# Life History Strategies

### Evidence of Tradeoffs in Placental Mammals



### Definition:

An individual's pattern of allocation, throughout life, of time and energy to various fundamental activities, such as growth, repair of cell and tissue damage, and reproduction













LH General Questions...

• What are the trade-offs & constraints under which evolution operates?

• Given these, what is the optimal strategy to adopt?





## Specific Questions

- Why do organisms age and die?
- How many offspring should an individual produce in a given period of time?
- How big should each offspring be?

# Why Do Organisms Age & Die?



late life decline in an individual's fertility & probability of survival... i.e reduces fitness

.... should be opposed by ns

### Rate of Living Theory makes 2 predictions:

- the aging rate should be correlated with metabolic rate
- 2. species should <u>not</u> be able to evolve longer life spans (by NS or artificial selection)







• Evolutionary Theory





engineered lab skin cultures to express high levels of telomerase
-> prevent telomere loss & increase life span by 20 additional cell divisions (Bodnar et al. 1998)
Image: Constant of the span sector of









### Antagonistic Pleiotropy Hypothesis

- A mutation affecting <u>2 different</u> life history characters
- Involves <u>tradeoff</u> between reproduction early in life and survival late in life
  - e.g. Age-1 gene in Caenorhabditis elegans (Walker et al. 2000) mutation hx546 increases life span by ca. 80% otherwise appears normal





































Testing predictions in the real world...







Reznick & Endler (1982) The impact of predation on life history evolution in Trinidadian guppies (Poecilia reticulata). Evolution

- Crenicichla alta, high predation, 1° on adults
- Rivulus hartii, moderate predation, 1º on juveniles
- Aequidens pulcher, low predation on all size classes

