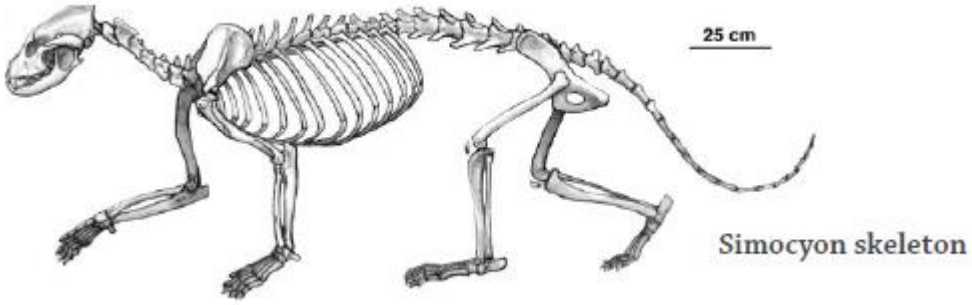
Common Ancestry Project

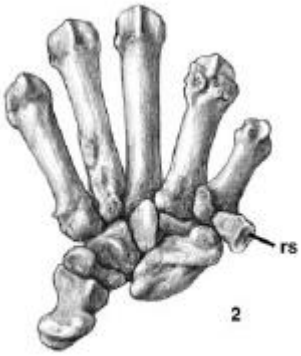
Background Information

*Simocyon batalleri (*shared common ancestor)

Simocyon lived between 5 and 12 million years ago. Two nearly complete skeletal fossils from a cave in Spain were discovered in 2006. Among the fossilized remains were forelimbs which had an enlarged wrist bone (the radial sesamoid), shown below. The red panda does not have the same wrist bone, but share many other traits. Because the Simocyon and the Red Panda share many traits it has been determined the two clearly belong to the same linages with the Simocyon being an ancient ancestor.



Simocyon skeleton



Simocyon paw (partial)

Figure 1. Skull (top) and life appearance (bottom) of *Simocyon batalleri*, based on the fossils from Batallones-1 (artwork by M. Antón).

Project Brochure Instructions

1

Common Ancestry Brochure

- Create a folded brochure using 8.5”x11” plain white copy paper

- Use the evidence provided by the teacher to answer the question
  - The Red Panda and which other species share the same common ancestor, Simocyon?
- You must follow the provided template to organize your brochure.
- Your brochure must include:
  - ❑ Title
  - ❑ Your Name
  - ❑ (Claim)Sentence stating the species sharing common ancestor with Red Panda
  - ❑ (Evidence) Paragraph listing the 3 strands of evidence chosen (selected from the provided case study)
  - ❑ (Reasoning)You must explain how each strand proves the Red Pandas connection to the other species
  - ❑ At least one hand-drawn picture on any page

2

On Each Fold

FOLD #1

❑Title (5 pts)

❑Your Name (5pts)

At least one hand drawn picture on ANY fold!!! (5pts)

FOLD 2

- ❑ Claim-one sentence stating which species shares the same common ancestor (10 pts)
- ❑ Paragraph explaining which 3 pieces of evidence you are using to support your claim. (15pts)

3

On Each Fold

FOLD #3

❑Name of selected evidence (5pts)

❑Reasoning –Why did you choose this evidence? How does it prove the species is related? (15pts)

*Paragraph min. 5 sent

FOLD #4

❑Name of selected evidence (5pts)

❑Reasoning –Why did you choose this evidence? How does it prove the species is related? (15pts)

*Paragraph min. 5 sent

FOLD #5

❑Name of selected evidence (5pts)

❑Reasoning –Why did you choose this evidence? How does it prove the species is related? (15pts)

*Paragraph min. 5 sent

At least one hand drawn picture on ANY fold! (5pts)

Brochure Template

Side 1

Claim Sentence

Which species shares same common ancestor?

Evidence

One paragraph explaining the 3 strands of evidence you chose to support your claim.

Fold #2

Title

Your Name

Fold #1

Side 2

Chosen Evidence #1

Reasoning Paragraph

Explain how this evidence strand supports your claim.

Fold #3

Chosen Evidence #2

Reasoning Paragraph

Explain how this evidence strand supports your claim.

Fold #4

Chosen Evidence #3

Reasoning Paragraph

Explain how this evidence strand supports your claim.

