

# Speciation

How are species defined?

Species divergence in allopatry

Species divergence in sympatry

Reuniting

# Speciation

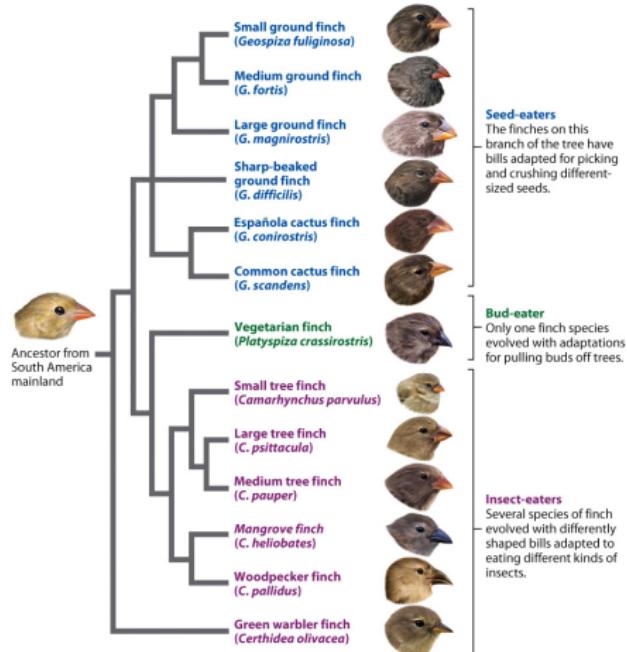
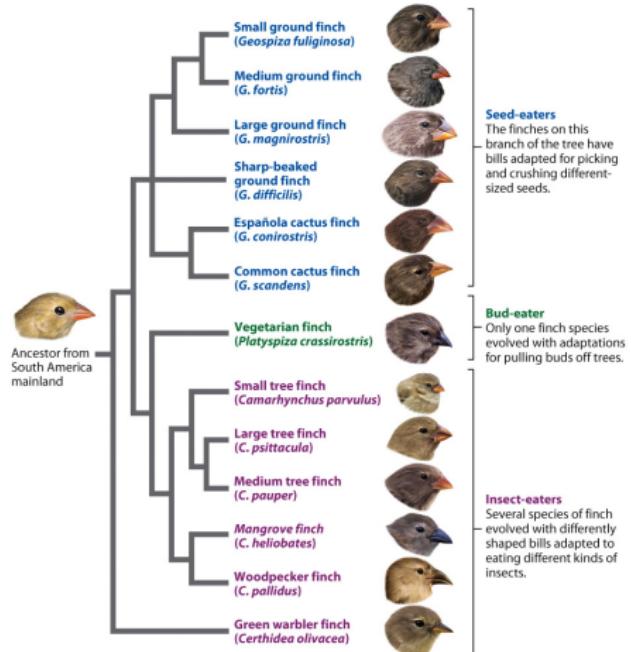


Figure 21.9 (Part 1)  
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# Outline

## How are species defined?

Biological species concept

Morphological species concept

Ecological species concept

Phylogenetic species concept

## Species divergence in allopatry

Dispersal

Vicariance

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Disruptive selection

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# African Forest Elephant



# Sri Lankan Elephant



# Indian Elephant



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    - ▶ *If we focus on mitochondria, then maybe you and your cousins are a species*

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- Ecological species concept

- Phylogenetic species concept

Species divergence in allopatry

- Dispersal

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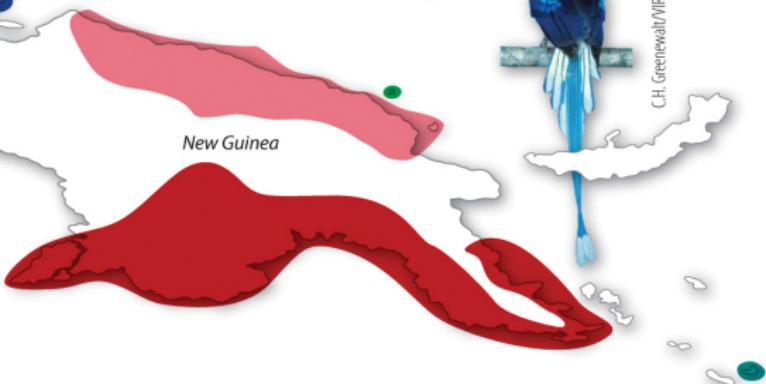
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The three mainland subspecies of *Tanysiptera* are similar to one another (and colored similarly on the map), but island subspecies are more distinct (and colored differently), suggesting faster genetic divergence on island populations.



The eight subspecies on New Guinea and nearby islands are marked in different colors.



