One cuttlefish, changing appearance

Ages 6–12 | Observation, comparison and asking good questions

Troy's field observation: Troy identifies these nine photographs as the same cuttlefish changing appearance. Follow his supplied sequence; do not guess how much time passed.



01. A darker body and fine pale markings stand out among the branching coral.



02. The body appears much paler in this view above the sand.

Look and compare: Find the eye, the body edge and the pale markings. What looks different? What can you still recognise?

Look from another angle

Keep the photographs in this order. All images are shown in full.



03. Pale and dark patches appear together as the cuttlefish faces towards the camera.

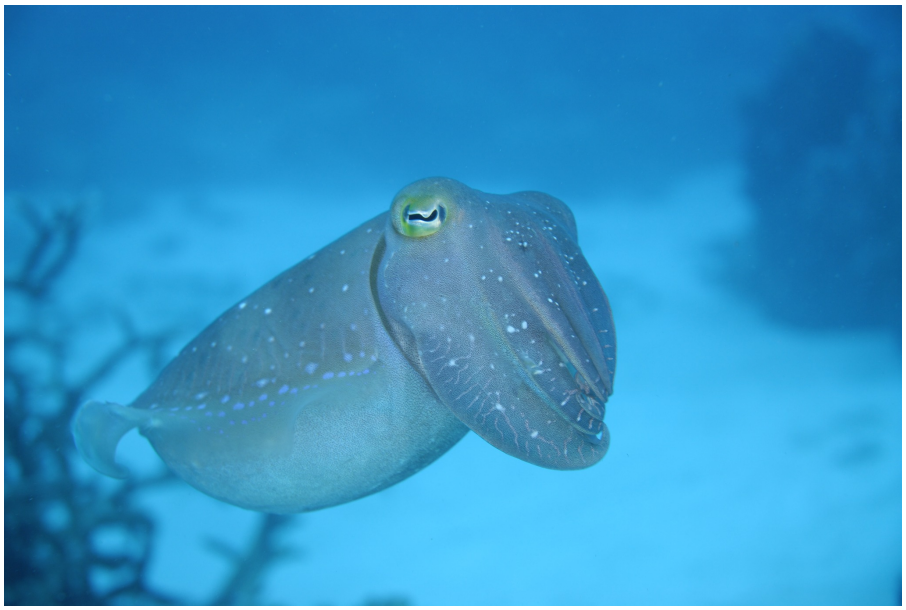


04. This portrait view shows the front of the animal and part of its side.

Look and compare: Compare 03 and 04. Point to one area you can see in both photographs. Which differences might be affected by the viewing angle?

Follow the body and its markings

Keep the photographs in this order. All images are shown in full.



05. A side view makes the eye, body edge and smaller pale markings easier to compare.



06. In this front view, the pale body contrasts with darker branches behind it.

Look and compare: Compare 05 and 06. Find the body behind the eyes and the arms at the front. Describe what you see before suggesting why it changed.

Compare patches and outlines

Keep the photographs in this order. All images are shown in full.



07. The front appears darker again, with many small pale markings.



08. An overhead view reveals irregular dark patches across a paler body.

Look and compare: Compare 07 and 08. Where are the largest dark areas? Separate a dark patch from an area that might be in shadow.

The final supplied view



09. The final supplied view shows fine pale markings and a different viewing angle.

Look back through all nine photographs. Choose two with a similar viewing angle, then record a visible difference. A reason for the difference needs more evidence than its appearance alone.

I notice ...

Name a visible feature and give the photograph numbers.

I think ... because ...

Suggest an explanation, then state the evidence you would need.

I wonder ...

Ask one question that a video or field note could help answer.

Keep in mind: A still photograph does not tell us the animal's feelings, the exact cause of a change or the time between views.

What changed? What stayed recognisable?

Name: _____ Date: _____

1. Choose two photographs. Write their numbers and sketch one feature you can compare. It can be an eye, a body edge or an area of pale or dark markings.

