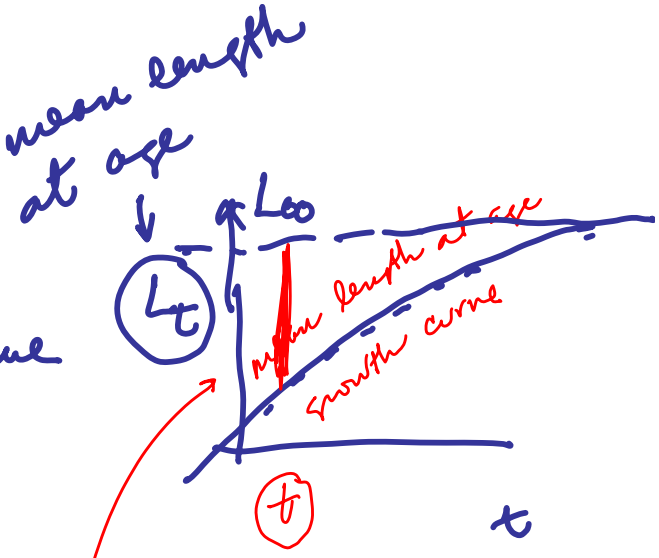
NOTES

1| L_∞, K and t_0 have units

eg. ↓ ↓ ↓

cm /yr yr

or yr^{-1}



2| L_∞ is an average value

$L_{max} > L_\infty$

3| K is de growth coefficient

K is not the growth rate. It is related with it

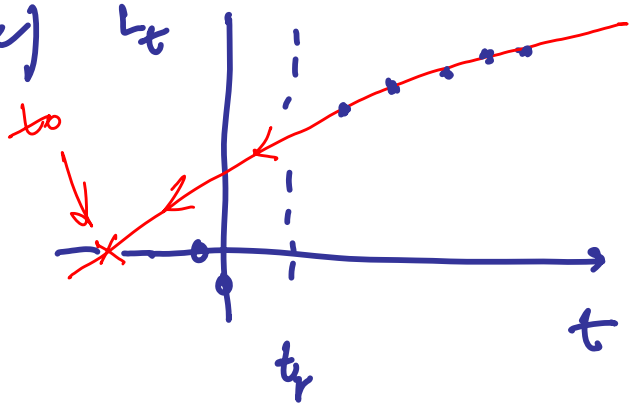
$$\frac{dL_t}{dt} = K(L_\infty - L_t)$$

↑ coefficient of proportionality

$$K = \frac{1}{L_\infty - L_t} \times \frac{dL_t}{dt}$$

4| t_0 has not biological mean. It is used

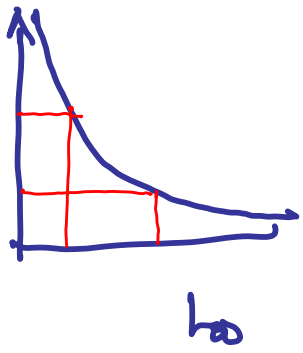
only for fixing the curve to the t axis.
(projecting the curve)



t_0 normally is negative.

