Pràctica 5

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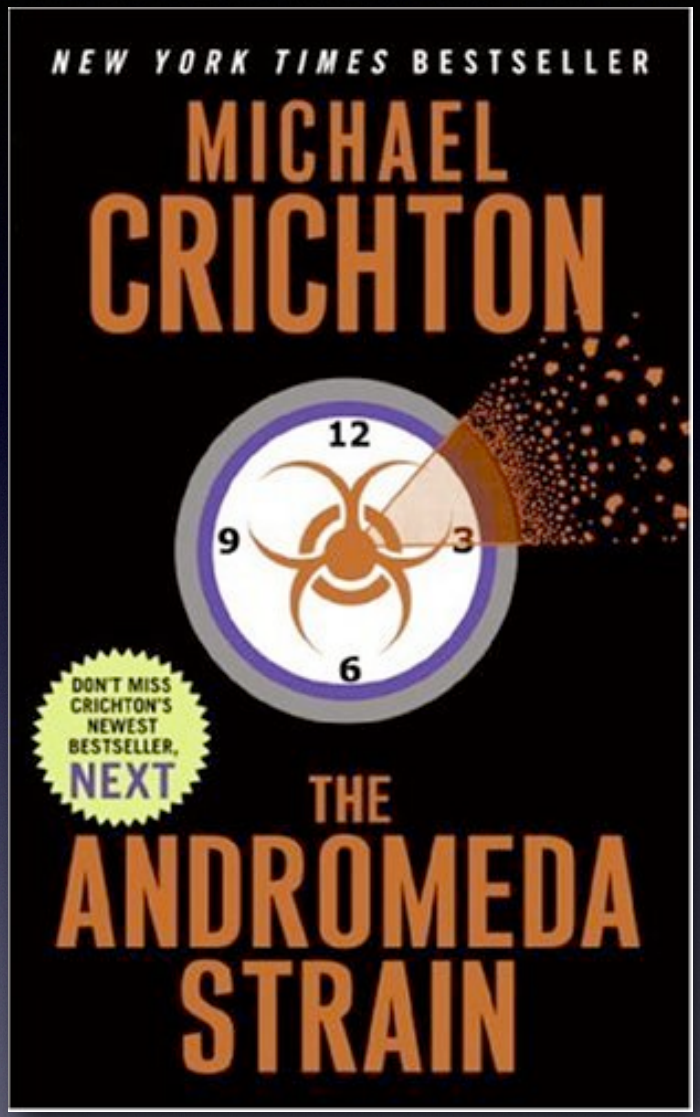
Complex Systems Lab
University Pompeu Fabra


NEW YORK TIMES BESTSELLER
MICHAEL
CRICHTON
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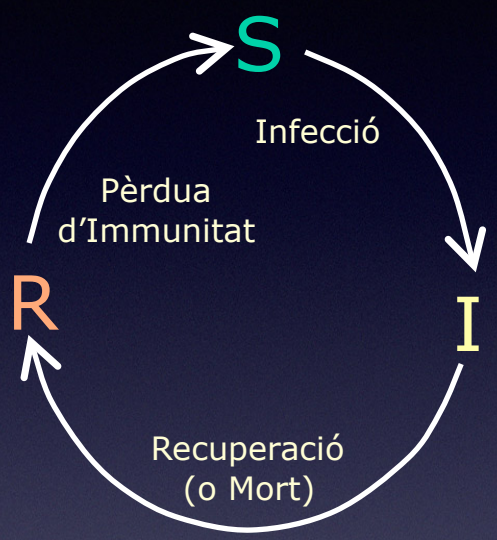
DON'T MISS CRICHTON'S NEWEST BESTSELLER, NEXT
THE
ANDROMEDA
STRAIN


From the Director of THE SHAWSHANK REDEMPTION and the Producer of THE TERMINATOR
THE
WALKING DEAD
A NEW ORIGINAL SERIES
SUNDAY OCT 31 10/9c
amc

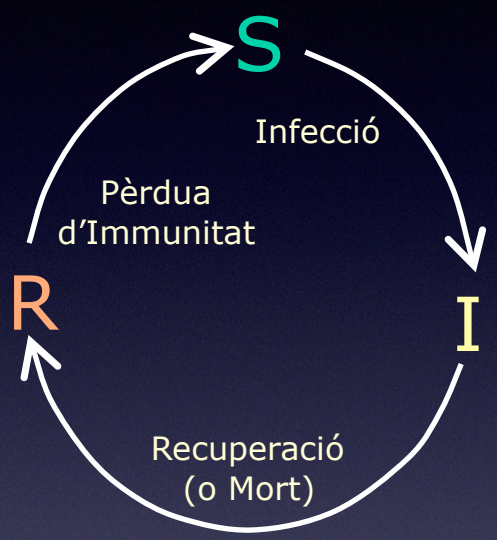
Les Matemàtiques de les Epidèmies

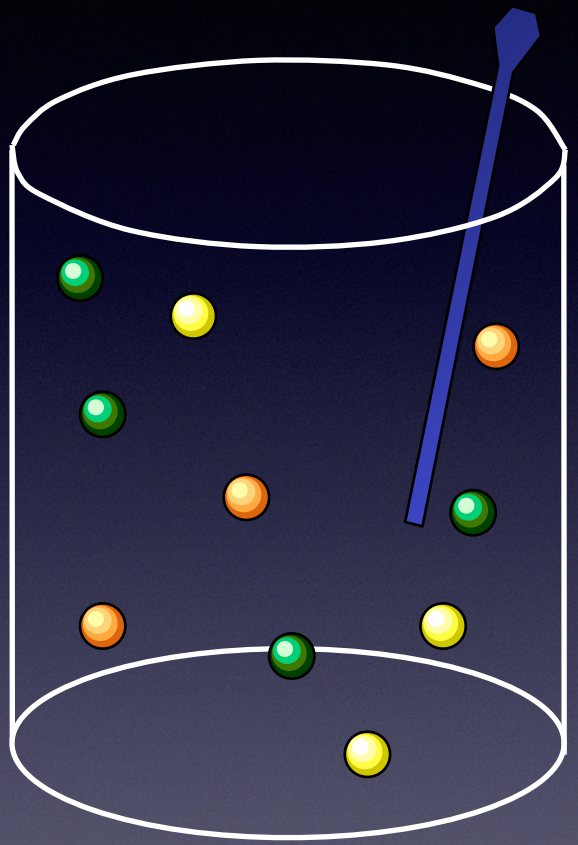
- Model SIR (Susceptible, Infected, Removed)



