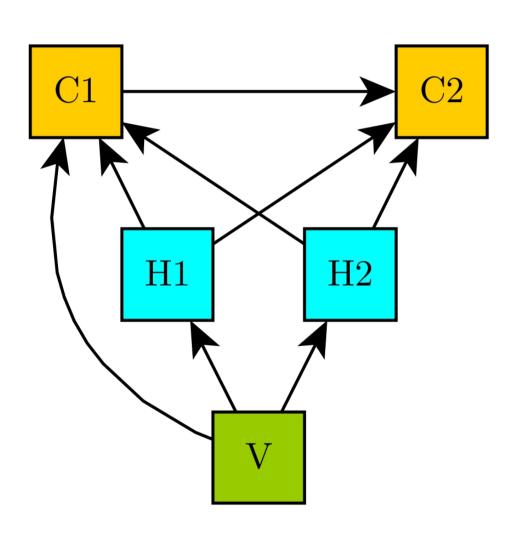
Rede Trófica

Hilário Fernandes de Araújo Júnior Fernando Soares

Funcionamento da rede



Funcionamento da rede

$$\frac{dV}{dt} = V(a_1 - \frac{b_1}{1000}V - \frac{c_1}{1000}H_1 - \frac{d_1}{1000}h_2 - \frac{e_1}{1000}C_2)$$

$$\frac{dH_1}{dt} = H_1(-a_2 + b_2V - c_2C_1 - d_2C_2)$$

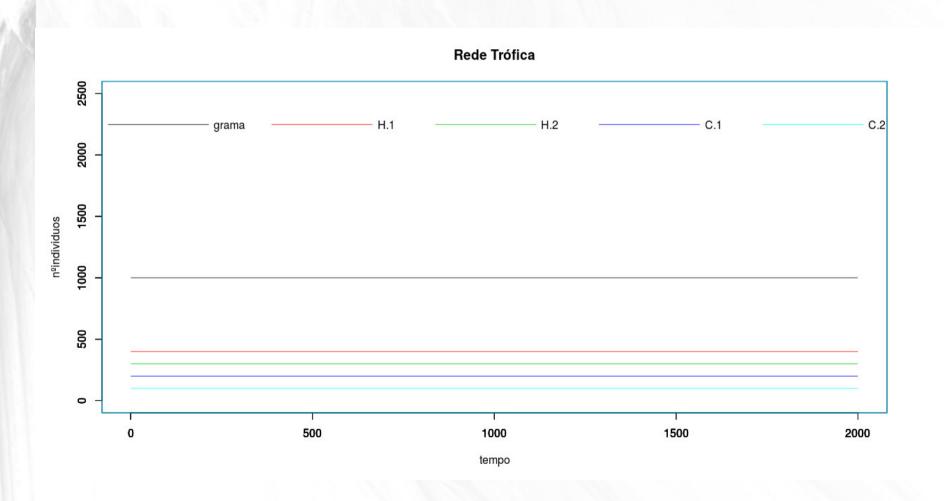
$$\frac{dH_2}{dt} = H_2(-a_3 + b_3V - c_3C_1 - d_3C_2)$$

$$\frac{dC_1}{dt} = C_1(-a_4 + b_4H_1 + c_4H_2 + d_4V - e_4C_2)$$

$$\frac{dC_2}{dt} = C_2(-a_5 + b_5H_1 + c_5H_2 + d_5C_1)$$

• O seguinte critério, no contexto do método de Euler, nos gera um sistema estático:

$$\frac{dV}{dt} = \frac{dH_1}{dt} = \frac{dH_2}{dt} = \frac{dC_1}{dt} = \frac{dC_2}{dt} = 0$$