Photograph number: _____	Photograph number: _____

2. Record your evidence. Speak, draw or write. Use the photograph numbers.

Compare	**My evidence**
A visible difference	
A recognisable feature	
Something I cannot tell	

3. Explain carefully. Why should we consider camera angle and lighting when comparing these photographs?

4. Ask a next question. What would a video, a time record or a field note help you find out?

My careful conclusion: "I can see _____. I cannot yet tell _____."

A short investigation, not a guessing game

Learning goal

Compare visible features across a photo sequence and distinguish observation, an explanation and an unanswered question.

Time and materials

Allow 30–40 minutes. Display pages 1–5, and print only page 6 for each pupil. Provide pencils and scrap paper. The activity does not require a Reef Gang book or contact with a live animal.

Suggested lesson

Look (5 minutes): Show 01 and 02 without supplying a cause. Collect visible observations.
Compare (10 minutes): Follow 01–09. Ask pairs to select two views with similar angles.
Record (10–15 minutes): Complete the worksheet using photograph numbers.
Explain and reflect (5–10 minutes): Introduce the science below, then revisit what the photographs alone can establish.

Science to share

Cuttlefish can vary skin patterns by controlling pigment-bearing structures called chromatophores. Small muscles change the visible area of pigment.[1] They can also alter raised skin structures called papillae; controlled research shows that visual contrast and changing illumination can influence this response.[2] These mechanisms offer possible explanations, not a diagnosis of what caused each change in Troy's photographs.

Suggested answers

Visible comparisons: 01 appears darker than 02; 03 and 04 show different viewpoints; 08 reveals dark areas from above. Accept other comparisons supported by the images.
Limits: There are no supplied time intervals, experimental controls or measurements of the animal's internal state. Light, viewpoint and photographic exposure also affect appearance. Not every bright point should be labelled a skin structure.

Different ways to take part

Ages 6–8: Compare one pair. Point, talk or draw; use "I notice" and "I wonder".
Ages 9–12: Compare several views, support statements with photograph numbers, and identify evidence needed to test an explanation. Use larger images or verbal descriptions when needed.

Check learning

Ask each pupil for one observation, one explanation labelled as a possibility, and one question still to investigate. A strong answer separates these rather than choosing a confident-sounding cause.

Research and photograph record

The research below is freely readable online, with downloadable full-text PDFs. Both studies examined the common cuttlefish, *Sepia officinalis*. They support the general teaching explanation; they do not identify the species, timing or motivation in Troy's photographs.

1. Theodosia Woo, Xitong Liang, Dominic A. Evans, Olivier Fernandez, Friedrich Kretschmer, Sam Reiter, and Gilles Laurent, "The Dynamics of Pattern Matching in Camouflaging Cuttlefish," *Nature* 619 (2023): 122–128, https://doi.org/10.1038/s41586-023-06259-2.

Download full-text PDF | Read open full text

2. Christian Drerup, Martin J. How, and James E. Herbert-Read, "Visual Contrast from Background Features and Dynamic Illumination Contributes to Three-Dimensional Camouflage in Cuttlefish," *Journal of Experimental Biology* 228, no. 16 (2025): jeb249713, https://doi.org/10.1242/jeb.249713.

Download full-text PDF | Read open full text

Photograph provenance

Photographs © Troy Mayne. The source is *WRG Teacher Master Book: First Manuscript*, photo studies A37–A41 (PDF pages 237–241). Troy's field observation identifies the sequence as one individual changing appearance.

This pack uses the image copies embedded in that manuscript. They are reproduced in the supplied order and full framing, without retouching, colour adjustment, generative editing or replacement. Their equivalence to full-resolution camera originals has not been established.

Image order

01: _TLM2537.JPG | 02: _TLM2540.JPG | 03: _TLM2546.JPG

04: _TLM2547.JPG | 05: _TLM2550.JPG | 06: _TLM2552.JPG

07: _TLM2555.JPG | 08: _TLM2560.JPG | 09: _TLM2562.JPG

Preparation record

Prepared for the English Wally's Reef Gang education website on 4 November 2026. This file is a prepared resource, not a claim that the lesson or download has been installed on the live website. No permissions for wider commercial reuse of the photographs are granted by this preparation record.