Les Matematiques de les Epidèmies

- Model SIR (Susceptible, Infected, Removed)





Lattice Gas Approximation

Les Matematiques de les Epidèmies

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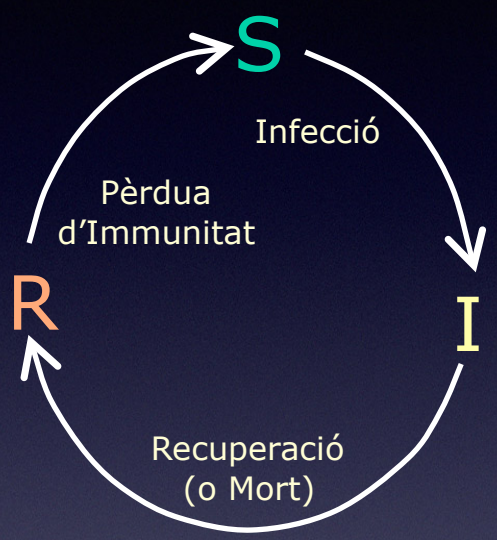

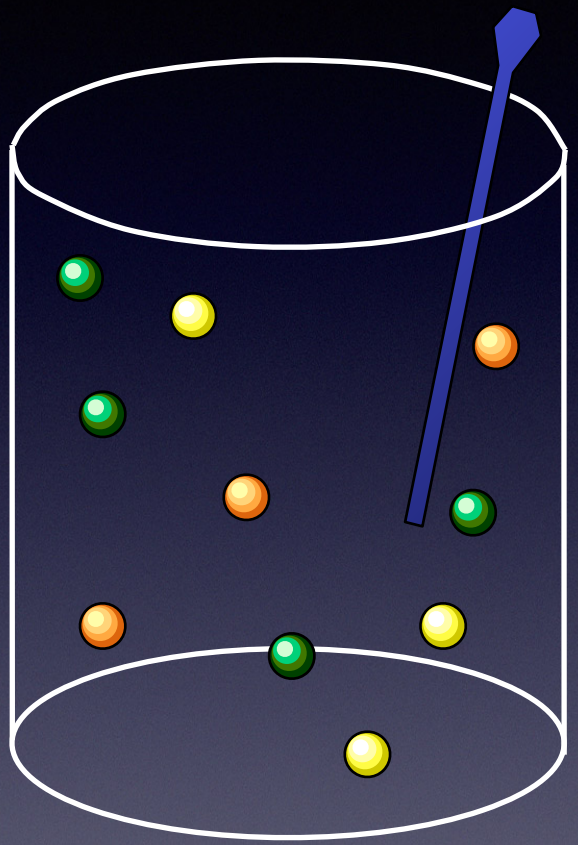

Ignorem l'estructura de la població
Barrejem els individus

Les Matematiques de les Epidèmies

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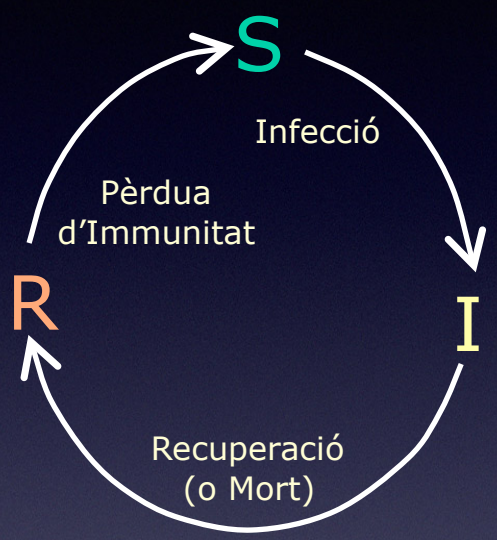
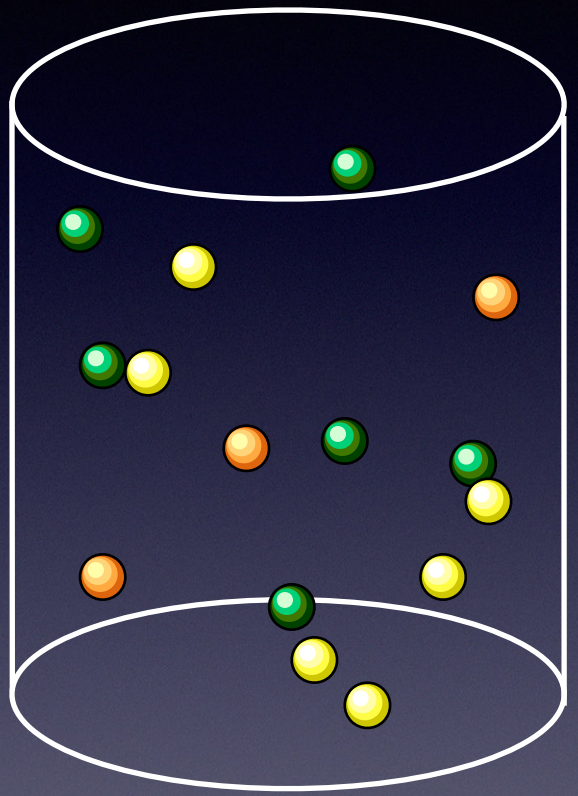
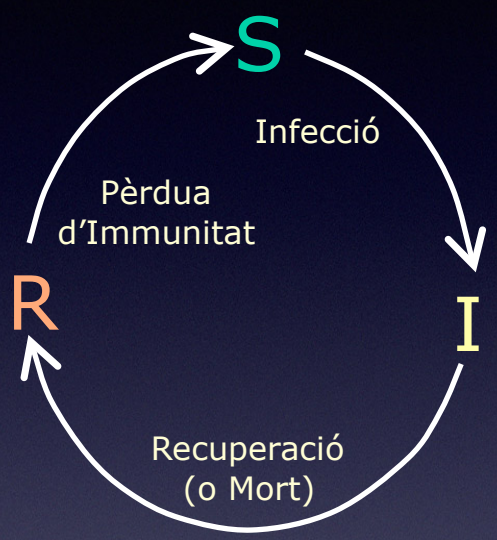


