Fast-Slow Continuum

Fast

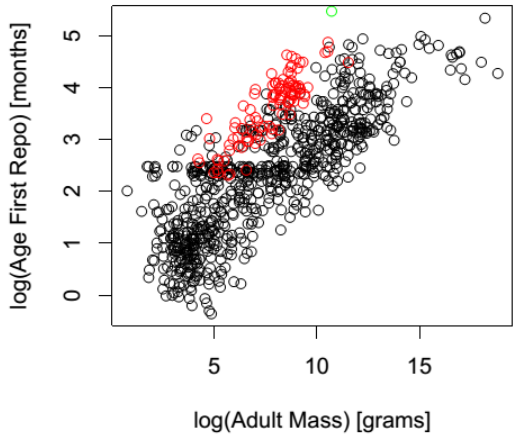
Slow

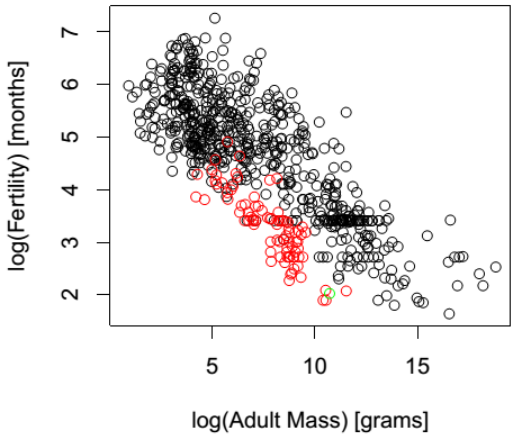
High Extrinsic Mortality

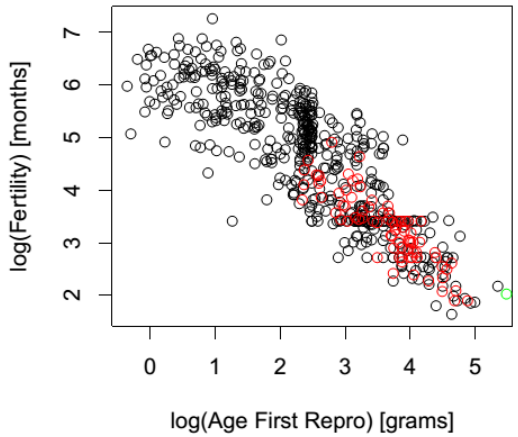
Low Extrinsic Mortality

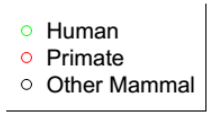
Source: Wikipedia

Correlation of Life History Traits



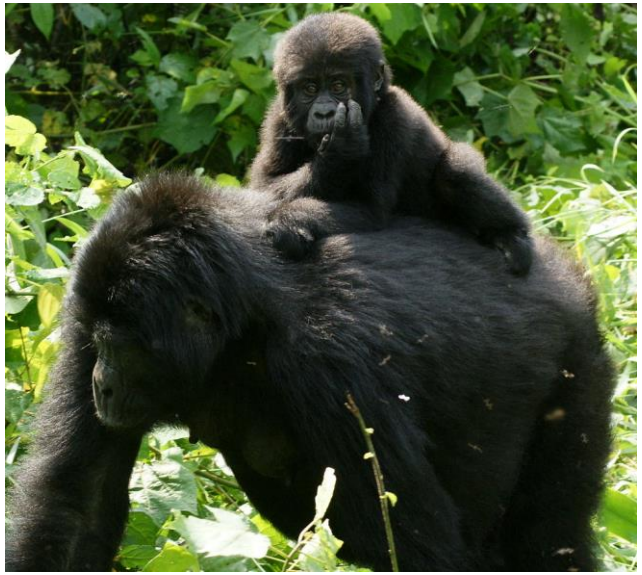




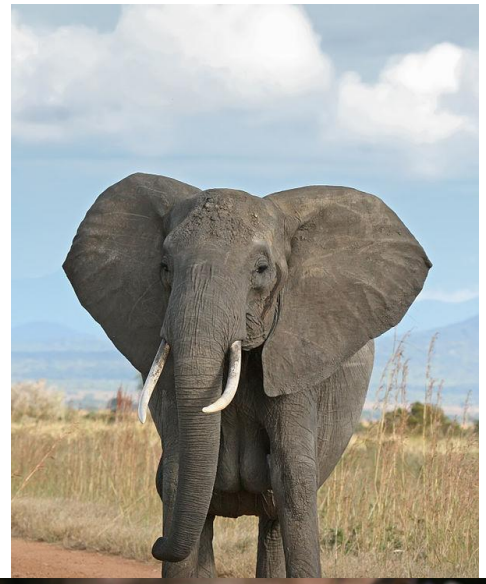


Offspring Size

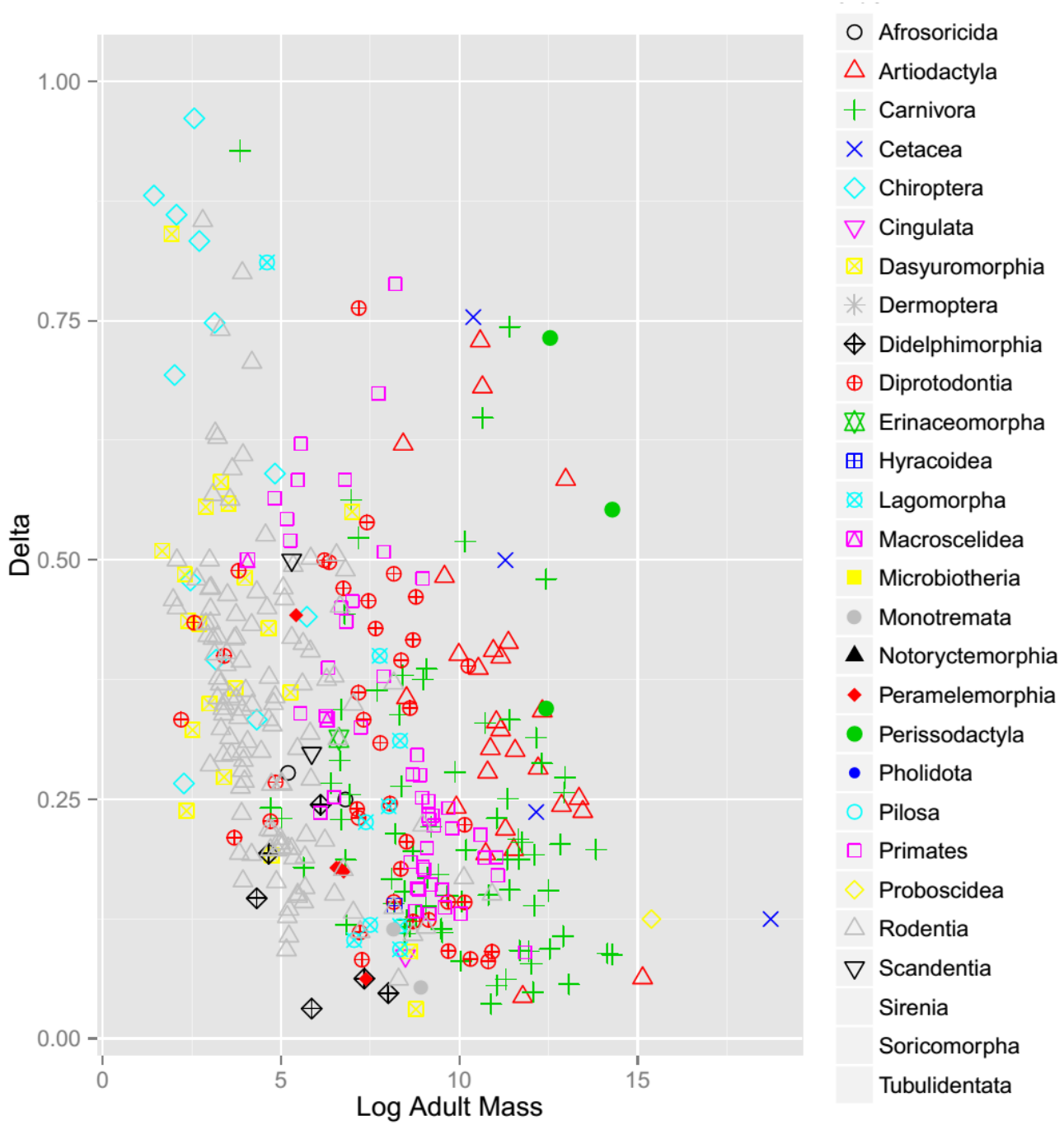
Small Relative Size



Large Relative Size



Source: Wikipedia


Delta
1.00
0.75
0.50
0.25
0.00
0
5
10
15
Log Adult Mass