$$[V(0), H_1(0), H_2(0), C_1(0), C_2(0)] = [1000, 400, 300, 200, 100]$$

$$[a_1, b_1, c_1, d_1, e_1] = [1900, 1000, 1000, 1000, 1000]$$

$$[a_2, b_2, c_2, d_2] = [700, 1, 1, 1]$$

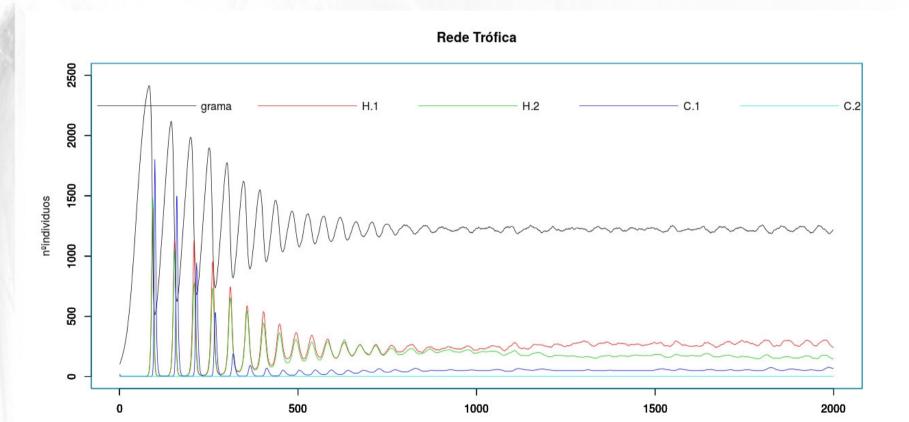
$$[a_3, b_3, c_3, d_3] = [700, 1, 1, 1]$$

$$[a_4, b_4, c_4, d_4, e_4] = [1600, 1, 1, 1, 1]$$

$$[a_5, b_5, c_5, d_5] = [900, 1, 1, 1]$$

• Todavia, na maioria esmagadora dos casos, qualquer perturbação em um sistema como esse destrói todas as espécies instantaneamente.

• Todavia, foi possível ajustar os parâmetros e estabilizar um sistema onde o segundo carnívoro é ausente.



tempo

$$[V(0), H_1(0), H_2(0), C_1(0), C_2(0)] = [100, 40, 40, 8, 0]$$

$$[a_1, b_1, c_1, d_1, e_1] = [0.071, 0.027, 0.086, 0.087, 0.01]$$

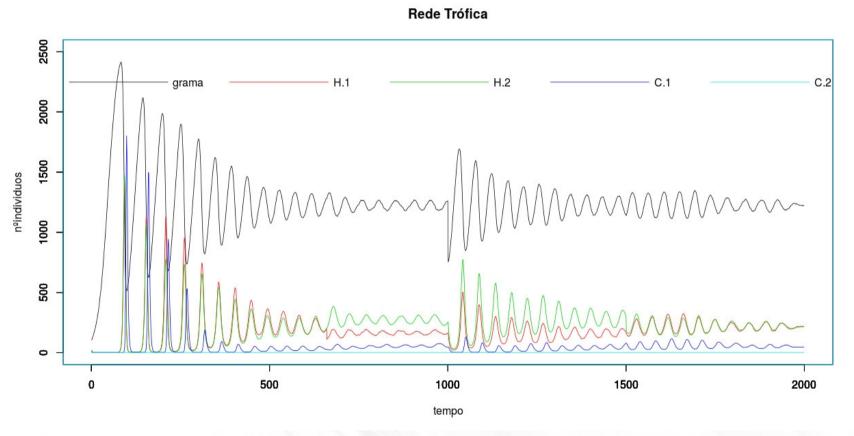
$$[a_2, b_2, c_2, d_2] = [0.557, 0.00046, 0.0001, 0]$$

