Exercise: Evolutionary theory

Nothing in Biology Makes Sense Except in the Light of Evolution
Theodosius Dobzhansky (1973)

Consider a consumer or predator with a variable trait, θ. The trait variation could be due to behavior, it could reflect different foraging abilities, birth schedules etc.

1. Decide upon the species and the setting
2. Write down the *trade-off* of the trait in terms of costs and benefits. Benefits could occur from the functional response in the consumption term. Costs could be due to metabolic costs of foraging and the mortality risk of foraging.
3. Write the population's growth rate as function of the trait, $r(\theta)$ and identify the optimal trait.

If possible:

4. Solve the consumer-resource (or predator-prey) model with many species with different values of θ. Which survives? What happens if the environment changes in a way that changes costs and benefits?