

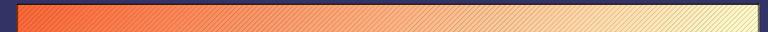


# COMPETIÇÃO E COEXISTÊNCIA EM COMUNIDADES VEGETAIS

Leituras:

Gurevich *et al.* cap.10

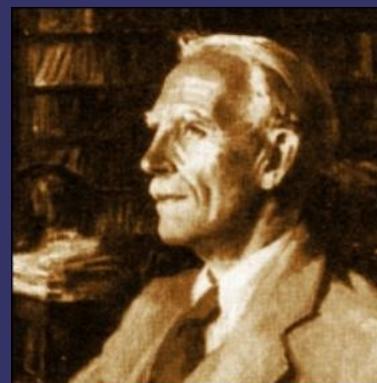
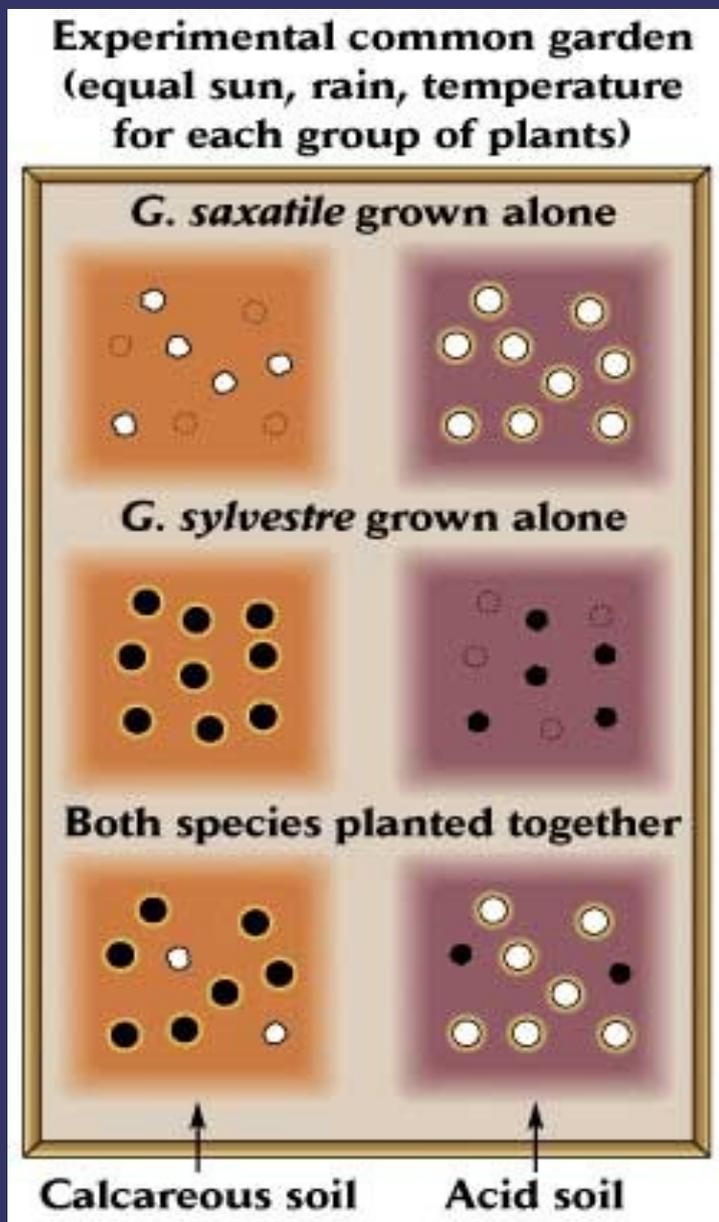
Begon *et al.* cap.8



# TÓPICOS

- Definição de competição e seus problemas
  - Detecção de competição entre plantas
  - Modelos fenomenológicos
  - Modelos mecanísticos
  - Nicho e estrutura de comunidades
  - Paradigma Hutchinsoniano
- 