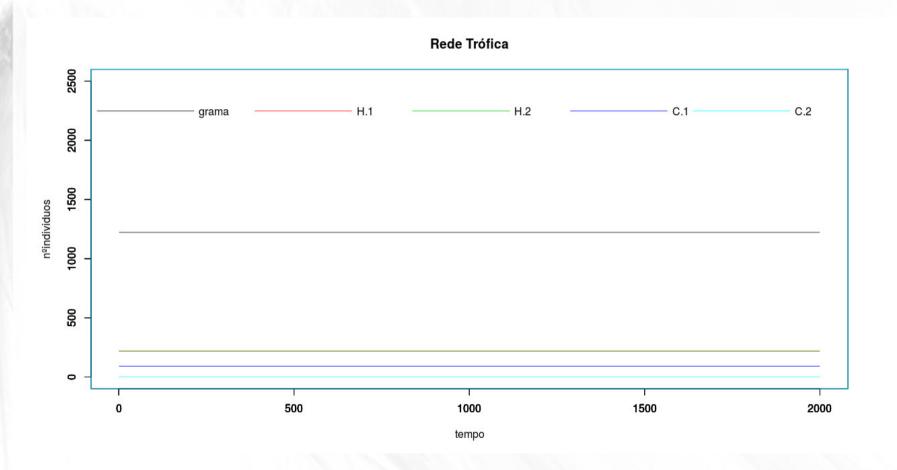
$$[a_3, b_3, c_3, d_3] = [0.557, 0.00046, 0.0001, 0]$$

$$[a_4, b_4, c_4, d_4, e_4] = [0.41, 0.00073, 0.00073, 0.00008, 0]$$

$$[a_5, b_5, c_5, d_5] = [0, 0, 0, 0]$$







$$[V(0), H_1(0), H_2(0), C_1(0), C_2(0)] = [1222, 219, 219, 91, 0]$$

$$[a_1, b_1, c_1, d_1, e_1] = [0.071, 0.027, 0.086, 0.087, 0.01]$$

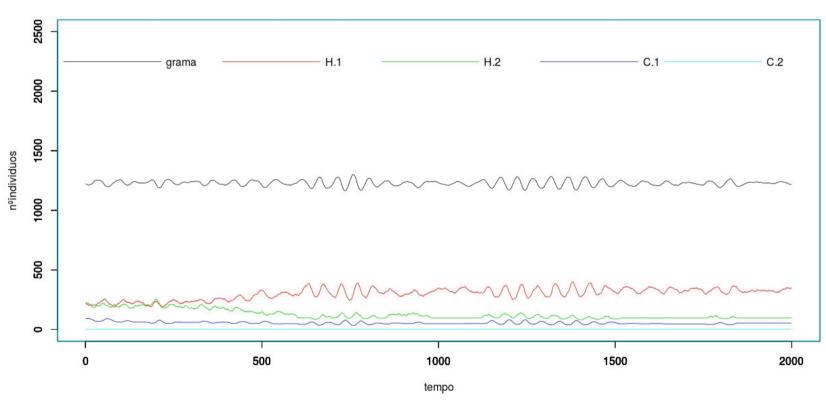
$$[a_2, b_2, c_2, d_2] = [0.557, 0.00046, 0.0001, 0]$$

