

BEHAVIOR ⇒ ECOLOGY

Consumer Choice ⇒ Resource Diversity

Consumer: Predator, Herbivore/Granivore

Resource: Prey, Plant/Seed

Consumers: Generalists, “Partially Selective,” Specialists

Diet Breadth: Broad, Variable, Narrow

Resources: Between-Species Competition

How does consumer dietary-choice behavior affect the diversity of resource species?

Does consumer behavior permit dominant competitor to exclude other resource species (loss of resource diversity)?

Does consumer behavior promote resource diversity by limiting competitive effects of dominant resource species?



Darwin (1859) on lawnmowers

Mowing: greater plant diversity than area not mowed.

“Generalist” lawnmower:

prevented competitive dominants from excluding other spp.

Rabbits: *Generalist herbivores*

Tansley & Adamson (1925)

Excluded rabbits from plots in species-rich grassland

Plant spp lost from plots (reduced resource diversity)

Few dominant plant spp. excluded others in plots

Rabbit grazing checked dominant plant spp.

Generalist diet included dominant plant spp.

Plant diversity persists in grassland

“Exploiter mediated coexistence”

Intense grazing by *generalists*: reduced plant diversity

Milton (1947): Sheep in Wales

Overgrazed habitats

Only unpalatable spp. left; diversity diminished

Partially Selective Consumer

Frequency-dependent predation: Consumer selects common prey

Diet changes as rare prey becomes common

Butterfly *Battus philenor*

Exploits 2 host-plant spp.; larvae – foliovores

Host plants differ in leaf shape

Adult butterfly “search image”

Chooses common leaf morphology for oviposition

Larvae attack common host; rare host can advance

Consumer selection promotes host spp. coexistence

Specialist Consumer

Specialize on *competitively dominant prey*

Maintains prey diversity

Moderates competition among resource spp

Specialize on *competitively inferior prey*

Diminish prey diversity

Increase impact of competition

Resources: high growth rate

More competitive by faster growth

More palatable to consumer

Habitat Use One Species

⇒ Another Species' Population Growth

Keesing, F. 1998. Impacts of ungulates on the demography and diversity of small mammals in central Kenya. *Oecologia* **116**:381.

East African rodents: agricultural pests (herbivore)

disease reservoirs

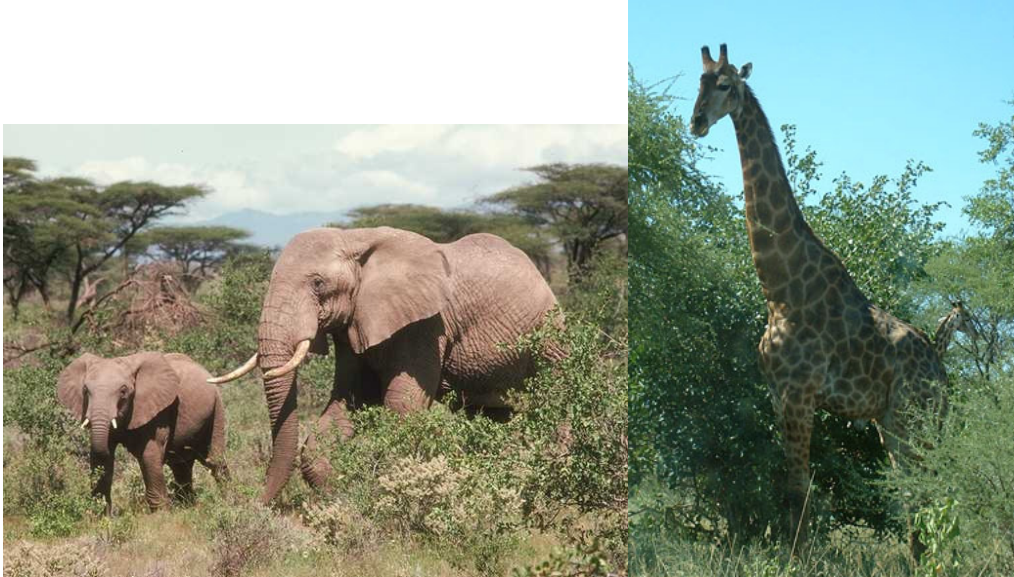
Generally: low density, outbreaks

Pouched mouse: *Saccostomus mearnsi* (70 - 80 g)



Same savanna

Predominant (mammalian) herbivores: large ungulates



How might large herbivores affect small mammals?

1. Competition for food between organisms differing in size
2. Large herbivores trample vegetation

Reduce cover for small mammals \Rightarrow Predation



Test: Ungulate exclusion, fenced areas

Ungulate inclusion, open areas

Several years: Ungulate densities, cattle use, small mammal densities, small mammal body mass, plant cover, (insect biomass)

Density: pouched mouse

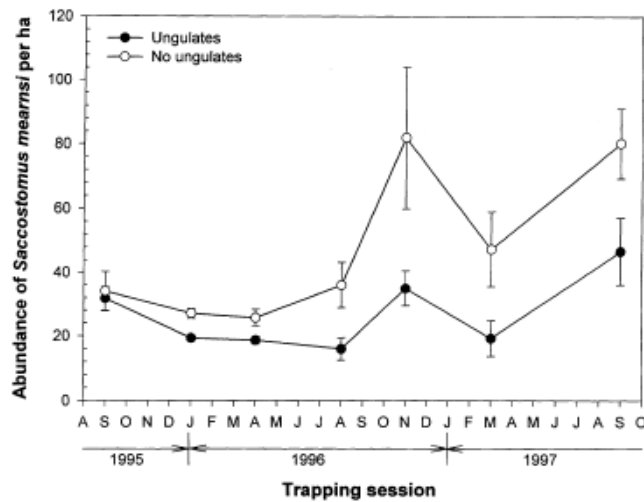


Fig. 2 Abundance of pouched mice, *Saccostomus mearnsi*, per hectare in ungulate exclusion (open circles) and control (solid circles) treatments. Error bars represent SEs

Mouse abundance *doubled* where ungulates excluded

(Male) mouse body mass 4% greater where ungulates excluded

Mouse survival same, Female fecundity not different

Immigration by mice

No significant difference in vegetative cover

77.0% with ungulates; 77.2 % without ungulates

Tends to *exclude* differential mouse mortality via *predation*

Ungulate removal \Rightarrow increase quantity, quality of food for mice

Reduce large mammal competition (via habitat choice)

Resource availability increased

Habitat choice by mice, immigration