

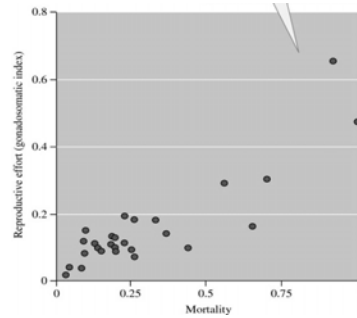
### III. Life Histories

- III. Life Histories (Chap. 12)
  - A. Life history traits
  - B. Tradeoffs in resource allocation
  - C. Life history strategies

#### A. Life History Traits

#### Adult fish mortality and reproductive effort

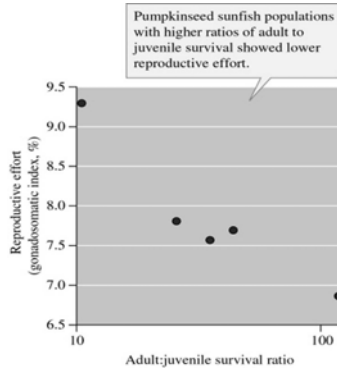
Figure 12.13



12-10 Source: Gauderson 1997

#### Survival ratio and reproductive effort

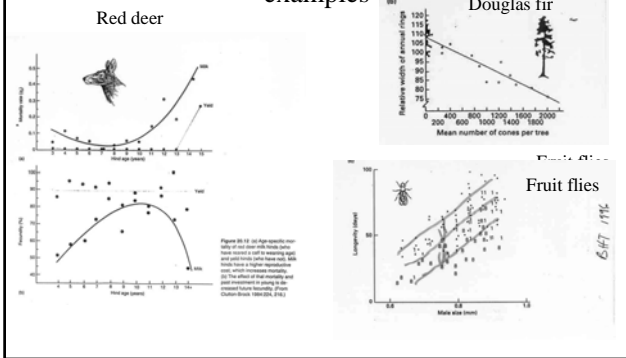
Figure 12.18



12-14 Source: Bertschy and Fox 1999

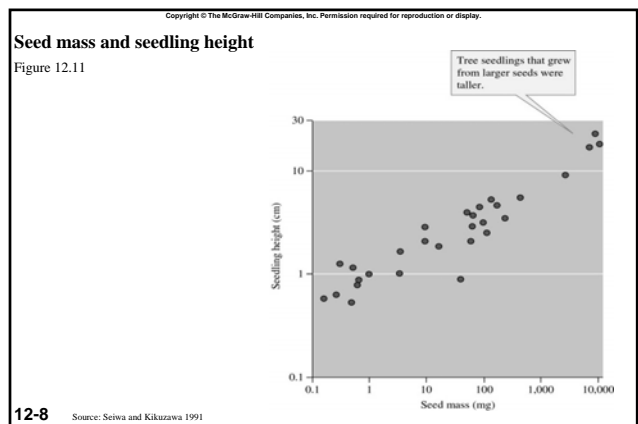
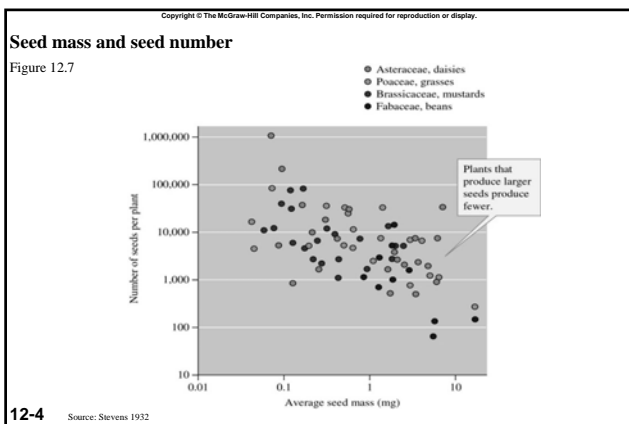
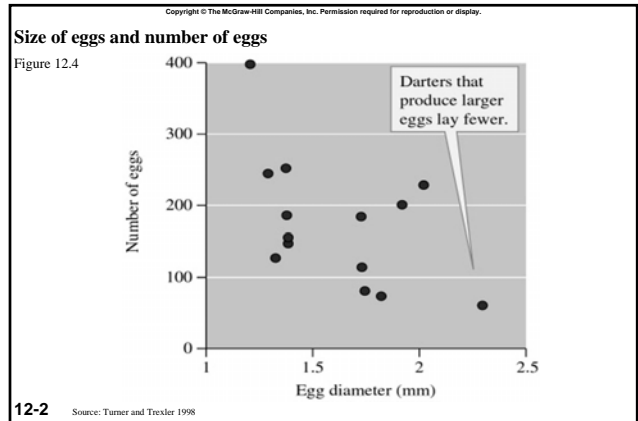
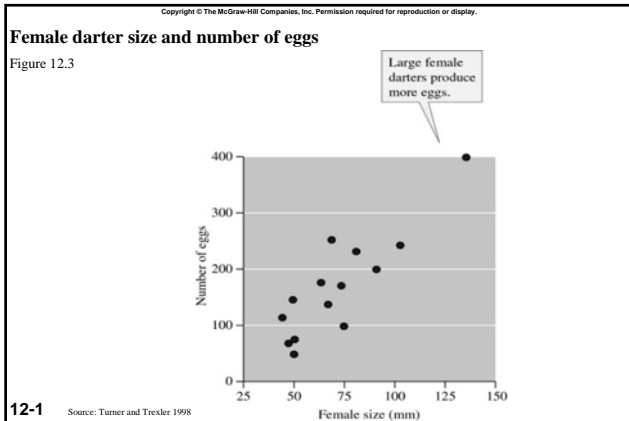
1. Reproductive allocation vs. growth/survival
  - limited resources
  - reproduction is energetically expensive
  - different reproductive strategies
    - a. frequent disturbances
    - b. stable environments