# COMPETIÇÃO: UM TEMA FUNDADOR



Sir Arthur Tanlsey



*Galium saxatile*

# TIPOS DE INTERAÇÃO

INTERAÇÃO	Presente	Ausente
COMPETIÇÃO	- / -	0 / 0
PARASITISMO	+ / -	- / 0
FACILITAÇÃO	0 / +	0 / 0
MUTUALISMO	+ / +	- / -

# COMPETIÇÃO POR RECURSOS



LUZ: floresta equatorial pluvial,  
Barro Colorado, Panamá



ÁGUA: deserto de Sonora, México

# COMPETIÇÃO POR INTERFERÊNCIA

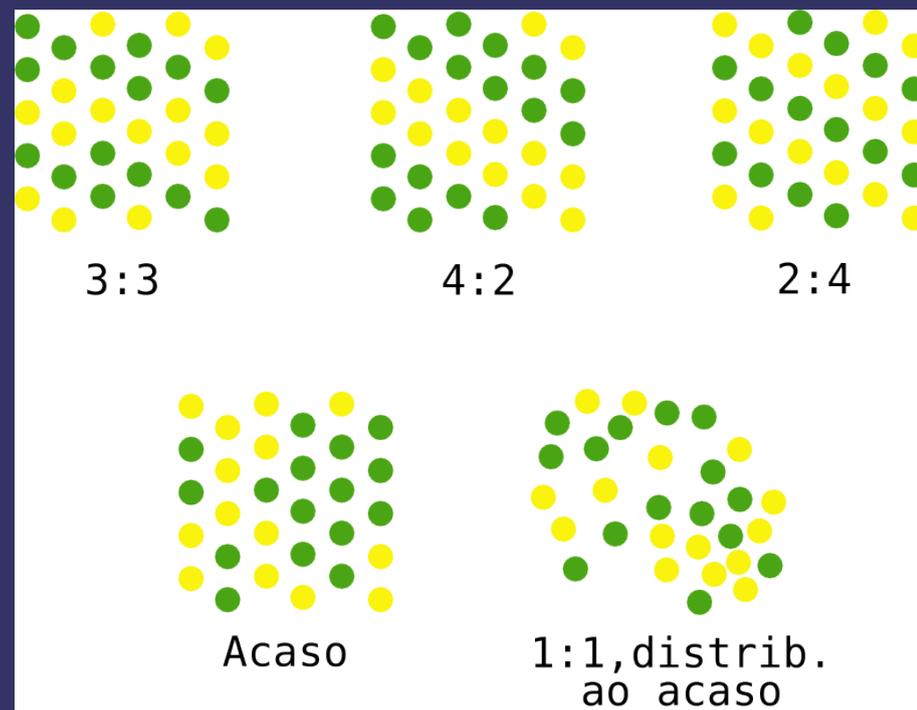
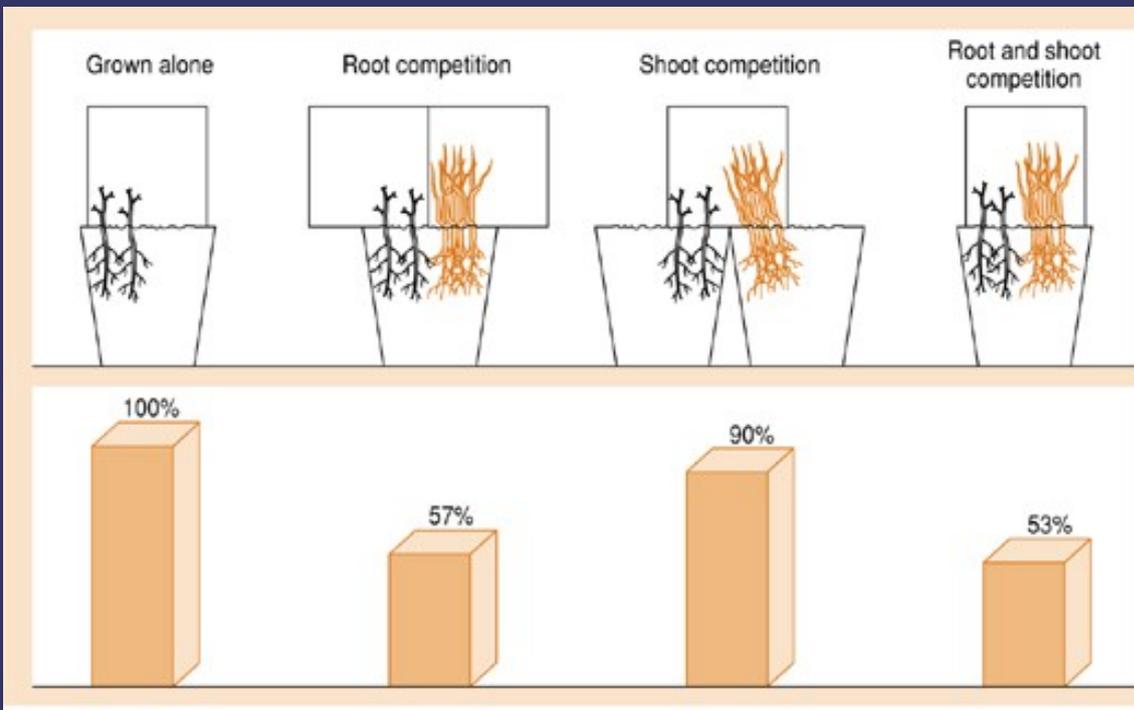


Casuarina, Havaí (Wikipedia)

Capim-gordura, cerrado (L. Coutinho)



