DEB notes

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*'This Supplementary Material can be found at https://github.com/darwinanddavis/DEB_notes'

Overview

Summarised notes from DEB workshops, telecourses, lectures, and discussions.

Reserve mobilisation

Conductance determines mobilisation rate from reserve to structure
The larger the SA of reserve, the more mobilisation is possible and thus faster maintenance and growth because due to more SA - SA scales slower than volume-specific flows

Reserve dynamics f = 1 (max feeding rate)

$$\frac{dE}{dt} = \frac{f\{\dot{p}_{AM}\}}{L} - \frac{\dot{v}[E]}{L}$$

$[E_M]$ = max reserve. Reserve doesn't change.

$$= \frac{\{\dot{p}_{AM}\}}{L} - \frac{\dot{v}[E_M]}{L}$$

$$\therefore [E_M] = \frac{\{\dot{p}_{AM}\}}{\dot{v}}$$

Scaled reserve

$$e = \frac{[E]}{[E_M]}$$

$$\frac{de}{dt} = \frac{[E]/[E_M]}{dt} = \frac{f\dot{v}}{L} - \frac{e\dot{v}}{L}$$

$$= \frac{\dot{v}(f\breve{\ }e)}{L}$$

Under steady state, reserve doesn't change

$$0 = \frac{\dot{v}(f\breve{\ }e)}{L} \quad \text{or} \quad f = e$$

Length
Getting maximum length L_M

$$\frac{dV}{dt} = V\dot{r}$$

Can rewrite r using scaled reserve e

$$\dot{r} = f$$

Weak homeostasis

Structural isomorphy implies weak homeostasis Weak homeostasis depends on ratio of reserve to structure $(d[E]/dt)$