The origin of species

Concept outline

Species are the basic units of evolution

- The nature species

Two phenomena

- The Distinctiveness of Sympatric species F22.2(phenotypically differant , sibling species)
- Geographic variation within species F22.3 (subspecies or varieties)
- (Allopatric)
- The biological species
- Problem with Applying Biological species

The biologycal species concept

- Gene pools
- Gene flow
- Biologycal species concept

Group of actually can interbreeding natural population which are reproductively isolated from other such groups

- Proplems with applying the biologycal species concept

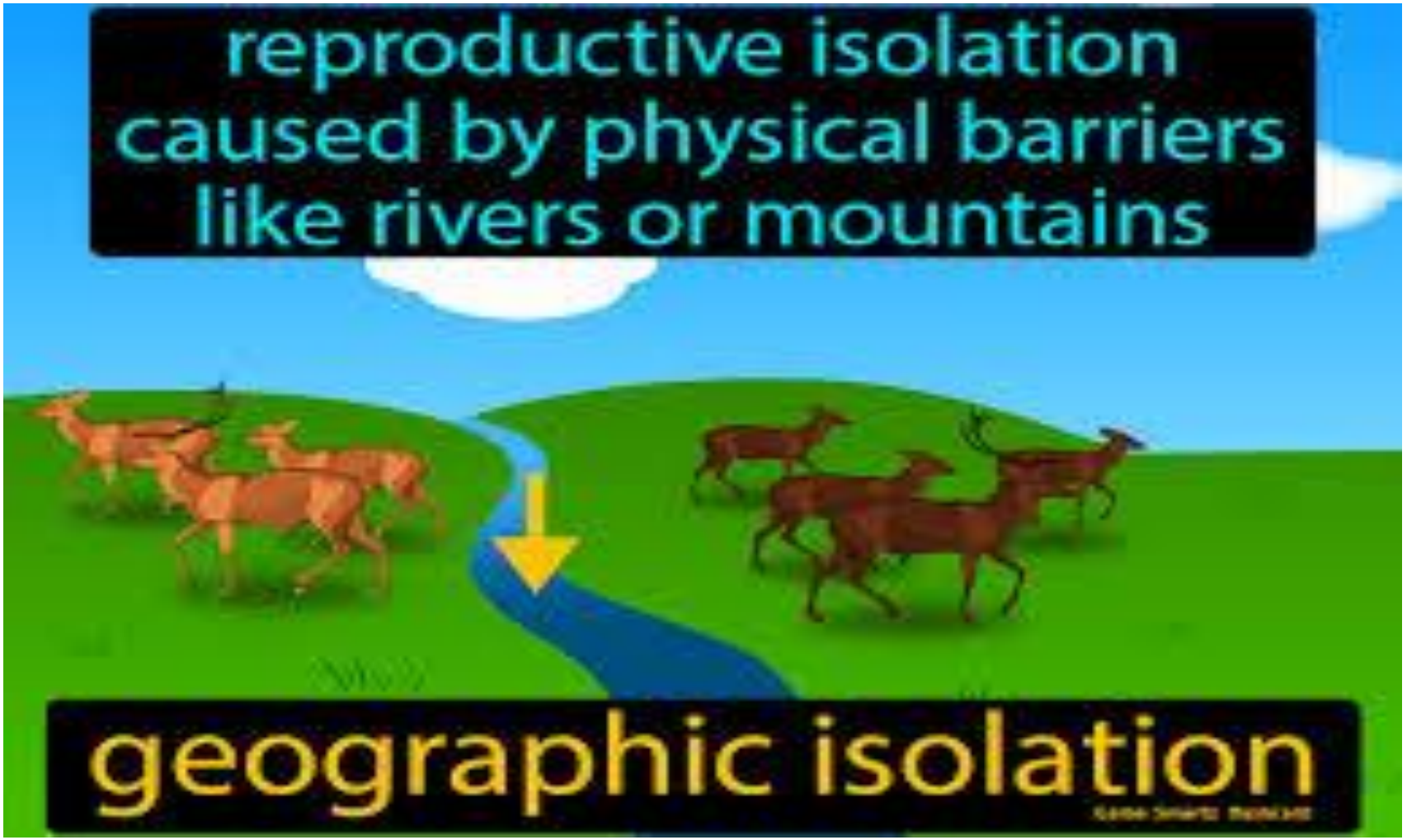
Species are agroups of organsim that are distinct from other co-acconrring species and tha are interconacted geographically

The ablity to exchange genes appears to be hallmark of scuh species.