Afrosoricida
Artiodactyla
Carnivora
Cetacea
Chiroptera
Cingulata
Dasyuromorphia
Dermoptera
Didelphimorphia
Diprotodontia
Erinaceomorpha
Hyracoidea
Lagomorpha
Macroscelidea
Microbiotheria
Monotremata
Notoryctemorphia
Peramelemorphia
Perissodactyla
Pholidota
Pilosa
Primates
Proboscidea
Rodentia
Scandentia
Sirenia
Soricomorpha
Tubulidentata

Fast-Slow is too Simplistic

Empirical Continuums

Fast-Slow

Small-Large Offspring

Causal Constraints

Extrinsic Mortality

Tissue Maintenance Cost

[Interactive Constraints]

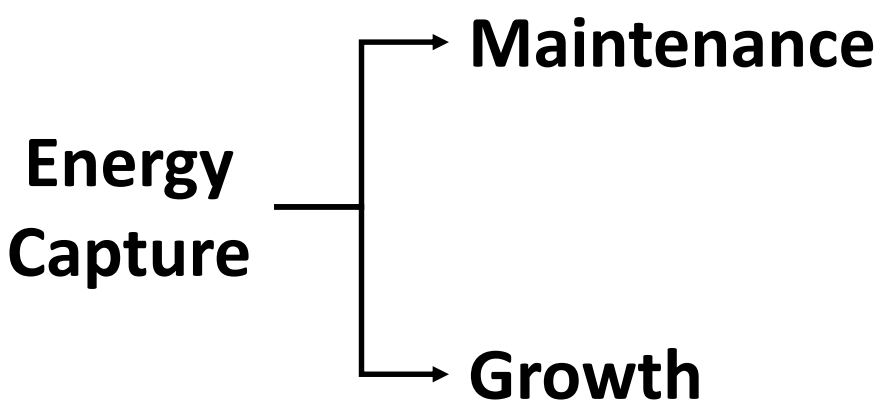
Life History Model: Determinate Growth