# EXPERIMENTOS DE COMPETIÇÃO



Harper, 1961



# FACILITAÇÃO X COMPETIÇÃO

# FACILITAÇÃO: EFEITO BERÇÁRIO



*Olneya tesota*, uma leguminosa fixadora de Nitrogênio do deserto de Sonora



# MODELOS DE DINÂMICA

$$\frac{dN}{dt} = r \cdot N \left(1 - \frac{N}{K}\right)$$

# LOTKA- VOLTERRA: UM MODELO FENOMENOLÓGICO

$$\frac{dN}{dt} = r \cdot N \left(1 - \frac{N}{K}\right)$$

$$\frac{dN_1}{dt} = r_1 \cdot N_1 \left(1 - \frac{N_1 + \alpha N_2}{K}\right)$$

# MODELOS MECANÍSTICOS: DINÂMICA DE CONSUMO



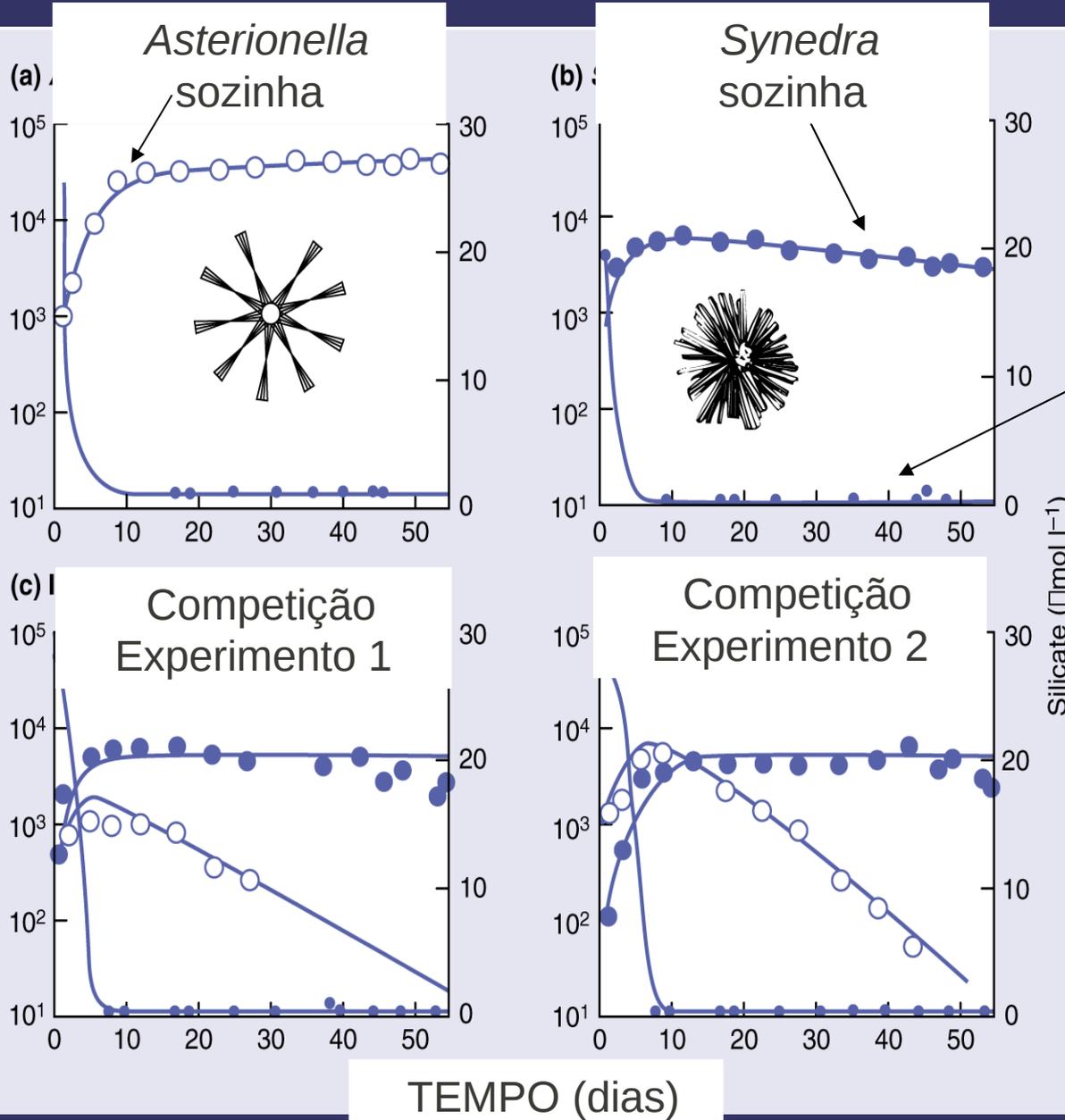
David Tilman



Experimento de Longa duração (LTER)  
de Cedar Creek, East Bethel, Minnesota



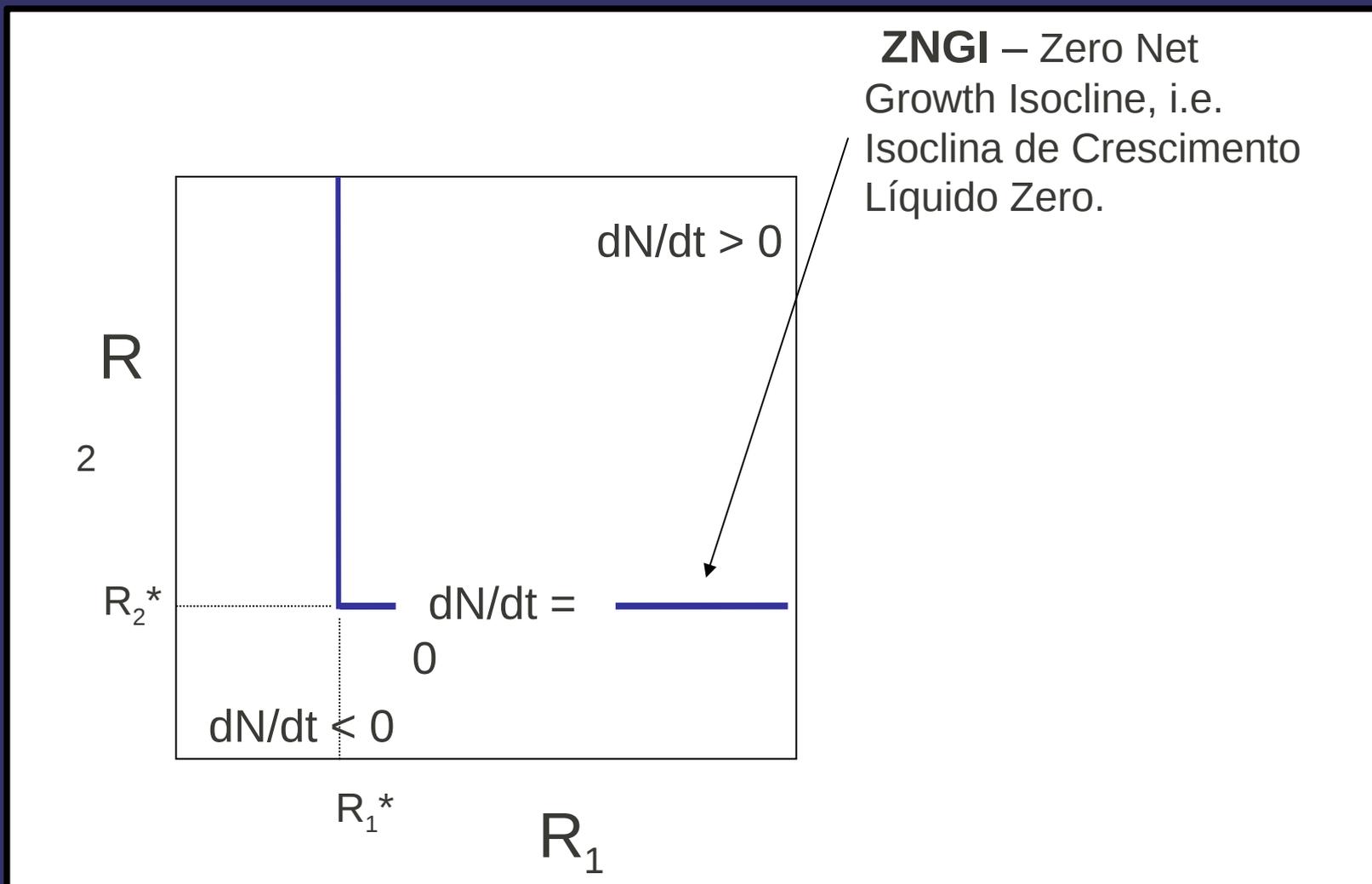
DENSIDADE POPULACIONAL (células/mL)



TEMPO (dias)

Concentração de sílica no meio de cultura.