#### Reproduction vs. growth tradeoffs: examples



#### B. Tradeoffs

2. # of offspring vs. individual fitness
  - a. body size of offspring vs. # of offspring
  - b. # of offspring vs. amount of parental care for each

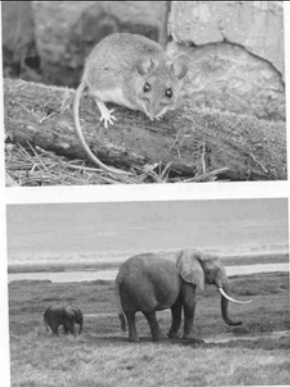


## C. Life History Strategies

1. r-selected vs. K-selected
2. Grime's CSR

## r- vs K-selection

|                | <u>r-selection</u>      | <u>K-selection</u>    |
|----------------|-------------------------|-----------------------|
| A. Disturbance | Common, irregular       | Rarer, more regular   |
| B. Mortality   | Variable, unpredictable | Constant, predictable |
| C. Competition | Low or variable         | High, constant        |
| D. Pop. size   | Variable, below K       | Rel. constant, near K |
| E. Consequence | High r                  | Good competitors      |

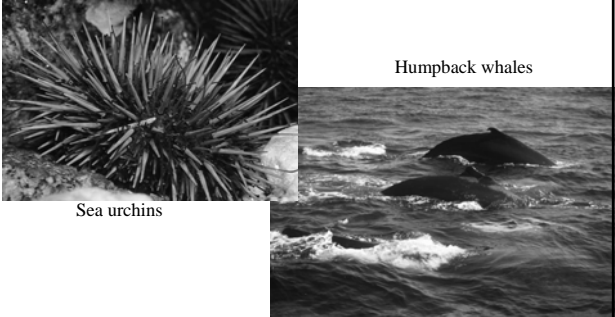


Small size  
Rapid growth  
Early reproduction  
Many, small offspring

Large size  
Slow growth  
Late reproduction  
Few, large offspring

FIGURE 12.19 Mouse and elephant: r selection versus K selection.


### K vs. r selection: extremes in parental care



Sea urchins

Humpback whales

### K vs. r selection: extremes



### r vs. K selection: Cattails

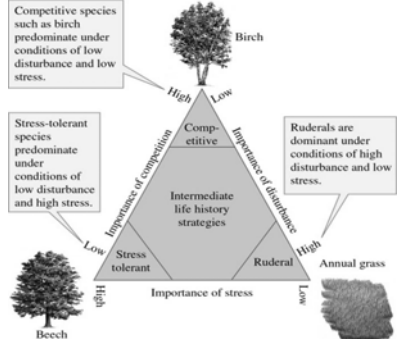
Table 14.2 Life-history traits of two *Typha* (cattail) species, along with properties of the habitats in which they grow.  $s^2 / \bar{x}$  refers to the variance : mean ratio, a measure of variability. The cattails conform to the r / K scheme. (After McNaughton, 1975.)

| Habitat property                | Measured by                              | Growing season         |                       |
|---------------------------------|--|------------------------|-----------------------|
|                                 |  | Short                  | Long                  |
| Climate variability             | $s^2 / \bar{x}$ frost-free days per year | 3.05                   | 1.56                  |
| Competition                     | Biomass above ground ( $g\ m^{-2}$ )     | 404                    | 1336                  |
| Annual recolonization           | Winter rhizome mortality (%)             | 74                     | 5                     |
| Annual density variation        | $s^2 / \bar{x}$ shoot numbers $m^{-2}$   | 2.75                   | 1.51                  |
| Plant traits                    |  | <i>T. angustifolia</i> | <i>T. domingensis</i> |
| Days before flowering           | 44                                       | 70                     |                       |
| Mean foliage height (cm)        | 162                                      | 186                    |                       |
| Mean genet weight (g)           | 12.64                                    | 14.34                  |                       |
| Mean number of fruits per genet | 41                                       | 8                      |                       |
| Mean weights of fruits (g)      | 11.8                                     | 21.4                   |                       |
| Mean total weight of fruits (g) | 483                                      | 171                    |                       |

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### Plant life history strategies – Grime's CSR

Figure 12.20



Competitive species such as birch predominate under conditions of low disturbance and low stress.

Stress-tolerant species predominate under conditions of low disturbance and high stress.

Ruderals are dominant under conditions of high disturbance and low stress.

12-15 Source: after Grime 1979

End