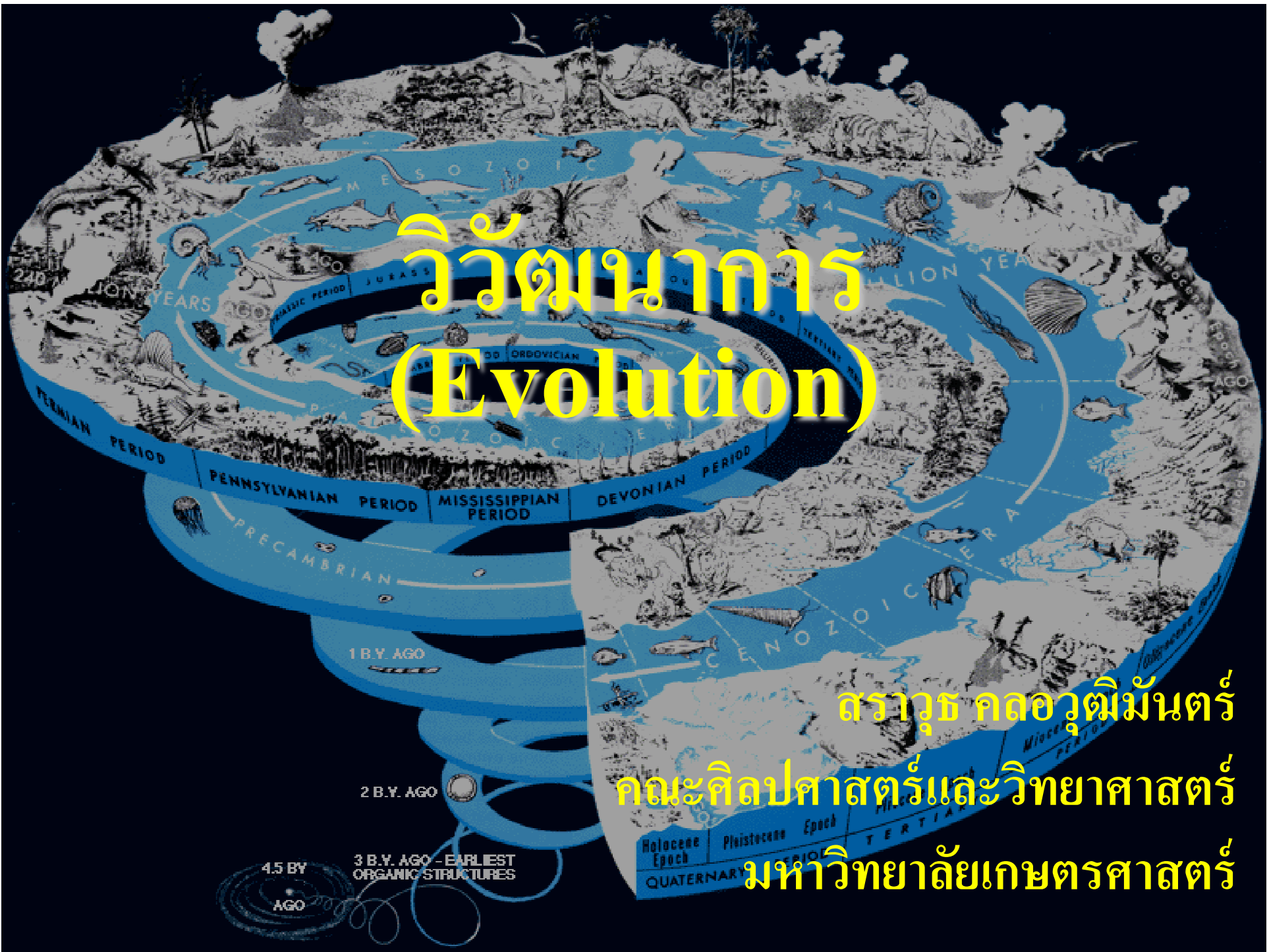


วิวัฒนาการ (Evolution)



ตราวุธ คดอวุฒิมันตร์

คณะศิลปศาสตร์และวิทยาศาสตร์

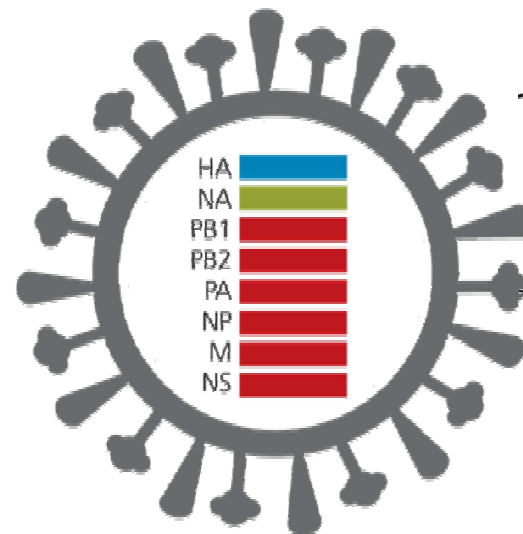
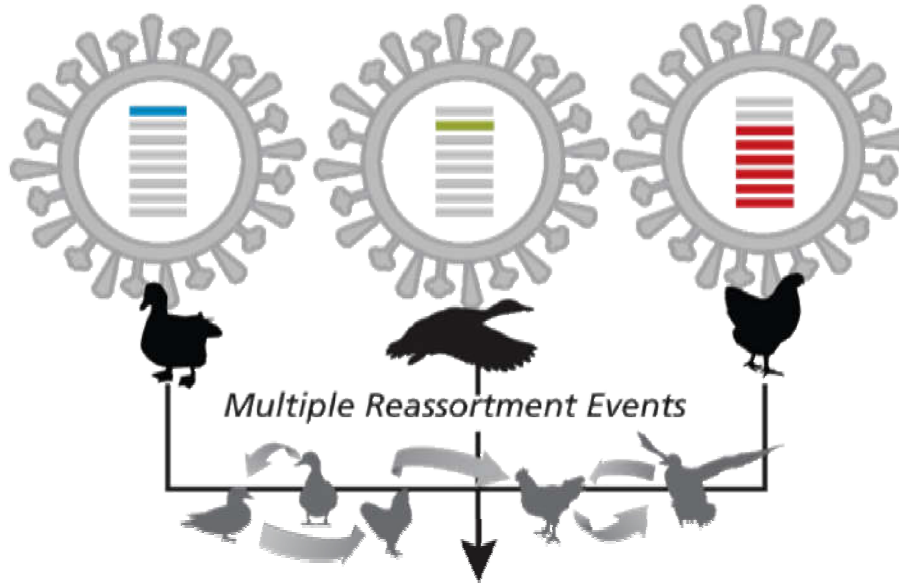
มหาวิทยาลัยเกษตรศาสตร์

EVOLUTION OF THE H7N9 VIRUS IN CHINA, 2013

Domestic Ducks
H7N3 Virus

Wild Birds
H7N9 Virus

Domestic Poultry
Multiple H9N2 Viruses



Current H7N9 Virus

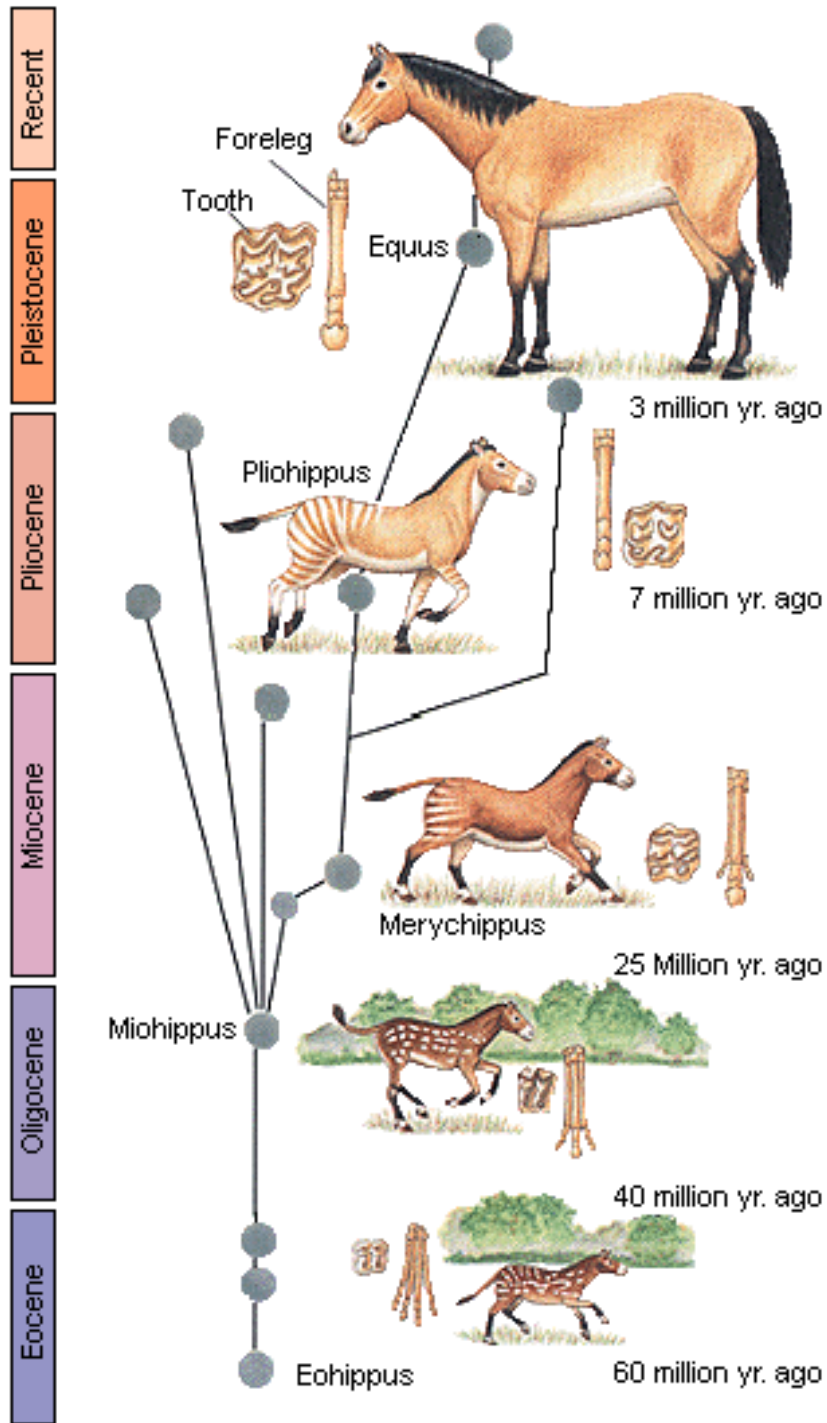


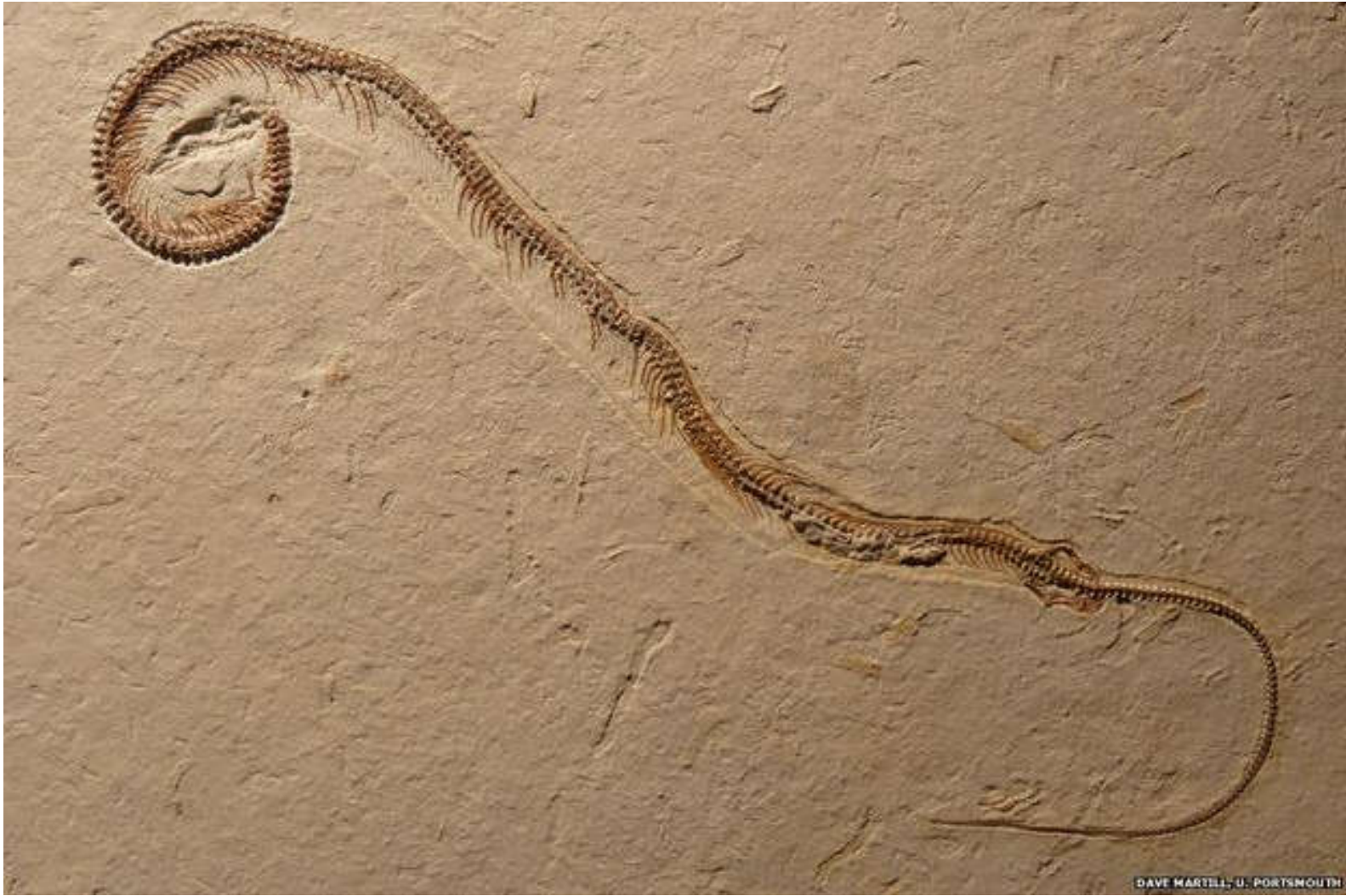
Hemagglutinin determines how the virus **sticks** to the host cell.



Neuraminidase determines how the virus **spreads** through the host.