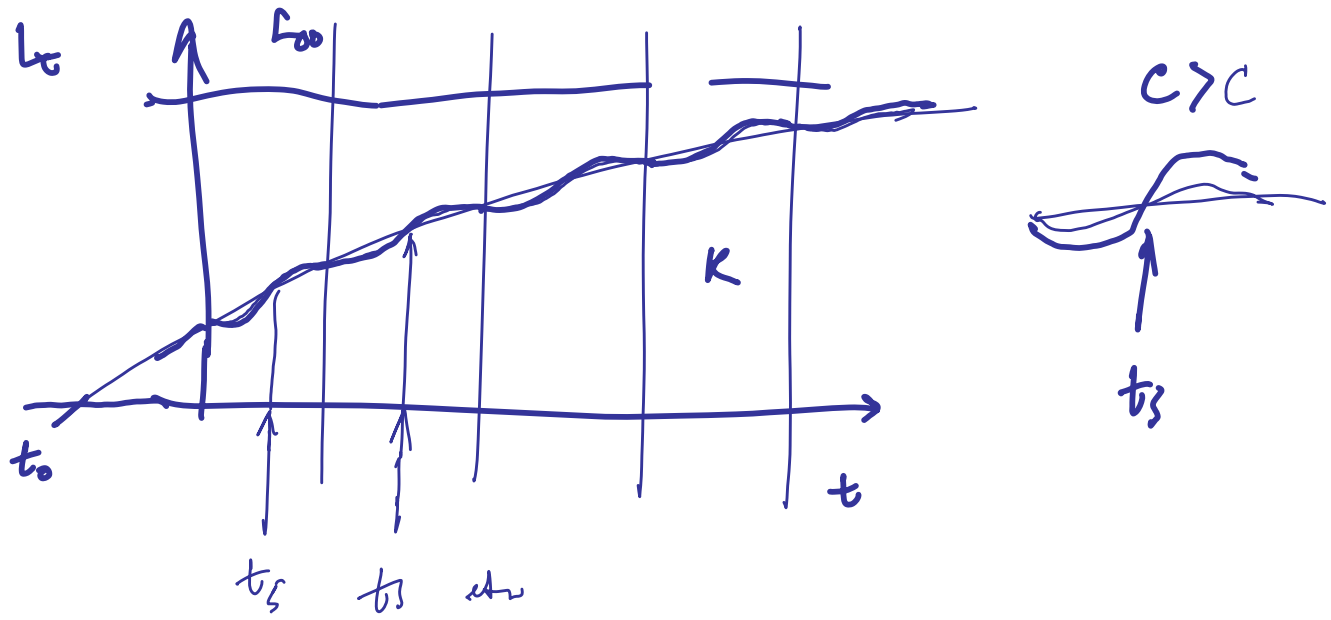
5) Bertalanffy growth curve is used normally to describe growth of a species after age of recruitment (t_r)

6) VB Growth parameters are auto correlated by K



$\Rightarrow$ Compare growth curves not single parameters!

7) Seasonal growth



t_s : turning point

C = oscillation amplitude

$$L_t = L_\infty \left[1 - e^{-K(t-t_0) - A} \right]$$

$$A = \frac{C.K}{2\pi} \times \sin\left(2\pi \times \left(t - t_s \right) \right)$$

$\pi = 3,14159$ $\quad 0 \leq C \leq 1$

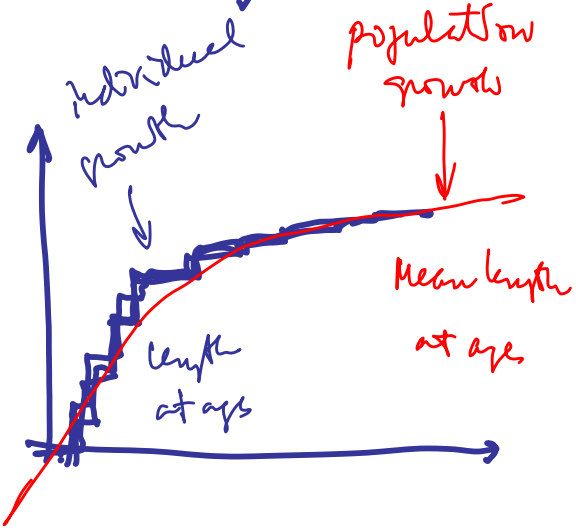
$0 \leq t_s \leq 1$

if $C = 0 \Rightarrow A = 0$ (do not have oscillations)

