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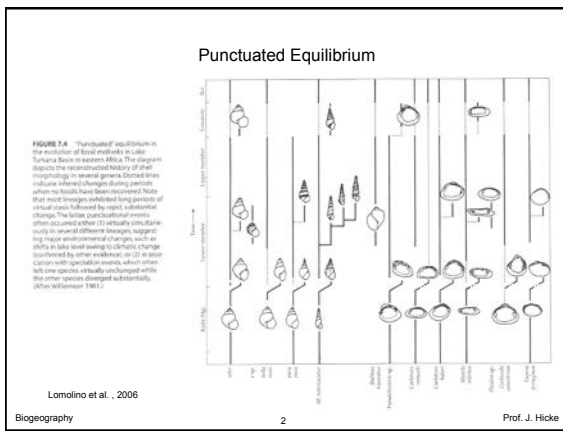
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### Allopatric Speciation

[http://wps.pearsoncustom.com/wps/media/objects/3014/3087289/Web\\_Tutorials/18\\_A01.swf](http://wps.pearsoncustom.com/wps/media/objects/3014/3087289/Web_Tutorials/18_A01.swf)

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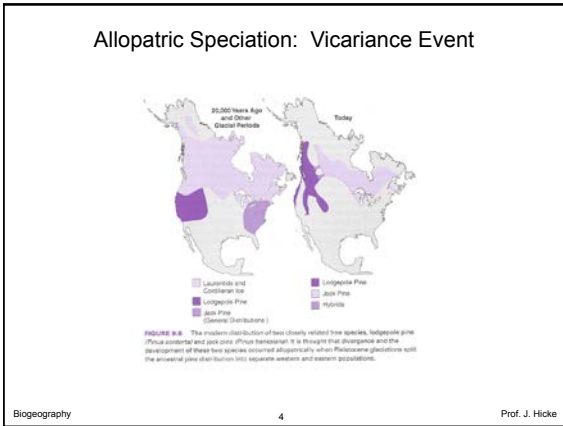
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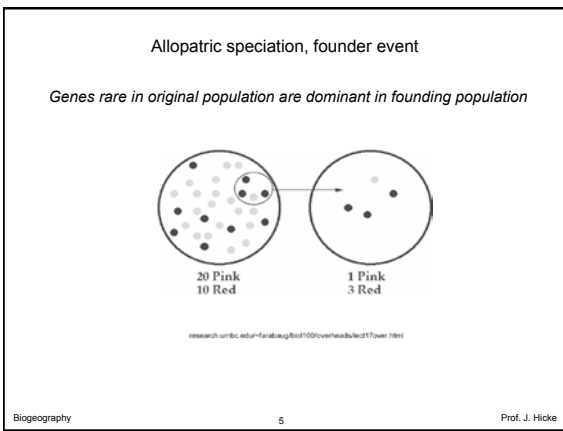
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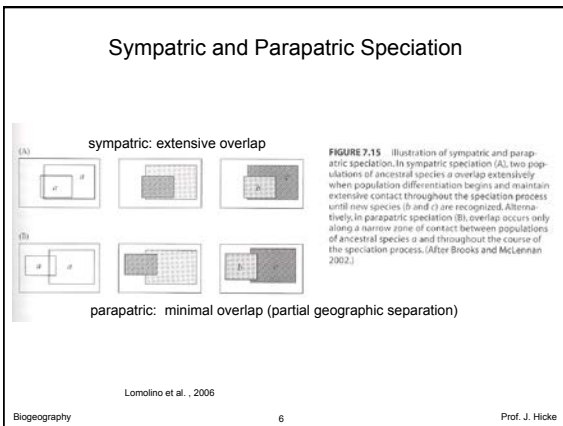
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### Parapatric Speciation

No extrinsic barrier to gene flow, but...