Tetrapodophis amplexus



Tetrapodophis amplexus

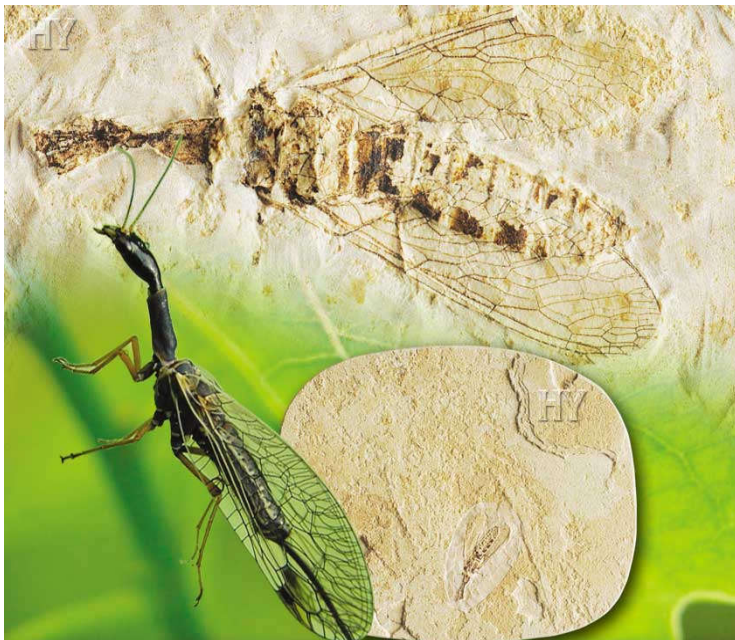
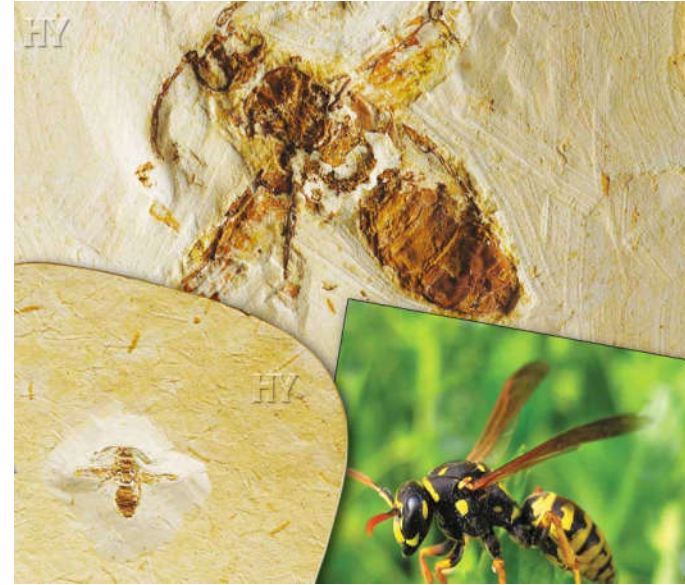
ตัวอย่างฟอสซิลที่มีชีวิต (Living fossil)



ตัวอย่างฟอสซิลที่มีชีวิต (Living fossil)

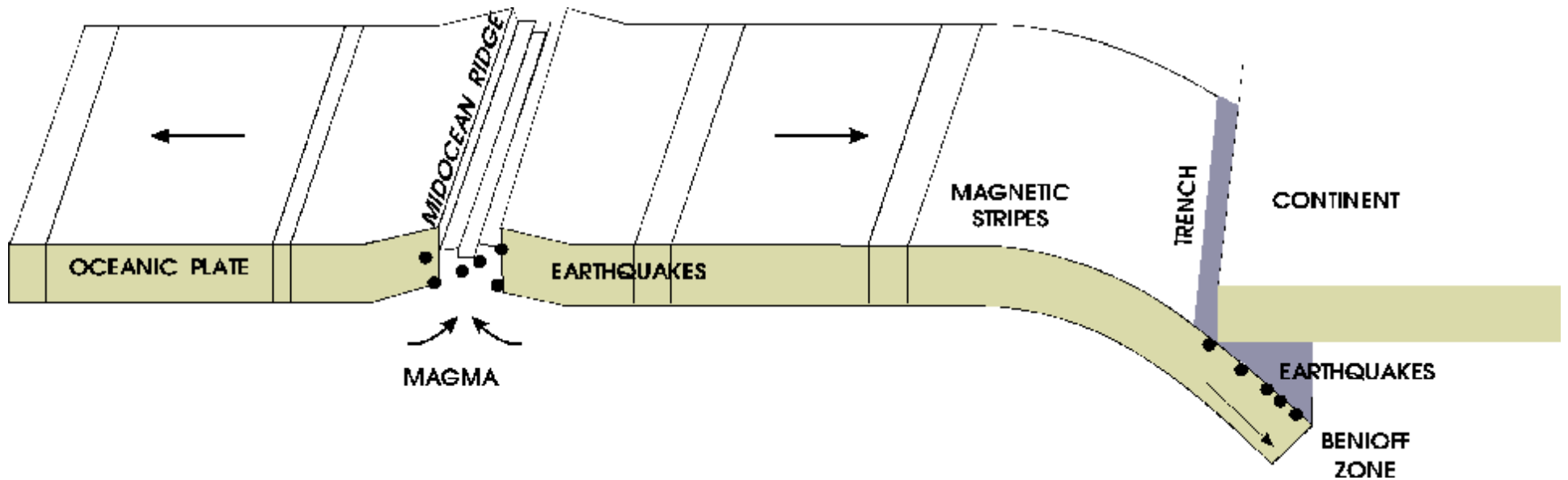


ตัวอย่างฟอสซิลที่มีชีวิต (Living fossil)

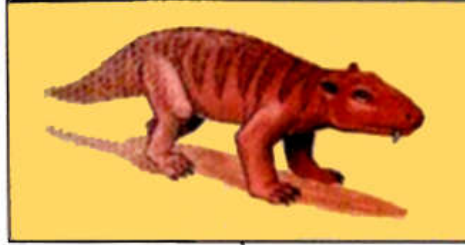


หลักฐานของการวิวัฒนาการ

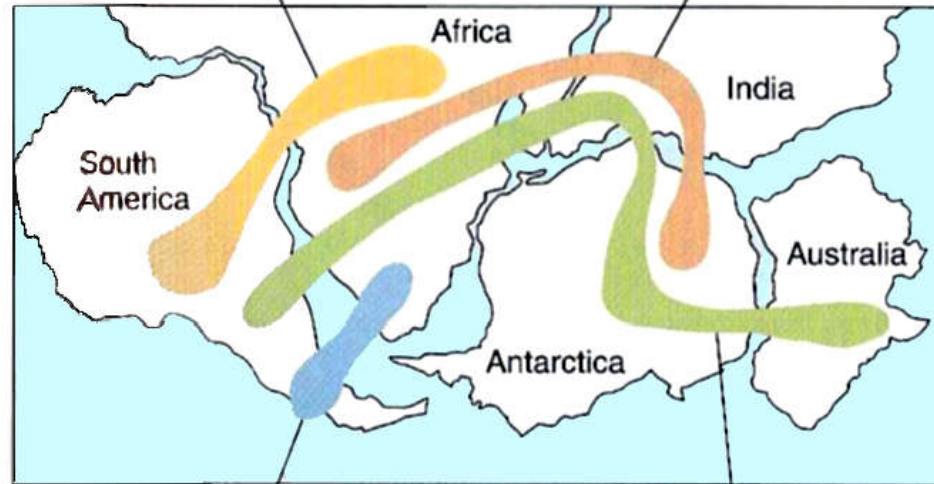
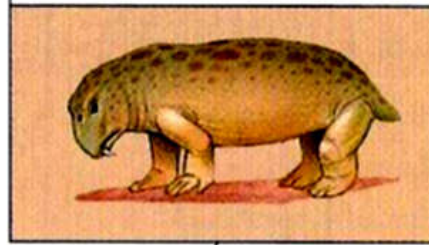
- Biogeography evidence



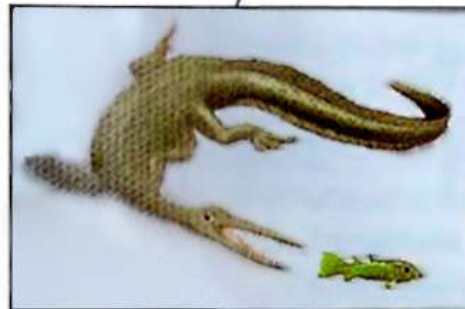
Cynognathus



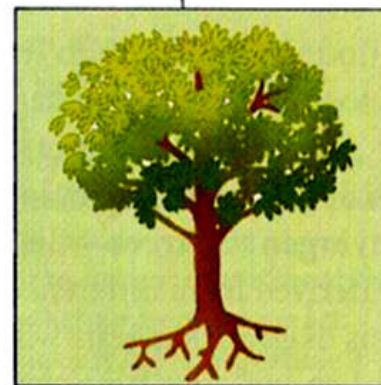
Lystrosaurus



Mososaurus

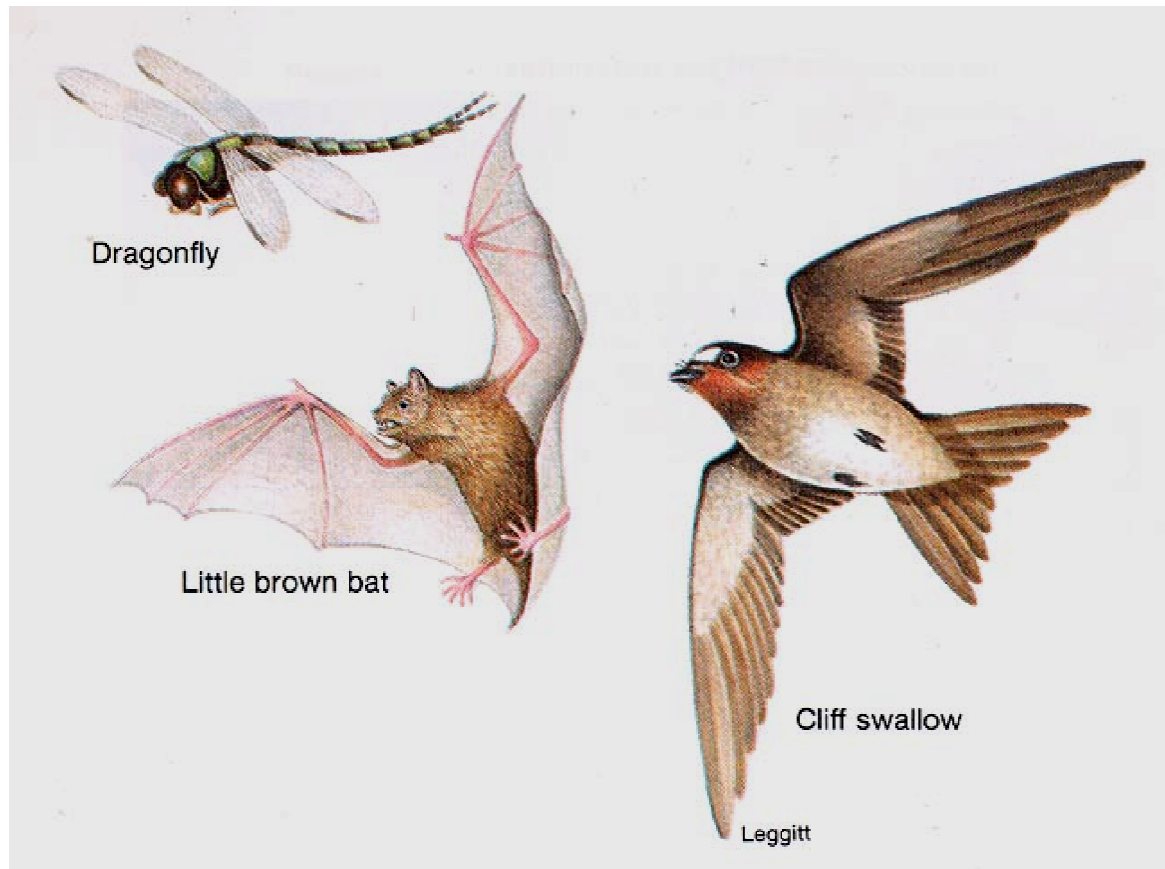


Glossopteris

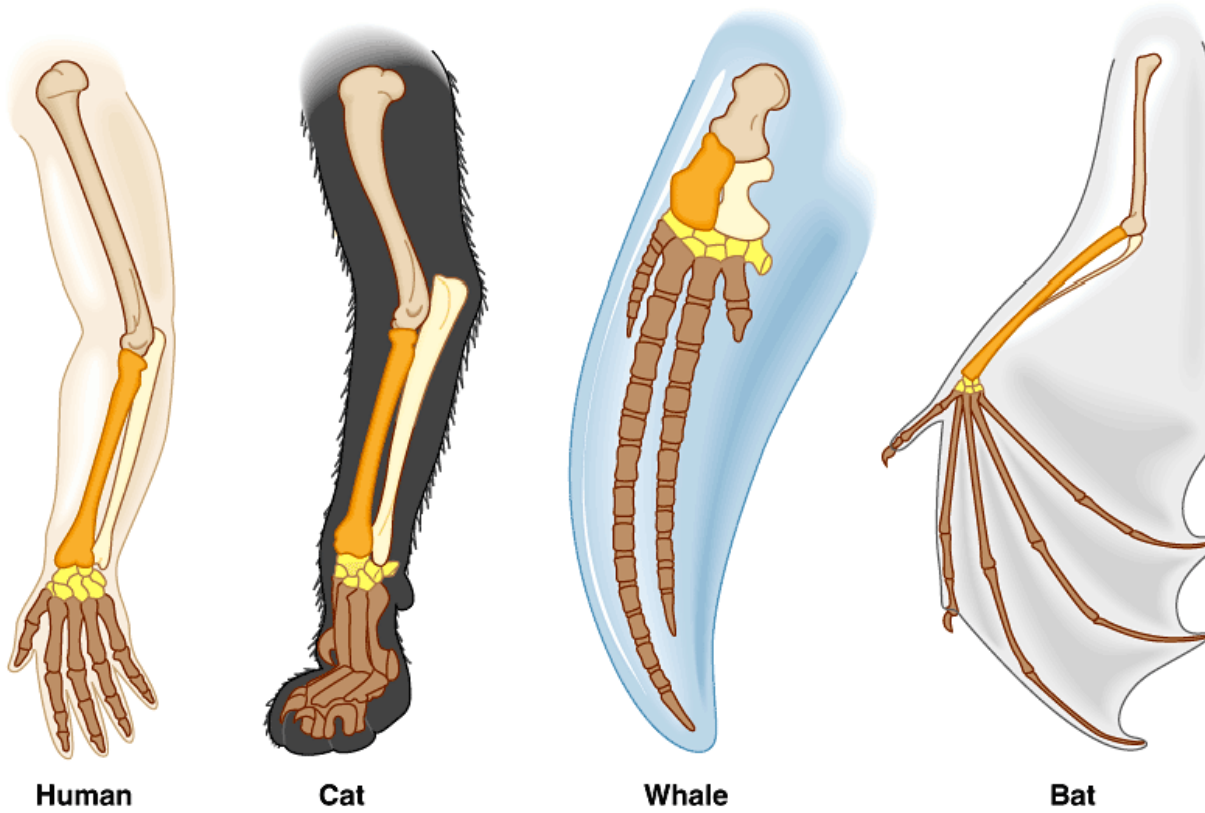


หลักฐานของการวิวัฒนาการ

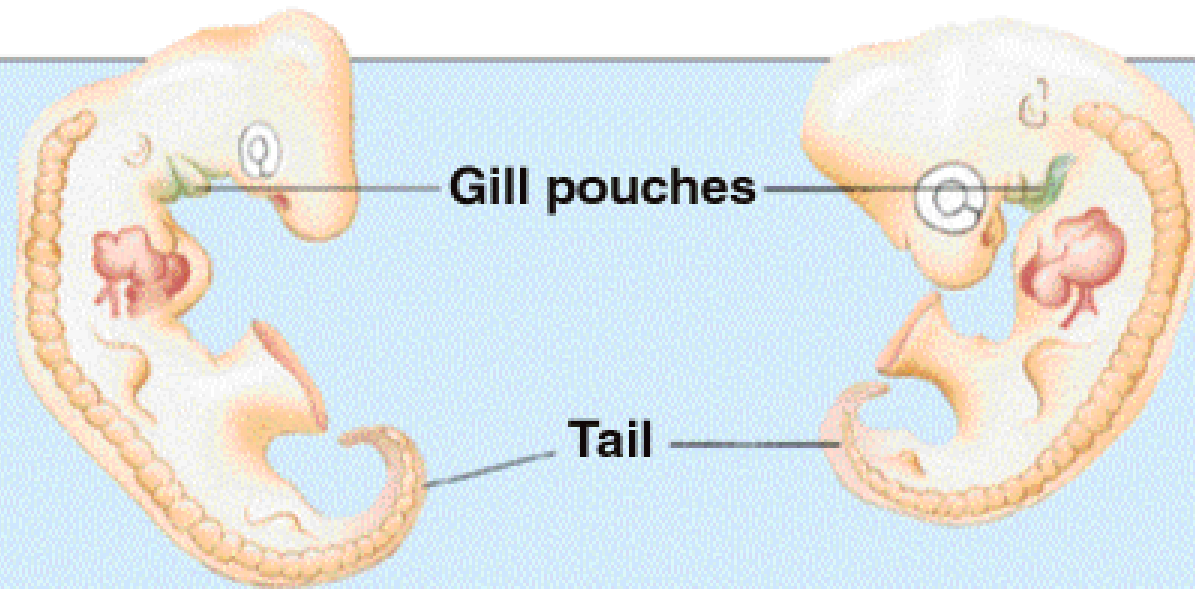
- Homologous structure VS Analogous structure