$$[a_3, b_3, c_3, d_3] = [0.557, 0.00046, 0.0001, 0]$$

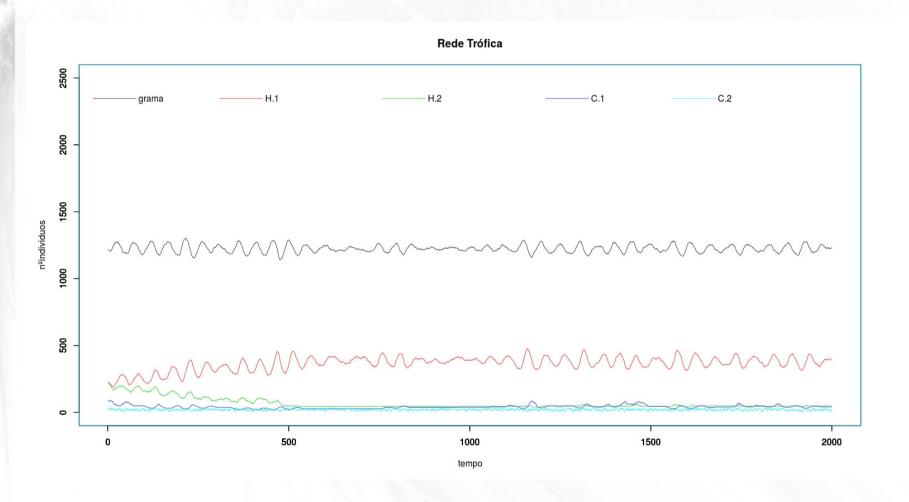
$$[a_4, b_4, c_4, d_4, e_4] = [0.41, 0.00073, 0.00073, 0.00008, 0]$$

$$[a_5, b_5, c_5, d_5] = [0, 0, 0, 0]$$





• Partindo da situação anterior, pudemos introduzir o último carnívoro no sistema.



$$[V(0), H_1(0), H_2(0), C_1(0), C_2(0)] = [1222, 219, 219, 91, 5]$$

$$[a_1, b_1, c_1, d_1, e_1] = [0.071, 0.027, 0.086, 0.087, 0.01]$$

$$[a_2, b_2, c_2, d_2] = [0.557, 0.00046, 0.0001, 0.00001]$$

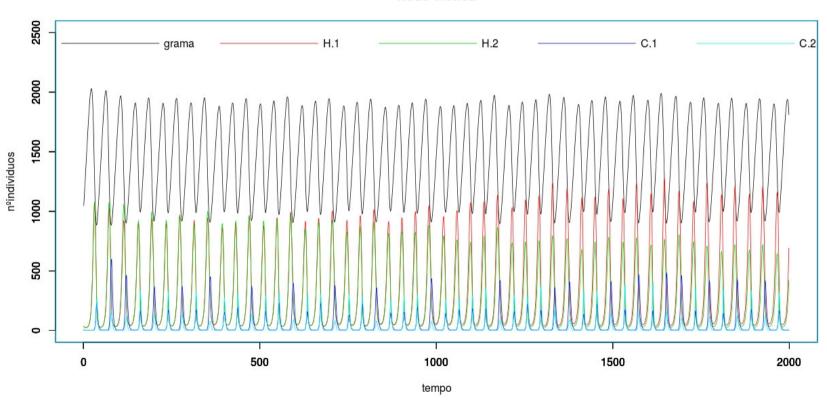
$$[a_3, b_3, c_3, d_3] = [0.557, 0.00046, 0.0001, 0.00001]$$

$$[a_4, b_4, c_4, d_4, e_4] = [0.41, 0.00073, 0.00073, 0.00008, 0.000001]$$

$$[a_5, b_5, c_5, d_5] = [0.529, 0.0001, 0.0001, 0.0001]$$

• Também foi possível estabilizar o sistema de tal forma que as quantidades populacionais oscilem com altas amplitudes.

Rede Trófica



$$[V(0), H_1(0), H_2(0), C_1(0), C_2(0)] = [1050, 40, 40, 8, 10]$$

$$[a_1, b_1, c_1, d_1, e_1] = [0.081, 0.027, 0.068, 0.068, 0.0047]$$

$$[a_2, b_2, c_2, d_2] = [0.555, 0.000415, 0.00007, 0.0008]$$

$$[a_2, b_2, c_2, d_2] = [0.555, 0.000415, 0.00007, 0.0008]$$

$$[a_4, b_4, c_4, d_4, e_4] = [0.415, 0.000625, 0.000625, 0.000038, 0.00007]$$

$$[a_5, b_5, c_5, d_5] = [0.57, 0.0009, 0.0009, 0.000011]$$

Rede Trófica