1. restricted gene flow within population
2. varying selective pressures across the population range



*"Although continuously distributed, different flowering times have begun to reduce gene flow between metal-tolerant plants and metal-intolerant plants."*

[evolution.berkeley.edu/evosite/ev0101/VC1dParapatric.shtml](http://evolution.berkeley.edu/evosite/ev0101/VC1dParapatric.shtml)

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### Example of Sympatric Speciation



*Gene flow has been reduced between flies that feed on different food varieties, even though they both live in the same geographic area.*

<http://evolution.berkeley.edu/evosite/ev0101/VC1eSympatric.shtml>

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- 200 years ago, flies only on hawthorns
- then, introduction of domestic apple
- females lay eggs on type of fruit they grew up on; males look for mates on type of fruit they grew up on
- restricted gene flow
- speciation

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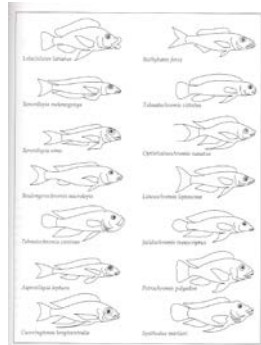
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### Example of Sympatric Speciation

**FIGURE 7.16** Examples of the variety of body forms resulting from adaptive radiation of cichlid fishes in Lake Tanganyika in eastern Africa. (After Fryer and Iles 1972.)

Lomolino et al., 2006

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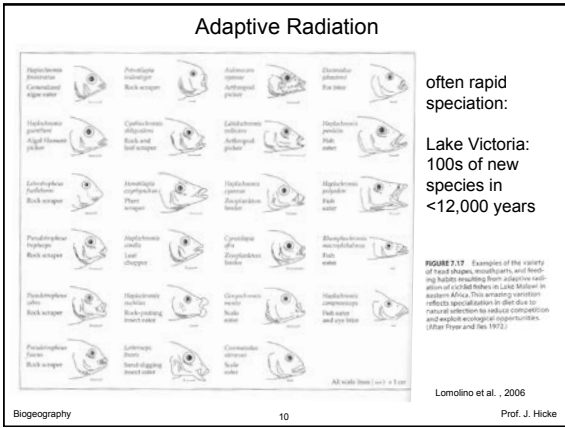
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often rapid speciation:  
 Lake Victoria:  
 100s of new  
 species in  
 <12,000 years

**FIGURE 7.17** Examples of the variety of head shapes, mouthparts, and feeding habits resulting from adaptive radiations of cichlid fishes in Lake Victoria in eastern Africa. This adaptive radiation reflects specialization in that due to natural selection to reduce competition and exploit ecological opportunities. (After Fryer and de la 1972.)

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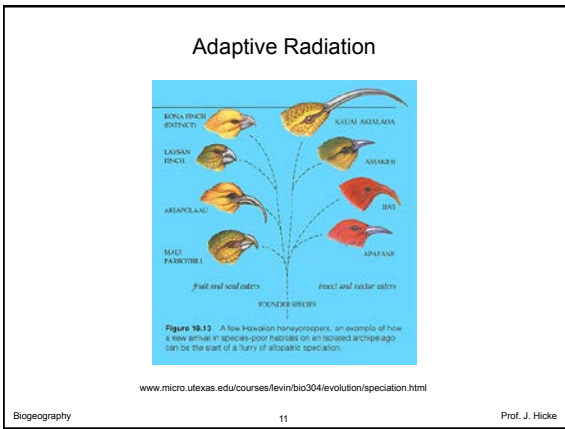
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**Figure 19.13** A few Hawaiian honeycreepers, an example of how a new arrival in species-poor habitats on an isolated archipelago can be the trait of a flurry of allopatric speciation.

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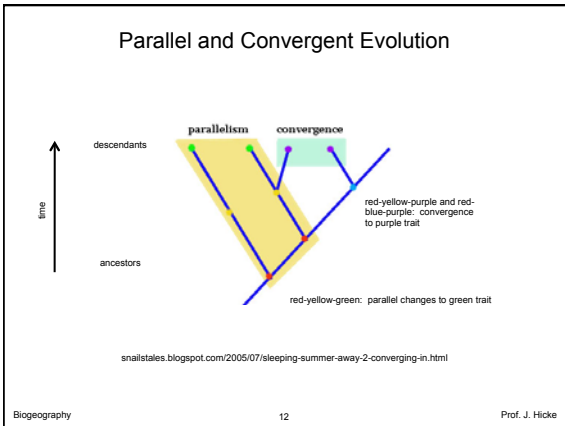
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### Convergent Evolution

**FIGURE 5.8** An example of convergent evolution: marsupials and ecologically similar mammals rather Baker and Garland, 1992.