Species maintain the genetic distinctiveness through barriers to reproduction

- Prezygotic isolating mechanisms
- Prozygotic isolating mechanisms

Prezygotic isolating mechanisms



Ecological Isolation

Behavioral Isolation

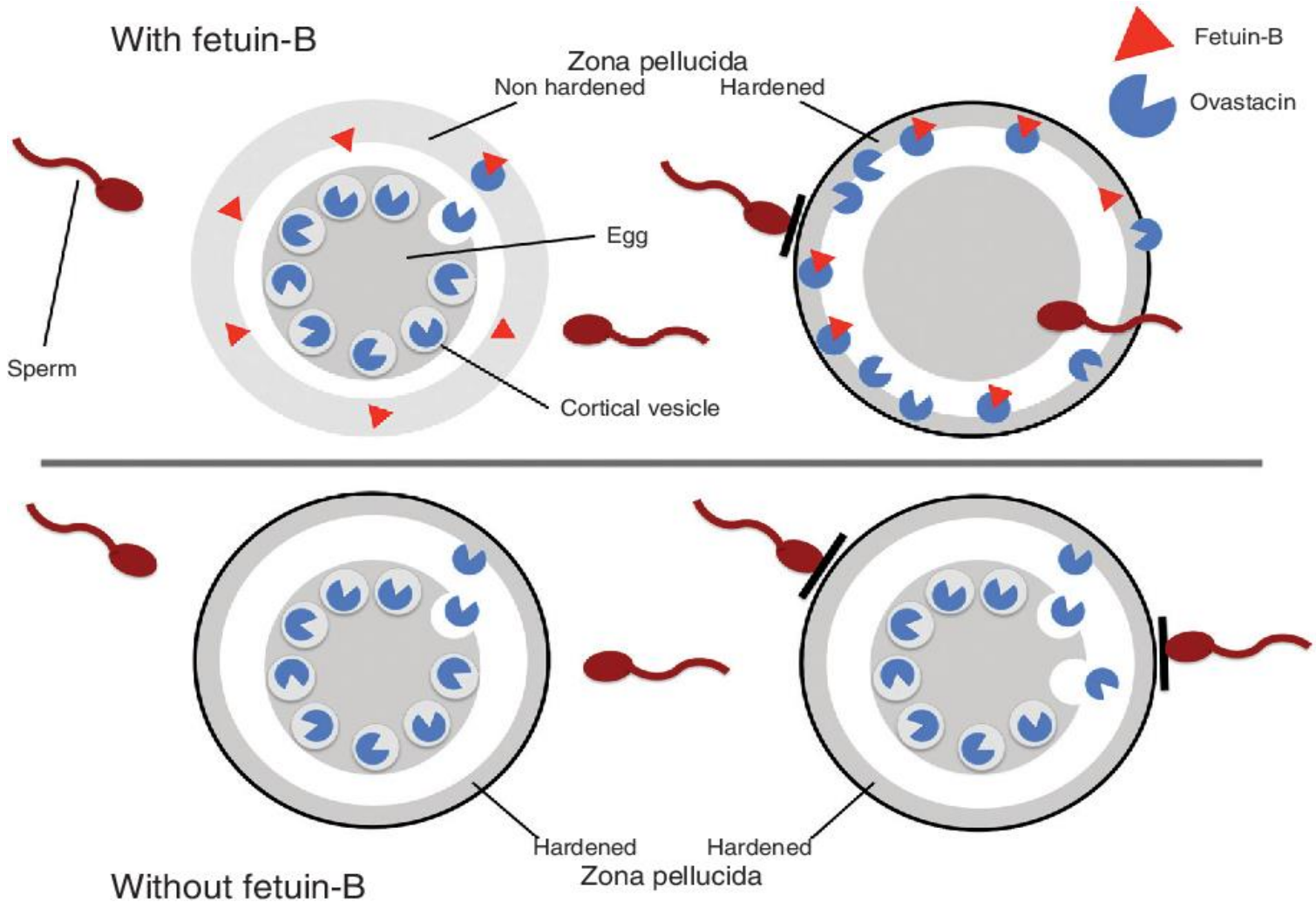
Temporal isolatin

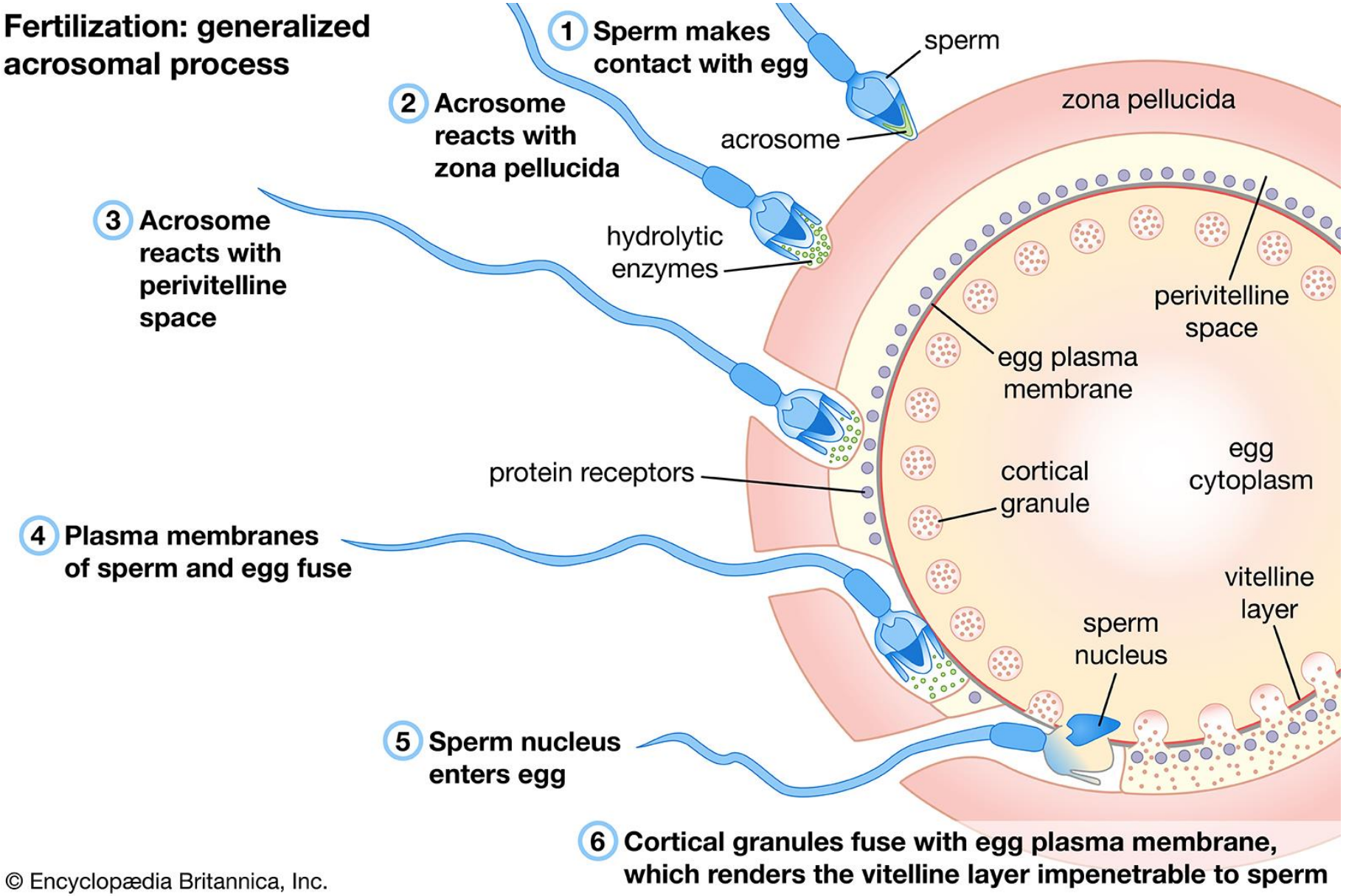
Mechanical Isolation

MECHANICAL ISOLATION

- Differences in morphological features may make two species incompatible
- EXAMPLE: The male and female genitalia of each species of damselflies are physically incompatible

Preventio of gameat fusion




Fertilization: generalized acrosomal process
1 Sperm makes contact with egg
2 Acrosome reacts with zona pellucida
3 Acrosome reacts with perivitelline space
4 Plasma membranes of sperm and egg fuse
5 Sperm nucleus enters egg
6 Cortical granules fuse with egg plasma membrane, which renders the vitelline layer impenetrable to sperm
sperm
acrosome
zona pellucida
hydrolytic enzymes
perivitelline space
egg plasma membrane
protein receptors
cortical granule
egg cytoplasm
vitelline layer
sperm nucleus
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Postzygotic Isolation mechanisms

Postzygotic Isolating Mechanisms

Hybrid Inviability – Hybrids (offspring of mixed species) die as embryos or at an early age.