Indeterminate

Determinate

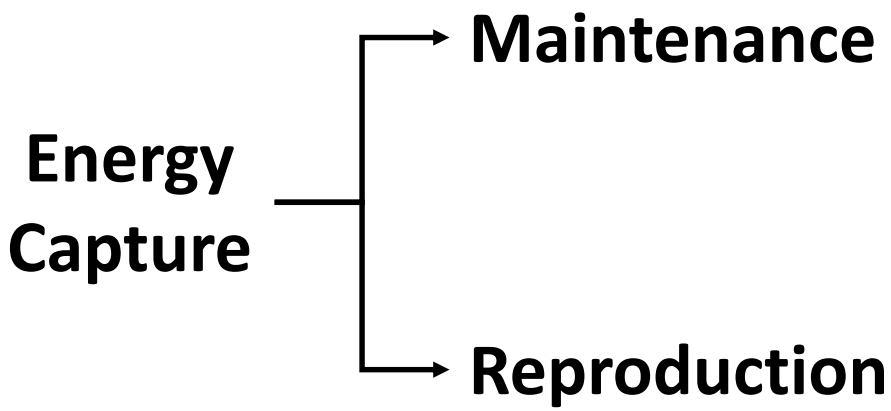
Energy Allocation Model

Juvenile



$f(w)$

Adult



$F(w)$

Model Variables

Juvenile	**Adult**
$f(w)$	$F(w)$
$m(w)$	$M(w)$
w_0	w_α

Growth Model

Energy Capture

$$\frac{dw}{dt} = f(w) = A_1 w^a - A_2 w$$

Tissue Maint. Cost

The optimality conditions

$$1 = R(w_0, w_\alpha) e^{-r\alpha} V(w_0, w_\alpha)$$

$$\frac{m_0}{f_0} = \frac{1}{w_0}$$

$$\frac{m_\alpha}{f_\alpha} = -\frac{M'_\alpha}{M_\alpha} + \frac{F'_\alpha}{F_\alpha}$$

$$\frac{d}{dw}\left[m - \frac{f}{w}\right]_{w_0} < 0$$