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### Parallel Evolution

**Figure 43-13 PARALLEL EVOLUTION IN PORCUPINES.**  
 (a) The American porcupine, *Conepatus peruanus*, and (b) the Old World porcupine, *Hystrix africaeaustralis*, have a common ancestor that lived 70 million years ago, before South America and Africa drifted apart. The porcupines have evolved independently on separate continents to modern forms that are anatomically similar. This is an example of parallel evolution.

[www.micro.utexas.edu/courses/levin/bio304/evolution/macroevol.html](http://www.micro.utexas.edu/courses/levin/bio304/evolution/macroevol.html)

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### Coevolution

flowers pollinated by hummingbirds

- have more nectar and sugar
- are colored to attract the birds
- bloom during hummingbird breeding seasons
- have tubular flowers that force bills to pick up pollen
- have little or no fragrance (hummingbirds have poor senses of smell)

[www.montereybay.com/creagnus/hummingbirds.html](http://www.montereybay.com/creagnus/hummingbirds.html)

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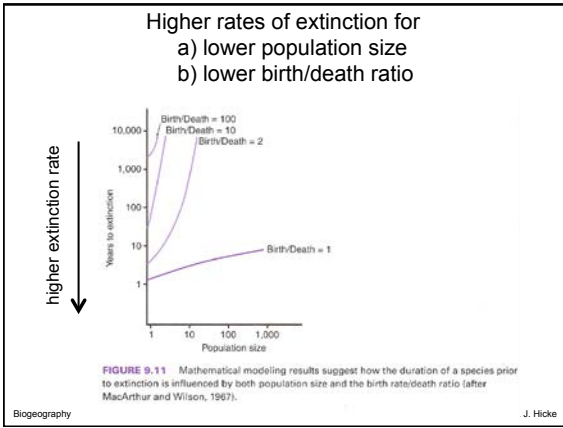
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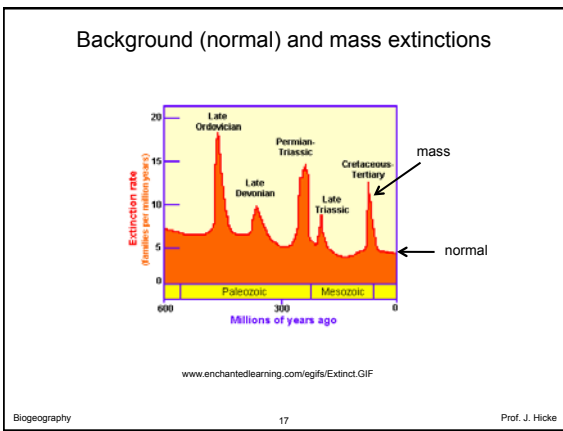
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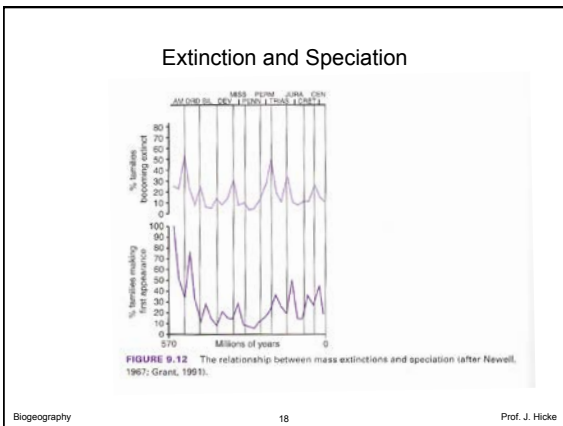
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### Extinction and Speciation



[www.paleozoic.org/lucson/gallery-pics/fossils-fs/black-hills-trex-2.jpg](http://www.paleozoic.org/lucson/gallery-pics/fossils-fs/black-hills-trex-2.jpg)

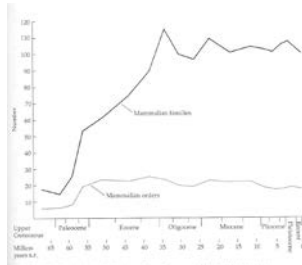


FIGURE 2.25 The "explosive" radiation of placental mammals during the Cenozoic is supported by the rapid increase in number of families. This radiation occurred after the K-T mass extinction event as mammals diverged and specialized to take advantage of ecological opportunities presented by the extinction of dinosaurs and other groups of previously dominant reptiles. (After Lillegraven 1972.)

Lomolino et al., 2006

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