Homologous structure



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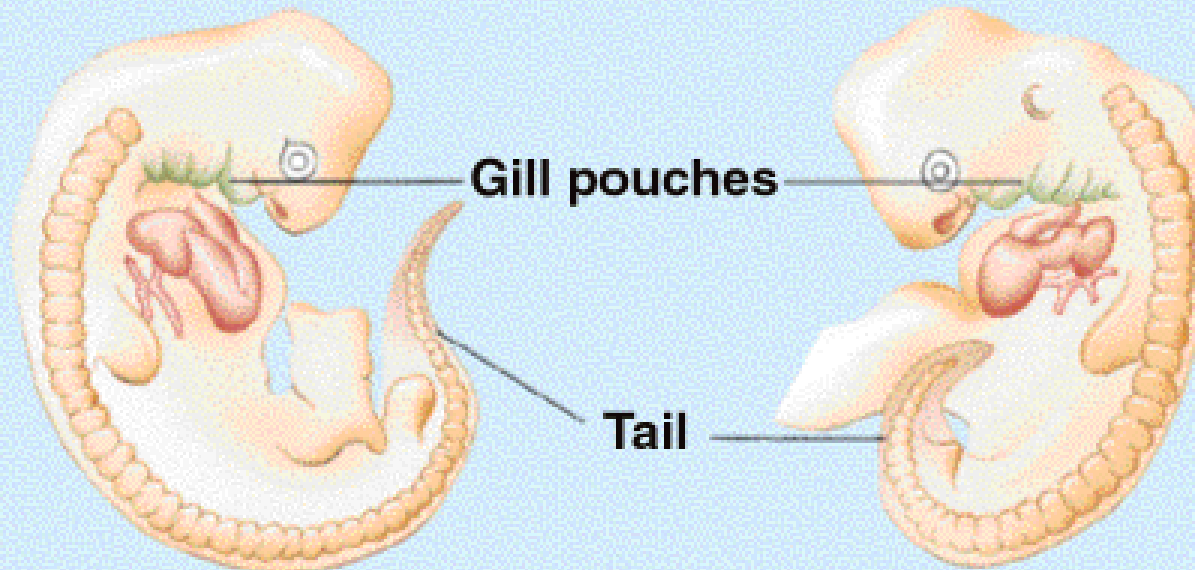


Gill pouches

Tail

(a) Reptile

(b) Bird



Gill pouches

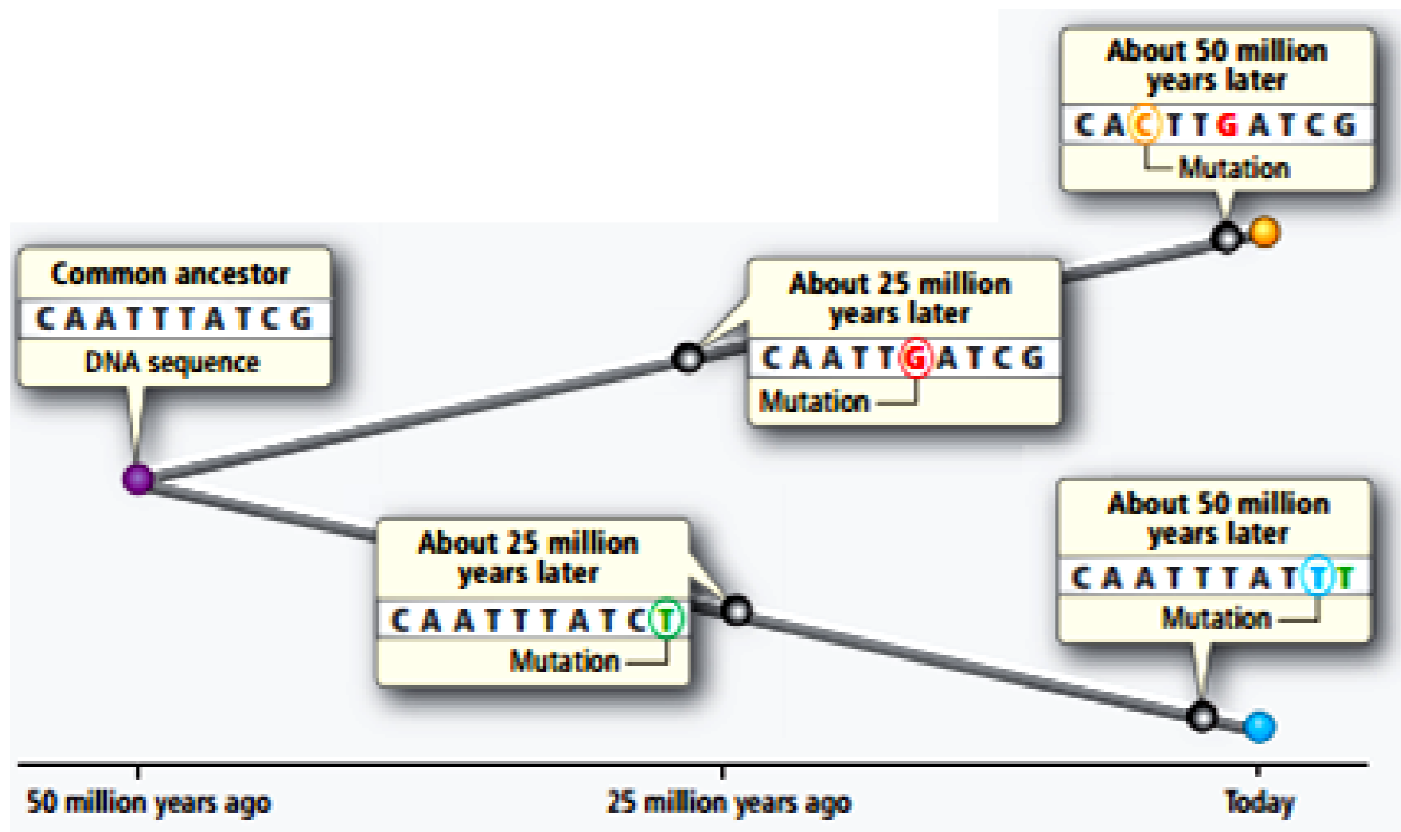
Tail

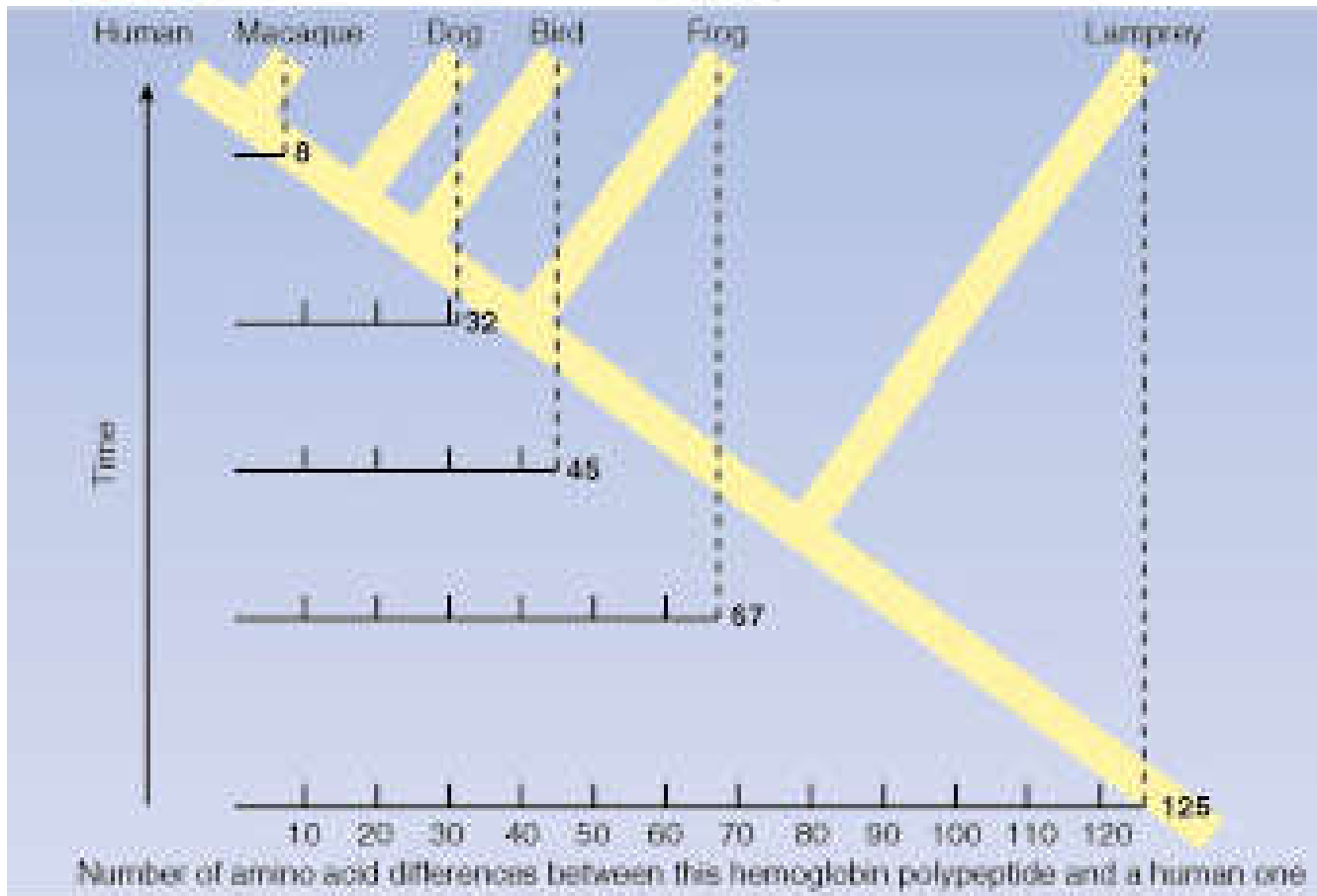
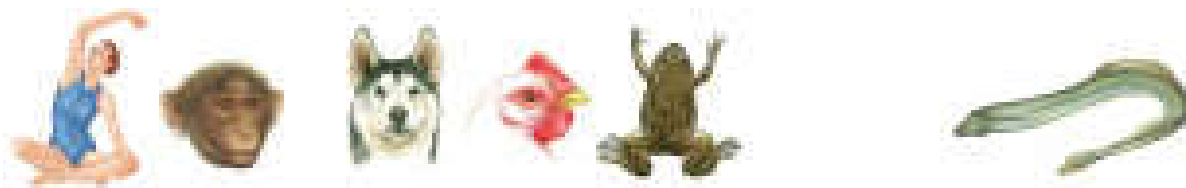
(c) Pig