Hybrid Sterility – Hybrids develop into adults but cannot reproduce.

Reproductive Isolating Mechanisms (1)

Prezygotic isolating mechanisms

Geographic isolation
Species occur in different places

Ecological isolation
Species utilize different resources in the habitat

Behavioral isolation
Species have different mating rituals

Temporal isolation
Mating or flowering occur during different seasons or at different times of the day

Mating

Mechanical isolation
Structural differences prevent mating or pollen transfer

Prevention of gamete fusion
Gametes fail to attract each other or function poorly

Reproductive Isolating Mechanisms (2)

Postzygotic isolating mechanisms

Fertilization

Hybrid embryos do not develop properly

Hybrid adults do not survive in nature

Hybrid adults are sterile or have reduced fertility

Fertile hybrid offspring

We have learned a great deal about how species form.

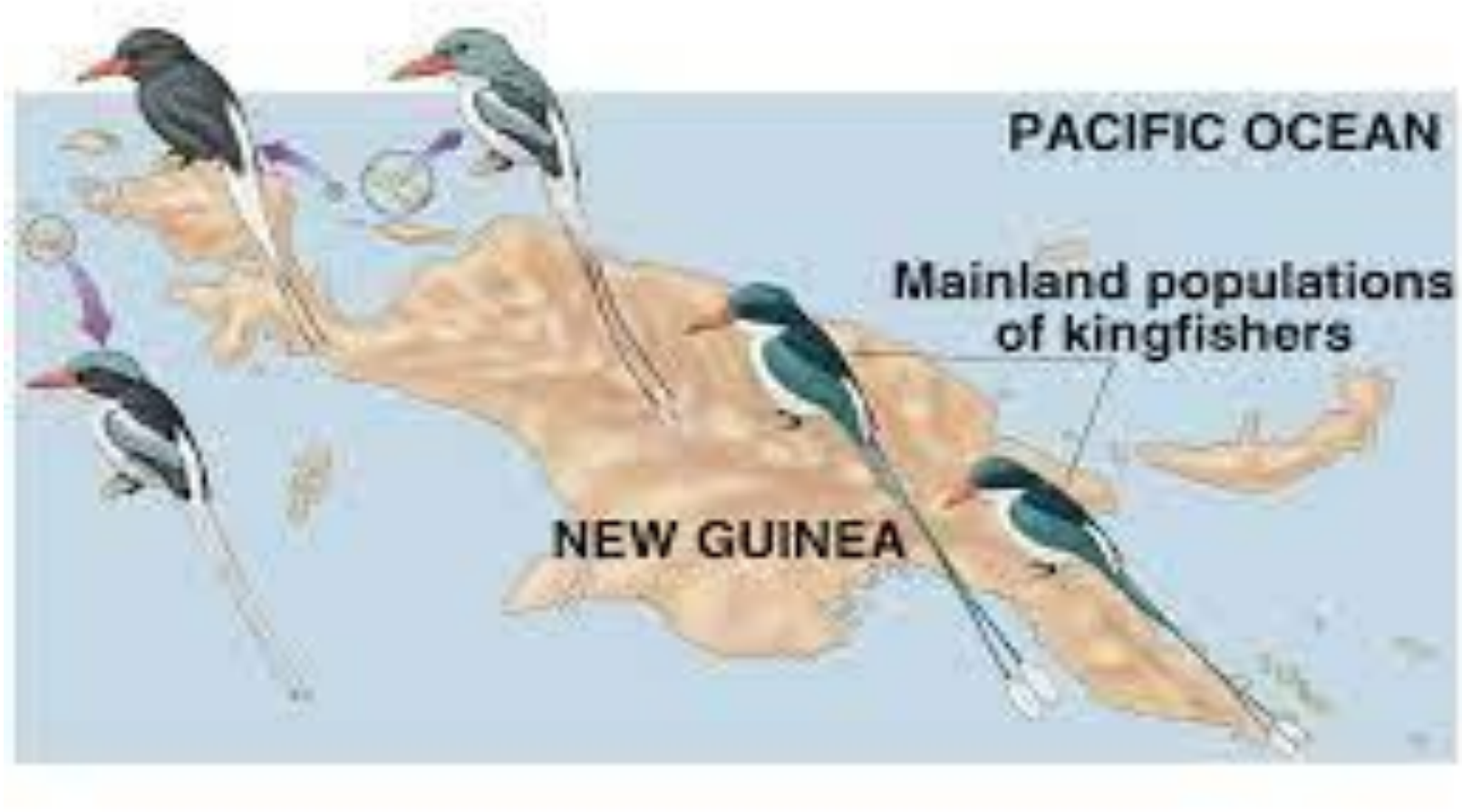
- Rebroductiv Isolation may evolve as By-product of Evolutionary change F 22-7

