Formulas

discrete time growth:

- $N_T = N_0 \lambda^T$
- $\lambda = f + p$
- $\mathcal{R} = f/(1-p)$

continuous time growth:

- $N(t) = N(0) \exp(rt)$
- r = b d
- $\mathcal{R} = b/d$

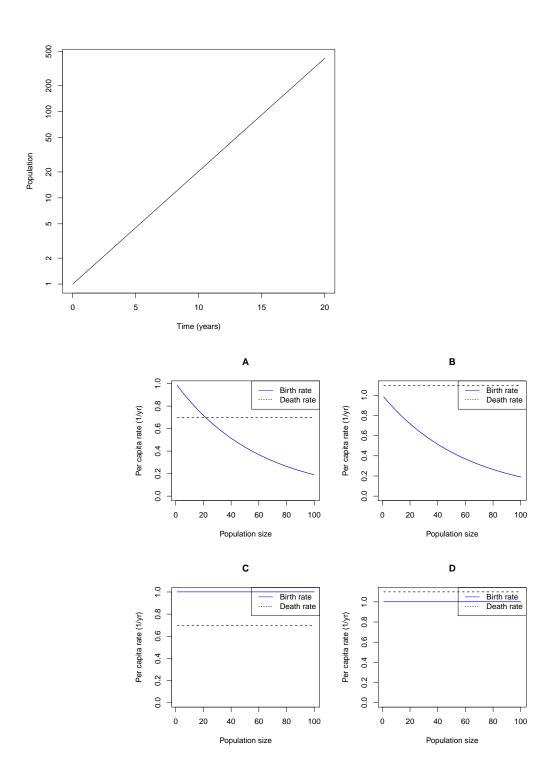
structured growth:

- $\bullet \ \ell_x = p_1 \times p_2 \times \dots p_{x-1}$
- $\mathcal{R} = \sum \ell_x f_x$
- $\sum \ell_x f_x \lambda^{-x} = 1$
- $SAD(x) \propto \ell_x \lambda^{-x}$

competition:

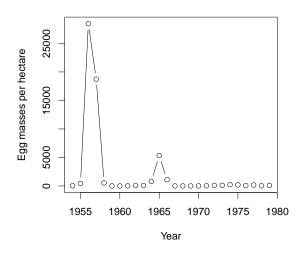
- $\alpha_{ij} = \text{effect of species } i \text{ on species } j$
- $C = \alpha_{12}\alpha_{21}$
- $E_{ij} = \alpha_{ij} K_i / K_j$

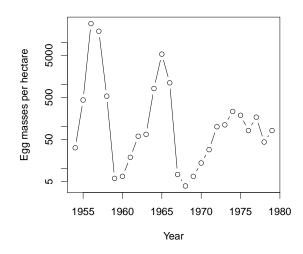
Increase



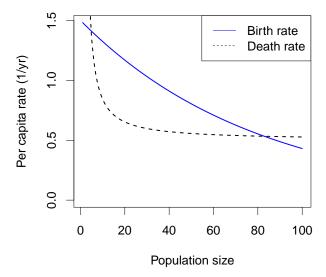
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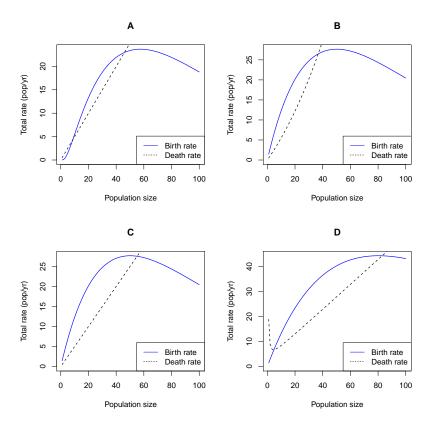
Gypsy



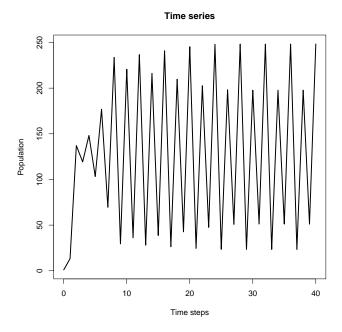


Rates



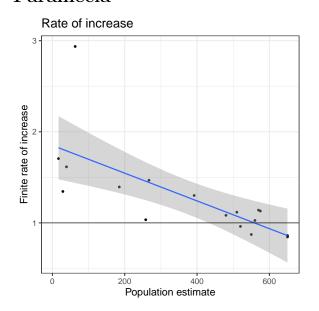


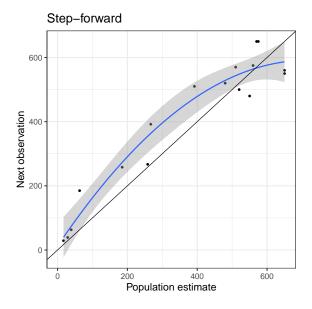
Cycles



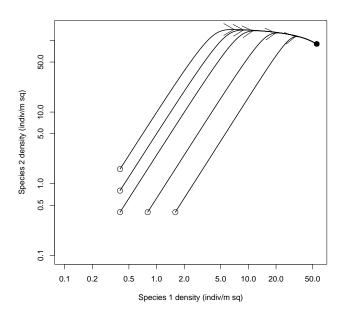
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Paramecia





Competition



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