*Synedra* reduz os níveis de SiO<sub>2</sub> mais do que *Asterionella*.



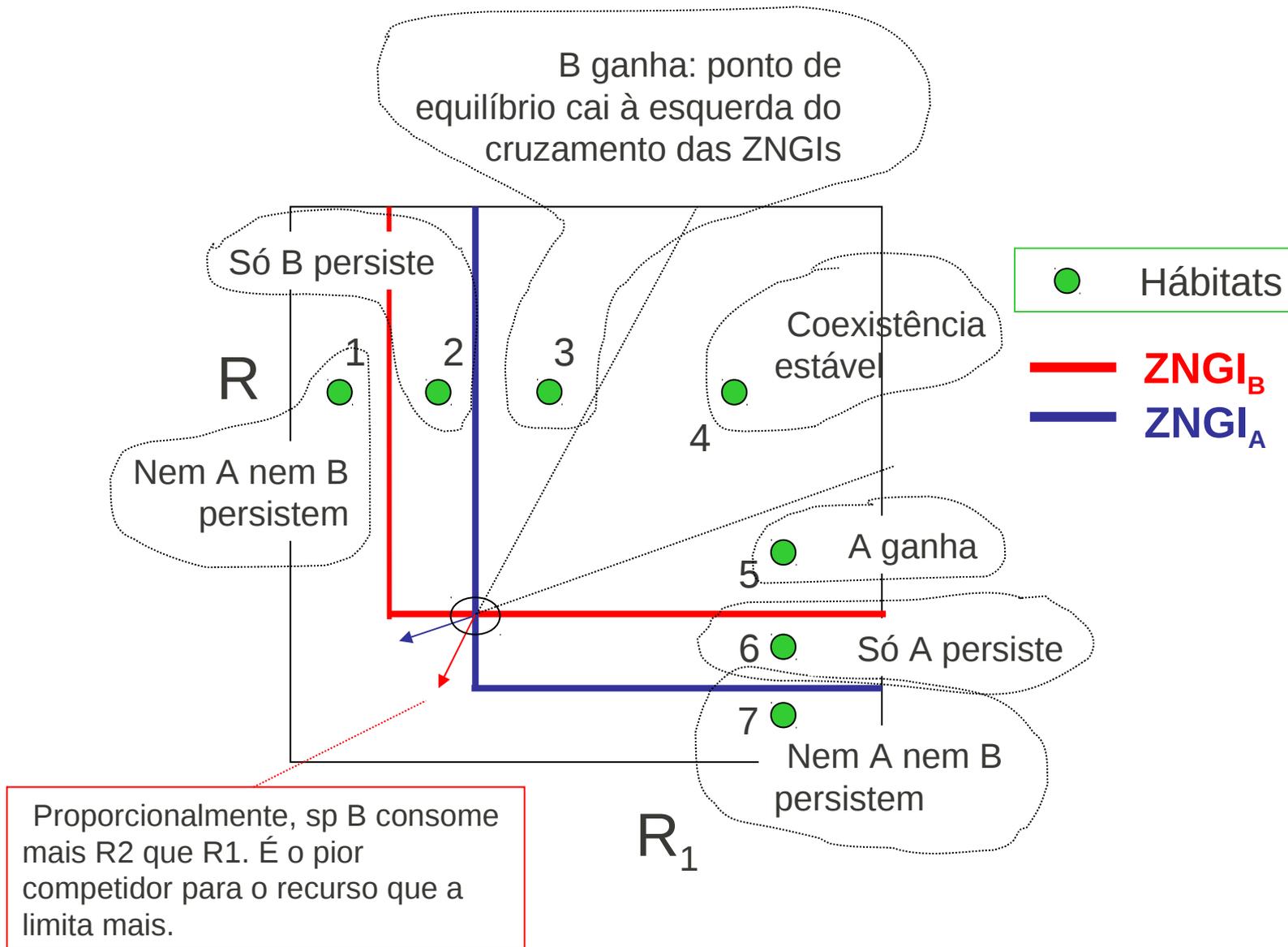
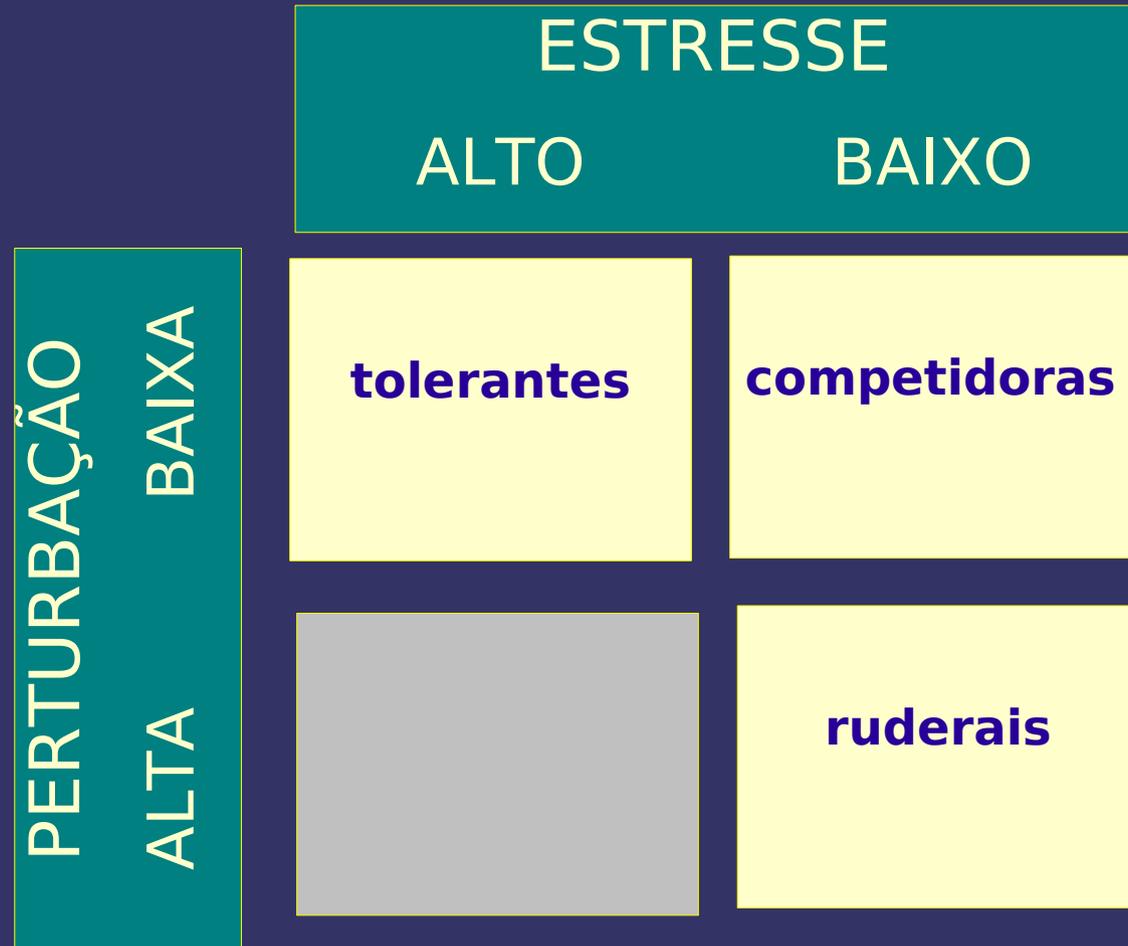