Selection may reinforce Isolating mechanisms

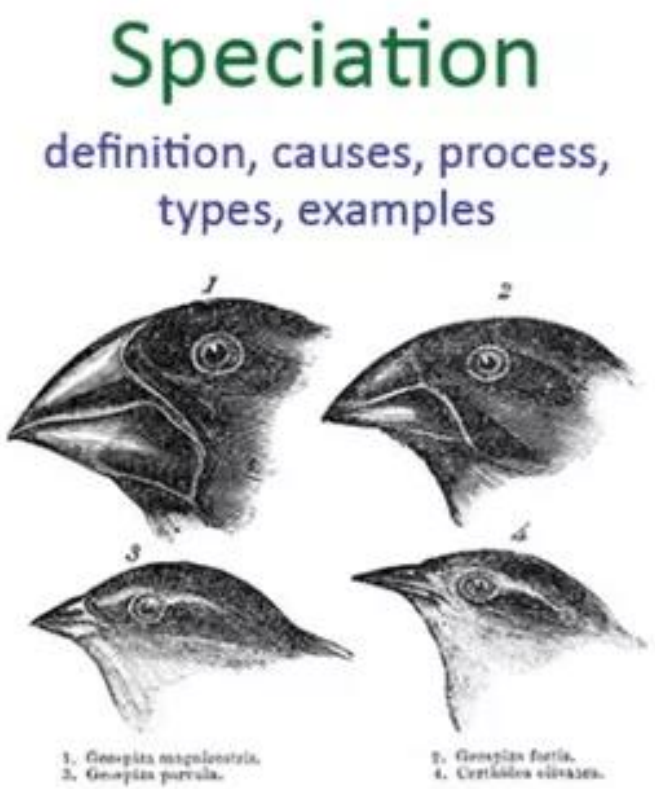
- The role of natural selection in speciation
- Random changes may cause Reproductive isolation
- Adaptation and Speciation