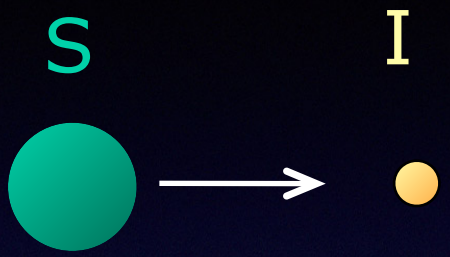


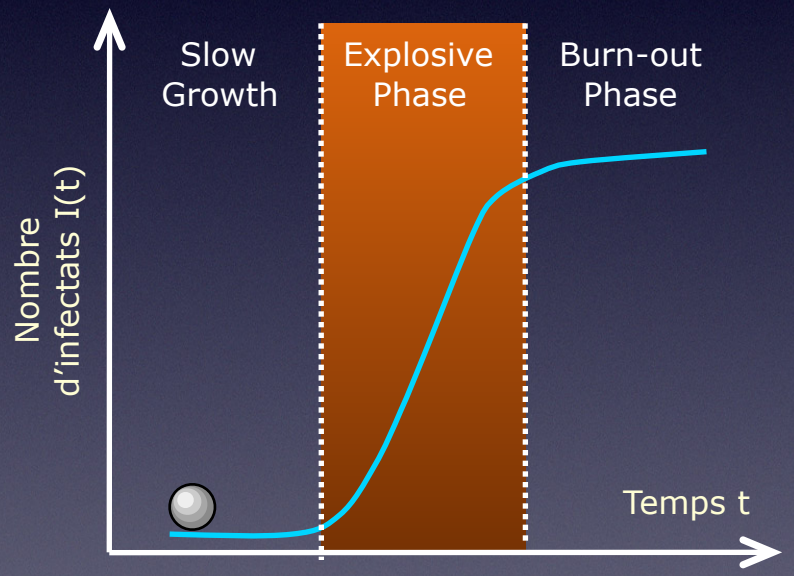
Interaccions a l'atzar

Les Matematiques de les Epidèmies

- Model SIR (Susceptible, Infected, Removed)