A longer $\Rightarrow$ longer oscillations

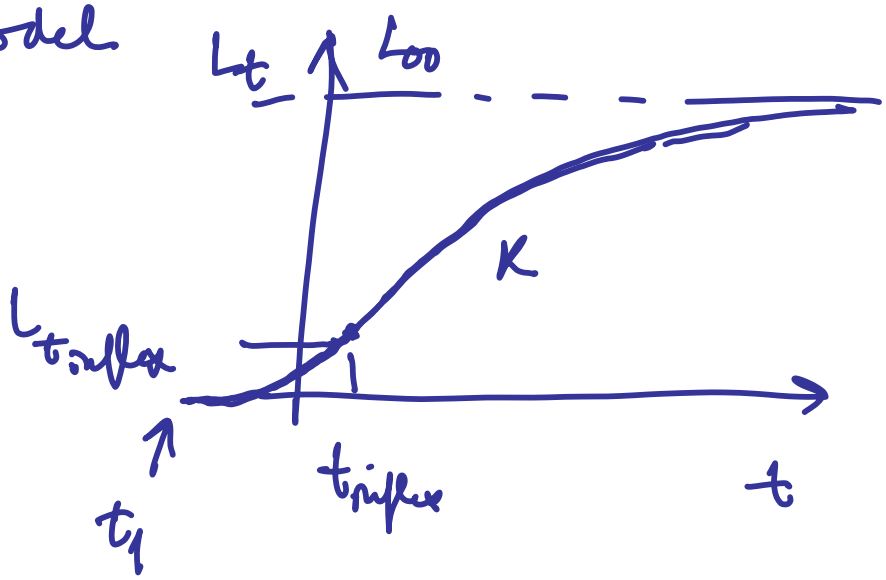
FiSAT Software (FAO)

8) In crustacea VB growth works well!



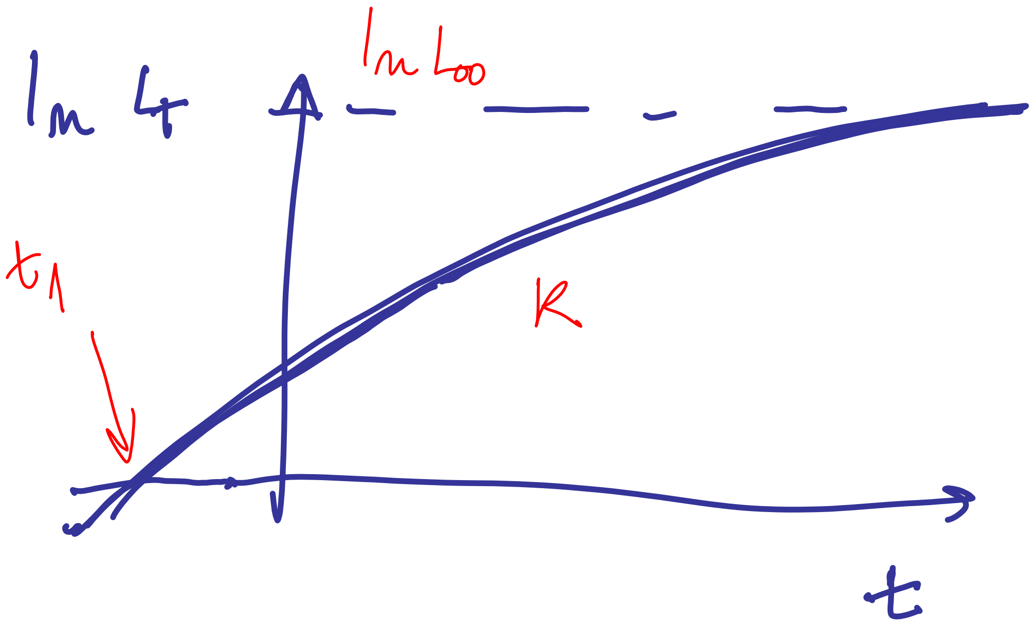
9) Other growth models

Gompertz model



$$\ln L_t = \ln L_\infty \left[1 - e^{-k(t - t_1)}\right]$$

where t_1 is t where $L = 1$ and $\ln L = 0$



Graphical methods used to estimate VB parameters can be used here to estimate the Gompertz parameters.

→ CADIMA (2000)

10/ Growth curves comparisons

$$\phi \text{ index} = \log K + 0{,}67 \log W_\infty$$

$$\phi' \text{ index} = \log K + 2 \log L_\infty$$

$\log_{10}$

$$\phi' \approx \phi - 0{,}67 \log q$$

← from length-weight relationship

Statistical methods

1) Residual sum of squares method
   (F-method)
2) Log-likelihood ratio test
3) Hotelling T^2 test