

How one species becomes two

60 minutes • A4.1.6, A4.1.7 • Chapters 5, 6

Speciation by splitting: reproductive isolation and differential selection in bonobos and chimpanzees

BY THE END, STUDENTS CAN

- ☐ Explain why splitting is the only way new species arise, and why gradual change in one line is not speciation A4.1.6
- ☐ Explain how reproductive isolation and differential selection split bonobos from common chimpanzees A4.1.7

TIMING

0-5	5 min	Do now	
5-15	10 min	Splits add, extinctions take away	
15-25	10 min	Storyboard: from one gene pool to two	
25-50	25 min	The river case file	
50-60	10 min	Exam question, timed	
	60 min	One lesson	

STARTER

5 min Do now

"A chihuahua and a grey wolf: one species or two? How would you decide?" Draw out the definition: able to interbreed and have fertile offspring. By that test they are one species: dogs and wolves still interbreed and have fertile pups, and the dog is often classed as a subspecies of the grey wolf.

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.

05 New species arise only by splitting

CHAPTER 05 IN THE SLIDES

Step through the figure (6 steps, the arrow keys on a projector). Stop on each caption and ask what changed before you go on.

- One species:** every population can interbreed with every other.
- A barrier divides it into two populations. **Gene flow stops**, but for now they are still one species.
- Each population changes separately until they **cannot interbreed**: two species.
- The lower species changes **gradually** but never splits: still one species, so the count stays at two.
- The upper species **splits** again: three.
- The lower species dies out: **extinction** takes the count back to two.

Play the animation, Watch it happen: one population becomes two. It loops; pause it on each moment below and ask what is happening (in the lesson slides it is a video).

- One population:** any two can meet and mate, so genes flow across the valley.
- Different selection** each side: coats match the ground, displays drift apart.
- Hybrids are rare, weak and often sterile, so the two never merge: **two species**.

Predict box: A line of snails changes its shell shape steadily for two million years and never splits. The oldest and newest shells look so different that fossil experts give them different names. How many species has the line added to the Earth? Hands up or mini whiteboards first.

Answer B: None: at every moment there was still only one species

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. Long ago: one population of **ancestral apes**, north of the Congo River.
2. Perhaps in a dry spell, the river runs low and a few apes reach the **south bank**.
3. The water rises. Neither side can cross: **no gene flow** between the populations.
4. Different conditions on each bank: **differential selection** favours different behaviour and bodies.
5. Over about 1 to 2 million years they diverge into **two species**: chimpanzees north, bonobos south.

Predict box: Suppose the river had divided the apes but the forests on both banks were identical. What would you expect after a million years? Hands up or mini whiteboards first.

Answer B: Some differences, from mutation and drift, but less divergence

THE LESSON

10

min

Splits add, extinctions take away

Play [chapter 5](#)'s figure and keep the species counter in view. Stop at step 4 and ask whether the count should go up. Then the snail predict box.

10

min

Storyboard: from one gene pool to two

Four panels, drawn by each student with no notes: one population; a barrier; each side changing differently; the barrier gone and the two unable to interbreed. A caption under each panel must use one of: gene flow, differential selection, mutation, genetic drift.

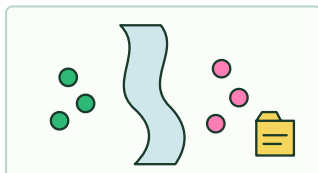
25

min

The river case file

The activity below: groups build a one-page case file on the bonobos and chimpanzees from evidence cards, including what is still uncertain. Play [chapter 6](#)'s map first.

ACTIVITIES



RESEARCH AND WRITING

The river case file

Each group gets evidence cards: the map; where gorillas live; food on each bank; group behaviour; body differences; the genetic estimate of 1 to 2 million years; the traces of later crossings. They write a one-page case file under five headings: the barrier, the two populations, what differed on each side, how they diverged, and what is still uncertain. The last heading is the point: good science says how sure it is.

Needs: [chapter 6](#) on screen; evidence cards; A3 paper.

PLENARY

10

min

Exam question, timed

A written question on speciation from the A4.1 exam maker (in Practise and revise, below), such as the one on bonobos and chimpanzees, in 8 minutes, then peer-marked against the markscheme. Point out that the markscheme has more points than marks. For homework, [the Check step](#): a fresh paper on A4.1 from the exam bank, marked as students go.

WHAT STUDENTS GET WRONG

The barrier causes the change. It only stops gene flow; selection, mutation and drift do the changing.

Gradual change is speciation. Only a split adds a species.

STRETCH AND SUPPORT

Support: give the captions of each figure as a cut-up storyboard to put in order, and use the key terms (tap the dotted words) as a glossary.

Support: for the river case file, give a writing frame with the five headings and a sentence starter for each.

Support: the three mnemonics (Dragons Breathe Heat; Hungry Rats Chew My Pencils; Grumpy Birds Tweet) as a starter on each lesson.

Stretch: the bonobos and chimpanzees still have traces of later interbreeding in their genomes. Does that change whether they are two species? What does it say about the species concept?

IN THE GUIDE

5 [New species arise only by splitting](#)

6 [One river, two apes](#)

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 A4.1 at standard level each time, marked as students go and saved to their Exam practice when they are signed in.

biologybybradford.com/exam-maker/sit?topics=A4.1&level=SL&paper=quiz&marks=15&src=ep



PRACTISE AND REVISE

BUILD FOR YOUR CLASS

- [Tarsia puzzle, dominoes and picture reveal](#) on A4.1, built from its key terms and ready to print
- A [pub quiz](#) with rounds on A4.1, to present or run with no projector
- An [escape room](#) built from the [question bank](#) on A4.1

ALREADY ON THE SITE FOR A4.1

- [Quiz: Evolution & Speciation](#)
- Revision map: [A4.1 Evolution and speciation](#), to fill in
- Exam questions: [A4.1 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.

- [A4.1 Evolution and Speciation \(SL\)](#)
- [A4.1 Evolution and Speciation \(HL\)](#)

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.