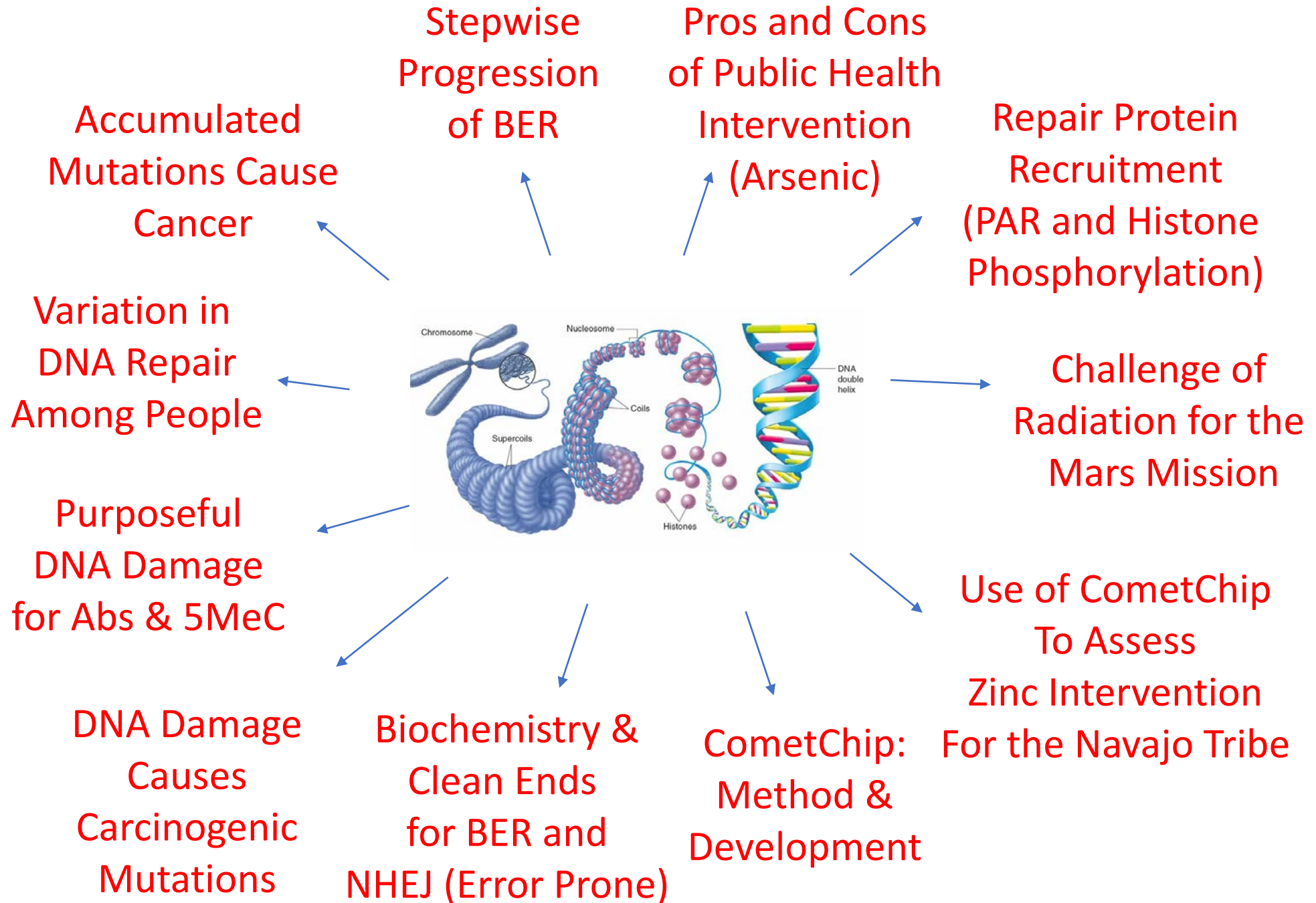
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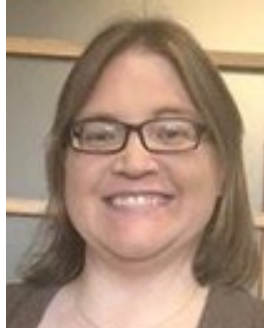
Philosophy