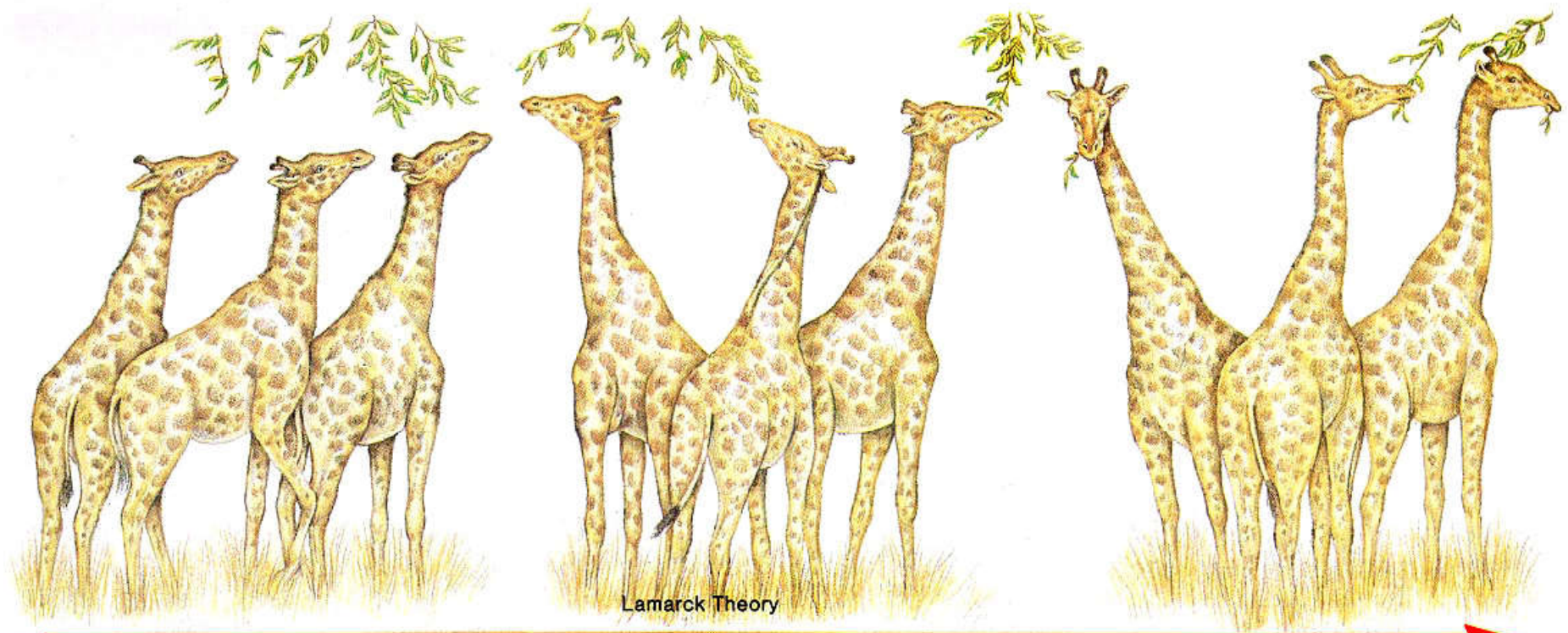
(d) Human

หลักฐานของการวิวัฒนาการ

- Molecular record

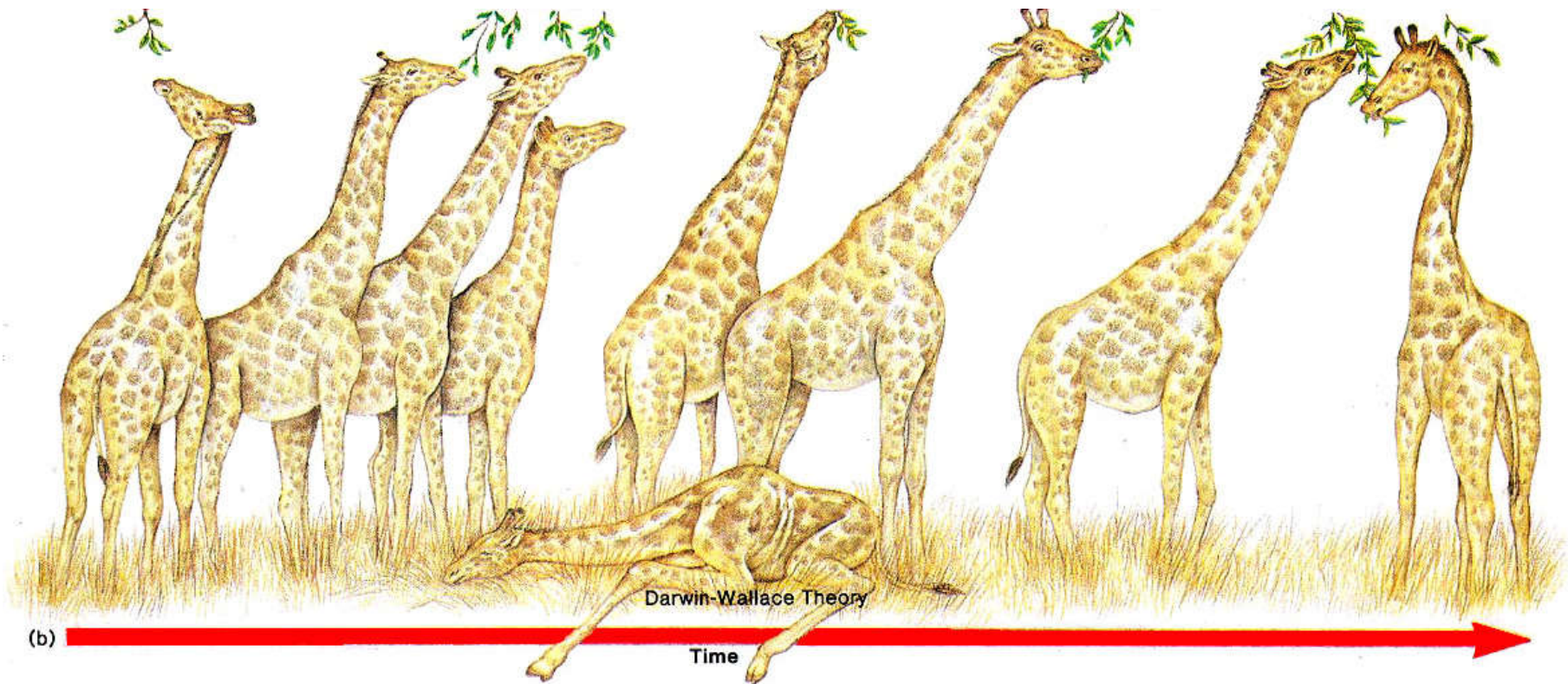






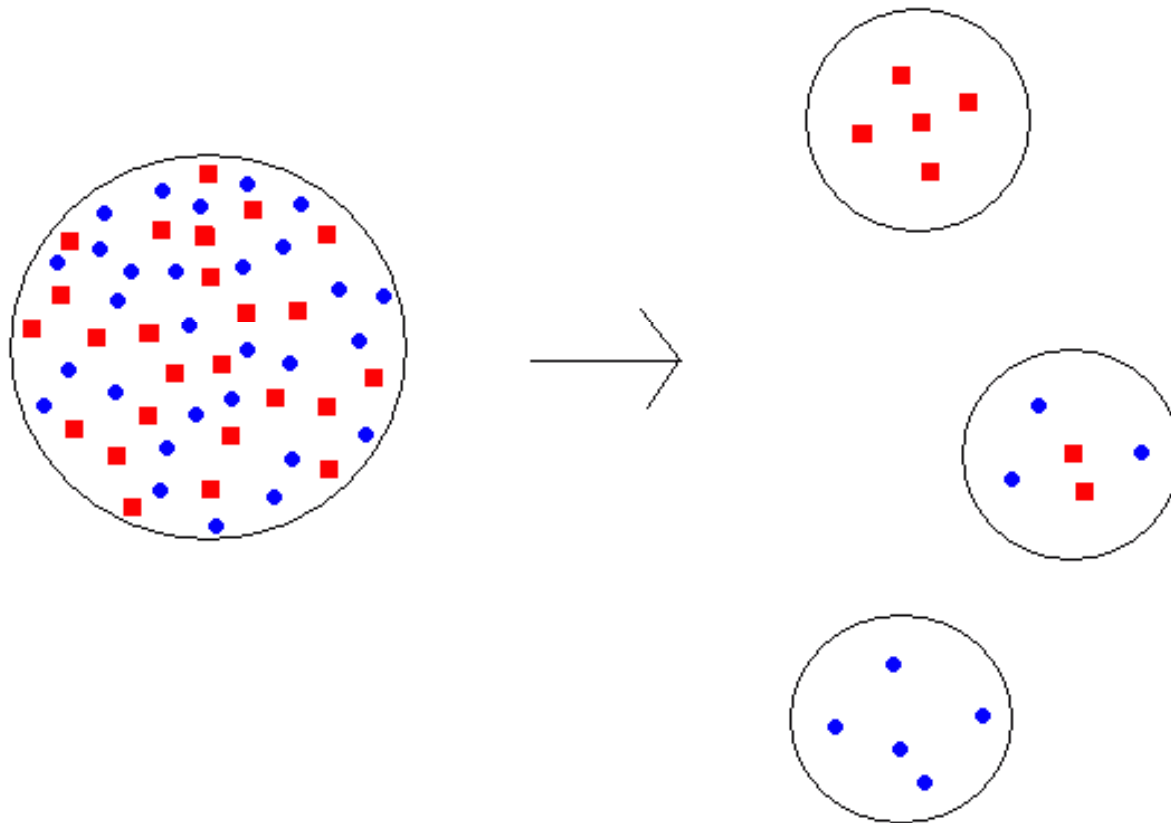
Lamarck Theory

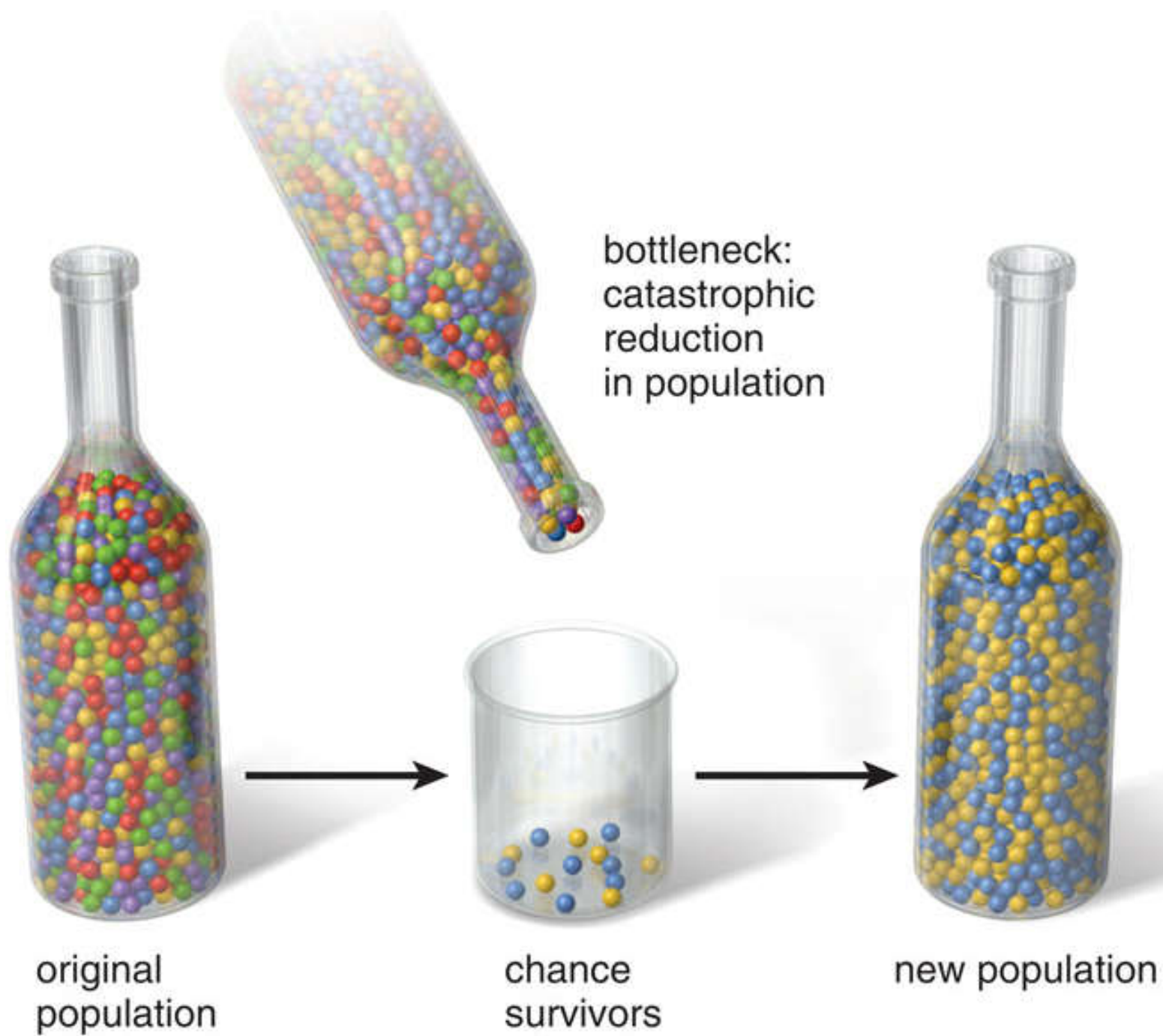
(a)



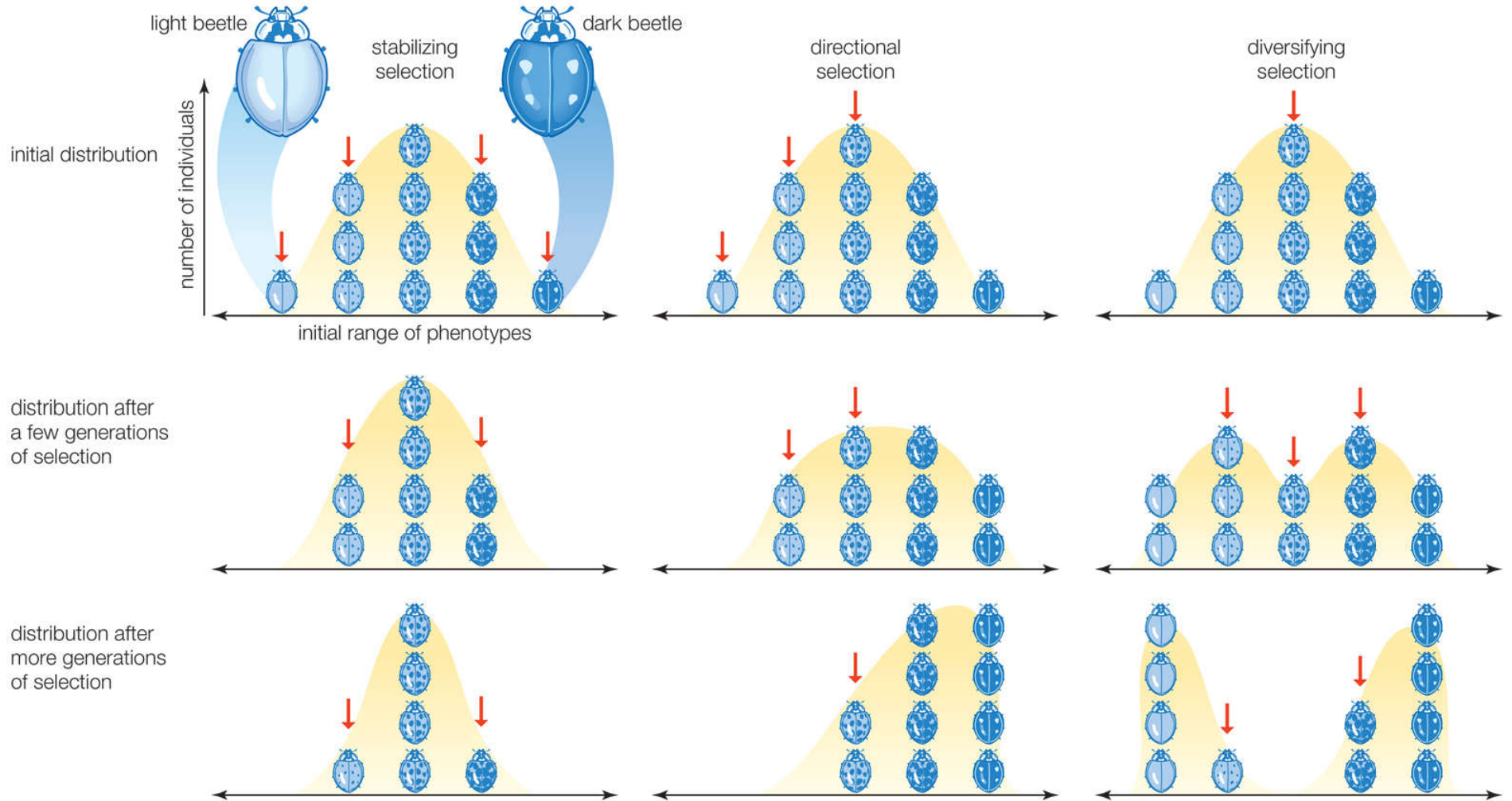


Founder effect



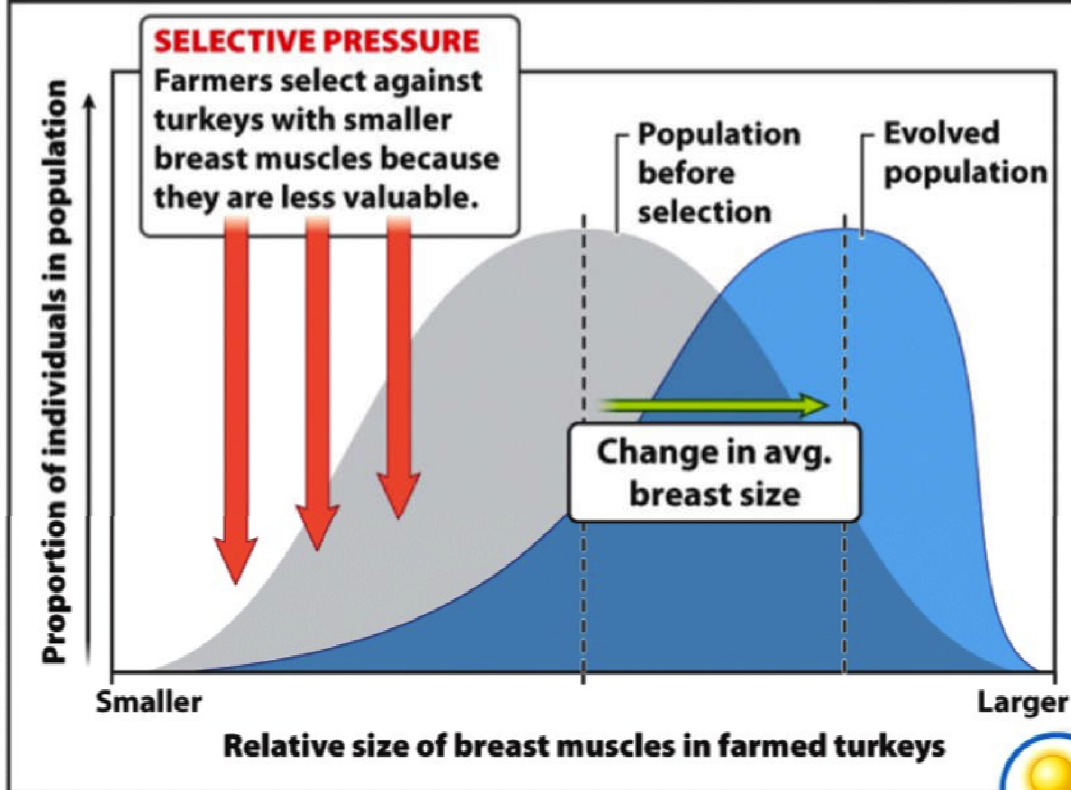


The effects of different types of selection on a population





DIRECTIONAL SELECTION



Turkeys on poultry farms can no longer mate naturally! Their breast muscles have become so large that artificial insemination is required.