Figura de L. Schiesari

# MODELOS MECANÍSTICOS: DEMANDAS CONFLITANTES \*



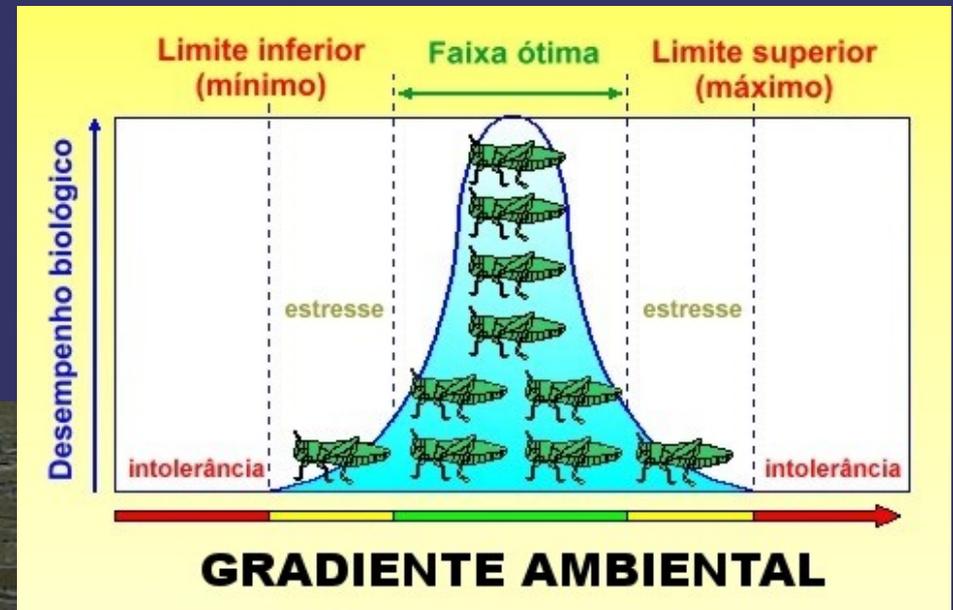
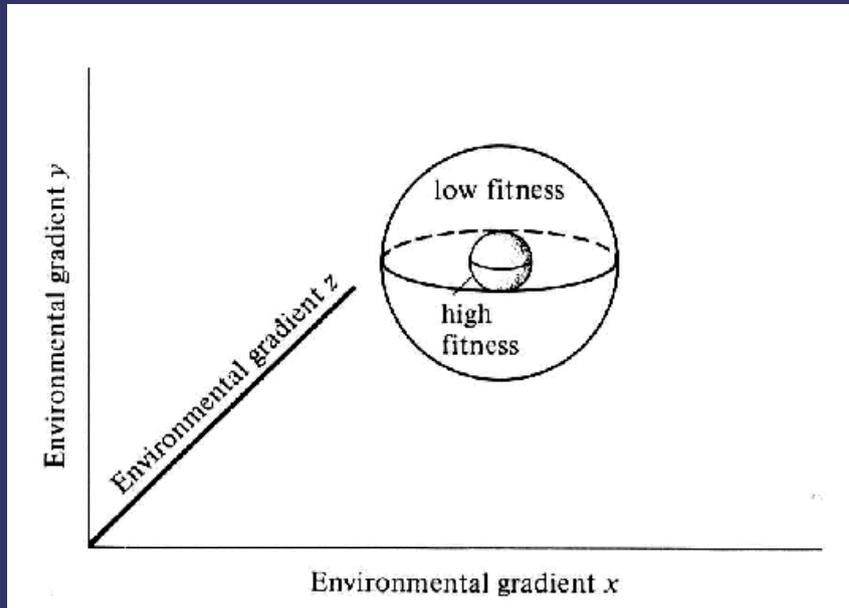
J. Philippe Grime



