

Discovering the Wallace line

Background: Alfred Russel Wallace (1823–1913) was a naturalist and a contemporary of Charles Darwin. As a young man, he became intrigued with the idea that species arise from earlier forms. He conducted two expeditions to collect specimens and to research where species come from. The first expedition, a four-year trip to the Amazon, ended in disaster when his ship caught fire and sank, taking his entire collection with it. Undaunted, Wallace mounted his second expedition in 1854, this time to the Malay Archipelago. He spent 8 years exploring the islands, and it was during this time that he described the phenomenon of natural selection. After returning to England, Wallace continued his work and made many important contributions in fields including politics, geodesy, glaciology, and planetary science.

In this activity, you will walk in Wallace’s footsteps as you investigate the animals that live in the Malay Archipelago and explore how those observations contributed to the theory of evolution by natural selection.

Procedures: Follow the steps below to draw boundaries for the fauna (animals) of this region. You will be using field observations to see where each species can be found. The goal is to be able to find the imaginary Wallace line!

1. For each type of animal listed on the next page, you will draw boundary lines **on the map** that includes **all the locations (islands) where specimens of each animal have been found**. There are 10 total animals Wallace observed in 10 locations that are shown on the field cards.

NOTE: We are only looking at 7 of the animals.

- First, look at the list of 7 animals listed on the field notes.
 - Begin with *Cacatuidae* (the cockatoo)
 - Reference the 10 Field cards. Identify where the cockatoos were found. A check mark next to *Cacatuidae* means that Wallace found cockatoos living there! Record the letter A on each Island location that Wallace found cockatoos living.

(That means write the letter A on Australia, Sulawesi, New Guinea, Timor, and Lombok)

- Next, you will draw a **boundary line encircling all the places labeled with the letter A**. This line represents the entire region where the cockatoos were found. Be sure to include the entire island! Select a color to represent this boundary line and make a key.
2. Repeat this procedure for the 6 remaining animals (letter B through G). Use different colors to distinguish each of the different fauna boundary locations.
 3. Can you see the imaginary Wallace line? Draw a dashed line on the map showing where you think it is. Show the completed map to your teacher to be checked.
 4. On the back of your map, answer the analysis questions in complete sentences.

Wallace's Field Notes

Seven Main Animal Groups

Latin Family

- A. *Cacaturidae*
- B. *Felidae*
- C. *Macropodidae*
- D. *Meliphagidae*
- E. *Paradisaeidae*
- F. *Picidae*
- G. *Ursidae*

Common name

- Cockatoos
- Cats
- Kangaroos
- Honeyeater Birds
- Birds-of-paradise
- Woodpeckers
- Bears

Faunal Observations		Faunal Observations	
Location: Borneo		Location: Sulawesi	
<input type="checkbox"/>	Cacaturidae	<input checked="" type="checkbox"/>	Cacaturidae
<input checked="" type="checkbox"/>	Cercopithecididae	<input checked="" type="checkbox"/>	Cercopithecididae
<input checked="" type="checkbox"/>	Felidae	<input type="checkbox"/>	Felidae
<input type="checkbox"/>	Macropodidae	<input type="checkbox"/>	Macropodidae
<input checked="" type="checkbox"/>	Megapodidae	<input checked="" type="checkbox"/>	Megapodidae
<input type="checkbox"/>	Meliphagidae	<input checked="" type="checkbox"/>	Meliphagidae
<input type="checkbox"/>	Paradisaeidae	<input checked="" type="checkbox"/>	Paradisaeidae
<input checked="" type="checkbox"/>	Picidae	<input type="checkbox"/>	Picidae
<input checked="" type="checkbox"/>	Ursidae	<input type="checkbox"/>	Ursidae
<input type="checkbox"/>	Petauridae	<input type="checkbox"/>	Petauridae