Figure 8-26

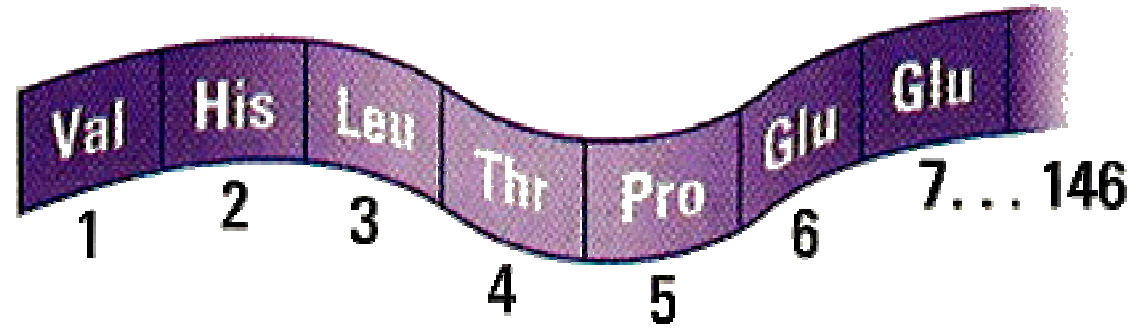
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SEM 18,000X

