

Reproductive isolation

-
- A **species** is a group of individual organisms that interbreed and produce fertile, viable offspring.



The mechanisms of **reproductive isolation** :

- 1. prevent members of different species from **producing offspring**.
- 2. or ensure that any offspring are **sterile**.

“This isolation is the means for achieving distinctiveness of each species”

Reproductive isolation

1. Pre-zygotic barrier



blocks reproduction from taking place

2. Post-zygotic barrier



includes organisms that don't survive the embryonic stage and those that are born sterile.

Pre-zygotic barrier

- 1.temporal isolation
- reproduce at different times of the day or in different seasons





(a)

January to March



(b)

March to May

Temporal Isolation

- Species that breed at different times of the day, different seasons, or different years cannot mix their gametes

(d)



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Late Summer

(c)



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Late Winter

Pre-zygotic Isolating Mechanisms

3) Temporal Isolation

2 populations that
breed during
different times of day
or seasons



Day vs. Night Blooming Lily

- 2. habitat isolation
- they occupy different habitats, even within the same area



Habitat isolation

Prezygotic Mechanisms: Habitat Isolation

- Same geographic area
- Different habitats



Water-dwelling *Thamnophis*

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Terrestrial *Thamnophis*

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- **3. Behavioral isolation**

- occurs when the presence or absence of a specific behavior prevents reproduction from taking place

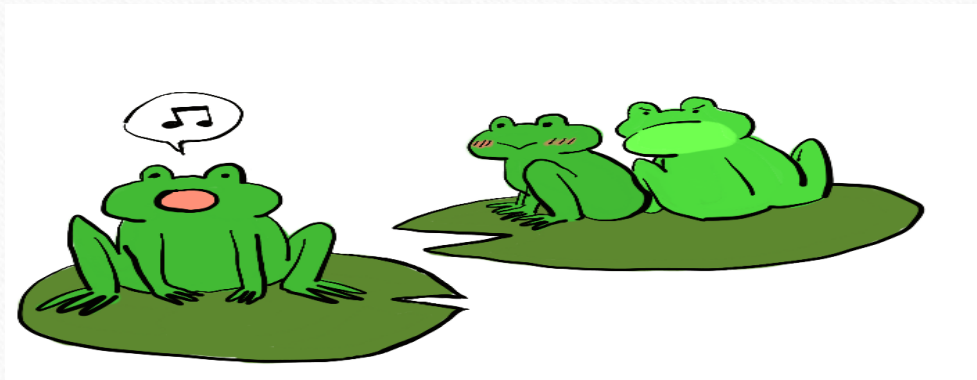




Fig. 24-4g



Courtship ritual of blue-footed boobies

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Behavioral Isolation Eastern and Western Meadowlarks



- Isolated by Songs

courtship songs of sympatric species of lacewings



Chrysoperla plorabunda



Chrysoperla adamsi



Chrysoperla johnsoni

0 1 2 3 4 5 6 7 8 9 10 11 12
Time (seconds)

- **4.mechanical isolation**
- Mating pairs may not be able to couple successfully if their genitals are not compatible.





(a) Honeybee drinking nectar from a foxglove flower



(b) Ruby-throated hummingbird drinking nectar from a trumpet creeper flower

Salvia mellifera
(Black sage)