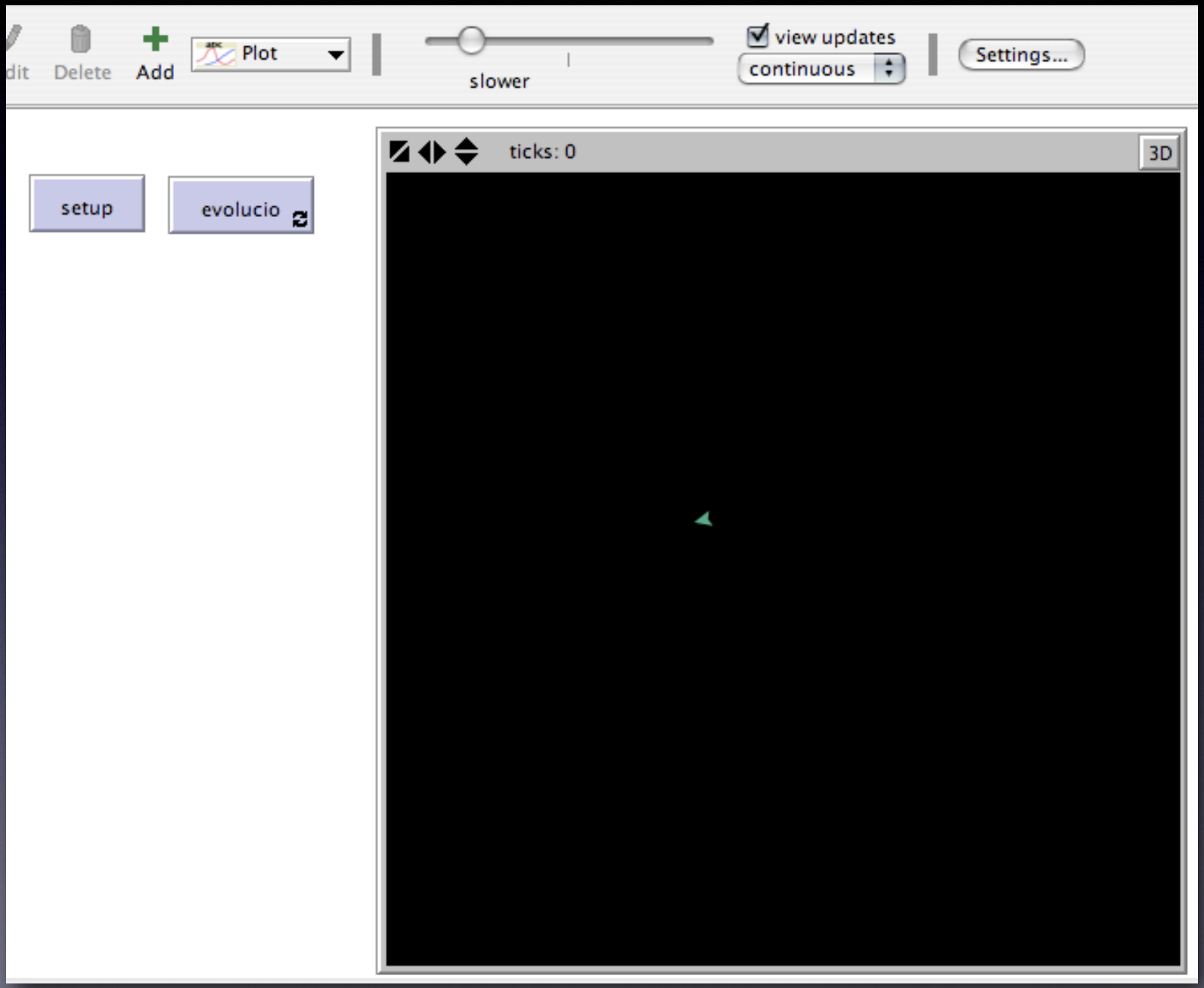
$S(t) + I(t) + R(t) = N$

Creixement Logístic

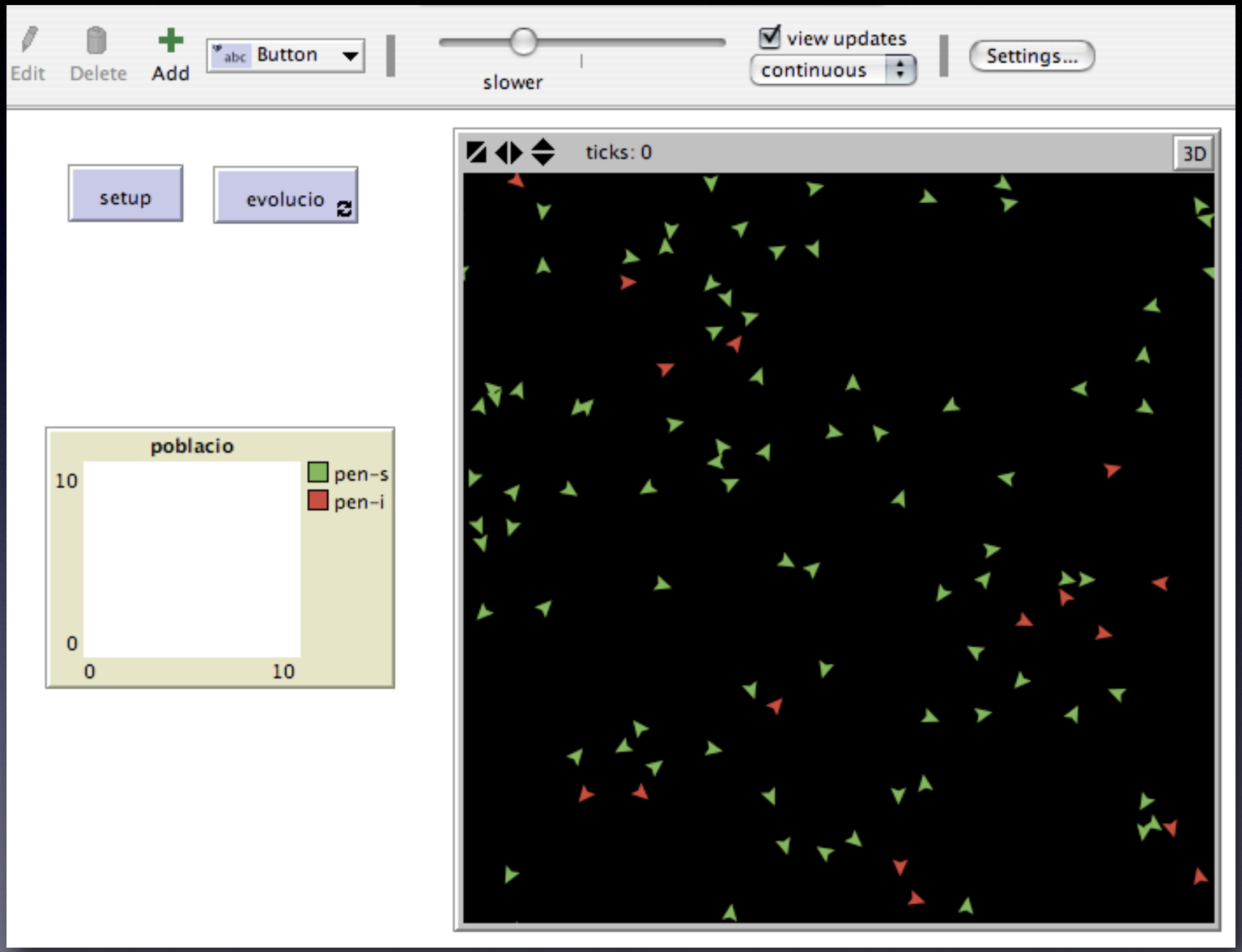
Moviment : programa

```
globals [ t n ]
to setup
  clear-all
  set t 1
  set n 1
  create-turtles(n)
end

to evolucio
  ask turtles [actuar]
  set t t + 1
end

to actuar
  rt random-float 360
  fd 1
end
```