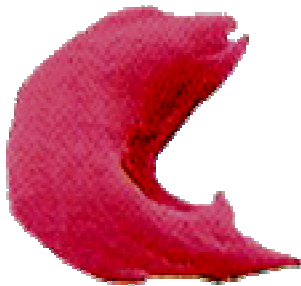


(a) Normal red blood cell

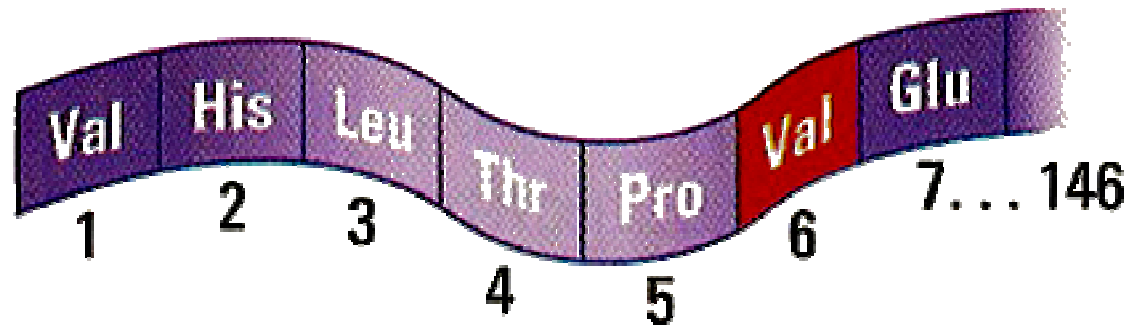


Normal hemoglobin

SEM 18,000X

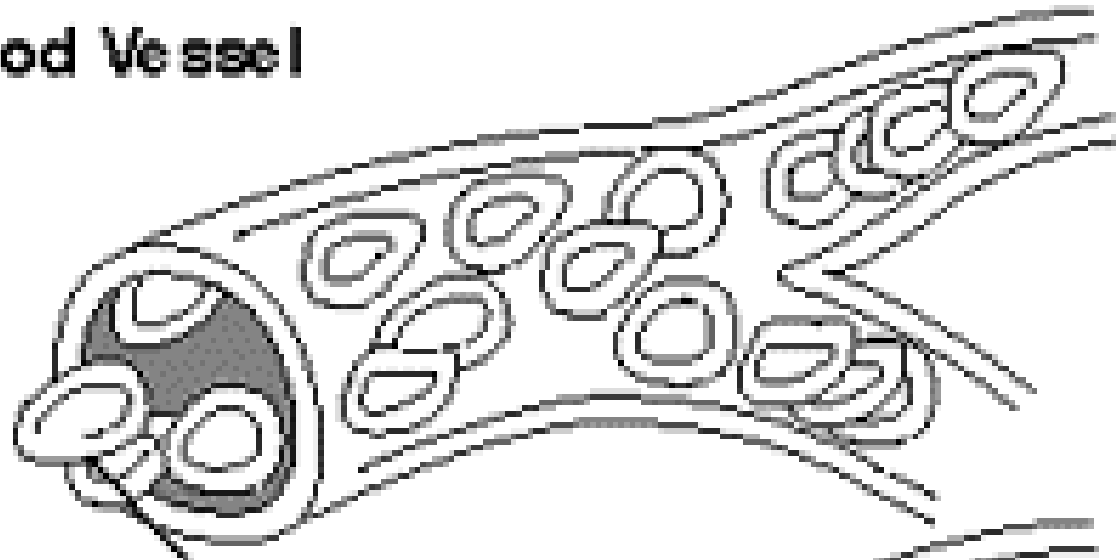


(b) Sickled red blood cell

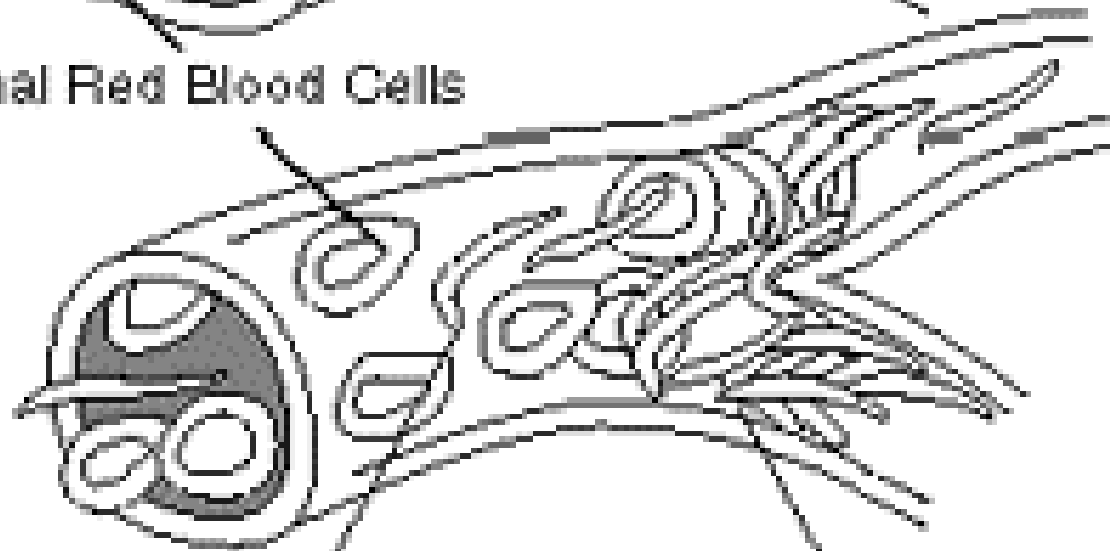


Sickle-cell hemoglobin

Blood Vessel

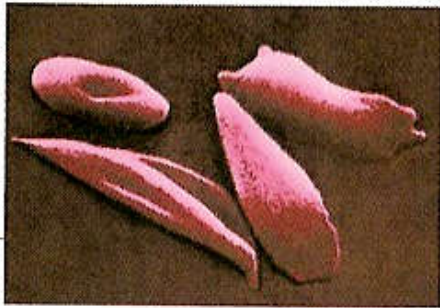


Normal Red Blood Cells

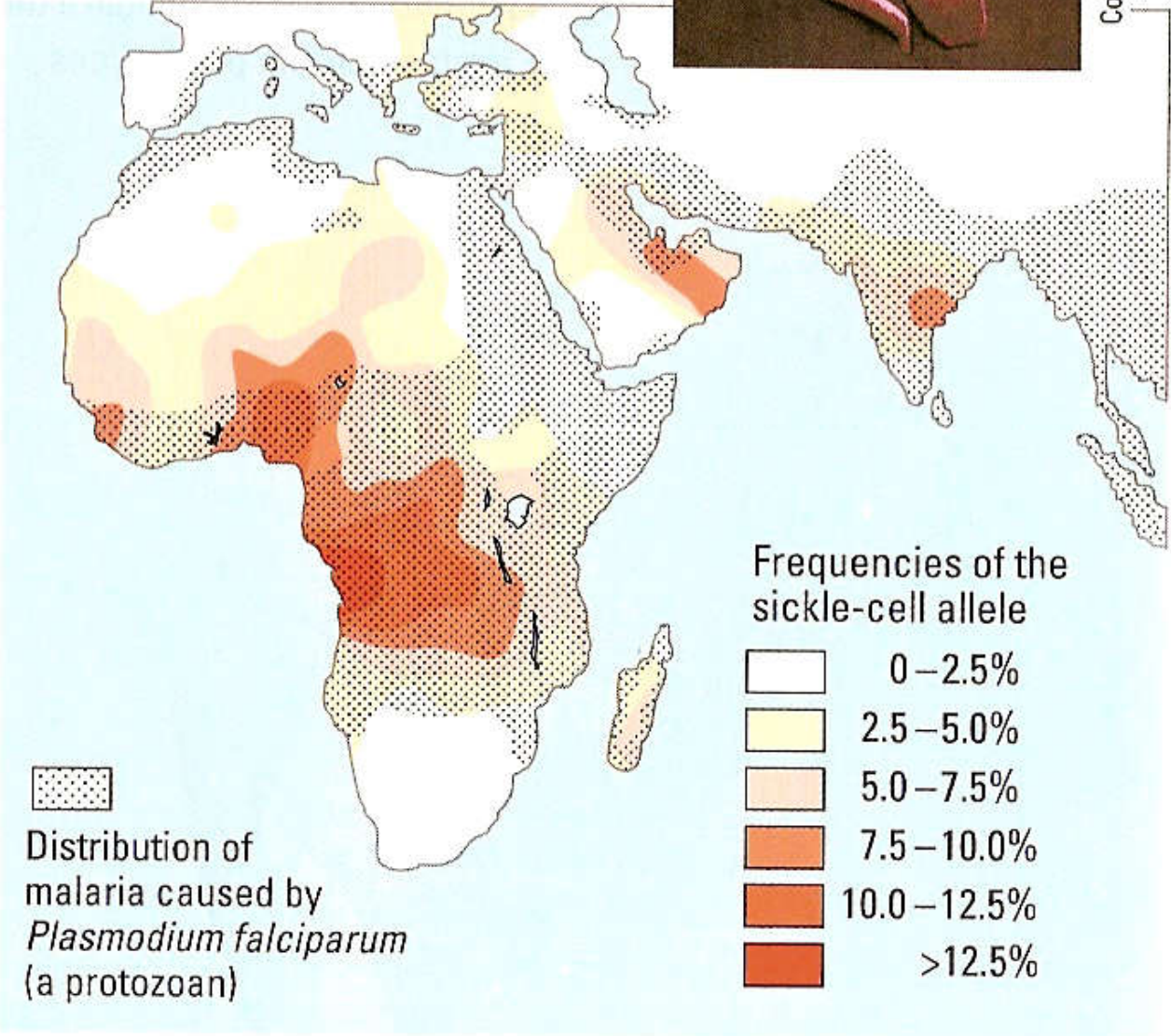


Sickle Cell

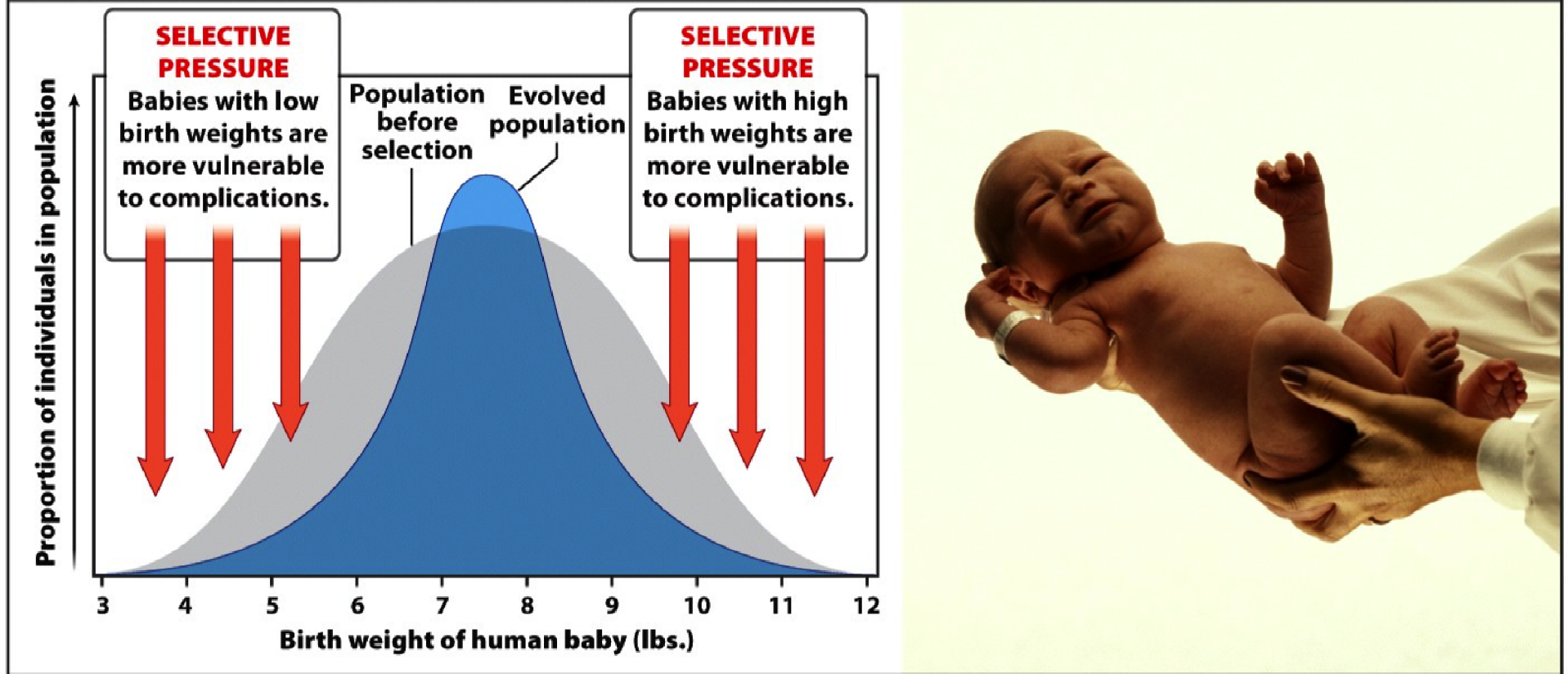
Clogged Blood Vessel



Colorized SEM 6,600X



STABILIZING SELECTION



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DISRUPTIVE SELECTION

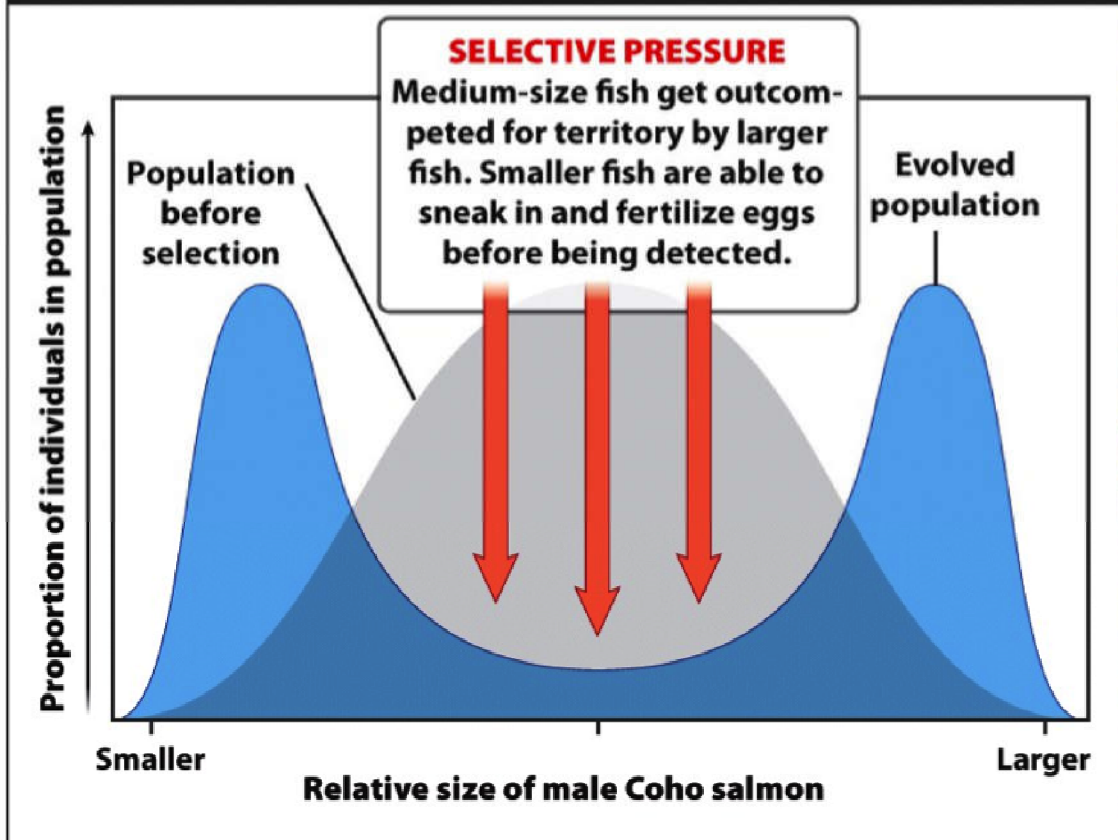


Figure 8-28

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Horse



Donkey



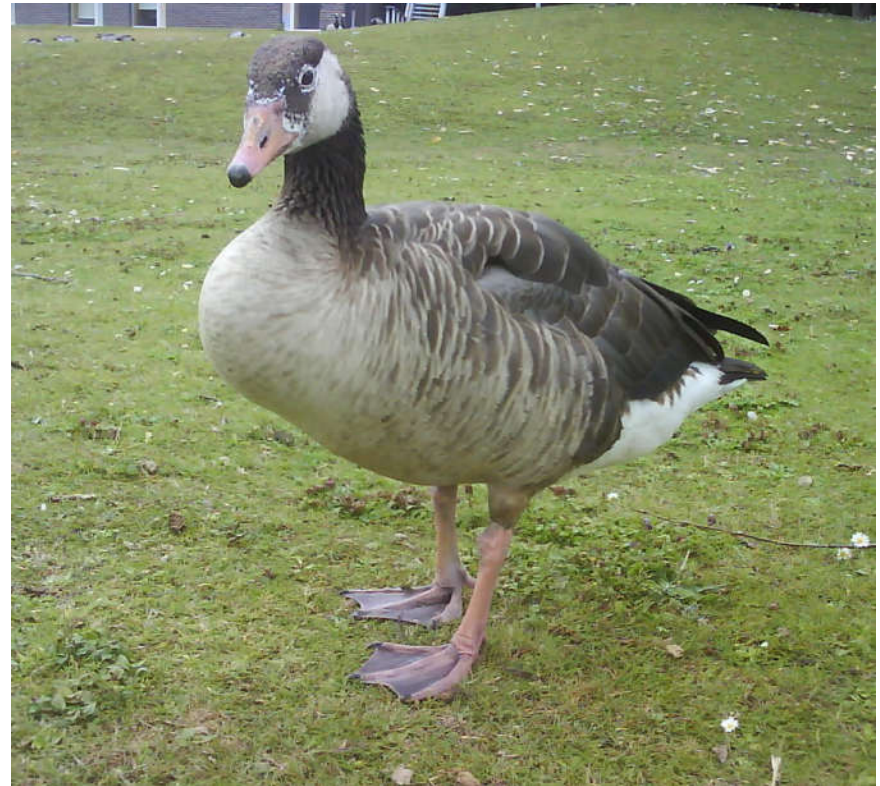
Mule (hybrid)



Greater Canada goose
(*Branta canadensis*)



Greylag goose (*Anser anser*)



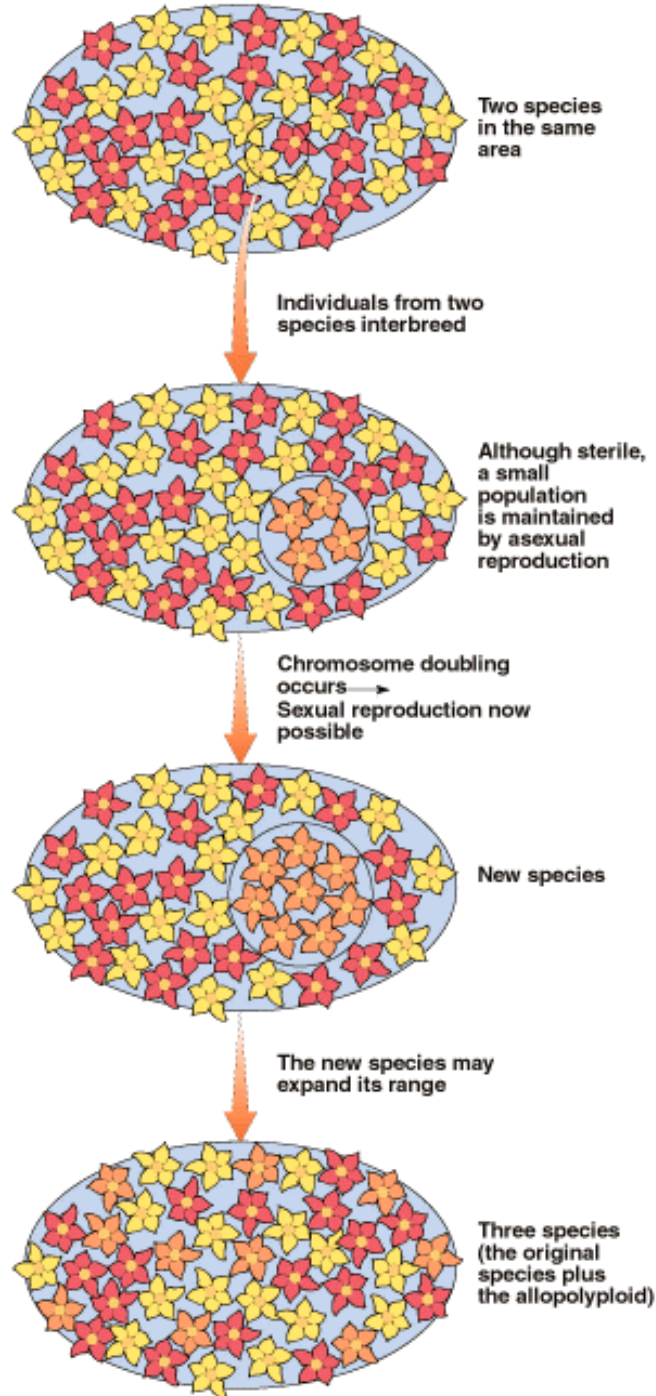
Abert's squirrel

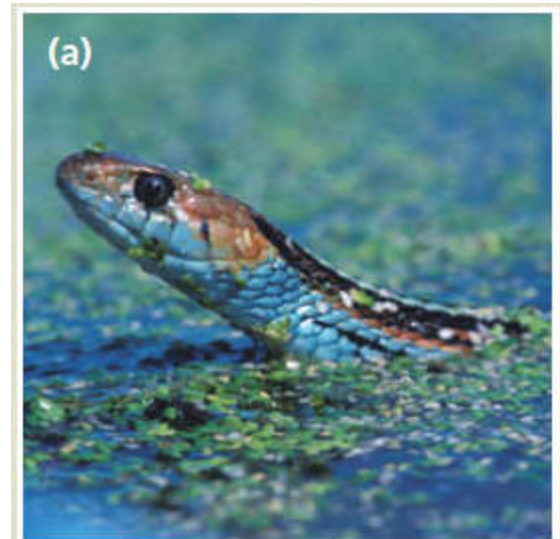
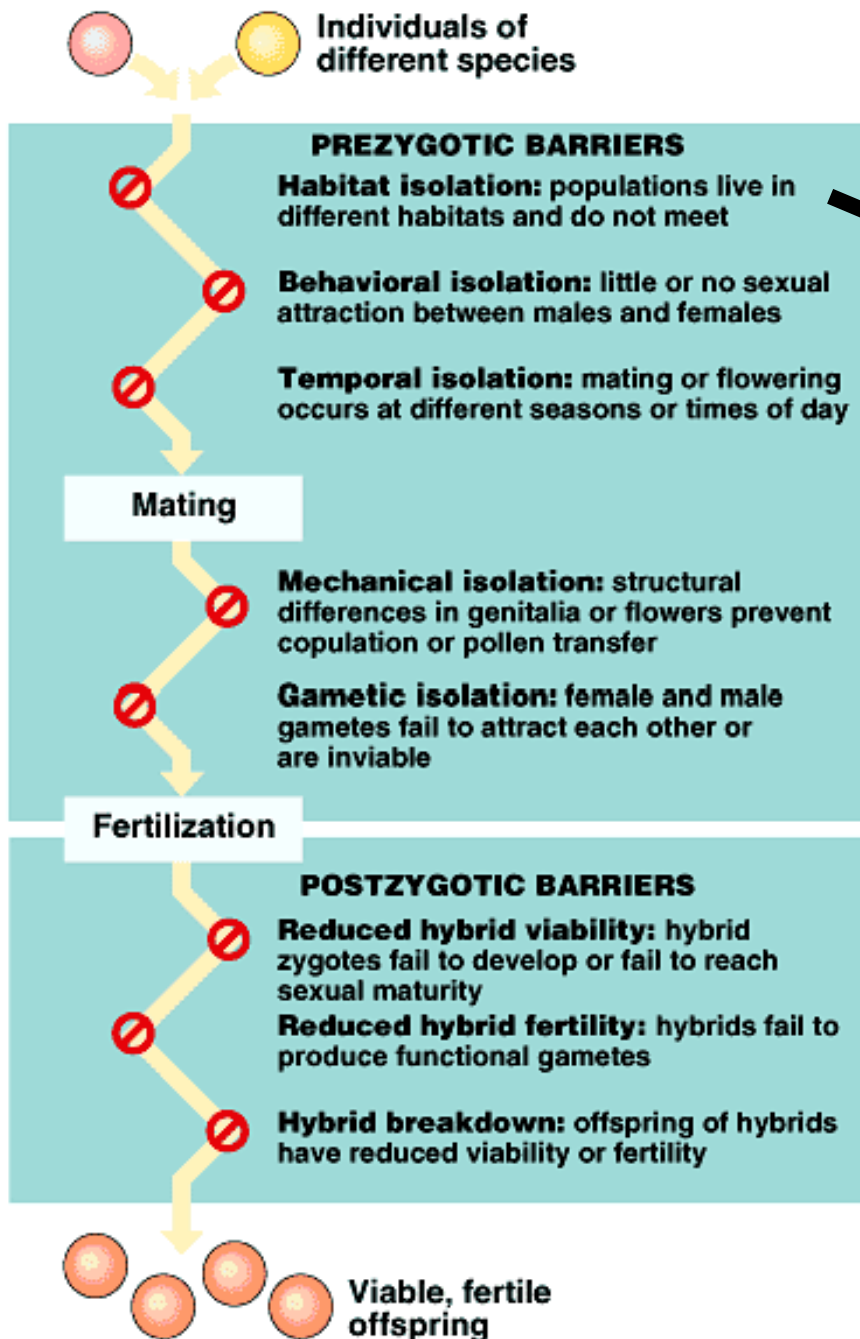


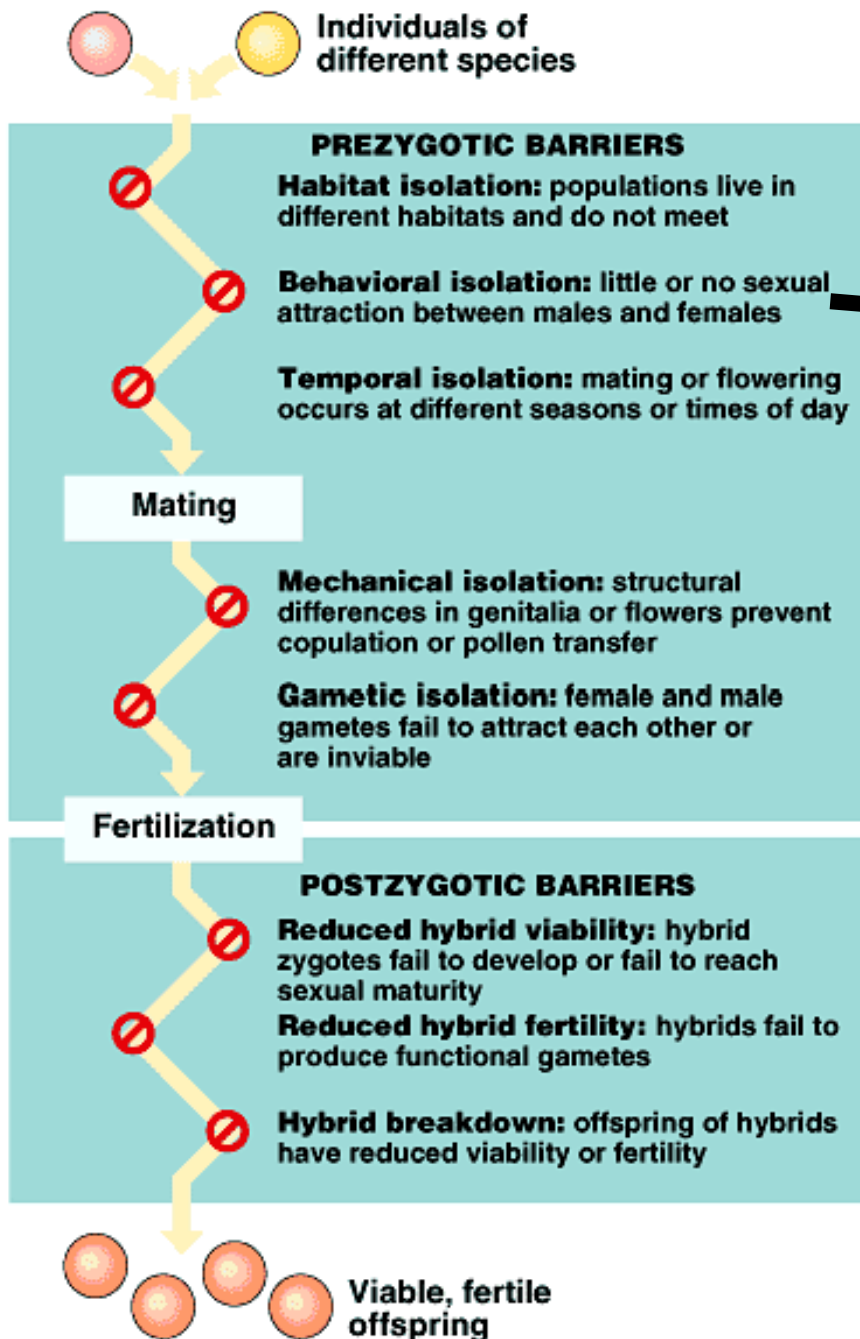
Kaibab squirrel

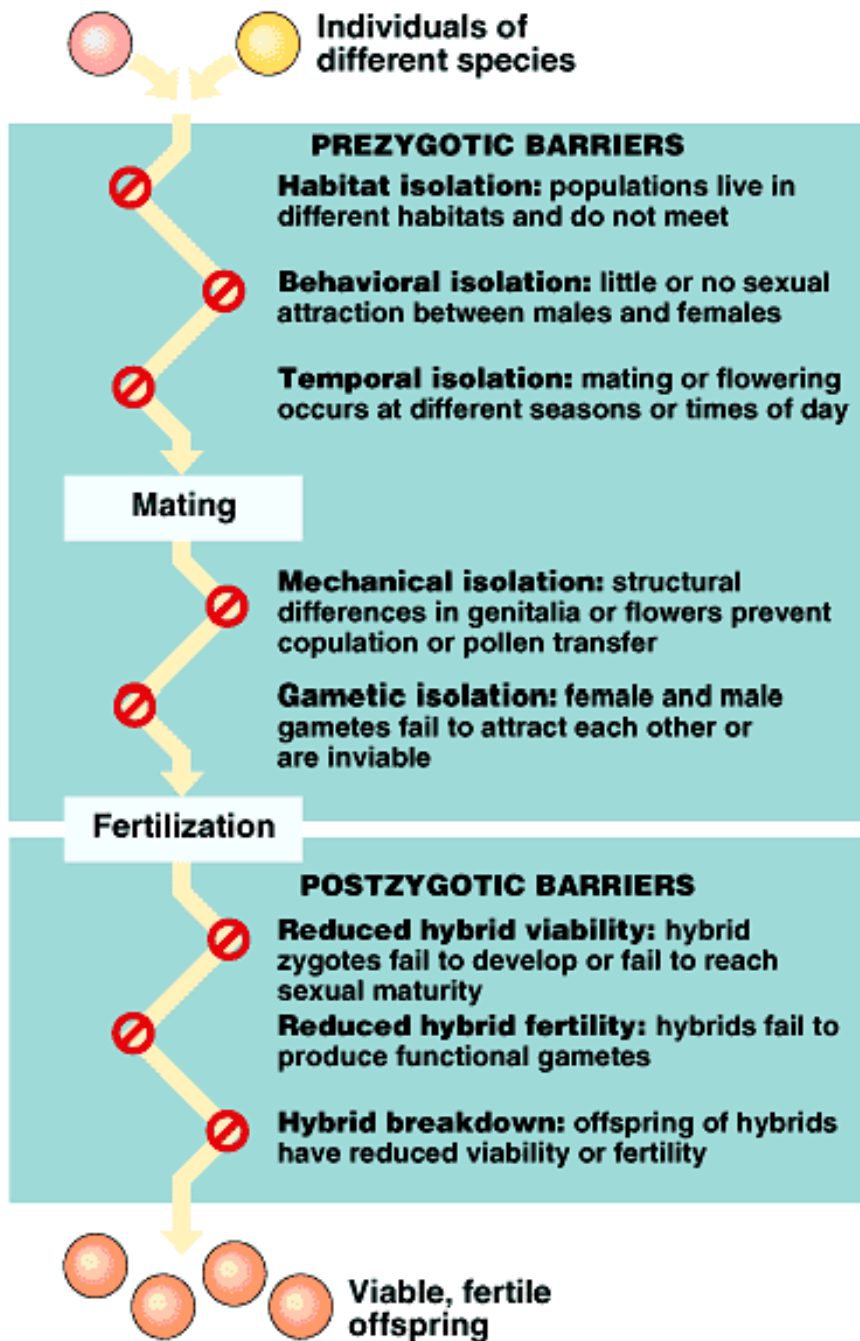


(D) Sympatric speciation (in plants)