20.109 MOD1 Fall 2022 – The Fabulous Team



**Dr. Noreen
Lyell**
Sr. Lecturer



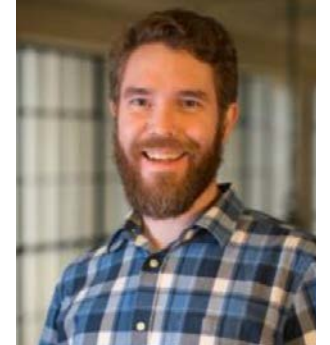
**Dr. Becky
Meyer**
Lecturer



Jamie Zhan
Instructor



Chiara Ricci-Tam
BE Communication
Lab Manager &
Lecturer



Sean Clarke
BE Communication
Lab, Lecturer



Alexander Hostetler
TA



Chyna Mays
TA



Bryan Wong
TA

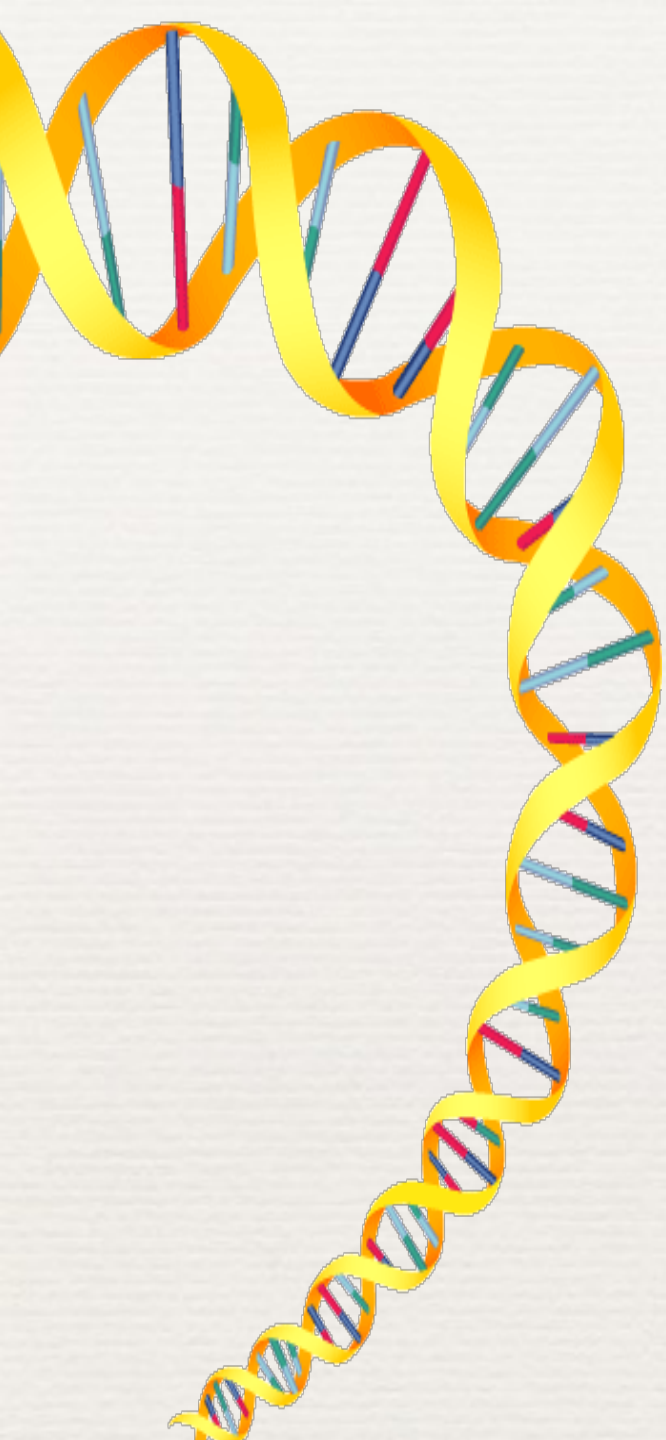
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Things I wish I'd been told

Bevin P. Engelward, Sc.D.
Professor of Biological Engineering
Director, MIT Superfund Research Program

Life's Journey... twists & turns



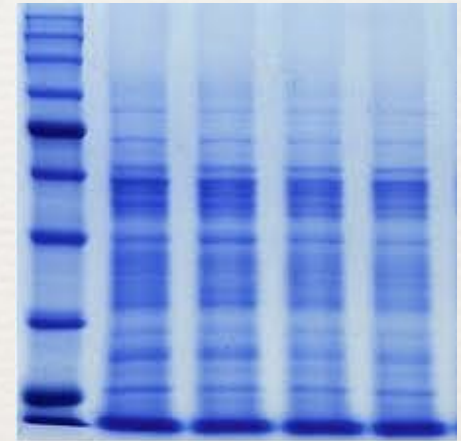
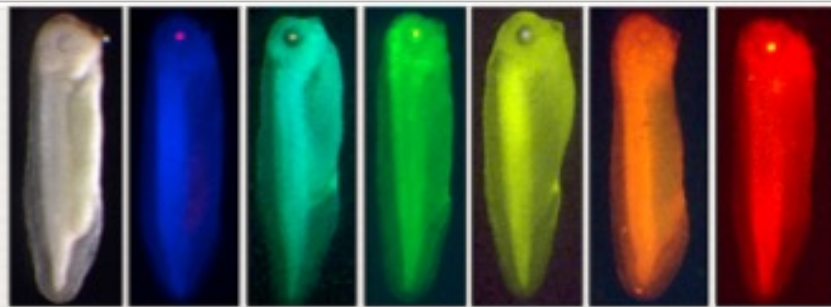
What is the
meaning of
life?