Moviment : interface



Model SI

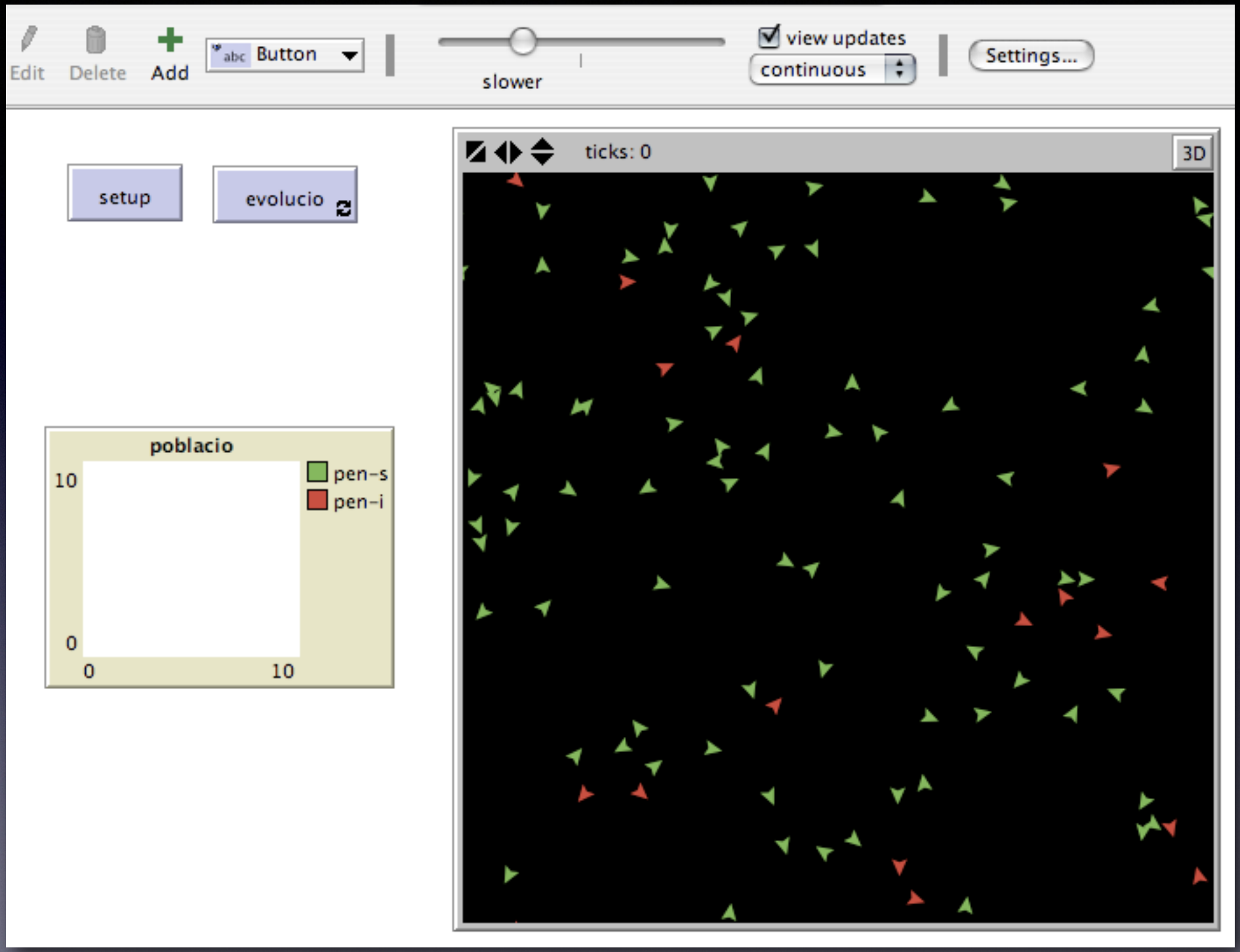

Edit
Delete
Add
Button
slower
view updates
continuous
Settings...
setup
evolucio
poblacio
10
0
0
10
pen-s
pen-i
ticks: 0
3D

```
globals [t n n1 n2 prob-infectat]
to setup
  clear-all
  clear-plot
  set t 1
  set n 300
  set prob-infectat 0.1
  create-turtles(n)
  set n1 0
  set n2 0
  ask turtles
  [
     setxy random-xcor random-ycor


  ]
end
```

```
to evolucio
   ask turtles [actuar]
   set t t + 1
end

to actuar
    rt random-float 360
    fd 1
end
```

```
globals [t n n1 n2 prob-infectat]
to setup
  clear-all
  clear-plot
  set t 1
  set n 300
  set prob-infectat 0.1
  create-turtles(n)
  set n1 0
  set n2 0
  ask turtles
  [
     setxy random-xcor random-ycor
     ifelse random-float 1 <= prob-infectat
     [
        set color red
        set n1 n1 + 1
      ]
      [
        set color green
        set n2 n2 + 1
      ]
  ]
end
```

```
to evolucio
  ask turtles [actuar]
  set-current-plot-pen "pen-i"
  plotxy t n1
  set-current-plot-pen "pen-s"
  plotxy t n2
  set t t + 1
end

to actuar
    rt random-float 360
    fd 1
end
```