\* *trade offs*



# NICHO



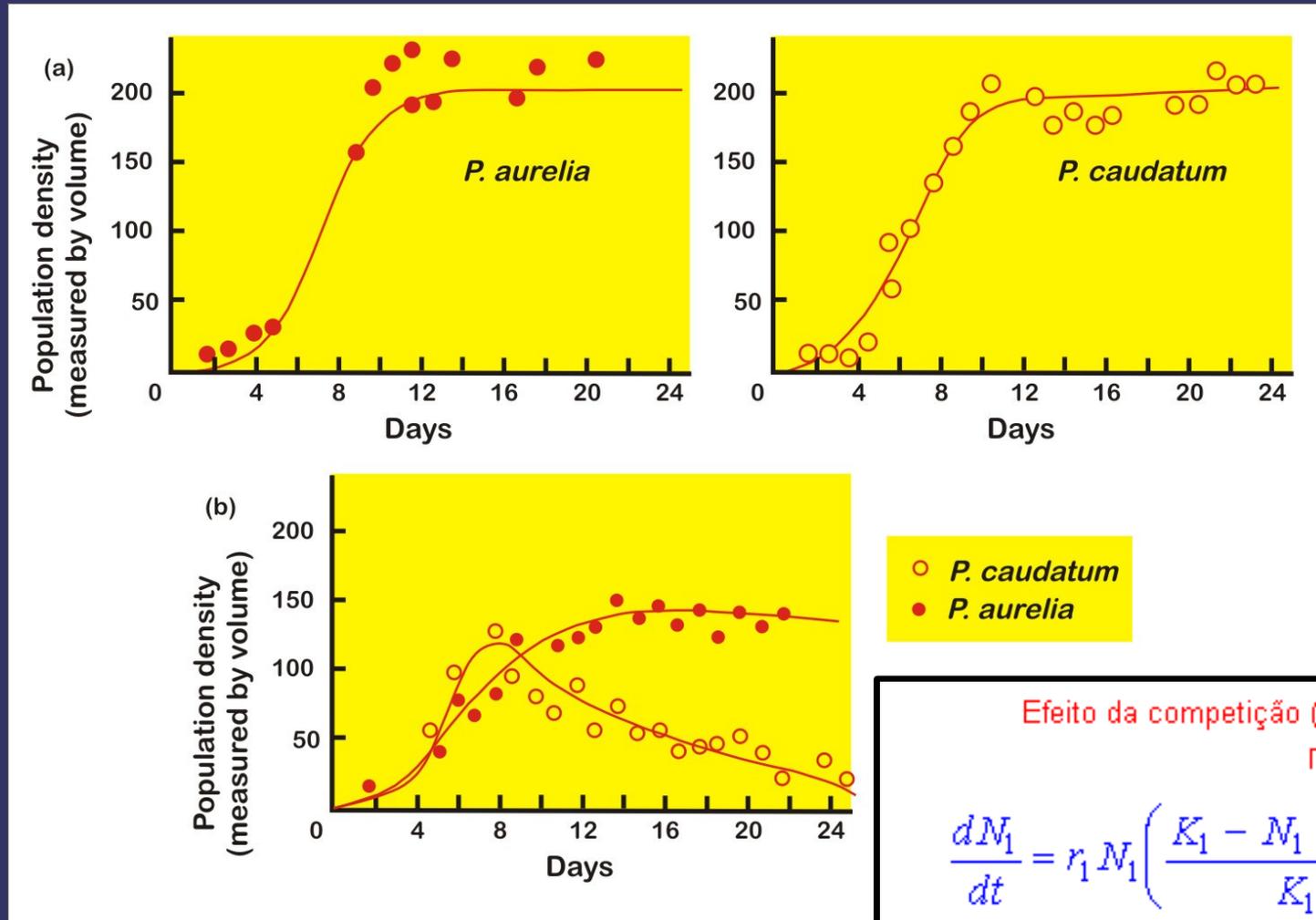
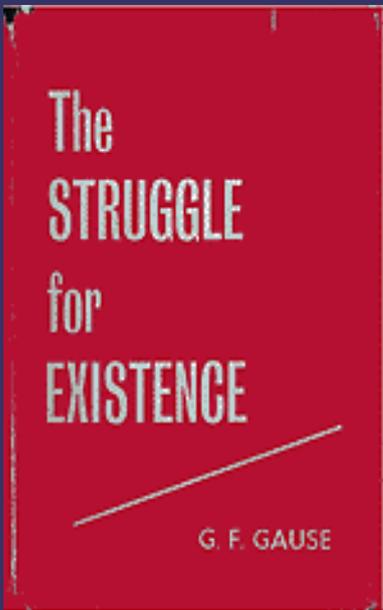
(modificado de Cox *et al.*, 1976)



# PRINCÍPIO DA EXCLUSÃO COMPETITIVA



Georgyi Frantsevitch Gause (1910 - 1986)



Efeito da competição (2 em 1)

$$\frac{dN_1}{dt} = r_1 N_1 \left( \frac{K_1 - N_1 - \alpha N_2}{K_1} \right)$$

Modelo logístico (sem competição)

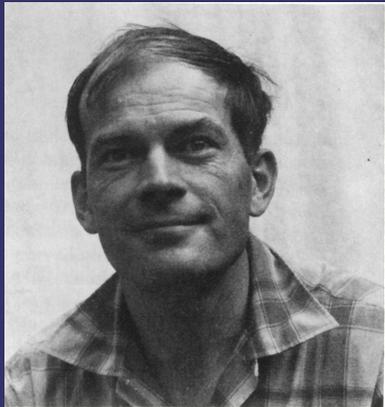
# HOMENAGEM A SANTA ROSÁLIA: NASCE UM PARADIGMA



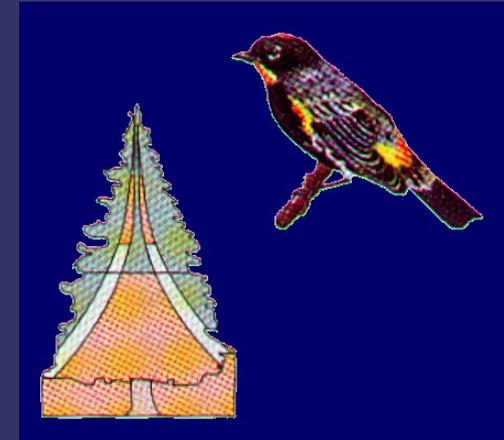
- Competição como principal força estruturadora.
- Diferenças de nicho mediam coexistência.
- Leis e princípios que geram modelos matemáticos.
- Sistemas saturados e em equilíbrio.