**Figure 21.8**  
*Biology: How Life Works*  
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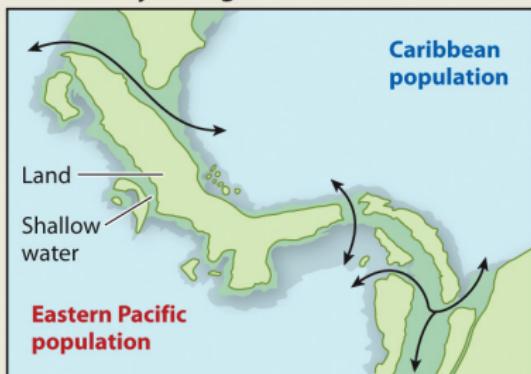
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# Example: Shrimp

Interbreeding between eastern Pacific and Caribbean populations of *Alpheus* was possible through the corridors that existed before the final formation of the Isthmus of Panama.

3.5 million years ago



Interbreeding between eastern Pacific and Caribbean populations is no longer possible because of the geographic barrier.

Today



Figure 21.7 (Part 1)  
Biology: How Life Works  
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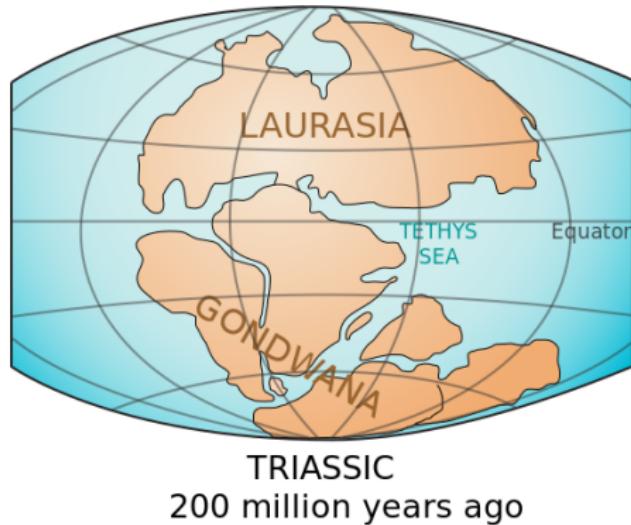
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The closing of marine corridors resulted over time in the speciation of *Alpheus* into eastern Pacific and Caribbean species.



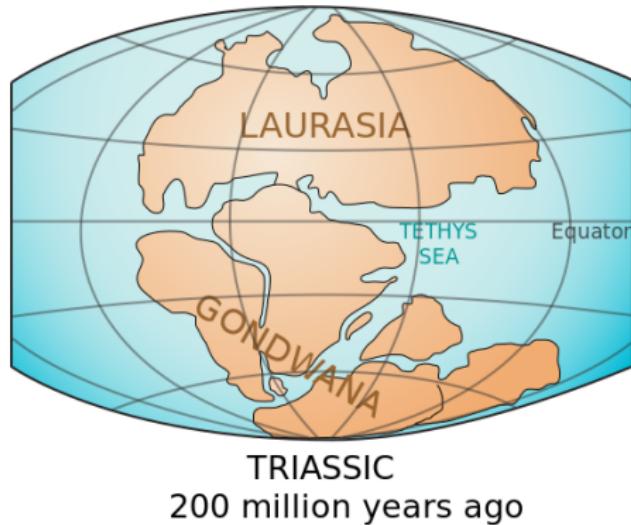
Figure 21.7 (Part 2)  
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## Example: ratites