Fold #5

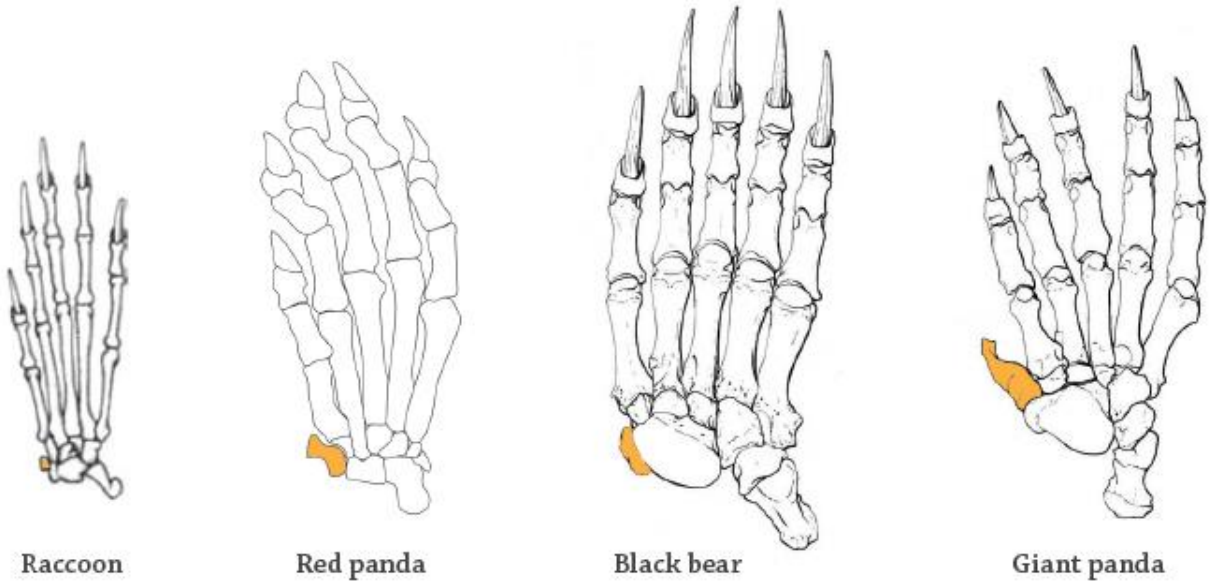
Evidence Strand #1

Radial Sesamoid Bone

The table below shows the size of the radial sesamoid bone relative to the size of the animals' paws. The radial sesamoid bone tends to be enlarged in many carnivores and especially those that spend time in trees.

Species	Relative size of radial sesamoid	Spends time in trees?
Giant panda	0.84	○
Wolverine	0.51	◒
Simocyon batalleri	0.51	◒
Fisher	0.50	●
Pine marten	0.46	◒
Red panda	0.45	●
Asian bearcat	0.44	●
Indarctos arctoides (an ancestral bear)	0.40	○

Both the giant panda and the red panda have an opposable "thumb" (highlighted). In both cases, the thumb is actually a greatly enlarged and modified wrist bone. A smaller version of this bone is present in bears, raccoons, and other carnivores. It helps the pandas handle bamboo as they eat it.
(Black bear and giant panda images modified from Davis, p. 30. Red panda based on Abella 2006, Figure 1.)



Raccoon Red panda Black bear Giant panda

Evidence Strand #2

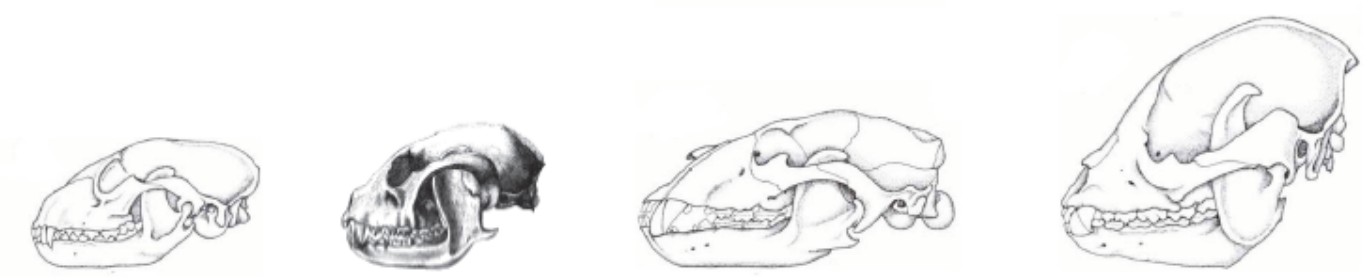
Diet

Both the giant panda and the red panda live in the bamboo forests of China. The giant panda eats only bamboo. The red panda eats mostly bamboo, though it sometimes eats other plants, fruit, and insects. The bamboo diet of the two pandas is quite different from those of most bears and members of the raccoon family—which tend to eat a variety of plants, fruits, and small animals.