Edit
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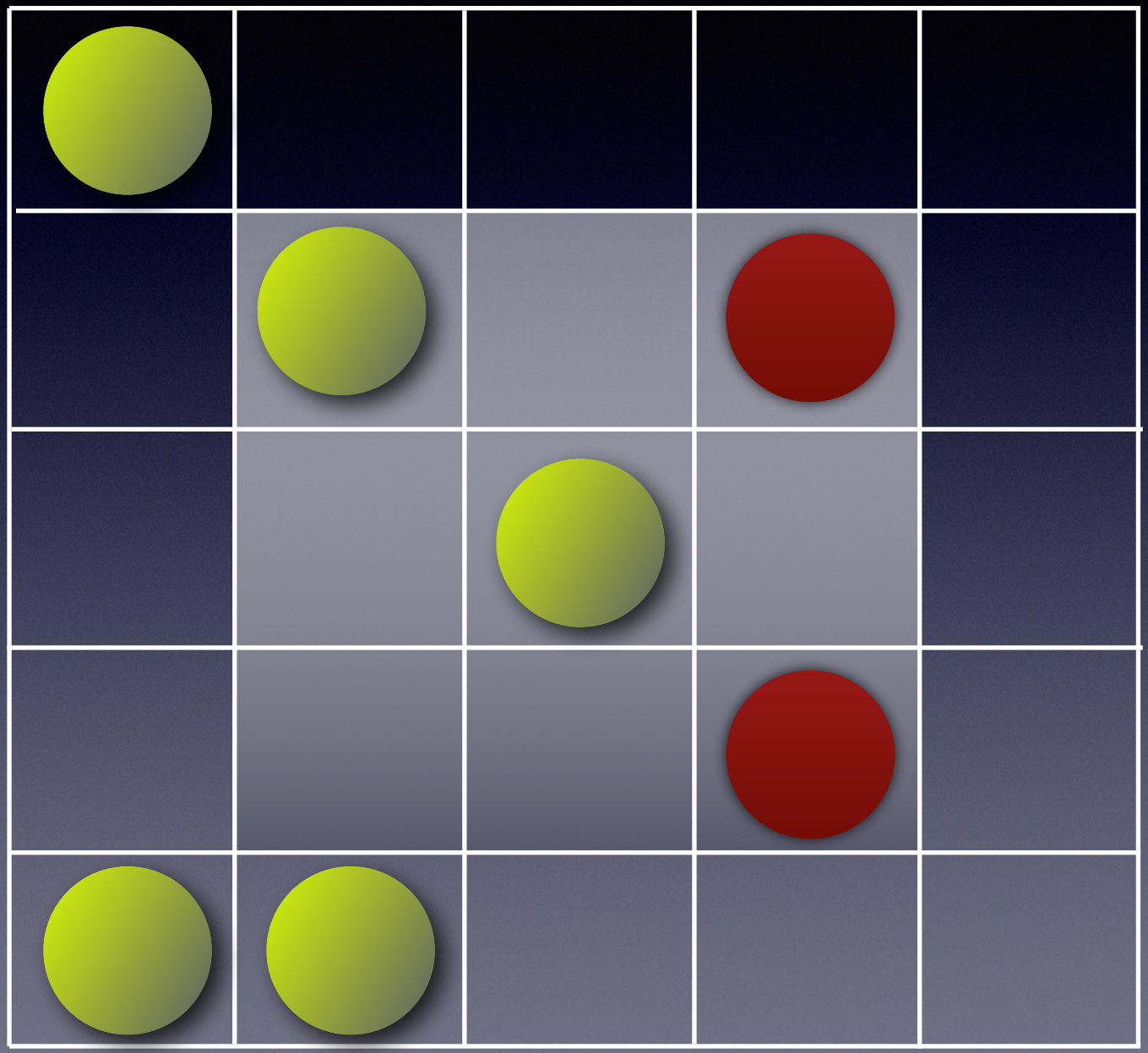
```
globals [t n n1 n2 prob-infectat]
to setup
  clear-all
  clear-plot
  set t 1
  set n 300
  set prob-infectat 0.1
  create-turtles(n)
  set n1 0
  set n2 0
  ask turtles
  [
    setxy random-xcor random-ycor
    ifelse random-float 1 <= prob-infectat
    [
      set color red
      set n1 n1 + 1
    ]
    [
      set color green
      set n2 n2 + 1
    ]
  ]
end
```

```
to evolucio
  ask turtles [
    if color = green
        [ actuar-sa ]
    if color = red
        [ actuar-infectat ]
    ]
    set-current-plot-pen "i"
    plotxy t n1
    set-current-plot-pen “s"
    plotxy t n2
    set t t + 1
end

to actuar-sa
    rt random-float 360
    fd 1
end

to actuar-infectat
    rt random-float 360
    fd 1
end
```

Comportament : infecció



Comportament : infectar-se

globals [t n n1 n2 prob-infectat vei infectat?]

Comportament : infectar-se

```
to actuar-sa
  rt random-float 360
  fd 1
  set infectat? false
  if infectat?
  [
      set color red
      set n1 n1 + 1
      set n2 n2 - 1
  ]
end
```

Comportament : infectar-se

```
to actuar-sa
  rt random-float 360
  fd 1
  set infectat? false

  ; comprobar si entrem en contacte amb un infectat

  if infectat?
  [
     set color red
     set n1 n1 + 1
     set n2 n2 - 1
  ]
end
```

Comportament : infectar-se

```
to actuar-sa
  rt random-float 360
  fd 1
  set infectat? false
```

```
        ; Comprobar si tenim un vei infectat ( one-of ... ,  [color] of ...)
        ; Si es aixi llavors ens infectem amb probabilitat 'prob-infectat'
```

```
  if infectat?
  [
     set color red
     set n1 n1 + 1
     set n2 n2 - 1
  ]
end
```