Faunal Observations		Faunal Observations	
Location: New Guinea		Location: Timor	
<input checked="" type="checkbox"/>	Cacaturidae	<input checked="" type="checkbox"/>	Cacaturidae
<input type="checkbox"/>	Cercopithecididae	<input checked="" type="checkbox"/>	Cercopithecididae
<input type="checkbox"/>	Felidae	<input type="checkbox"/>	Felidae
<input type="checkbox"/>	Macropodidae	<input type="checkbox"/>	Macropodidae
<input checked="" type="checkbox"/>	Megapodidae	<input checked="" type="checkbox"/>	Megapodidae
<input checked="" type="checkbox"/>	Meliphagidae	<input checked="" type="checkbox"/>	Meliphagidae
<input checked="" type="checkbox"/>	Paradisaeidae	<input type="checkbox"/>	Paradisaeidae
<input type="checkbox"/>	Picidae	<input type="checkbox"/>	Picidae
<input type="checkbox"/>	Ursidae	<input type="checkbox"/>	Ursidae
<input checked="" type="checkbox"/>	Petauridae	<input type="checkbox"/>	Petauridae

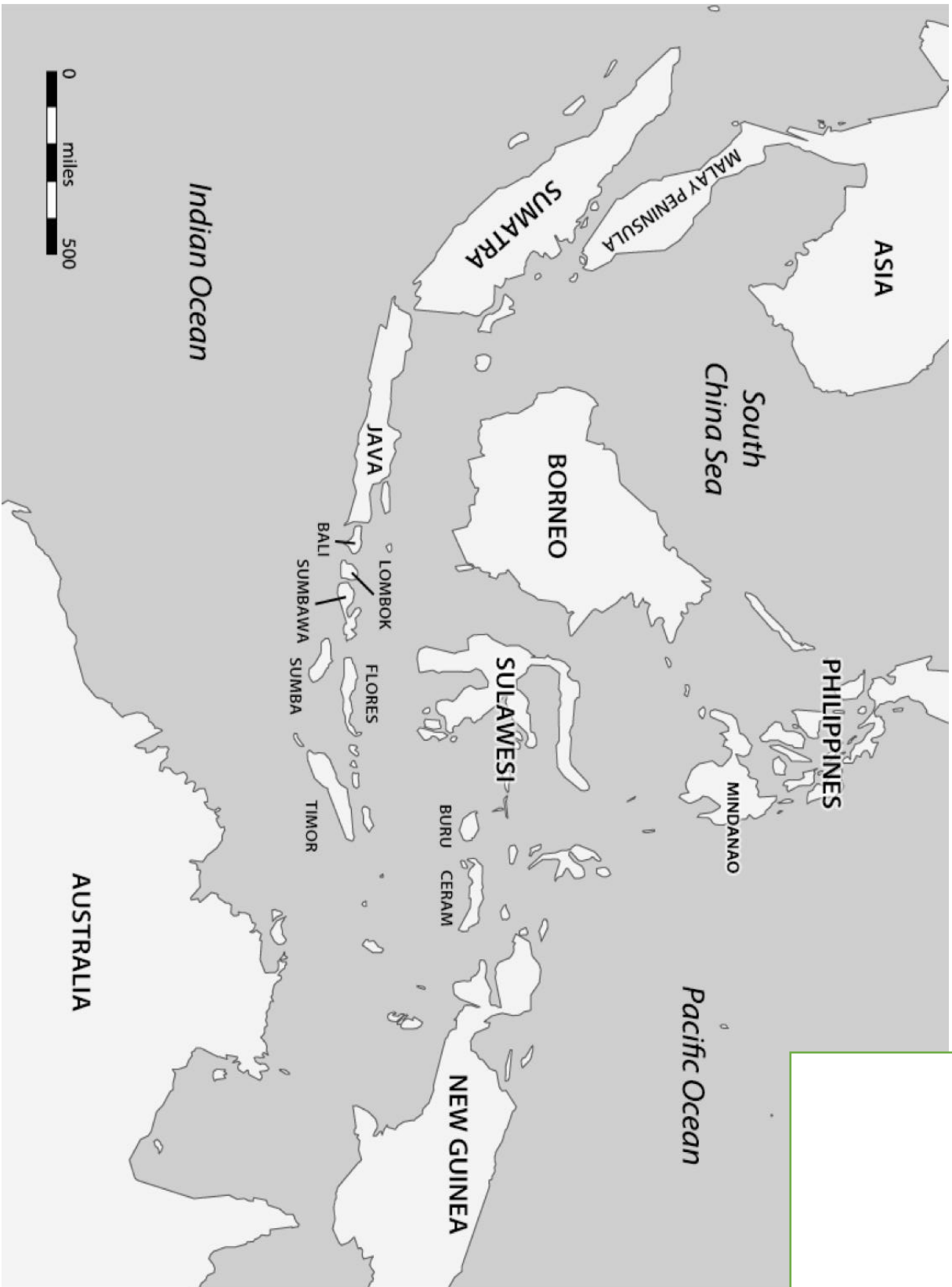
Faunal Observations		Faunal Observations	
Location: Lombok		Location: Bali	
<input checked="" type="checkbox"/>	Cacaturidae	<input type="checkbox"/>	Cacaturidae
<input checked="" type="checkbox"/>	Cercopithecididae	<input checked="" type="checkbox"/>	Cercopithecididae
<input type="checkbox"/>	Felidae	<input checked="" type="checkbox"/>	Felidae
<input type="checkbox"/>	Macropodidae	<input type="checkbox"/>	Macropodidae
<input type="checkbox"/>	Megapodidae	<input type="checkbox"/>	Megapodidae
<input checked="" type="checkbox"/>	Meliphagidae	<input checked="" type="checkbox"/>	Meliphagidae
<input type="checkbox"/>	Paradisaeidae	<input type="checkbox"/>	Paradisaeidae
<input checked="" type="checkbox"/>	Picidae	<input type="checkbox"/>	Picidae
<input type="checkbox"/>	Ursidae	<input type="checkbox"/>	Ursidae
<input type="checkbox"/>	Petauridae	<input type="checkbox"/>	Petauridae