Evidence #3

Skull Anatomy

Both the giant panda and the red panda have strong jaw muscles, which help them chew tough bamboo stalks. Their skulls are extra-thick, and the places where the jaw muscles attach (the ridge at the top of skull and the upward-curving part of the lower jaw) are enlarged. *(Raccoon, black bear, and giant panda images modified from O'Brien, p. 105.)*

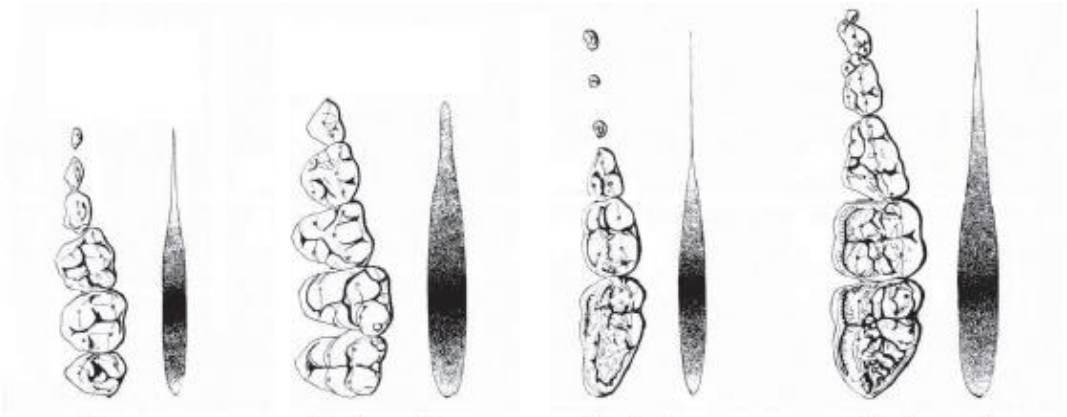


Raccoon | Red panda | Black bear | Giant panda

Evidence #4

Tooth Anatomy

The drawings below show the chewing surfaces of the teeth, along with a visual summary of their surface area, which affects how well they can grind tough food. *(Images modified from Davis, p. 129.)*



Evidence #5

DNA and Chromosomes

The data below summaries a DNA comparison experiment. Researchers compared the DNA of one species (on the left column) to the DNA of a different species (on the right column).

A lower number means the DNA was more similar.

	Brown bear	Giant panda	Red panda	Raccoon
Brown bear	–	4.3	14.0	14.4
Giant panda	4.8	–	14.4	14.2
Red panda	13.9	14.1	–	14.3
Raccoon	14.4	14.7	13.9	–
Dog (control)	18.7	18.3	18.9	18.5

The table below shows the number of chromosomes in several species.

Organism	Number of chromosomes
Raccoon	19 pairs
Red panda	22 pairs
Giant panda	21 pairs
American black bear	37 pairs
Sun bear	37 pairs
Polar bear	37 pairs
Spectacled bear	26 pairs

Evidence #6

Overall Anatomy

In 1964, an biologist named D. Dwight Davis published a detailed anatomy study of the giant panda and some of its relatives. Working from zoo animals that had died naturally, Davis and his team took measurements and made drawings of the bones, muscles, joints, blood vessels, nerves, brain, glands, organs, and more—enough to fill a 340-page book. Some of the findings are summarized below.

1. The giant panda stands and moves similarly to bears, though the panda moves less efficiently. *(Drawing modified from Davis, p. 25.)*

American black bear

Giant panda

2. The overall appearance of the giant panda is similar to that of bears. The two share body proportions that are different from those of other living carnivores (a larger group to which they belong). *(Drawings modified from Davis, p. 33.)*

Raccoon **Cacomistl** **Red panda**

American black bear **Giant panda**

Data derived from 2018 University of Utah case study, *Tale of Two Pandas*.