# MACARTHUR: CONSOLIDAÇÃO DE UM PARADIGMA

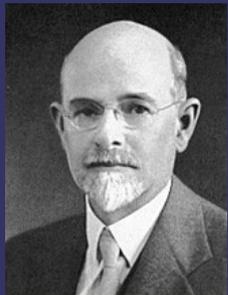


Robert MacArthur  
1930-1972



# AS CUNHAS DE DARWIN

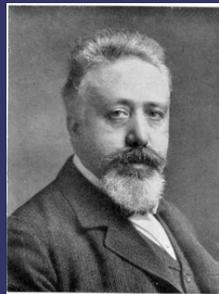
*"Nature may be compared to a surface covered with ten-thousand sharp wedges, many of the same shape & many of different shapes representing different species, all packed closely together & all driven in by incessant blows: the blows being far severer at one time than at another; sometimes a wedge of one form & sometimes another being struck; the one driven deeply in forcing out others; with the jar and shock often transmitted very far to other wedges in many lines of direction: beneath the surface we may suppose that there lies a hard layer, fluctuating in its level, & which may represent the minimum amount of food required by each living being, & which layer will be impenetrable by the sharpest wedge."*



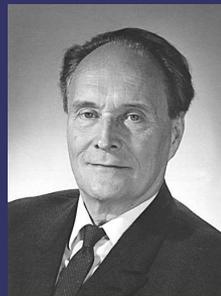
Grinnell



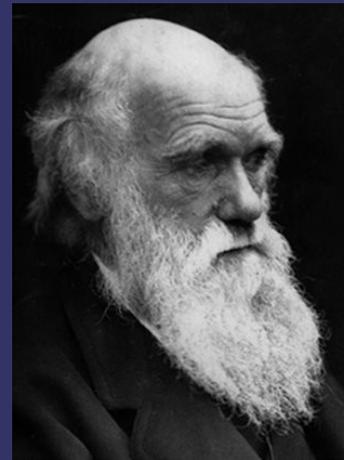
Lotka



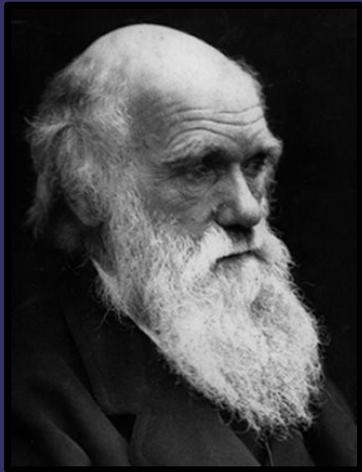
Volterra



Gause



# Sistema Ecológicos estão em Equilíbrio?



*... be compared to a surface covered with ten-thousand sharp  
... of the same shape & many of different shapes representing  
... cies, all packed closely together & **all driven in***

***by incessant blows: the blows being  
far severer at one time than at***

***another;** sometimes a wedge of one form & sometimes another  
being struck; the one driven deeply in forcing out others; with the jar and  
shock often transmitted very far to other wedges in many lines of  
direction ...*



# Perturbação: Nichos de Regeneração ...

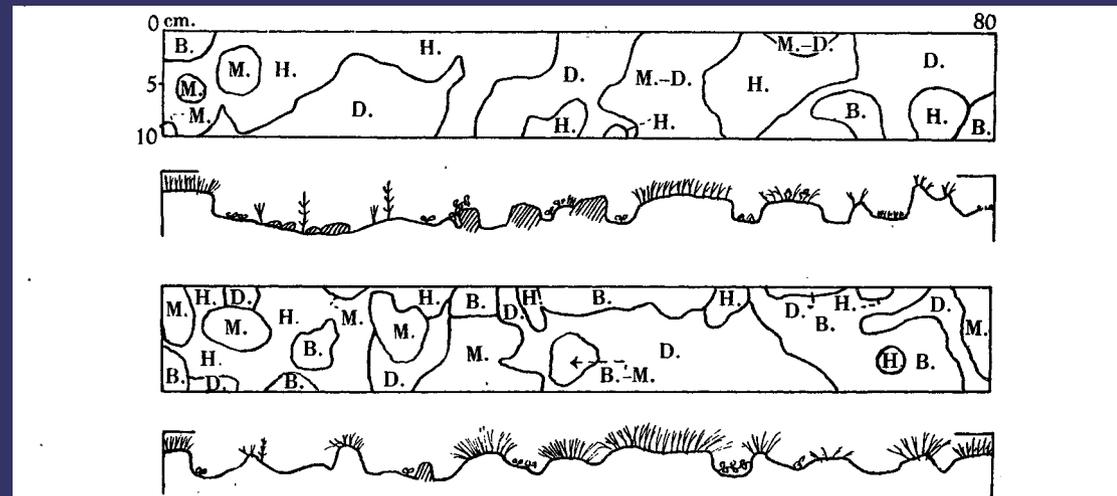
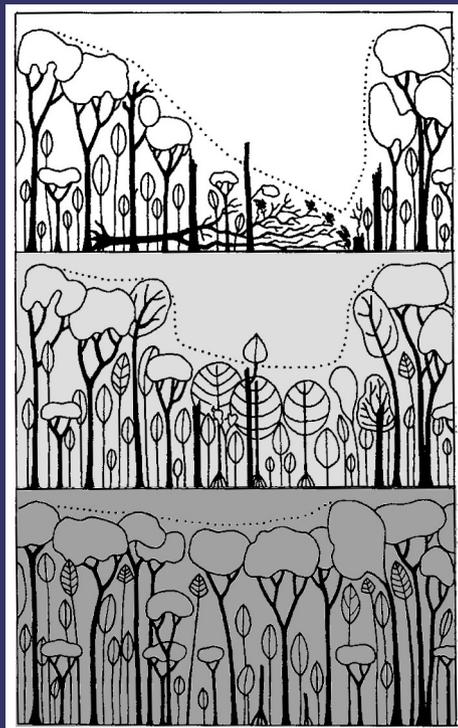
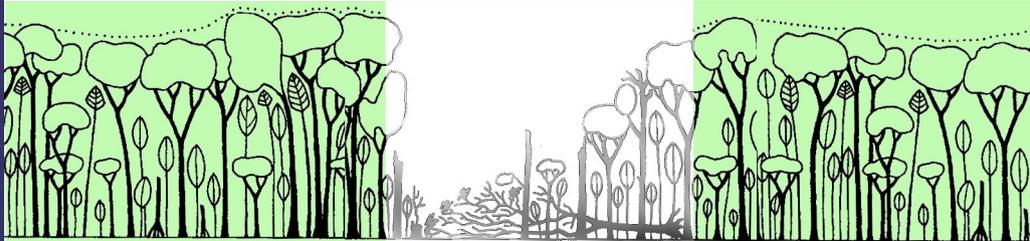
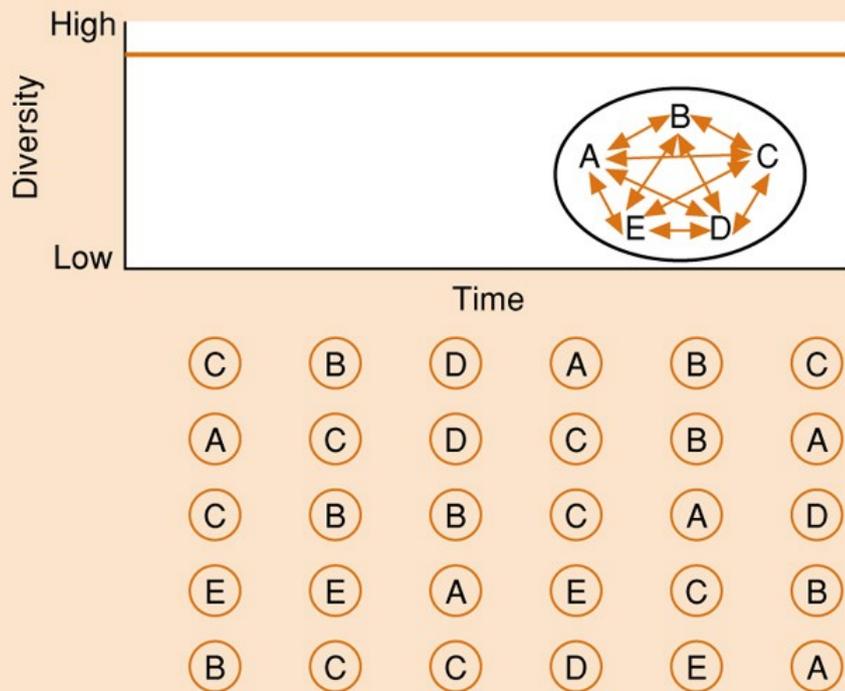