Comportament : infectar-se

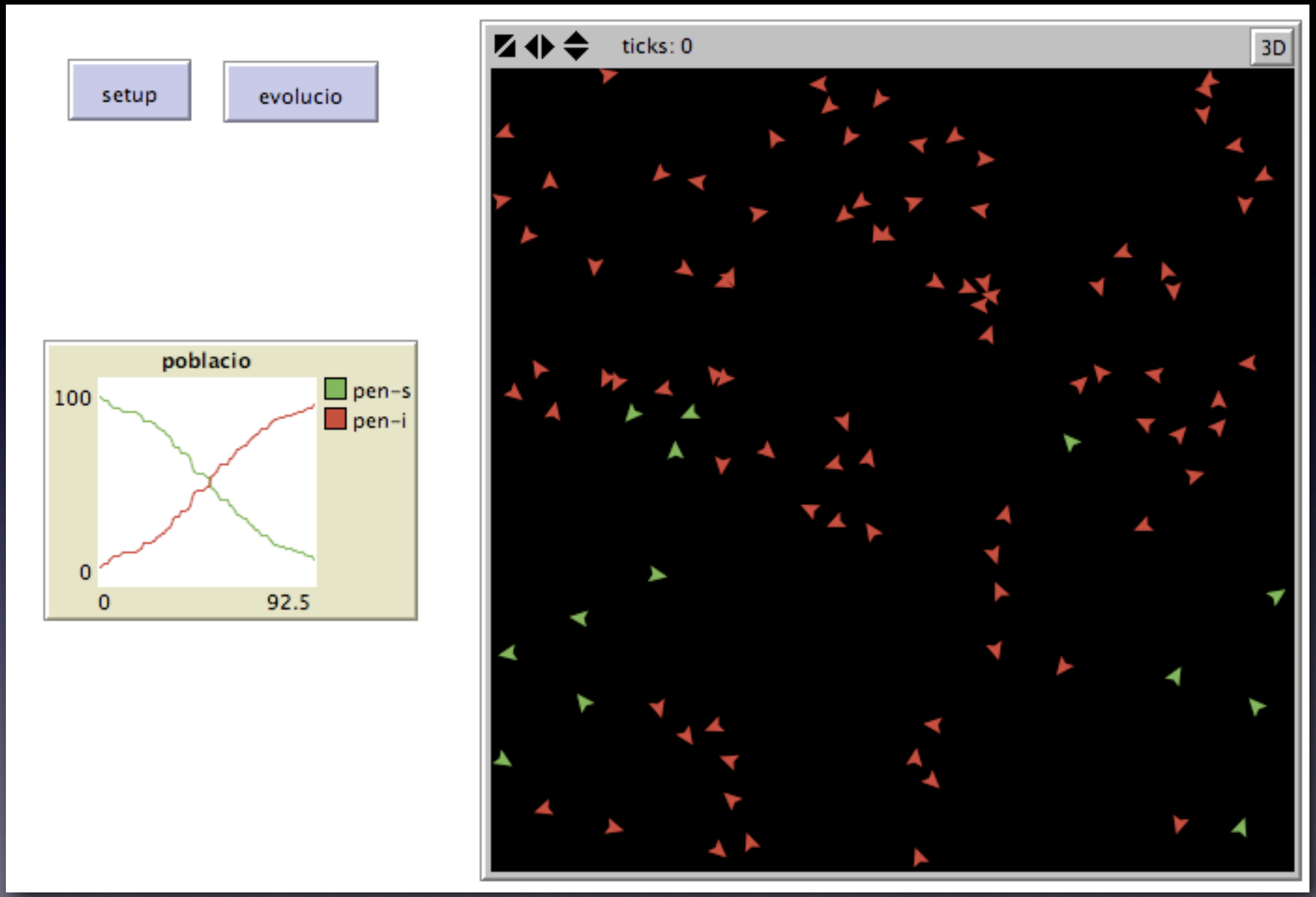
```
to actuar-sa
  rt random-float 360
  fd 1
  set infectat? false
  ask neighbors
  [
    if count turtles-here > 0
    [









    ]
  ]
  if infectat?
  [
     set color red
     set n1 n1 + 1
     set n2 n2 - 1
  ]
end
```

Comportament : infectar-se

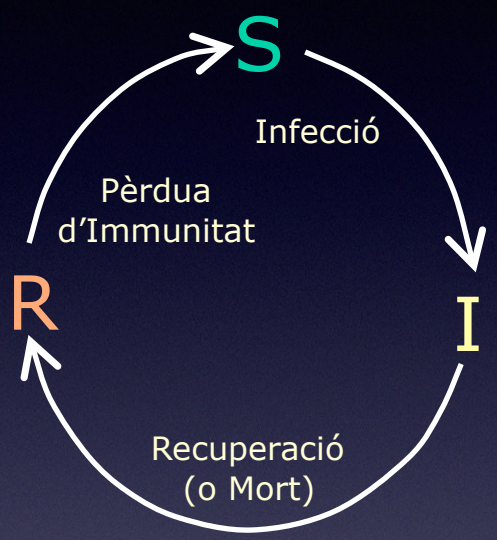
```
to actuar-sa
  rt random-float 360
  fd 1
  set infectat? false
  ask neighbors
  [
     if count turtles-here > 0
     [
         set vei one-of turtles-here




     ]
  ]
  if infectat?
  [
     set color red
     set n1 n1 + 1
     set n2 n2 - 1
  ]
end
```

Comportament : infectar-se

```
to actuar-sa
  rt random-float 360
  fd 1
  set infectat? false
  ask neighbors
  [
    if count turtles-here > 0
    [
       set vei one-of turtles-here
       if ([color] of vei = red) and (random-float 1 <= prob-infectat)
       [
          set infectat? true
       ]
    ]
  ]
  if infectat?
  [
     set color red
     set n1 n1 + 1
     set n2 n2 - 1
  ]
end
```

