

::: FIELD ASSIGNMENT • DETECTIVE WORK

The Casebook

Apply the criteria. Analyze the evidence. Make the call.

AGENT (STUDENT)

PERIOD

CASE DATE

:::PART A Make the Call — Theory, Law, or Hypothesis?

For each Field Log case below, use what the tutorial taught about natural selection, extinction, and the limits on adaptation to make the call, then briefly justify it.

:: CASE FILE 001

"On a sandy beach, a population of mice varies in coat color. A new predatory bird arrives. Over several generations the population becomes mostly light-colored. Which statement best explains how this happened by natural selection?"

- ☐ THE DARK MICE SENSED THE DANGER AND CHANGED THEIR FUR TO LIGHT SO THEY WOULD SURVIVE
- ☐ VARIATION IN COAT COLOR ALREADY EXISTED; THE BIRD CAUGHT MORE DARK MICE, SO LIGHT MICE SURVIVED AND REPRODUCED AND PASSED ON THE TRAIT, AND THE POPULATION EVOLVED
- ☐ ALL THE MICE MUTATED TO LIGHT FUR AT THE SAME TIME ONCE THE BIRD APPEARED
- ☐ THE MICE DECIDED AS A GROUP TO ADAPT TO THE NEW PREDATOR

WHY?

:: CASE FILE 002

"Hawaiian honeycreepers went extinct when a strain of bird malaria arrived and every individual was equally susceptible - no bird carried a resistance trait. Which limit on adaptation does this show?"

- ☐ NOT ENOUGH TIME - THE DISEASE SPREAD FASTER THAN THEY COULD ADAPT
- ☐ THE TRAIT WAS NOT POSSIBLE - BIRDS CANNOT EVOLVE DISEASE RESISTANCE AT ALL
- ☐ NOT ENOUGH VARIATION - WITH NO DIFFERENCES IN RESISTANCE, NATURAL SELECTION HAD NOTHING TO ACT ON
- ☐ TOO MUCH VARIATION - THE BIRDS WERE TOO DIFFERENT FROM ONE ANOTHER

WHY?

:: CASE FILE 003

"Many cacti have a tough outer layer that holds water. Which statement describes how cacti most likely evolved that feature via natural selection in response to a drier climate?"

- ☐ CACTI WERE STRESSED BY DRYNESS, SO EACH PLANT GREW A TOUGHER LAYER DURING ITS LIFE AND PASSED THAT EFFORT ON
- ☐ SOME CACTI HAD TOUGHER OUTER LAYERS THAN OTHERS; THOSE HELD MORE WATER AND SURVIVED AND REPRODUCED BETTER IN DRY CONDITIONS, AND THEIR OFFSPRING INHERITED TOUGHER LAYERS, SO THE POPULATION GRADUALLY EVOLVED TOUGH SKINS
- ☐ ANIMALS ATE THE CACTI, SO ALL CACTI SUDDENLY MUTATED TOUGH LAYERS TO STOP THEM
- ☐ CACTI WITH THICK STEMS BECAME COMMON PURELY BY CHANCE, WITH NO EFFECT ON SURVIVAL

WHY?

:::PART B Build the Case: Adapt or Go Extinct

Walk a population through a changing environment to one of the two outcomes. For each step, name what is happening, then finish with the big conclusion about adapt or die.

STEP 1 - THE ENVIRONMENT CHANGES	
STEP 2 - CHECK FOR VARIATION	
STEP 3 - SELECTION ACTS (IF THERE IS TIME AND THE TRAIT IS POSSIBLE)	
STEP 4A - OUTCOME: ADAPT	
STEP 4B - OUTCOME: DIE	
CONCLUSION	