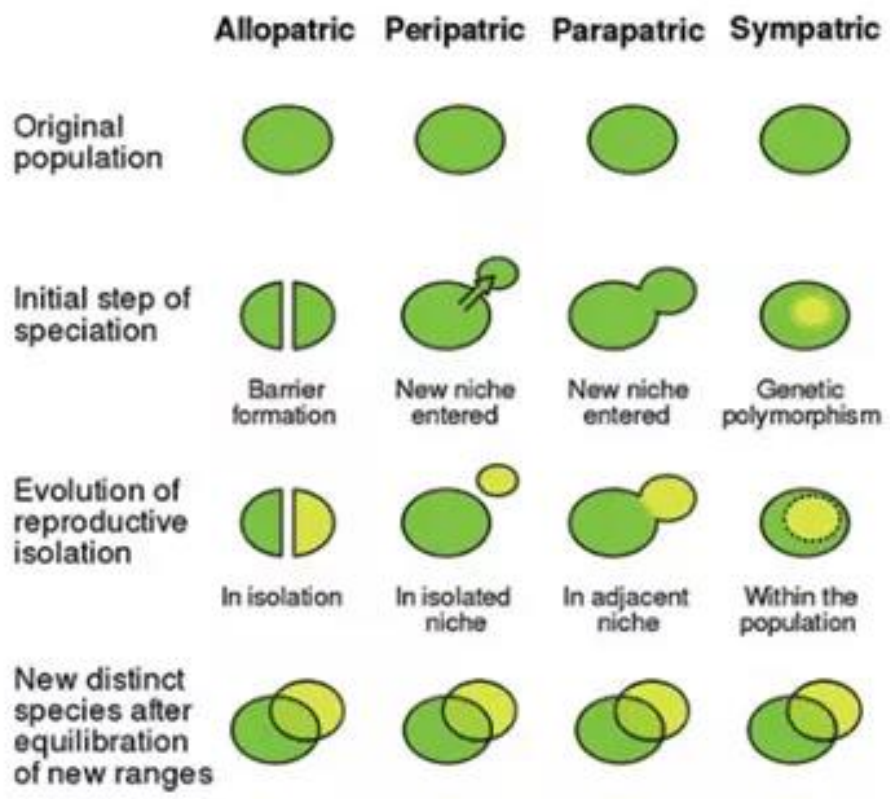
Adaptation and Speciation

The Geography of Speciation

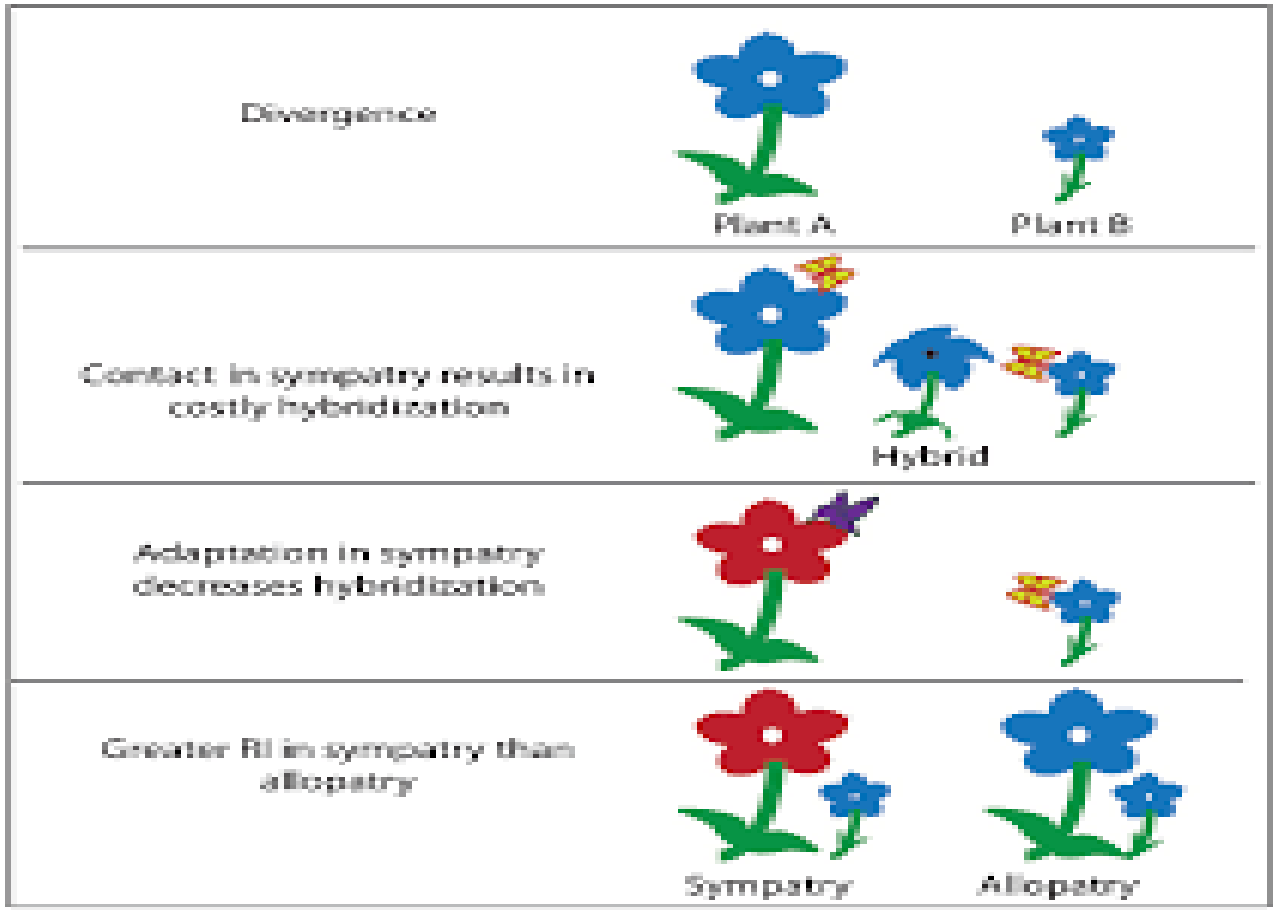


Allopatric Divergence is the primary means of speciation





