

Unit 5: Evolution - Patterns Biology

Distance Learning Plan

Unit 5: Evolution			
Unit Resources:	Digital Interactive Notebook	Unit Tracker	Paper Packet (for students doing distance learning without internet access or in need of paper accommodation)

ALT5 Evolution: Explain that all life is related and that populations change over time

Anchoring Phenomenon: Humans have a wide variety of skin colors.

Unit Essential Question: How does the theory of evolution explain both the unity and diversity of life on earth?

NGSS Performance Expectations Academic Supporting Targets (ASTs) with links to evidence statements:

HS-LS4-3 (AST 5.1) Investigating Trait Frequency: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-2 (AST 5.4) Natural Selection: Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-4 & HS-LS2-8 (AST 5.5) Adaptation: Construct an explanation based on evidence for how natural selection leads to adaptation of populations. Cross-reference: Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

HS-LS4-5 (AST 5.6) Speciation: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-LS4-1 (AST 5.7) Evidence for Evolution: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

Practices: Obtaining Evaluating and Communicating Information / Constructing Explanations / Analyzing and Interpreting Data / Engaging in Argument from Evidence

Crosscutting Concepts: Cause and Effect / Patterns

Disciplinary Core Ideas: Evidence of Common Ancestry and Diversity / Natural Selection / Adaptation

Task Set # (Min.)	Essential Question & Activities	Practice & Extension	SEPs CCCs DCIs	Evidence of Student Learning/ Assessment
Engage				
1 (120 mins)	EQ: Is race a biological characteristic determined by our genes? Phenomenon: Race has historically been used to separate humans into categories with the argument that we are biologically different, but in reality there is no biological basis for this categorization. - Introduce unit EQ with introductory activity about race and racial categories (student handout - and accompanying slides). Teachers - please pay attention to the slide notes as there are suggestions about how to implement this lesson with students including important talking points. - Students investigate their racial literacy with a Google Form Quiz - (use this template to make a copy to share with your students) - Option to include film clip from Race - The Power of an Illusion (20 min.) - Students read excerpts from “How Science and Genetics are Reshaping the Race Debate of the 21st Century” that lays out the differences in our understanding of race in the past and the present. (60 min) 2 options: Assign article with guiding questions OR article alone, pairing it with an online discussion post in Canvas or your LMS - Guiding question options: “What were your key takeaways from this article?”/“What surprised you about this article?”/“Provide evidence from	Reading: 10 Things Everyone Should Know about Race Explore racial categories throughout history, interactive website Pew video: Voices of Multiracial Americans Film clip: <i>Race, the Power of an Illusion, Part 1</i> which discusses the genetic similarities and differences among people categorized by race (30 min. w/questions included on handout linked above) (full video available at Kanopy. Log in with your county library card. or clips available at racepowerofanillusion.org)	SEP: Asking Questions CCC: Patterns DCI: Evidence of Common Ancestry and Diversity	Students predict racial categories and share ideas and questions about race as a social construct following the reading and film.



	the article that demonstrates that race is not determined by genes”. Fill out Unit Tracker TS1 boxes			
Explore and Explain				
2	EQ: How do populations change over time? Phenomenon: Rock pocket mouse populations have evolved fur colors that match their local environments. Rock Pocket Mouse Activity - Fill out Unit Tracker TS2 boxes - Assessment: Is It Natural Selection? Students select one of three examples (color blindness, stalk-eyed flies, malaria resistance). Each requires students to analyze data, make a graph, and write a CER. (Key available on teach.genetics.utah.edu)	PBS video: DNA Spells Evolution, how mutations lead to evolution Video: Simulating Natural Selection Simulate it yourself! Use this minutelabs.io simulator	SEP: Analyzing and Interpreting Data, Constructing Explanations CCC: Cause and Effect DCI: Natural Selection	Assessment: Is It Natural Selection?
3 (120 min)	EQ: How do adaptations increase the fitness of a population? Phenomenon: Bacteria rapidly adapt to environments and overcome antibiotics at high concentrations. - Jigsaw Learn.Genetics Misconceptions about Adaptations using shared slides. Teachers: make a copy of this slideshow to be worked on with each class. - Antibiotic resistance: Use the Slides to fill in the Activity Guide and complete the CER at the end of the notes - Career Connection: Watch: Pharmacy Technicians and Pharmacists both work on issues related to antibiotic resistance Addition / Alternative: After discussing adaptations, have students go outside and find a living thing somewhere in their environment and identify/describe an adaptation in that organism. Use Padlet (example)	Quizlet on Natural Selection homework, or Quizlet Live class activity	SEP: Constructing Explanations CCC: Patterns DCI: Adaptations	