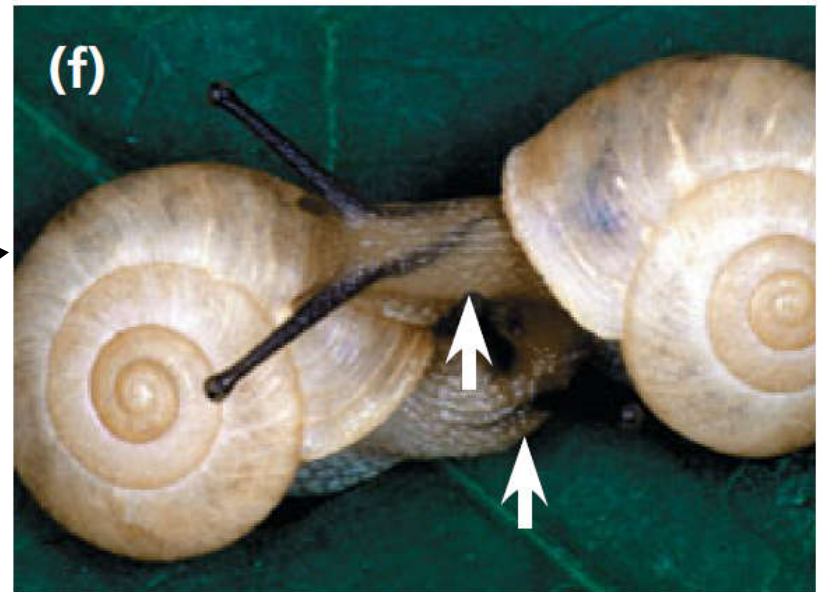
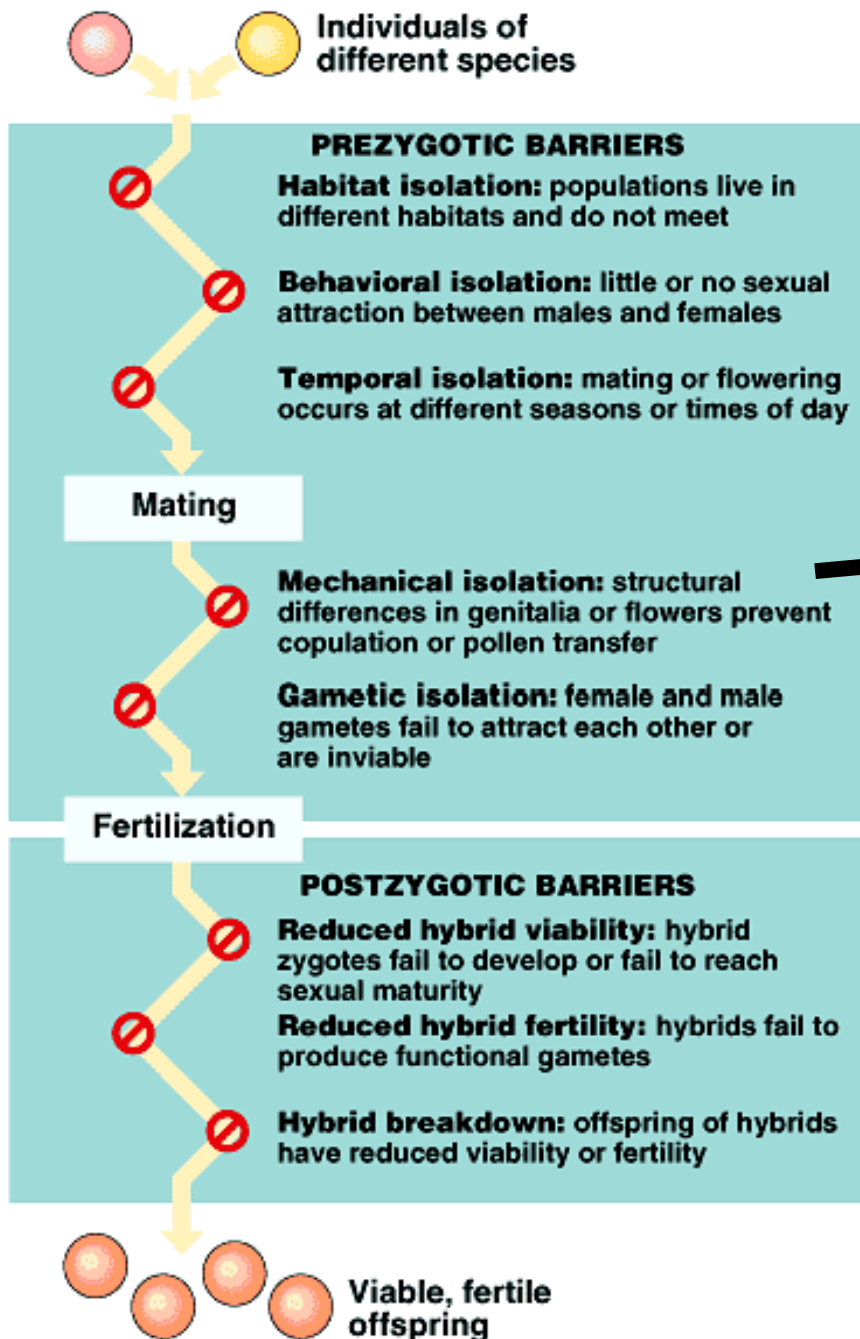


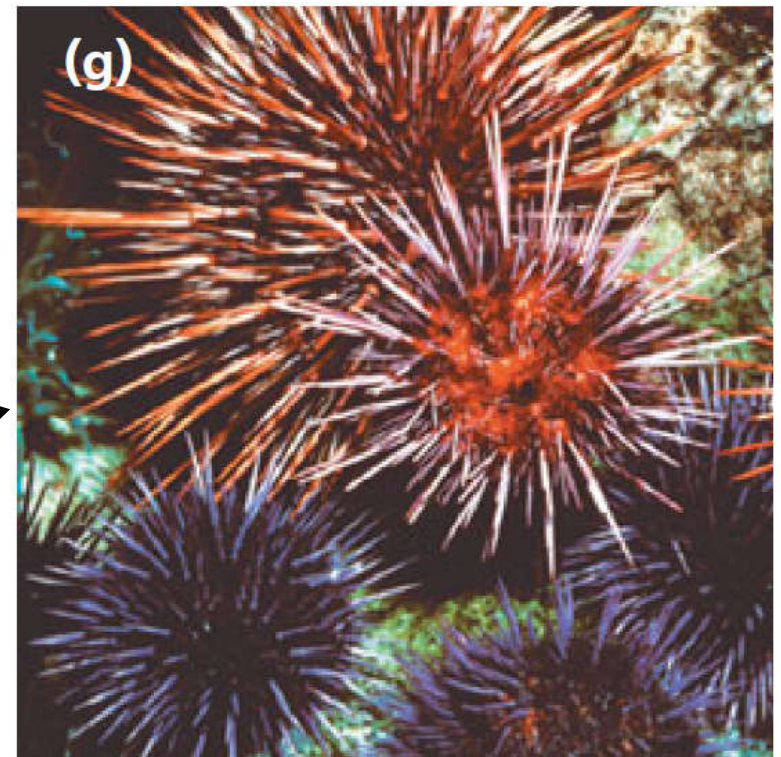
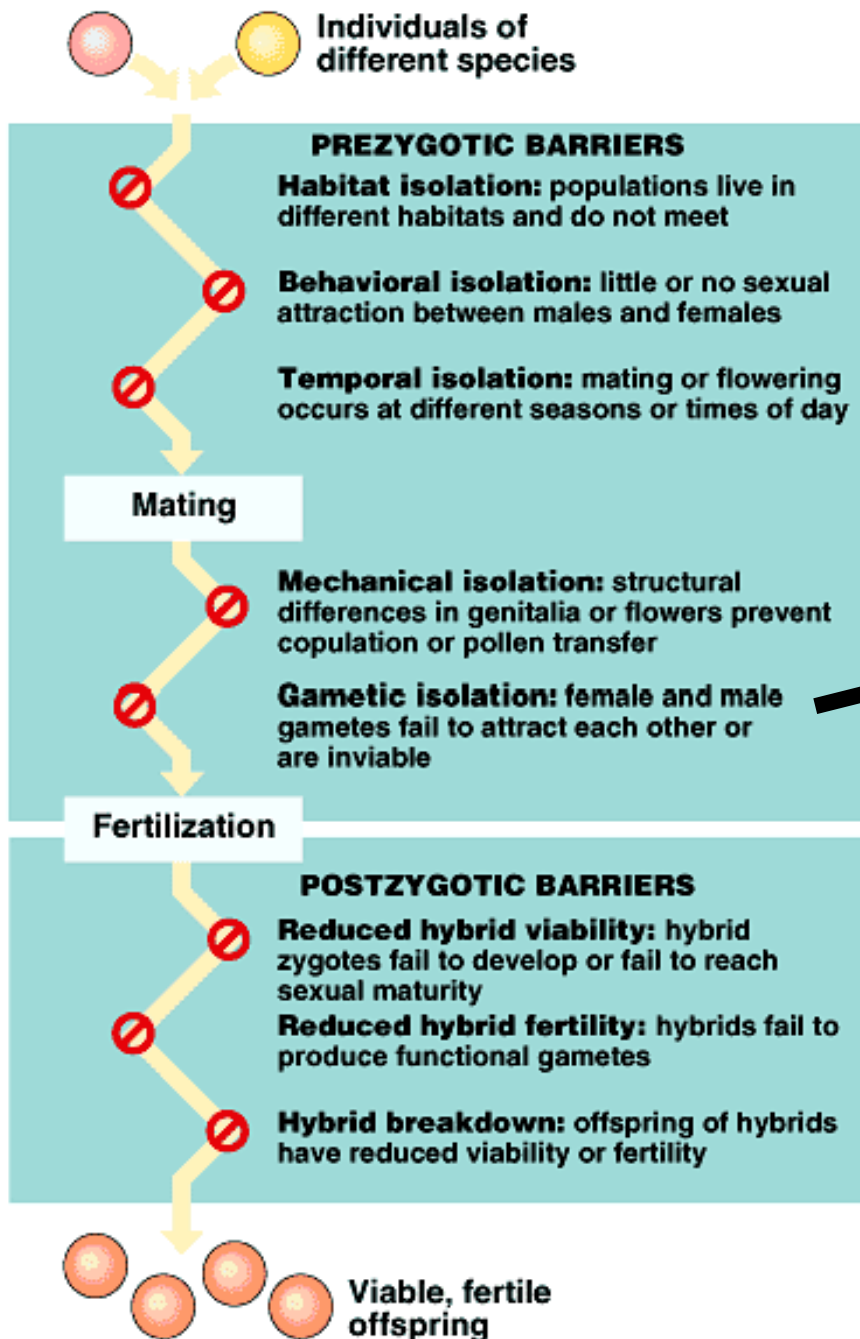