Whether speciation can occur in sympatry is controversial



Genetic changes underlying speciation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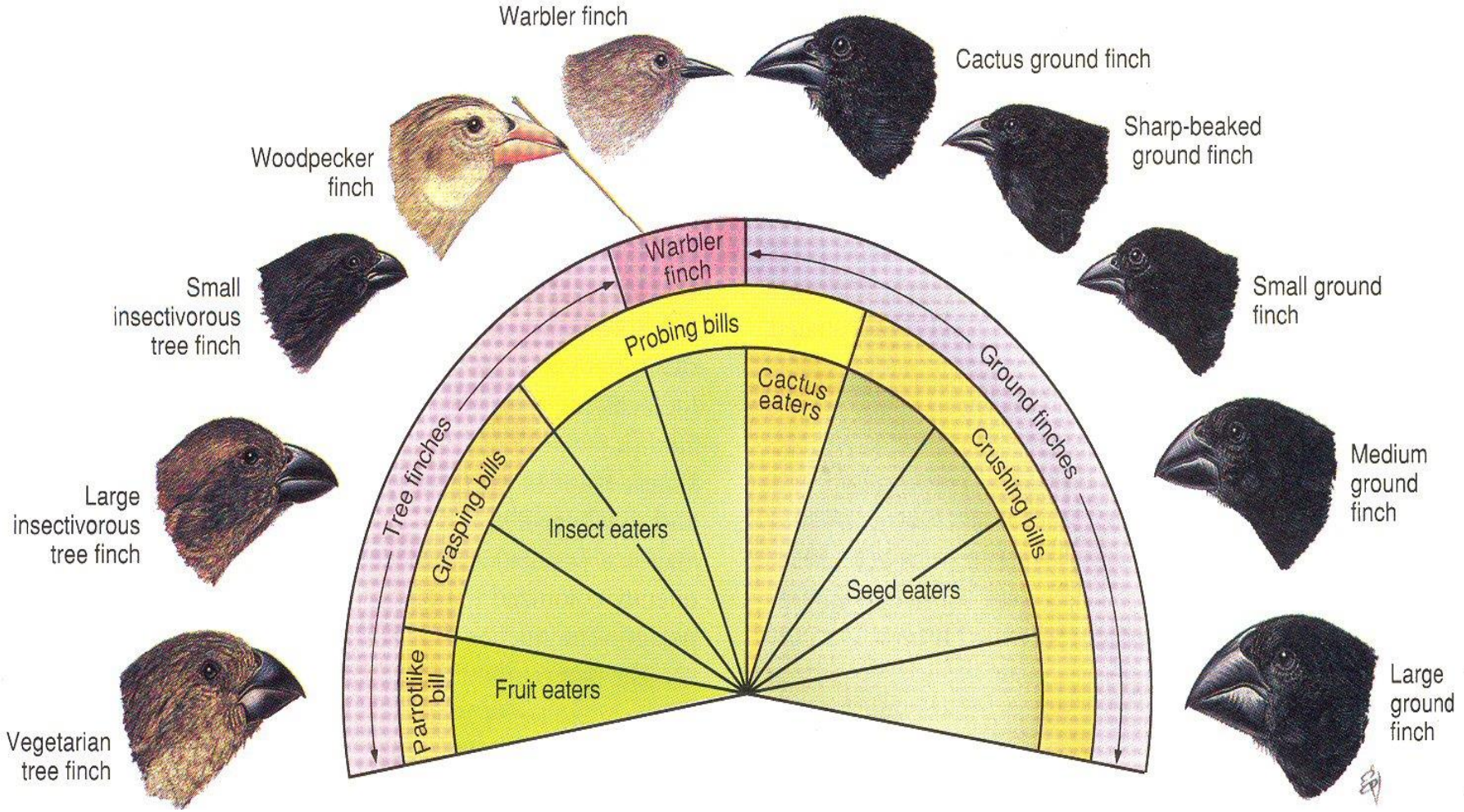
st adap