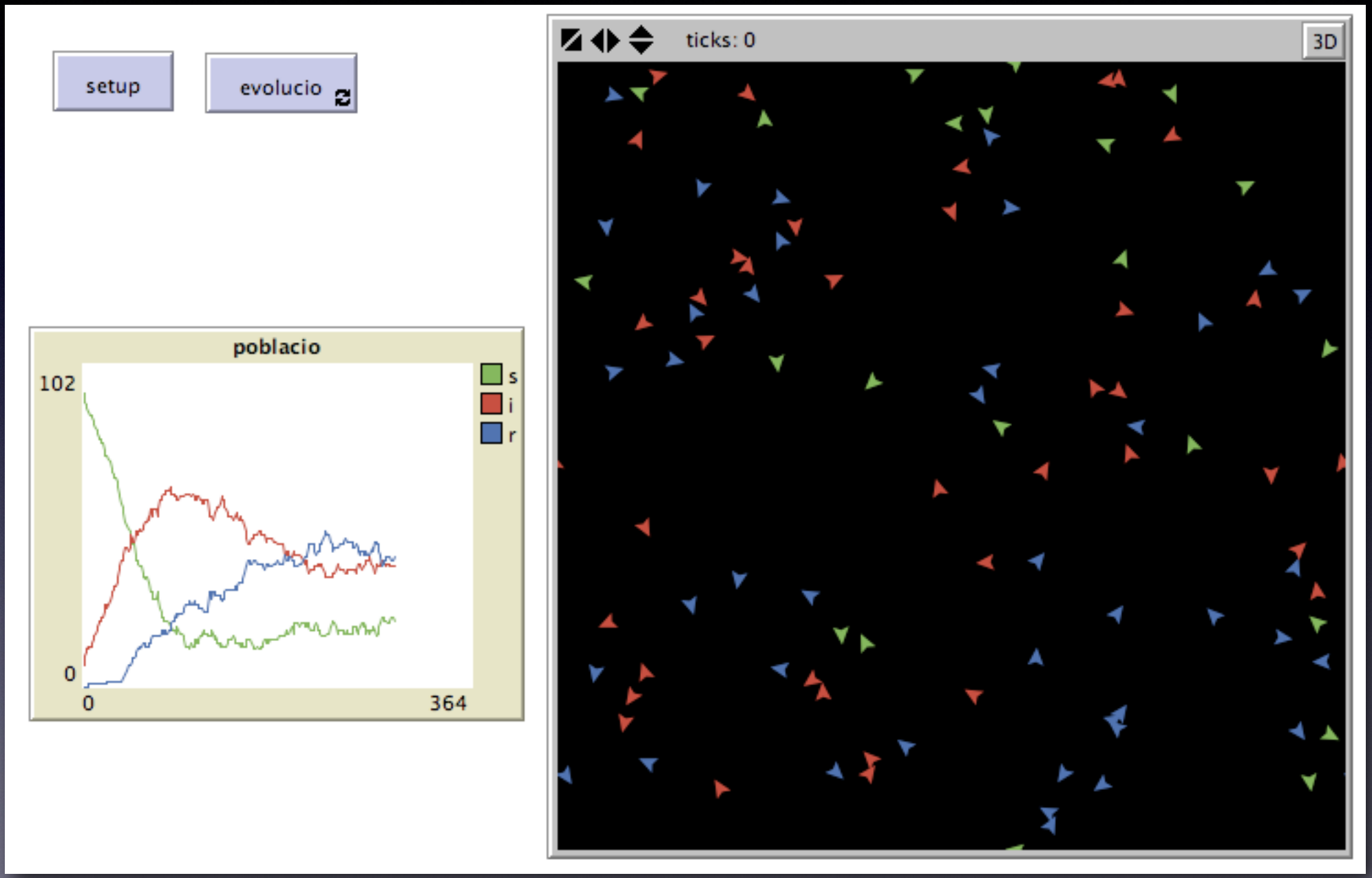

setup
evolucio
ticks: 0
3D
poblacio
100
0
0
92.5
pen-s
pen-i

Ex.: implementar model SIR



prob-recu = prob-inmu =0.01

prob-infectat = 0.1



```
globals [t n n1 n2 n3 prob-infectat prob-recu prob-inmu vei infectat?]

to setup
  clear-all
  clear-plot
  set t 1
  set n 100
  set prob-infectat 0.1
  set prob-recu 0.01
  set prob-inmu 0.01
  create-turtles(n)
  set n1 0
  set n2 0
  set n3 0
  ask turtles  [
    setxy random-xcor random-ycor
    ifelse random-float 1 <= prob-infectat  [
      set color red
      set n1 n1 + 1
    ]
    [
      set color green
      set n2 n2 + 1
    ]
  ]
end
```

```
to actuar-infectat
  rt random-float 360
  fd 1
  if random-float 1.0 <= prob-recu
  [
    set color blue
    set n1 n1 - 1
    set n3 n3 + 1
  ]
end
```

```
to evolucio
  ask turtles
  [
    if color = green
      [ actuar-sa ]
    if color = red
      [ actuar-infectat]
    if color = blue
      [ actuar-recuperat]
  ]
  set-current-plot-pen "i"
  plotxy t n1
  set-current-plot-pen "s"
  plotxy t n2
  set-current-plot-pen "r"
  plotxy t n3
  set t t + 1
end
```

```
to actuar-infectat
  rt random-float 360
  fd 1
  if random-float 1.0 <= prob-recu
  [
    set color blue
    set n1 n1 - 1
    set n3 n3 + 1
  ]
end

to actuar-recuperat
  rt random-float 360
  fd 1
  if random-float 1.0 <= prob-inmu
  [
    set color green
    set n3 n3 - 1
    set n2 n2 + 1
  ]
end
```

HAPPY HOUR
ASK US ANYTHING
(about Netlogo)