

Artificial selection, and putting it together HL

60 minutes • D4.1.15 • Chapter 11

Artificial selection against natural selection, antibiotic resistance as natural selection, and a consolidation of the whole subtopic

BY THE END, STUDENTS CAN

- ☐ Distinguish artificial selection from natural selection, and explain antibiotic resistance as natural selection D4.1.15

TIMING

0-5	5 min	Do now	
5-15	10 min	Choose the parents	
15-25	10 min	Natural or artificial?	
25-45	20 min	ICE AGE on a fresh case	
45-55	10 min	Exam practice	
55-60	5 min	Exit	
	60 min	One lesson	

STARTER

5
min

Do now

Vote: antibiotic resistance in bacteria is artificial selection or natural selection? Keep the votes up.

ON THE BOARD, FROM THE GUIDE

Open the guide on the projector at each chapter (the links work in this PDF). Every figure plays from its own buttons, and the lesson's slides have the same figures, step by step, in the order of this plan.

11 Artificial selection and its side effects

CHAPTER 11 IN THE SLIDES

Step through the figure (5 steps, the arrow keys on a projector). Stop on each caption and ask what changed before you go on.

1. A crop varies in the size of its cobs. Each plant's size is partly **heritable**.
2. The breeder picks the **largest** and lets only those breed.
3. Repeat for a few generations: the cobs get steadily **bigger**, as the alleles for size become commoner.
4. A dish of bacteria with **one** resistant cell among many susceptible ones.
5. Add an antibiotic: the susceptible cells die, the resistant one multiplies. **Nobody chose it**, so this is natural selection.

Predict box: Farmers spray a crop with an insecticide. After some years most of the pests resist it. Which kind of selection has taken place? Hands up or mini whiteboards first.

Answer B: Natural selection, because the insecticide killed some pests and spared others

THE LESSON

10
min

Choose the parents

The dice model below, three rounds. Plot the class mean each round on the board. What happened to the variation as the breeder chose?

10

min

Natural or artificial?

Chapter 11's figure, then the card sort below. Go back to the vote: the antibiotic was a pressure nobody meant to apply with those consequences, so it is natural selection.

20

min

ICE AGE on a fresh case

The activity below: a new example, and students put the six letters onto it with their own words. Pairs swap and mark each other's against the list of letters. Then link the six letters to the Hardy-Weinberg conditions: which does selection break?

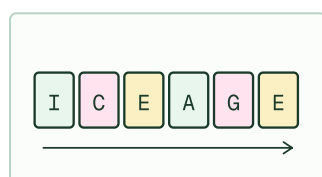
10

min

Exam practice

A written question on D4.1 from the exam maker (in Practise and revise, below), set at HL, in 8 minutes, then peer-marked against the markscheme. For homework, the Check step: a fresh paper on D4.1, marked as students go.

ACTIVITIES



WRITING

ICE AGE on a fresh example

Give a new population, not one from the guide, such as an island population of lizards whose food changes (invent the details, and make clear it is invented). On six strips, pairs write what happens at each of Inherited variation, Competition, Environmental pressure, Adaptations, Genes and Evolution, then order and read them aloud. Check that each strip is about the example, not just the definition, and that "Genes" is about allele frequencies.

Needs: six blank strips per pair, the invented case on a card.

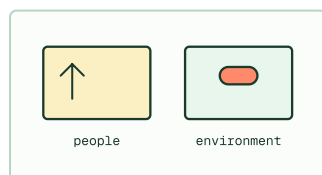


MODEL · HL

Choose the parents

Each group gets ten cards, each with a number from 1 to 10 for a trait (the size of a cob). They pick the two highest as parents. Offspring values are the parents' mean plus the roll of two dice (first die minus second), and the teacher deals the next ten cards that way. After three rounds, they plot the class mean each round. What happened to the mean, and to the spread?

Needs: ten cards per group, two dice, a results grid.



CARD SORT · HL

Natural or artificial?

Eight cards: farmers breeding the heaviest dairy cows; antibiotic resistance in a hospital ward; a breeder keeping only the gentlest puppies; insecticide resistance in a pest; bigger maize cobs over centuries; a dry year in which tough-seeded plants spread; a greenhouse grower choosing the tallest seedlings; resistant weeds after a herbicide. Sort into artificial selection (a person chooses the parents) and natural selection, then argue about any card where the line is unclear.

Needs: printed cards, one set per pair.

PLENARY

5

min

Exit

Linking question, in one sentence each: how do intraspecific and interspecific interactions differ, and what is one way competition is reduced?

WHAT STUDENTS GET WRONG

"Natural selection makes perfect organisms." It sorts what variation exists, under current conditions, so every organism is a compromise.

"The antibiotic caused the resistance." The mutation was already there, or arose by chance; the antibiotic only changed who survived.

STRETCH AND SUPPORT

Stretch: breeders choose for one trait. Why do other traits sometimes change at the same time?

IN THE GUIDE

- 11** [Artificial selection and its side effects](#)
- A11** [The whole guide, with the figures that play](#)
- PPTX** [This lesson's slides, in the order of this plan](#)

EXAM PRACTICE

Check yourself

Set it for homework: a fresh paper of exam-bank questions on D4.1 at higher level each time, marked as students go and saved to their Exam practice when they are signed in.

biologybybradford.com/exam-maker/sit?topics=D4.1&level=HL&paper=quiz&marks=15&src=ep



PRACTISE AND REVISE

BUILD FOR YOUR CLASS

- [Tarsia puzzle, dominoes and picture reveal](#) on D4.1, built from its key terms and ready to print
- A [pub quiz](#) with rounds on D4.1, to present or run with no projector
- An [escape room built from the question bank](#) on D4.1

ALREADY ON THE SITE FOR D4.1

- Lesson: [Hardy-Weinberg & Chi-Squared](#)
- Quiz: [Natural Selection \(HL\)](#)
- Quiz: [Natural Selection](#)
- Revision map: [D4.1 Natural selection](#), to fill in
- Exam questions: [D4.1 in the exam maker](#), a paper with its markscheme

CARD SETS ON SPLYCR

Open a set to host it as a class game, or make a copy to edit.

- [D4.1 Natural Selection](#)

How this was made. The course structure, the activities and the teaching choices come from my own classroom, my presentations and my years of teaching IB and AP Biology. I use Claude, an AI, to help write and build the interactive guides, lesson plans, slides and practice questions, and to draw the diagrams and code the interactives. I direct the work and review it against the IB and AP specifications before it goes live.