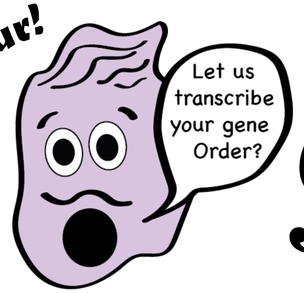


Welcome to… Restaurant Cell

Genome Sciences
UNIVERSITY OF WASHINGTON

and the Foundations for "The Building Blocks of Life" Cell Model

Atom Lesiak, Ph.D., Director
Genome Sciences Education Outreach

How to understand the essential process of Cell Biology?

DNA is like a Menu

- Really, really, big menus where you can order pretty much any food item in any Human restaurant.
  - Random diner might have ~300 things on the menu. Human DNA has minimum 20K genes.
  - Your DNA contains about 70 totally unique diners menus worth of genes…. AND, yes you can order DNA substitutions and RNA mix-and-match combos.

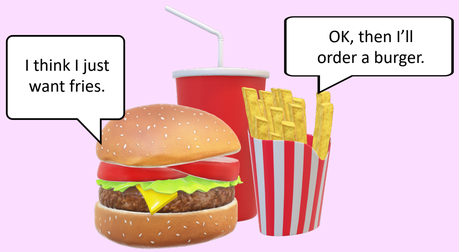
Order food off the menu and the waitstaff will "Transcribe" your order.

- Waitstaff writes you order down in "code".
- That ticket with the code is like messenger RNA that travels into the kitchen.

- In the kitchen, Chefs (Ribosomes) translate the ticket "code" into food.

- Amino acid subunits are like the individual objects in the food.
- Like the buns, lettuce, cheese slice, and patty in burger.
  - Amino acid = lettuce leaf
- The final folded protein = burger

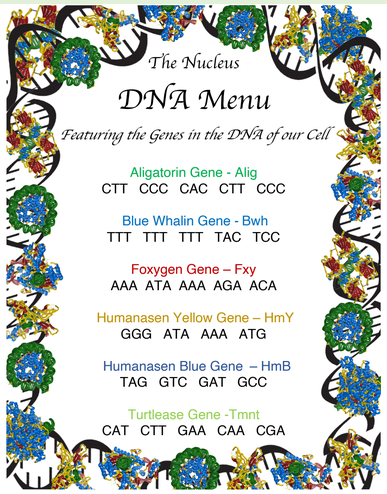
- Analogy gets weird because in a cell, the food orders other food AND does all the work in the cell.



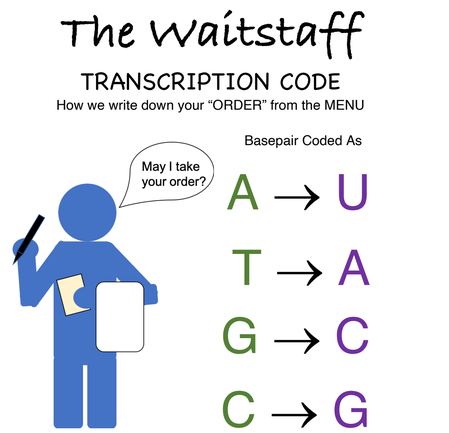
Central Dogma of Biology Model

Restaurant Cell

1. What protein will you order off the DNA menu?



2. Transcribe your order using…..



Example: Blue Whalin Gene - Bwh

The RNA	TTT	TTT	TTT	TAC	TCC	Is created based on the DNA
→	AAA	AAA	AAA	AUG	AGG	

3. RNA TRANSCRIPT travels to Kitchen (Ribosome) to become protein

Inside The Kitchen aka The Ribosome

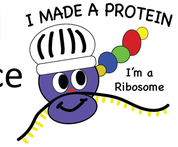
Brick (Amino Acid) Translation Code

CODE				Becomes				This
UUA	UUG	UCA	UCG					
UUC	UUU	UCC	UCU					
CUA	CUG	CCA	CCG					
CUC	CUU	CCC	CCU					
AUA	AUG	ACA	ACG					
AUC	AUU	ACC	ACU					
GUA	GUG	GCA	GCG					
GUC	GUU	GCC	GCU					

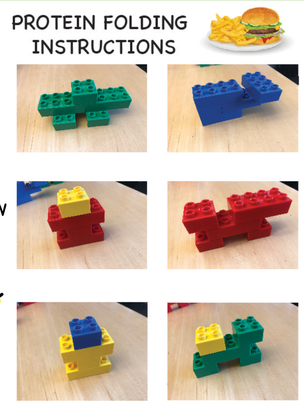
CODE				Becomes				This
UAA	UAG	UGA	UGG					
UAC	UAU	UGC	UGU					
CAA	CAG	CGA	CGG					
CAC	CAU	CGC	CGU					
AAA	AAG	AGA	AGG					
AAC	AAU	AGC	AGU					
GAA	GAG	GGA	GGG					
GAC	GAU	GGC	GGU					

Blue Whalin –RNA Transcript
AAA AAA AAA AUG AGG
Is Translated into this amino acid sequence

4. Amino acid brick sequence is folded into final structure.



PROTEIN FOLDING INSTRUCTIONS



Expansion and Gamification

What happens if the DNA menu gets mutated?

Subtle changes can have major effects.

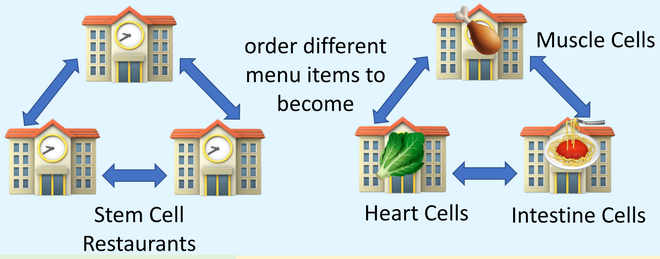
Let's design a Pizza Taco!

Can we edit the DNA to make new foods?

Explore CRISPR and genetic engineering.

Gamified Cell Simulation

Have Restaurant Cells send food to each other… what happens?



We are Looking for Collaborators!

- **Seeking collaborators for creating educational games online.**
- **Contact gsedout@uw.edu if interested.**