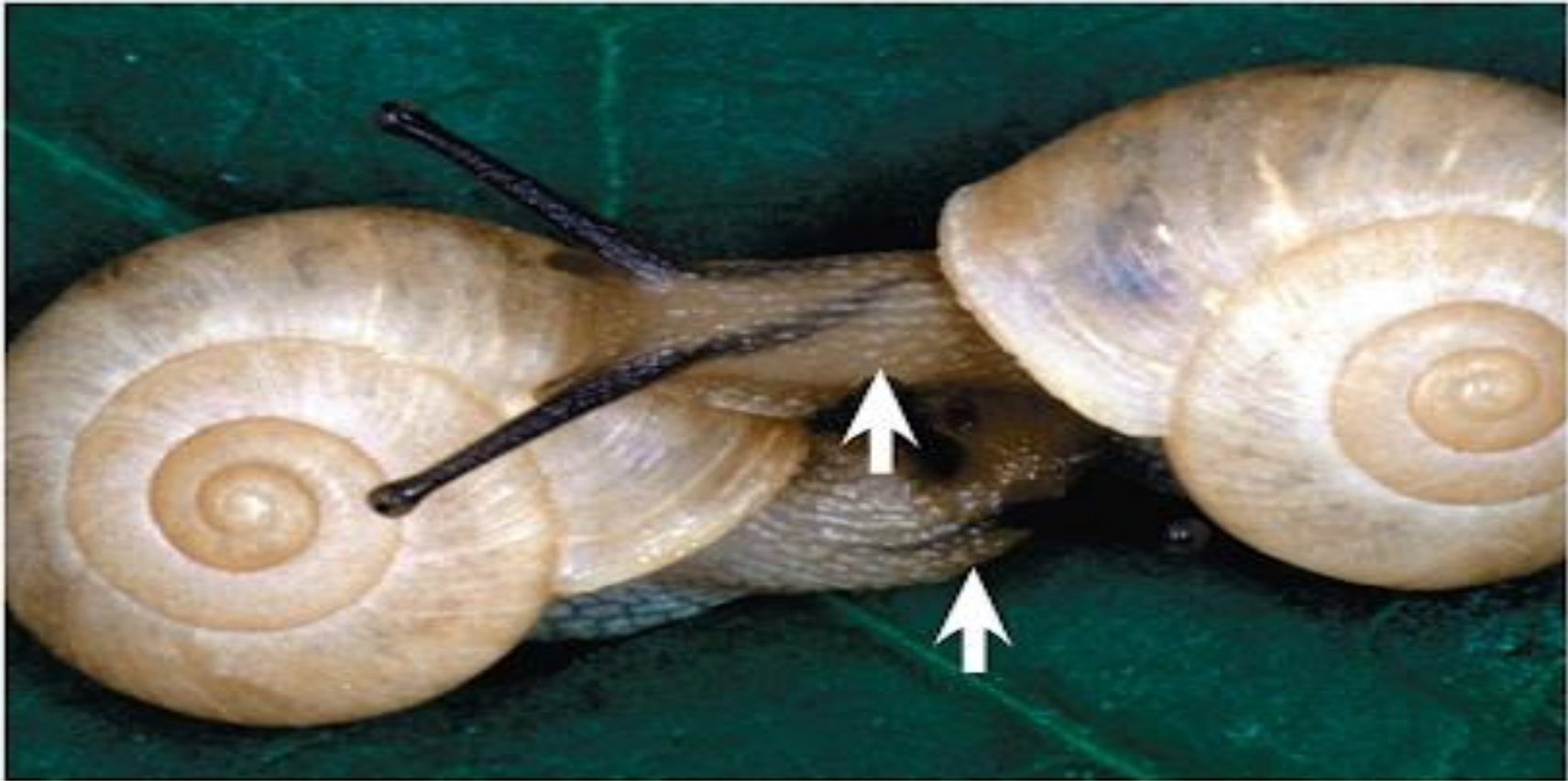


Salvia apiana
(White sage)



Black sage & White sage grow in the same areas, but hybrids rarely form because flowers of 2 species have become specialized for distinct pollinators. Black sage flowers are pollinated by small bees & white sage flowers by large bees

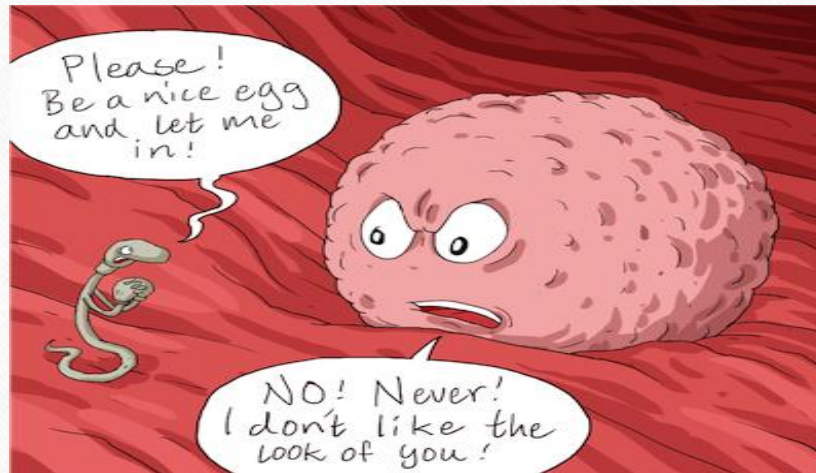
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Mechanical Isolation:
***Bradybaena* with shells spiraling in opposite directions**

- **5. Gametic isolation**

- differences in their gamete cells (eggs and sperm) prevent fertilization from taking place





Red sea urchin



Purple sea urchin

- Male gametes may not be able to recognize and fertilize an egg of a different species
- **EXAMPLE:** Sea cucumbers release their sperm and eggs into open water. The sperm recognize their own species through chemical markers



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Post-zygotic barrier

• 1. hybrid inviability

cannot form normally in the womb and simply do not survive past the embryonic stages

2. hybrid sterility

unable to reproduce offspring of their own

3. Hybrid break down

First generation hybrids, are viable and fertile but the next generation is feeble or sterile

Postzygotic Mechanism: Reduced Hybrid Viability

- If Sheep and goats mate → Hybrid zygotes
- Die before birth.

