
BioLab Documentation

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HEP

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This is a very simple simulation of

- a laboratory
- with many Petri dishes
- containing bacterial populations.

SIMULATION AND LABORATORY

1.1 The simulation module

Implements a complete simulation.

class `biolab.simulation.Sim`(*n_dishes*, *n_a*, *n_b*, *seed*, *p_dth*=0.1, *p_div*=0.1)
Define and perform a simulation.

Parameters

- **n_dishes** (*int*) – number of Petri dishes in lab
- **n_a** (*int*) – number of bacteria of type A per dish
- **n_b** (*int*) – number of bacteria of type B per dish
- **seed** (*int*) – random seed
- **p_dth** (*float*) – death probability per cycle
- **p_div** (*float*) – division probability per cycle

run (*cycles*, *report_cycles*=1, *return_counts*=False)
Run simulation for given number of cycles.

Parameters

- **cycles** (*int*) – number of cycles to simulate
- **report_cycles** (*int*) – interval between status information updates (== 0: no output)
- **return_counts** (*int*) – if True, return population counts

Returns If return of counts is requested, a tuple (cycle, nA, nB)

Return type None or tuple

1.2 The laboratory module

Implements a laboratory with many dishes.

class `biolab.laboratory.Lab`(*n_dishes*, *n_bact_a*, *n_bact_b*)
A laboratory with many dishes.

Parameters

- **n_dishes** (*int*) – number of Petri dishes in lab
- **n_bact_a** (*int*) – number of bacteria of type A per dish
- **n_bact_b** (*int*) – number of bacteria of type B per dish

bacteria_counts ()
Count bacteria across dishes.

Returns Two-element tuple with count of A and B bacteria.

Return type tuple

cycle ()

Update all dishes by one cycle.

DISHES AND BACTERIA

2.1 The dish module

Implements a dish with bacteria cultures.

class biolab.dish.**Dish** (*num_a*, *num_b*)
Petri dish containing bacteria of types A and B.

Parameters

- **num_a** (*int*) – number of bacteria of type A in dish
- **num_b** (*int*) – number of bacteria of type A in dish

aging ()
Age all bacteria in dish by one cycle.

death ()
Remove dying bacteria.

division ()
For each dividing bacterium, add one new.

get_num_a ()
Return number of A bacteria in dish.

get_num_b ()
Return number of B bacteria in dish.

2.2 The bacteria module

Implements a bacteria model.

class biolab.bacteria.**Bacteria**
Bacteria which die and multiply with fixed probabilities.

Create bacterium with age 0.

ages ()
Bacterium ages by one cycle.

dies ()
Decide whether bacterium dies.

Returns True if bacterium dies.

Return type bool

divides ()
Decide whether bacterium divides.

Returns True if bacterium divides.

Return type bool

classmethod `get_params()`

Get class parameters.

Returns Dictionary with class parameters.

Return type dict

p_death = 0.1

probability of death per cycle

p_divide = 0.2

probability of cell division per cycle

classmethod `set_params(new_params)`

Set class parameters.

Parameters `new_params` (*dict*) – Legal keys: 'p_death', 'p_divide'

Raises ValueError, KeyError

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