Faunal Observations		Faunal Observations	
Location: Malay Peninsula		Location: Australia	
<input type="checkbox"/>	Cacaturidae	<input checked="" type="checkbox"/>	Cacaturidae
<input checked="" type="checkbox"/>	Cercopithecididae	<input type="checkbox"/>	Cercopithecididae
<input checked="" type="checkbox"/>	Felidae	<input type="checkbox"/>	Felidae
<input type="checkbox"/>	Macropodidae	<input checked="" type="checkbox"/>	Macropodidae
<input type="checkbox"/>	Megapodidae	<input checked="" type="checkbox"/>	Megapodidae
<input type="checkbox"/>	Meliphagidae	<input checked="" type="checkbox"/>	Meliphagidae
<input type="checkbox"/>	Paradisaeidae	<input checked="" type="checkbox"/>	Paradisaeidae
<input checked="" type="checkbox"/>	Picidae	<input type="checkbox"/>	Picidae
<input checked="" type="checkbox"/>	Ursidae	<input type="checkbox"/>	Ursidae
<input type="checkbox"/>	Petauridae	<input checked="" type="checkbox"/>	Petauridae

Faunal Observations		Faunal Observations	
Location: Java		Location: Sumatra	
<input type="checkbox"/>	Cacaturidae	<input type="checkbox"/>	Cacaturidae
<input checked="" type="checkbox"/>	Cercopithecididae	<input checked="" type="checkbox"/>	Cercopithecididae
<input checked="" type="checkbox"/>	Felidae	<input type="checkbox"/>	Felidae
<input type="checkbox"/>	Macropodidae	<input type="checkbox"/>	Macropodidae
<input type="checkbox"/>	Megapodidae	<input type="checkbox"/>	Megapodidae
<input type="checkbox"/>	Meliphagidae	<input type="checkbox"/>	Meliphagidae
<input type="checkbox"/>	Paradisaeidae	<input type="checkbox"/>	Paradisaeidae
<input checked="" type="checkbox"/>	Picidae	<input checked="" type="checkbox"/>	Picidae
<input checked="" type="checkbox"/>	Ursidae	<input type="checkbox"/>	Ursidae
<input type="checkbox"/>	Petauridae	<input type="checkbox"/>	Petauridae

Name: _____ Period: _____ Date: _____

Wallace line Map



Analysis questions: *Answer in complete sentences.*

- 1) Explain how you arrived at your boundary placement. Can you locate the Wallace line based on your boundary placement? Using a black colored pencil, draw where you think the Wallace Line is on your map, and label it "Wallace Line".

- 2) Explain how Wallace's observations in the Malay Archipelago led to his theory of natural selection. Be sure to cite specific examples from the fauna field list and locations.

- 3) Are there any observations about the fauna (animals) and/or boundaries that surprise you? Explain.

- 4) How is it possible for the same species of animals to be found on separate islands?

- 5) Explain why the Wallace line exists. For instance, why are marsupials generally found only on the in Australian side of the line and not the Asian side? Is there an invisible force field that prevents animals from moving across the line?