

TOPIC: COMMUNITY INTERACTIONS: COMPETITION (-/-)

- ◆ **Competition:** ≥ 2 organisms _____ *directly* or *indirectly* for the same limited, vital resource.
 - Impact on organisms can be _____ (*symmetric* competition) or _____ (*asymmetric* competition).
- ◆ Competing for a resource always _____ fitness (-/-) compared to getting it without competition because:
 - “Loser” _____ access to the resource & “winner” must _____ precious energy/time to do so.



EXAMPLE



Appropriately match each competitive situation (labeled a-d) to the appropriate part of the table.

- A large bear chases away a fox from a deer carcass, then comes back to eat the whole deer for itself.
- A nocturnal mouse depletes a shared food source, leaving little-to-none available for a diurnal squirrel.
- Two lions are injured in a battle over a territory with prey but neither gains an advantage.
- Two species of birds feed on an insect population, and both experience a decline in food availability.

Is there an obvious winner or loser?

No

Yes

	Direct Competition	Indirect Competition
Symmetric 		
Asymmetric 		

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PRACTICE

Which of the following scenarios is an example of direct, asymmetric competition?

- a) Cheetahs struggling to get enough food because a pride of lions are eating all the zebra in the territory.
- b) Two gorillas fighting for dominance, but both ending up injured and neither emerging as a clear winner.
- c) Sea turtles & crabs both eat algae in a coral reef, leaving less food available for both species.
- d) A plant secretes poison into the soil, inhibiting the growth of other plants in the same area.

PRACTICE

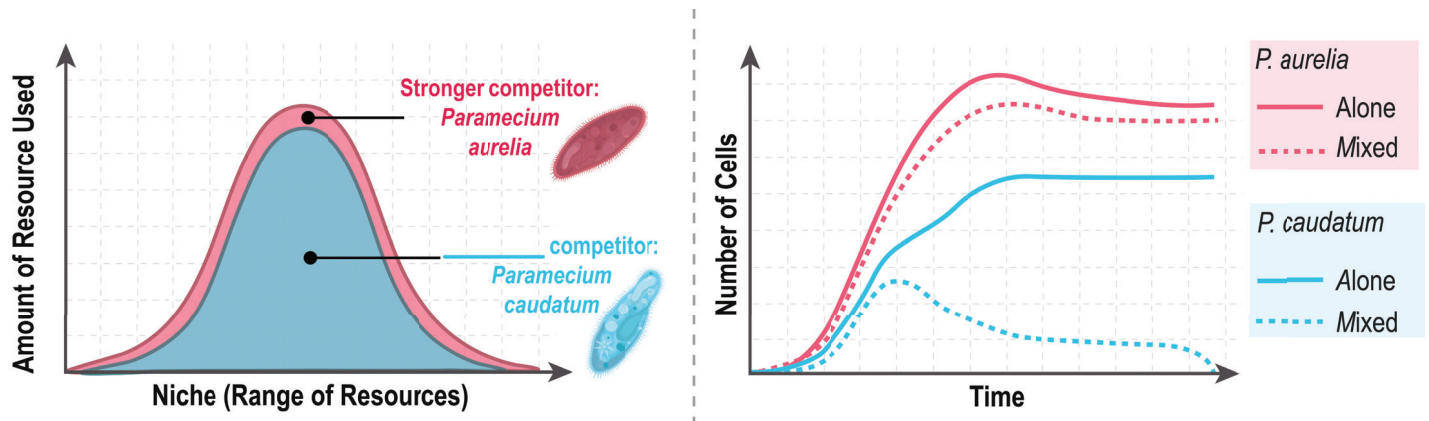
Which of the following is always true regarding competition between organisms?

- a) There's a clear "winner" and a clear "loser".
- b) It decreases the fitness of all organisms involved.
- c) It can increase the fitness of one species if they "win" the competition.
- d) None of the above.

TOPIC: COMMUNITY INTERACTIONS: COMPETITION (–/–)

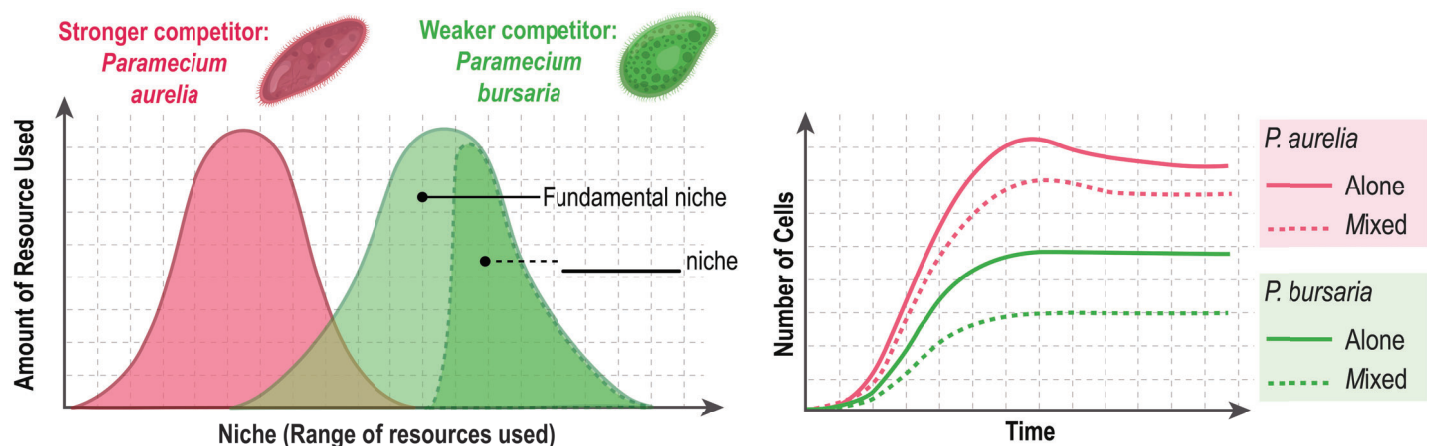
Competitive Exclusion Principle (Complete Niche Overlap)

- ◆ **Recall: Niche:** a species' ecological _____ (includes interactions, resource utilization & conditions it can tolerate).
- ◆ What happens to a *weaker* competitor when its niche _____ overlaps with a stronger competitor's niche?
- ◆ **Competitive Exclusion:** 2 species with completely *overlapping* niches can _____ permanently coexist in same area.
 - One species will always _____-compete the other, leading to local _____ of the “losing” species.