Fig. 5. The relative size and spatial relations of the phases in a plot of 160 x 10 cm, in Grassland A. The relation between the phases and the microtopography is seen in the profile taken along the upper edge of the plot.

Watt A S. Pattern and process in the plant community. I. Ecology 35:1-22, 1947.

# ... ou dinâmicas de não-equilíbrio?

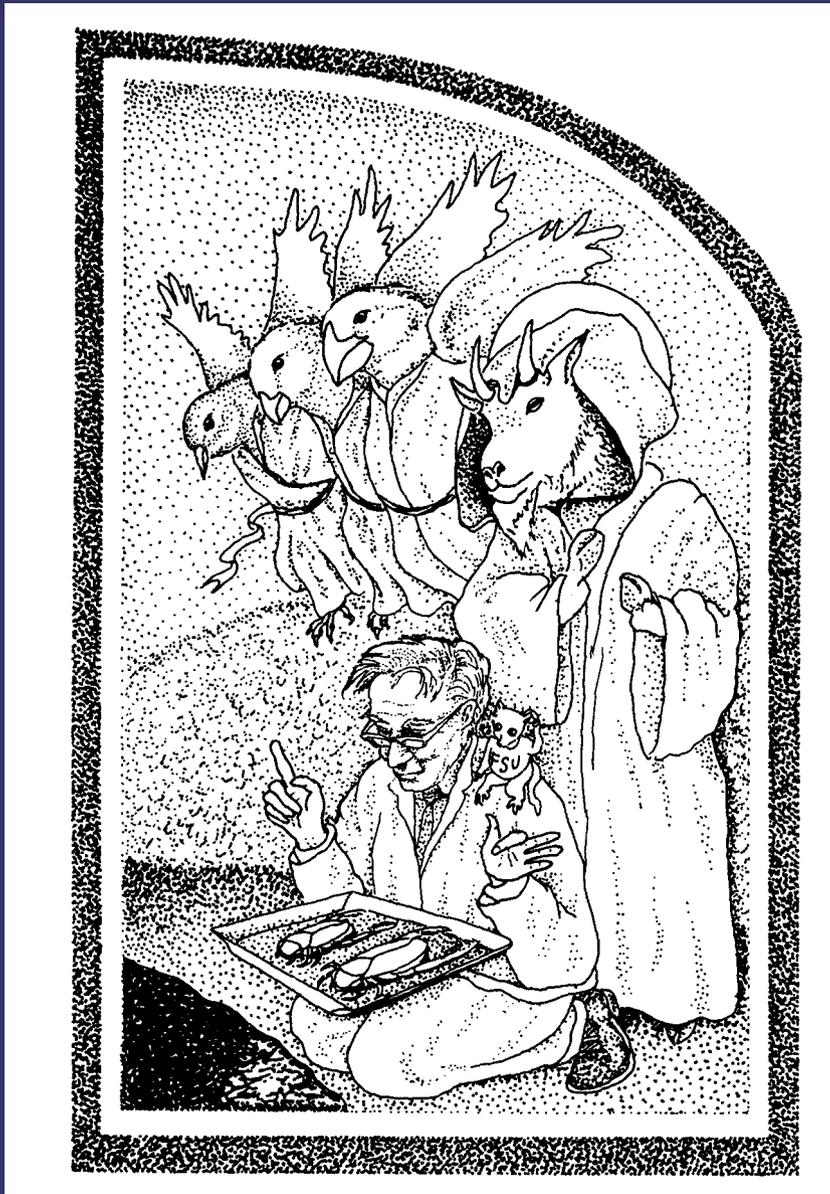


*"Tropical forests and reefs are subject to severe disturbances often enough that equilibrium may never be attained."*



Joseph Connell

Science, 1978



Santa Rosália era uma  
Cabra?



???