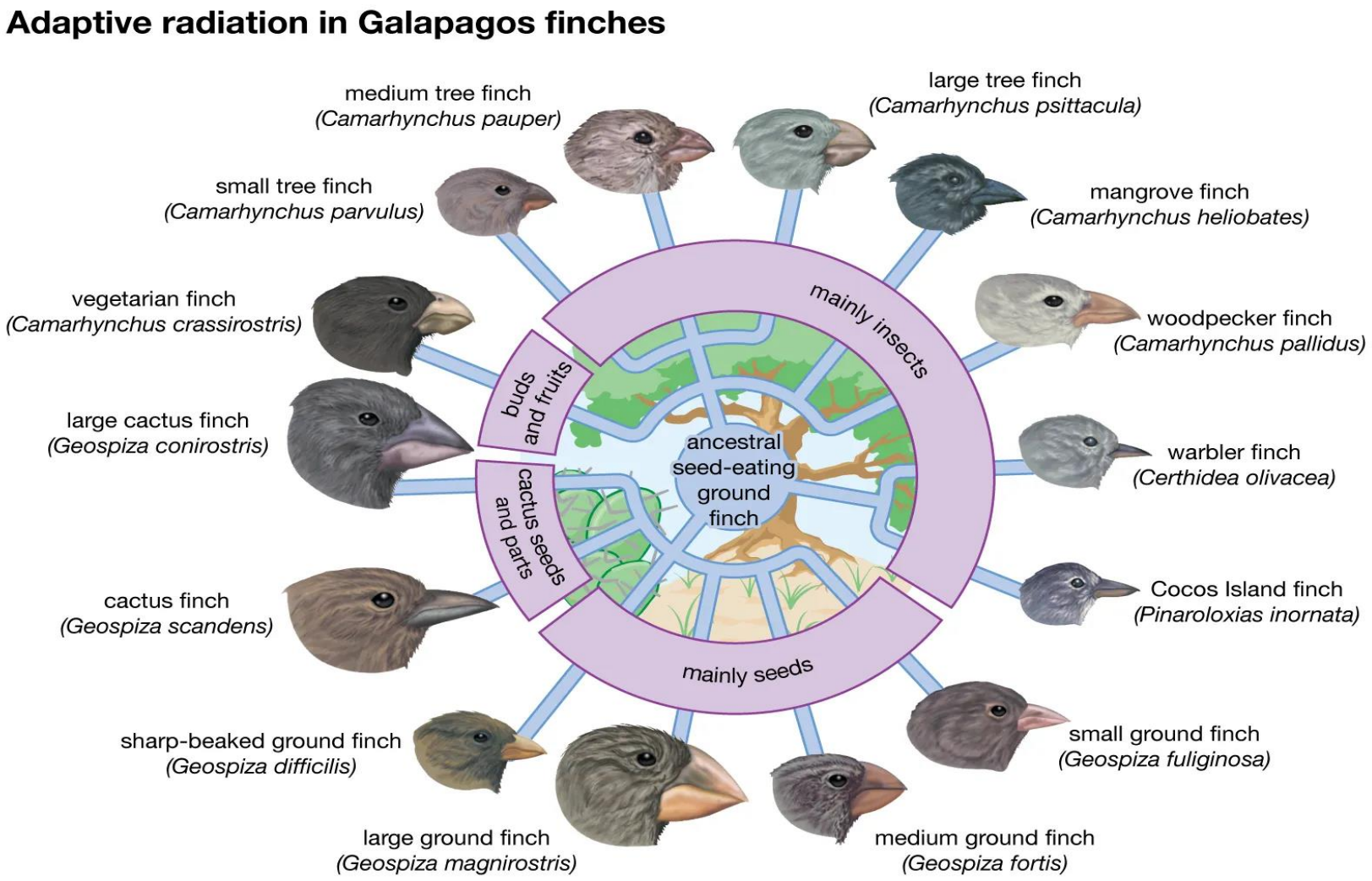

Do the dark rabbits turn white? No! They get eaten.
(survival of the fittest)

Clusters of species reflect rapid evolution

- Darwin s Finches



Clusters of species reflect rapide of evolution



The Pace of Evolution

PACE OF EVOLUTION