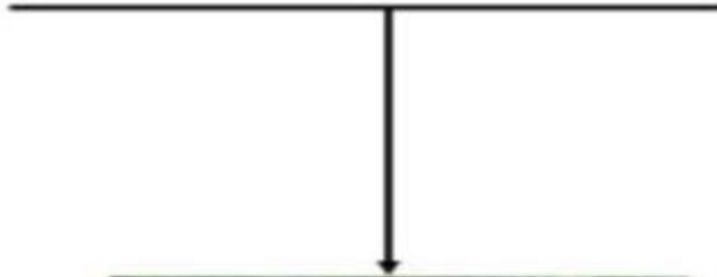




Female horse
($2n=64$)



Male donkey
($2n=62$)



Mule
($2n=63$)

Sterile, because synapsis and segregation cannot occur properly

- A viable hybrid, if formed, is not allowed to breed successfully and is infertile.

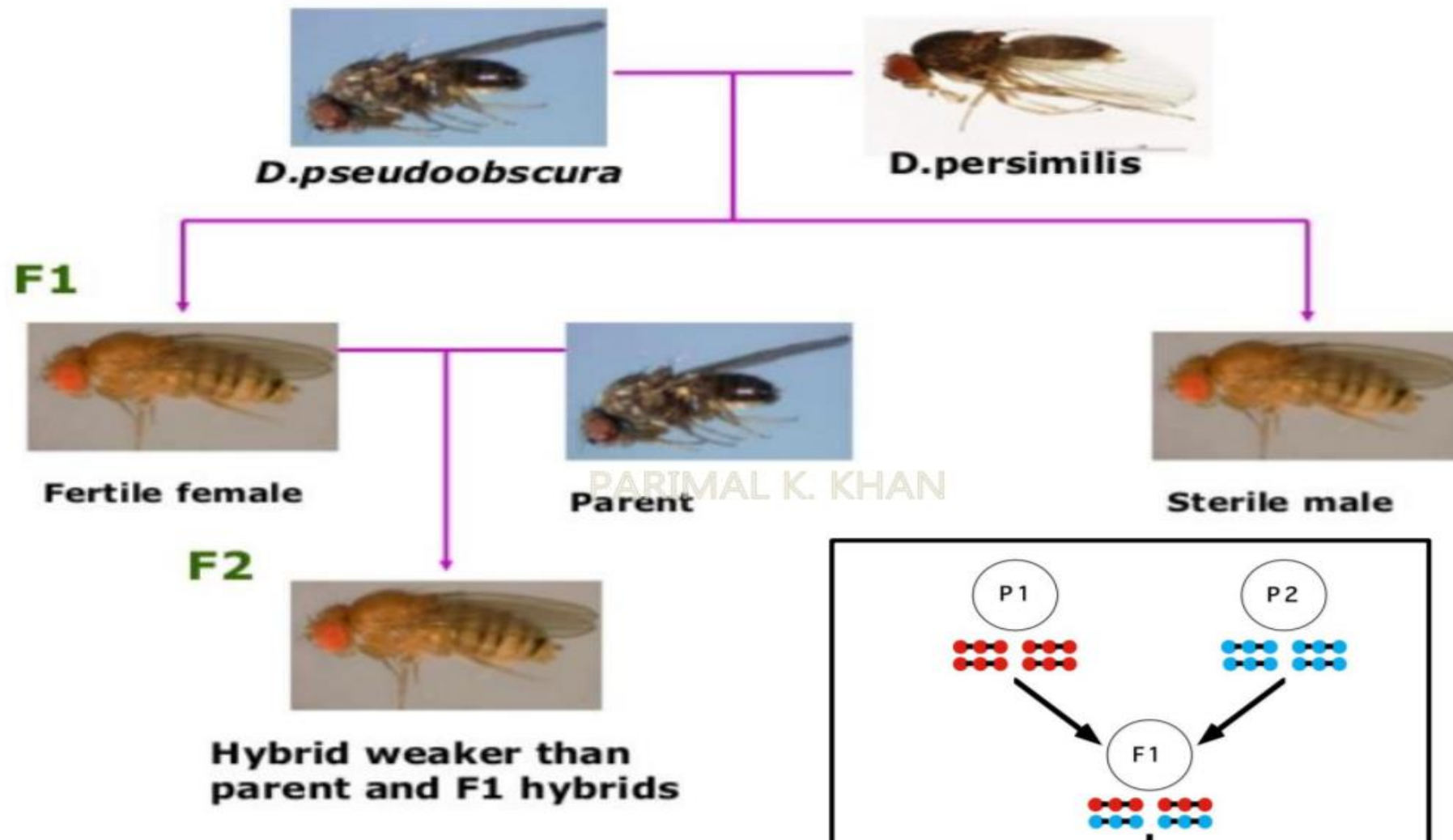
Zebroid: zebra & horse



Beefalo (domestic cow and buffalo)

- Example: sunflower hybrids
 - 80% of F2 generation are defective in some way and cannot reproduce successfully





The end

Thanks for your attention 😊