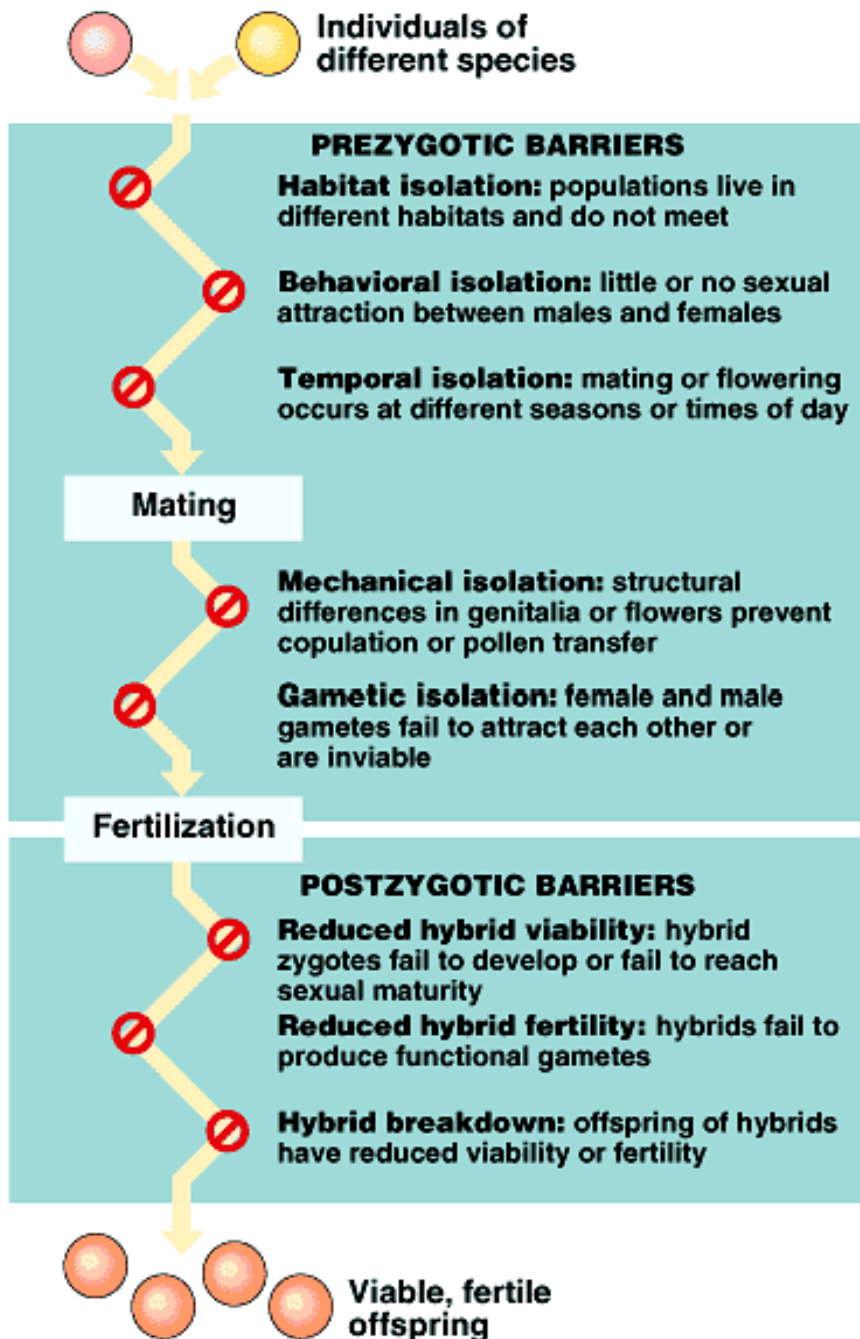
Mate late summer

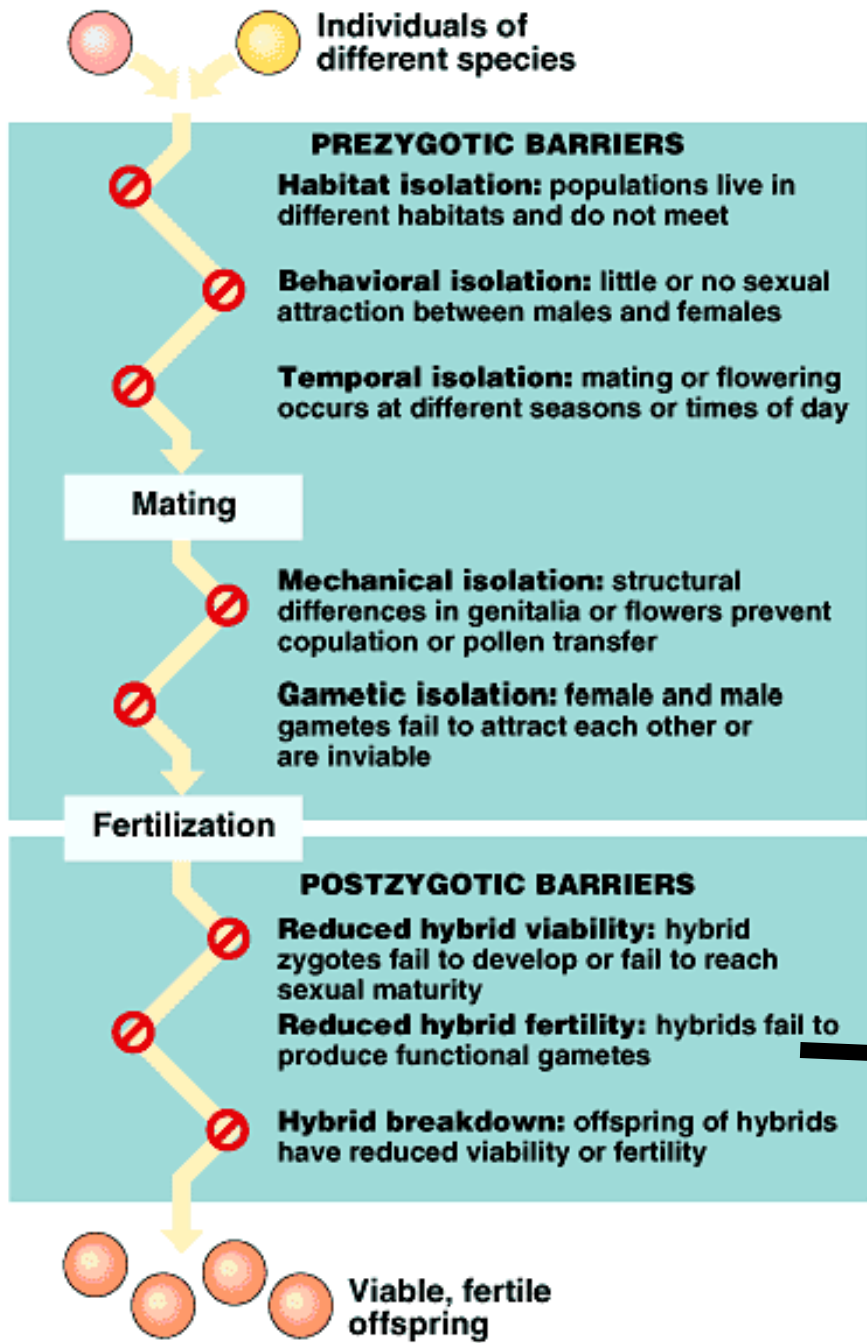


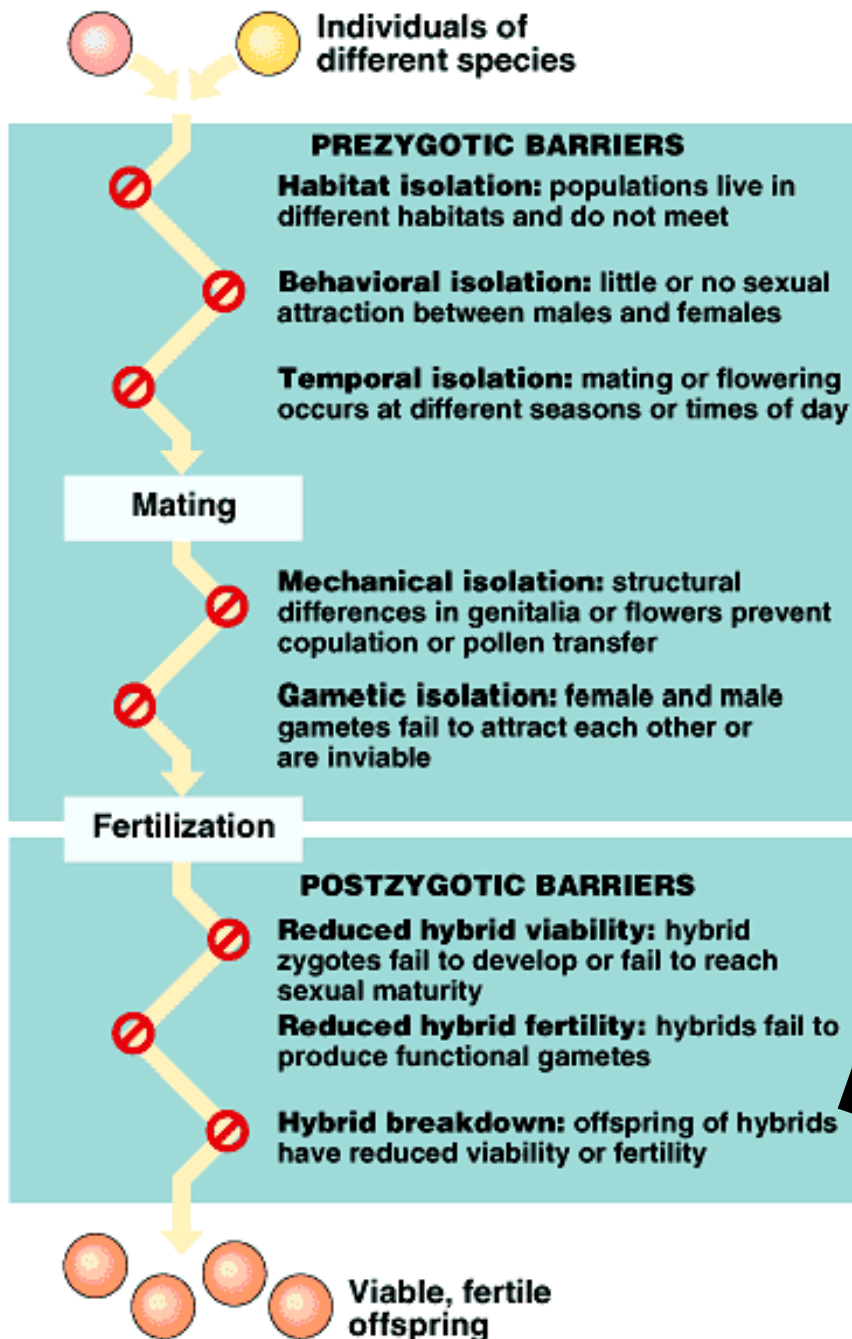
Mate late winter











Mimicry

© Brooks-Cole 2002



Monarch



Viceroy

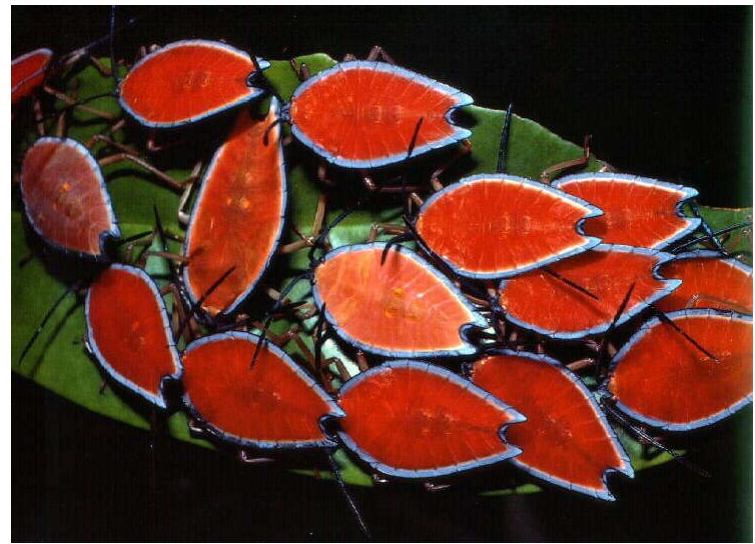
การปรับตัว

- Deceptive coloration

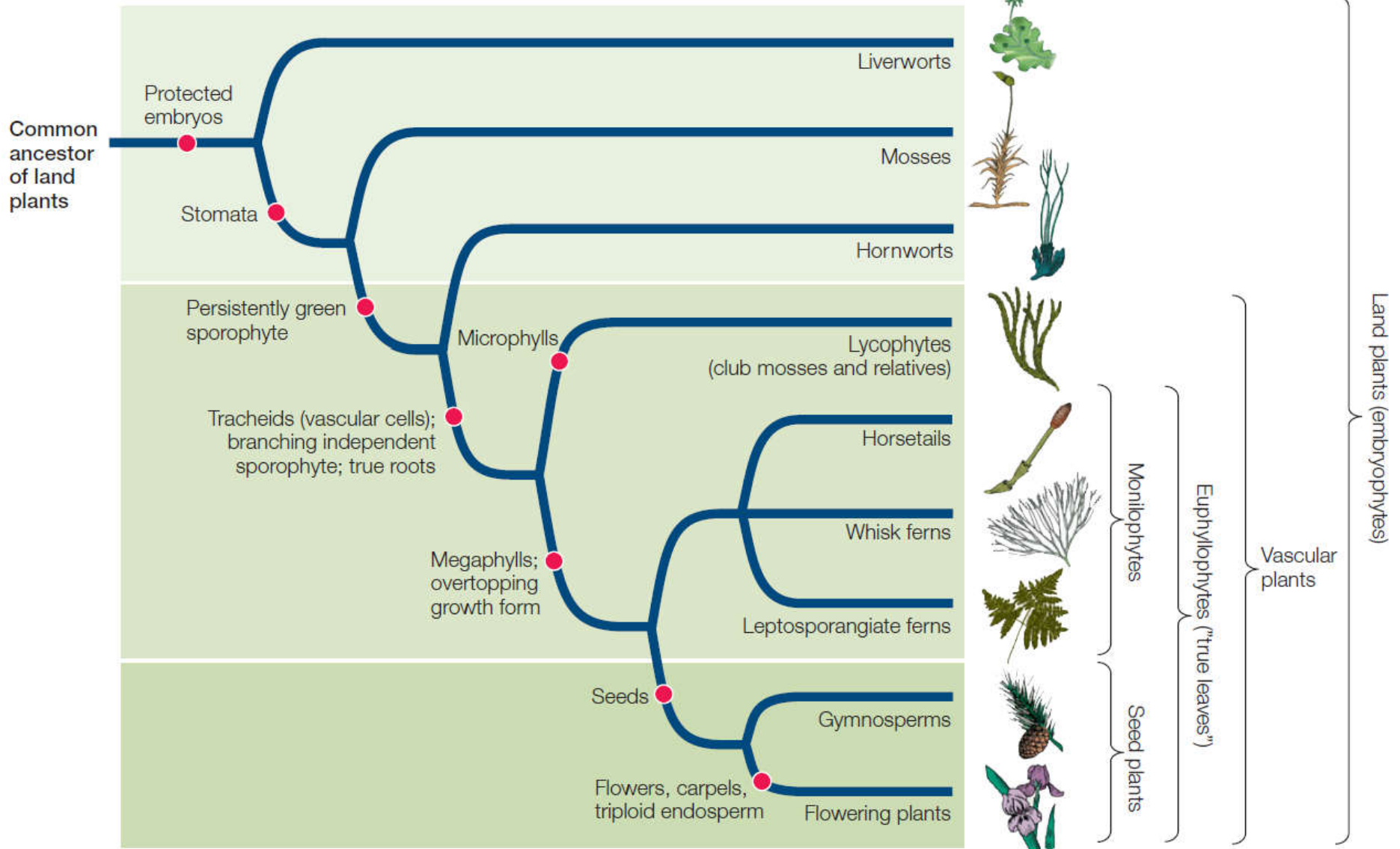


การปรับตัว

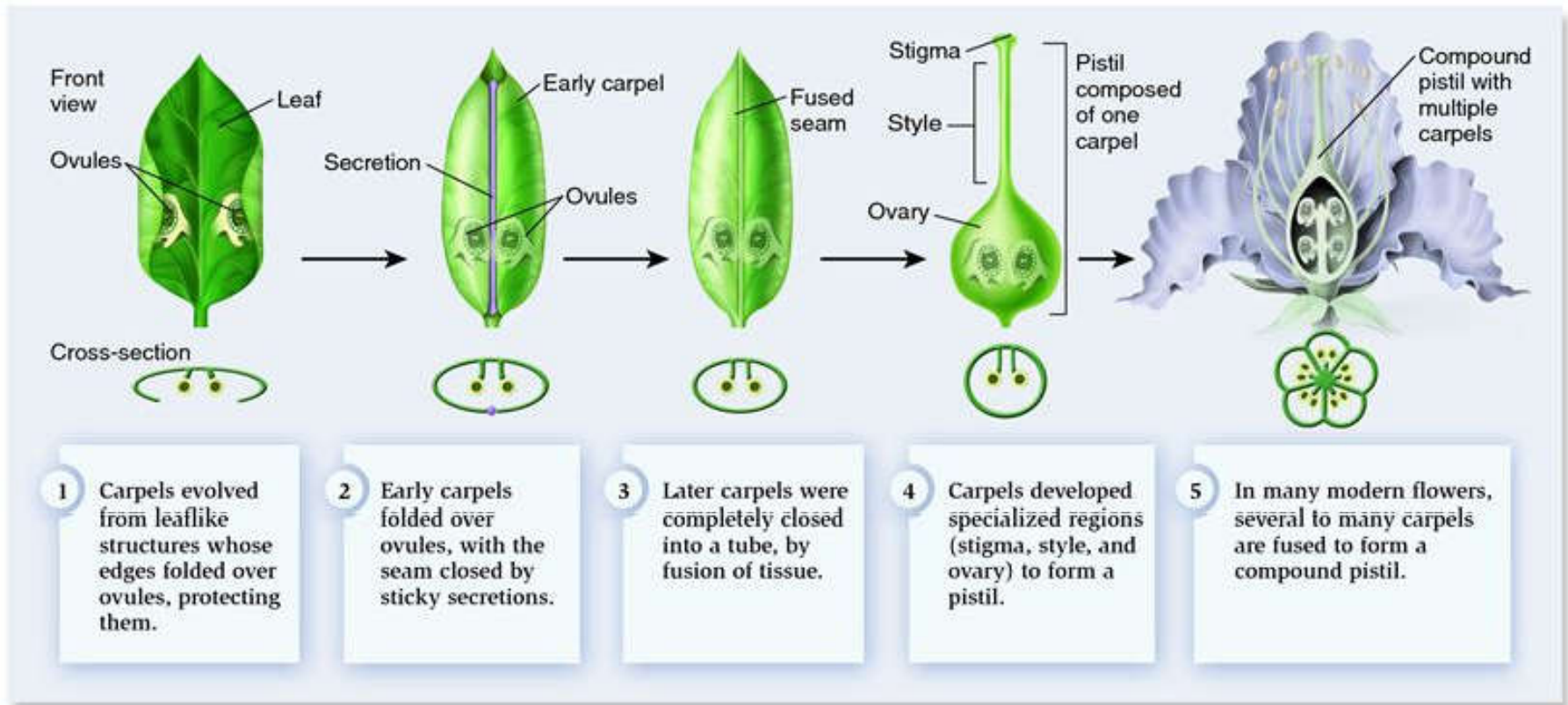
- Warning (aposematic) coloration



วิวัฒนาการของพืช







(b) Carpel evolution

วิวัฒนาการของสัตว์