Resource Partitioning (Partial Niche Overlap)

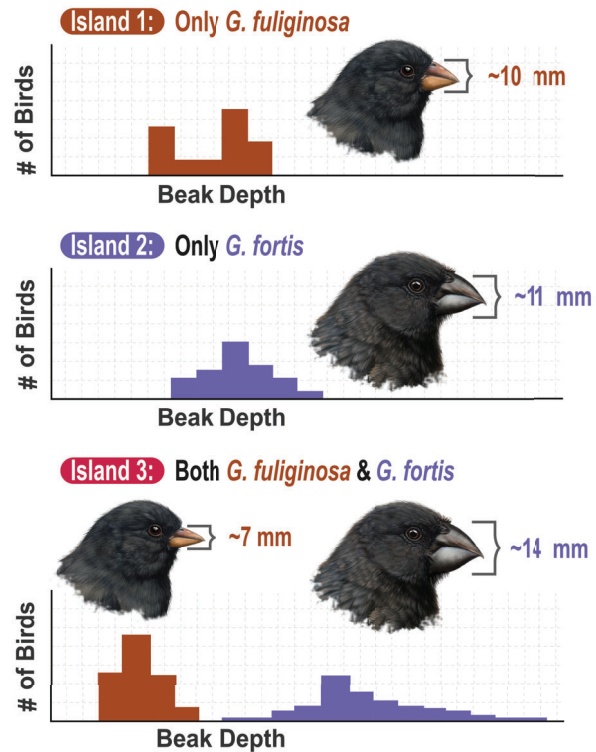
- ◆ What happens to a *weaker* competitor when its niche _____ overlaps with a stronger competitor's niche?
- ◆ **Resource Partitioning:** when a species _____ competitive exclusion by _____ its niche.
 - Causes an organism to _____ from their *fundamental* niche → *realized* niche.
- ◆ **Fundamental Niche:** the _____ *theoretical* niche a species could *potentially* occupy (*without* competition).
- ◆ **Realized Niche:** _____ portion of fundamental niche a species *actually* occupies (due to competition).



TOPIC: COMMUNITY INTERACTIONS: COMPETITION (–/–)

Character Displacement

- ◆ The long-term outcome/result of resource partitioning is _____ displacement.
- ◆ **Character Displacement:** the _____ of “new” traits between competing species to *reduce* competition.



EXAMPLE

Match each term to the correct definition:

Competitive exclusion _____	I) The ability of a species to survive and pass its genetic material onto offspring.
Resource partitioning _____	II) Principal that ≥ 2 organisms with the same niche cannot permanently coexist.
Fitness _____	III) The range of resources used by an organism due to competition.
Realized niche _____	IV) Species evolve new traits in order to avoid competition.
Character displacement _____	V) Species' niches diverge from one another to avoid competition & increase fitness.

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PRACTICE

In which scenario is competitive exclusion most likely to occur?

- a) When there are multiple predators in a community.
- b) When there are 2 species with partially overlapping niches in a community.
- c) When there are 2 species with completely overlapping niches in a community.
- d) Both b & c.

PRACTICE

The total range of resources that an organism can use & the conditions it can tolerate is its _____ niche, while the actual range of resources it uses & conditions it lives in is its _____ niche.

- | | |
|---------------------------|------------------------------|
| a) Fundamental; realized. | c) Competitive; realized. |
| b) Realized; fundamental. | d) Fundamental; competitive. |

PRACTICE

What could an ecologist do to find out if a species is occupying its fundamental or its realized niche?

- a) Remove a species it consumes & measure the effect.
- b) Observe how its use of resources changes upon the introduction of a competitive species.
- c) Take half the population out the community and observe the species' use of resources.
- d) Observe changes in the species' range of resources used after removal of a competitor.

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PRACTICE

Two barnacle species, *Chthamalus stellatus* & *Balanus balanoides*, can be found in communities on rocks along the coast. *C. stellatus* live higher up on the rocks than *B. balanoides*, who live closer to the surface of the water. In an experiment, all the *B. balanoides* are removed from the rock and over time the *C. stellatus* colonized the entire surface of the rock, including the area where only *B. balanoides* previously lived. In another area, all the *C. stellatus* were removed but the habitat of *B. balanoides* did not change. What does this suggest about the relationship between the two species?

- a) *C. stellatus* is a stronger competitor and forces *B. balanoides* into a realized niche.
- b) *B. balanoides* is a stronger competitor and forces *C. stellatus* into a realized niche.
- c) Both species have undergone resource partitioning to avoid competition.
- d) Both species have undergone character displacement to avoid competition.

PRACTICE

In which of the following scenarios is character displacement most likely to occur?

- a) Two allopatric species that have complete niche overlap.
- b) Two allopatric species that have partial niche overlap.
- c) Two sympatric species that have partial niche overlap.
- d) Two sympatric species that have complete niche overlap.
- e) None of the above.