Couldn't
find a job...



Finding Meaning
= Finding your passion



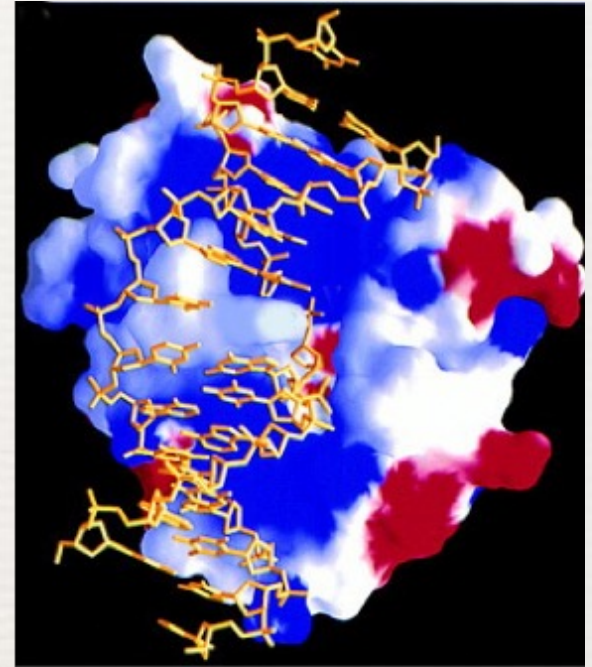
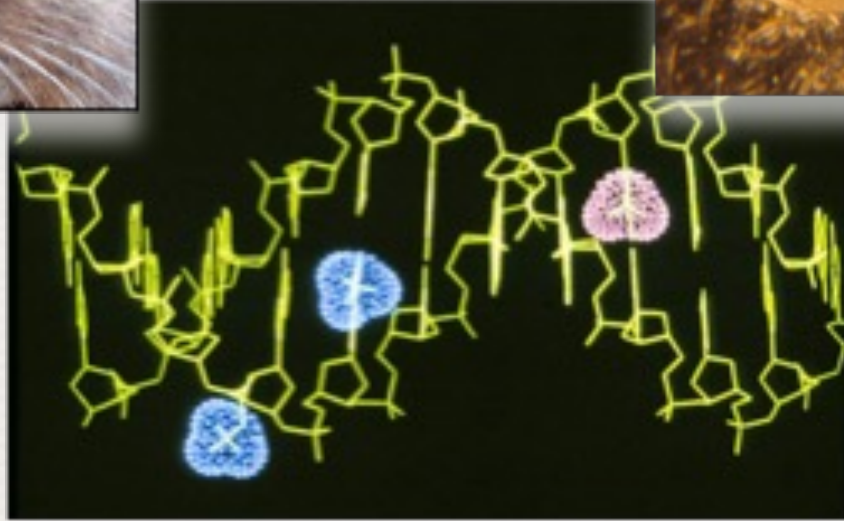
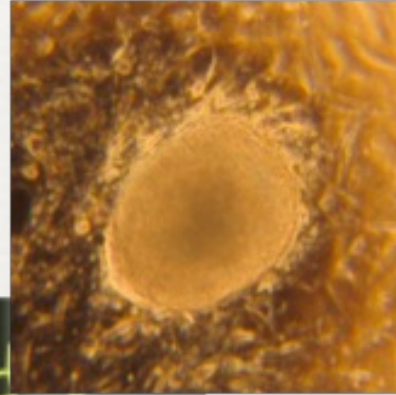
Life's Journey... twists & turns



The joy of studying life itself



When it takes your breath away...



You have found your passion

Be Courageous

Was invited to apply...

MIT





Compton Lecture 2021:
Sylvester James Gates

Gates: American theoretical physicist, known for work on supersymmetry and supergravity.

“Don’t be afraid to do something you have never done before.”

“Just because you don’t know how to do something doesn’t mean you should not try.”

One foot in front of the other...
the power of *time*

Was invited to apply...

**You are more capable
than you realize...
and you have **TIME****

MIT



One foot in front of the other.. the power of *time*



10,000 hours to true excellence (M. Gladwell)... time is on your side

One foot in front of the other..
the power of *time*

Was invited to apply...

**You are more capable
than you realize...
and you have TIME**

**Time is Powerful
Time is on your side**

MIT



Trust that you will achieve a good work/family balance

Was invited to apply...

**All jobs require
constant iteration to
achieve a work/family
balance**

MIT



You will likely reach your goals,
so aim high!

Was invited to apply....Accepted the Challenge

MIT



It is amazing what is possible
with passion & persistence



But don't forget about what is
truly important....



MIT



It's all about people.

True meaning always centers on people....

Three great doctoral students!



David Weingeist



Lizzie Ngo



James Mutamba