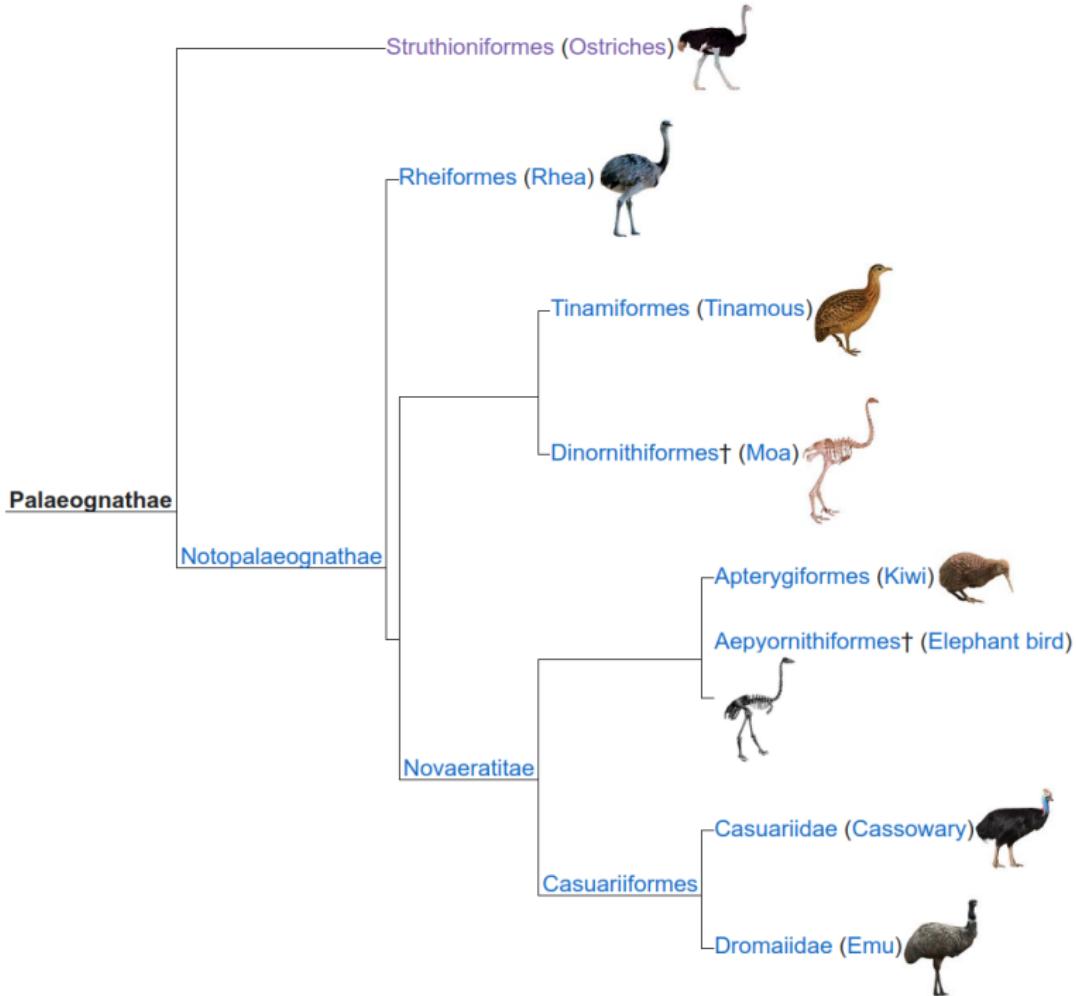


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- Dispersal

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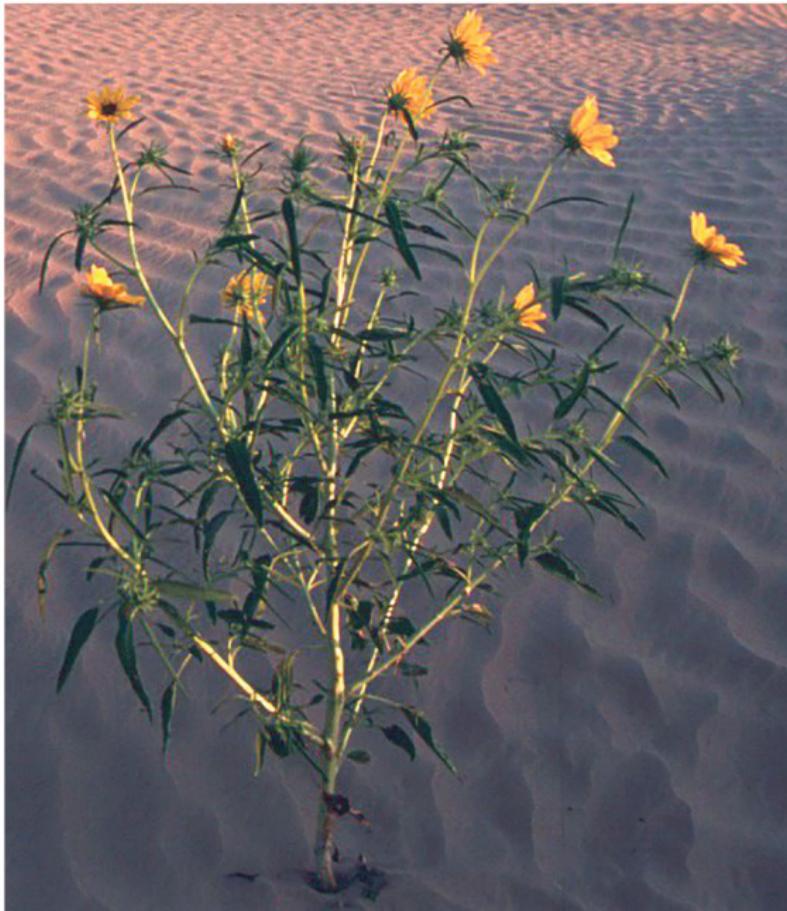


photo by Jason Rick, courtesy of Loren Rieseberg

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wikipedia/humans

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