	here) or an online discussion board to collect student responses. • Fill out Unit Tracker TS3 boxes (use the same Unit Tracker as in TS1 & TS2) EQ: What does the coronavirus vaccine mean for the fight against the pandemic? Phenomenon: Vaccines against coronavirus are the tools that will allow life to return to normal. Researchers have had to be mindful of how quickly a virus can mutate in developing these vaccines • Option 1 ○ Use these slides as a guide for this vaccine lesson. ○ Make a copy of this Jamboard for students to ask their initial questions about COVID-19 ○ Make a copy of this sheets template for students to collect data on a herd immunity simulation from NPR. ○ Make a copy of this shared slides template for students to do their individual research on a topic of their choice. • Option 2 (note to teachers, this lesson was written prior to the release of the Pfizer vaccine to the general public) ○ Anchor students in phenomenon before reviewing instructing how to fill out KWL ○ Start to fill out KWL chart in worksheet: What do you know about vaccines? Do you believe they are safe? What vaccines have you received in your lifetime? ○ Watch videos embedded in Pfizer's Covid Vaccine Slides about the Pfizer vaccine			
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	and what a virus is and include this information in KWL ○ Going further. Have students pick one of the 3 options to showcase their learning: share your learning, create a one pager, OR make a recommendation to Pfizer and the F.D.A.			
4 (120 min.)	**This task set does not cover highest-priority learning targets.** EQ: How do new species evolve? Phenomenon: There is vast diversity in all life on Earth. ● Watch “What is a Species?” video (5 min.) ● Open the Tree of Life & play around with it a little bit. Write in your INB: “What do you find surprising about the diversity of life on earth?” (10-20 min.) ● Reproductive Barriers task. Use this Activity Guide (90 min.) ● Fill out Unit Tracker TS4 boxes	Speciation and Evolutionary Trees videos Lizard Evolution Virtual Lab and fill out the Activity Guide. Extension: do modules 1, 2, and/or 3 of the Lizard lab	SEP: Collecting and analyzing data, constructing explanations CCC: Patterns / Cause & Effect DCI: Adaptations	● possible assessment)
5 (120 min)	EQ: How does the alignment of multiple lines of evidence support common ancestry and the theory of evolution? Phenomenon: Whales and dolphins are mammals, but mammals evolved on land. ● Complete the evidence for evolution activity (key) by reading through the information linked in the slides for each piece of evolution. ● Watch video: “What is the Evidence for Evolution” from Stated Clearly ● Fill out Unit Tracker TS5 boxes ● Optional assessment: A Tale of Two Pandas (Teachers: make a copy of this for each class). Assign each section of evidence to a different small group and have students jigsaw the evidence notes - then each student writes their CER using the evidence generated by the class)	Additional Resource: Video, <i>It's Okay to be Smart</i> There was no First Human “Fish or Mammals?” Lesson ○ Make a copy of this Activity Guide to record evidence of evolution and make arguments to support several claims about relationships.	SEP: Communicating Information and Constructing Explanations CCC: Patterns DCI: Evidence of Common Ancestry and Diversity	Summative Assessment is a Tale of Two Pandas - evidence can be collected as a group in class and students can use that group evidence to write their CER.

Elaborate and Evaluate				
6 (180 min.)	EQ: How did variation in human skin colors evolve? Phenomenon: Humans can not be sorted into biological categories based on skin color, yet skin color does vary among individuals and can affect human health. - Case Study: Human Skin Color: Evidence for Selection - Fill out Unit Tracker TS6 boxes	Extension: How We Get Our Skin Color Interactive & Student Worksheet		CER at the end of Case Study should be collected for a Summative Assessment

Possible Summative Assessments:

TS2: Is It Natural Selection? (Different example than the practice they complete in TS)

Rock Pocket Mouse - option if short on time

TS3: Antibiotic Resistance CER

TS4: Lizard Evolution Virtual Lab

TS5: A Tale of Two Pandas OR Fish or Mammals Activity

TS6: Human Skin Color Activity

Phone Assessment Prompts

These assessments are in the Teachers Only Google Drive in the Distance Learning folder of Unit 5. If you need access to this folder, [click here](#).