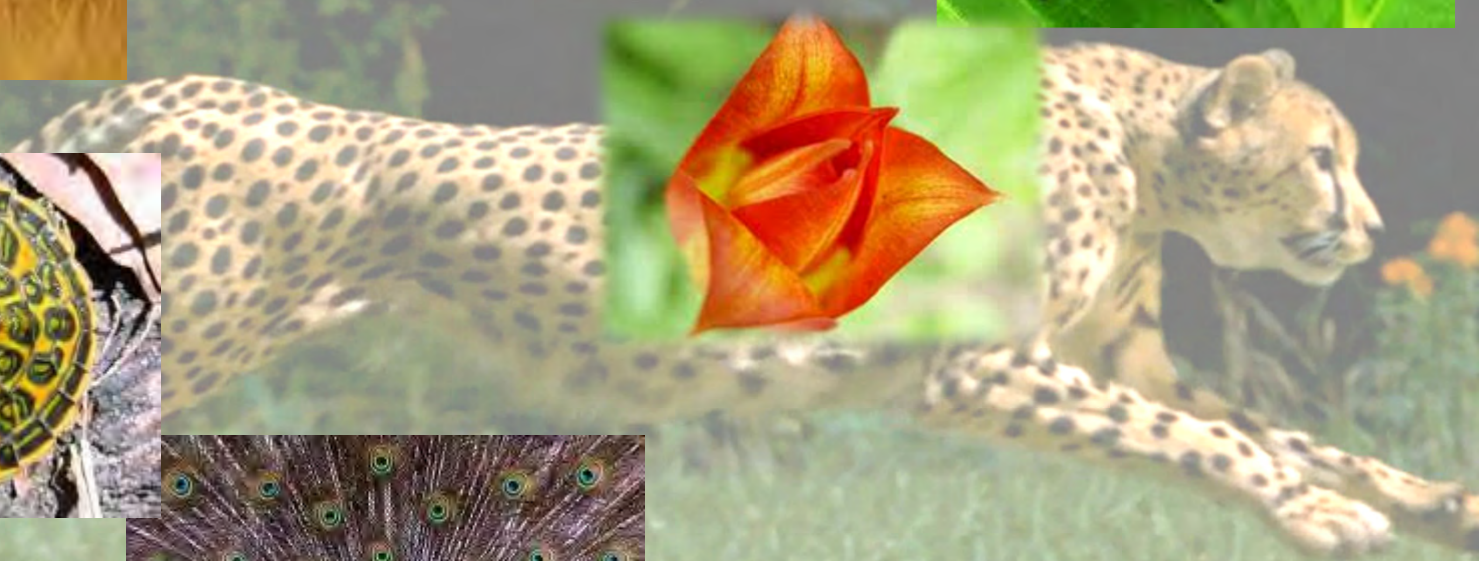


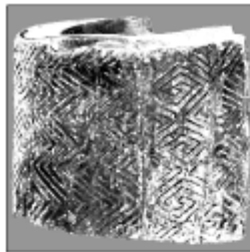
Rend és rendezetlenség a természetben,

avagy hogyan lesz csíkos a zebra, s pöttyös a katica?

Bagyinka Csaba
MTA SZBK Biofizikai Intézet







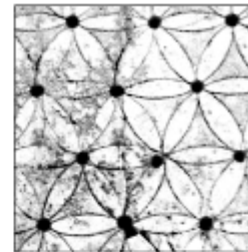
22,000 BC (Paleolithic)



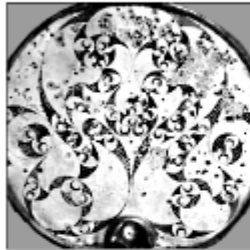
3500 BC (Sumerian)



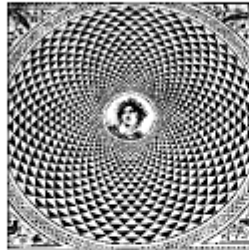
1200 BC (Greek)



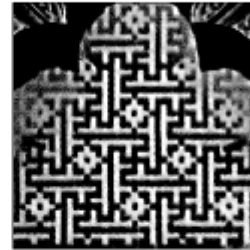
8th century BC (Phoenician)



1st century BC (Celtic)



2nd century (Roman)



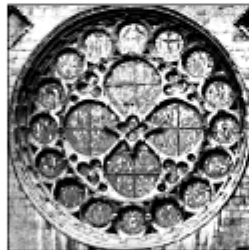
8th century (Islamic)



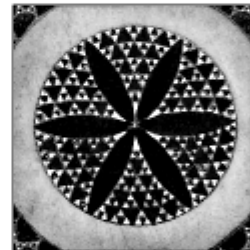
8th century (Celtic)



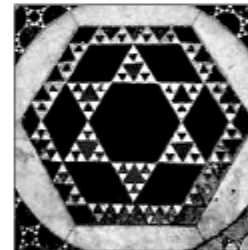
12th century (Italian)



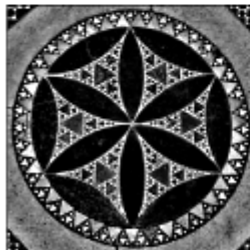
13th century (English)



13th century (Italian)



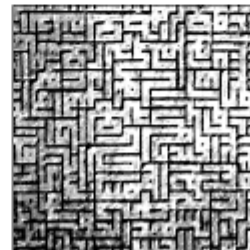
13th century (Italian)



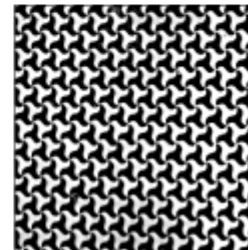
13th century (Italian)



13th century (Italian)



14th century (Islamic)



14th century (Islamic)

Historical examples of ornamental art. Repetitive patterns are common and some nested patterns are seen, but the more complicated kinds of patterns discussed in this chapter do not ever appear to have been used. Note that the second-to-last picture is not an abstract design, but is instead text written in a highly stylized form of Arabic script.

Mi a rend, mi a rendezetlenség?





Mi a rend, mi a rendezetlenség?





Mi a rend, mi a rendezetlenség?

Matekozzunk!



Sejtautomaták

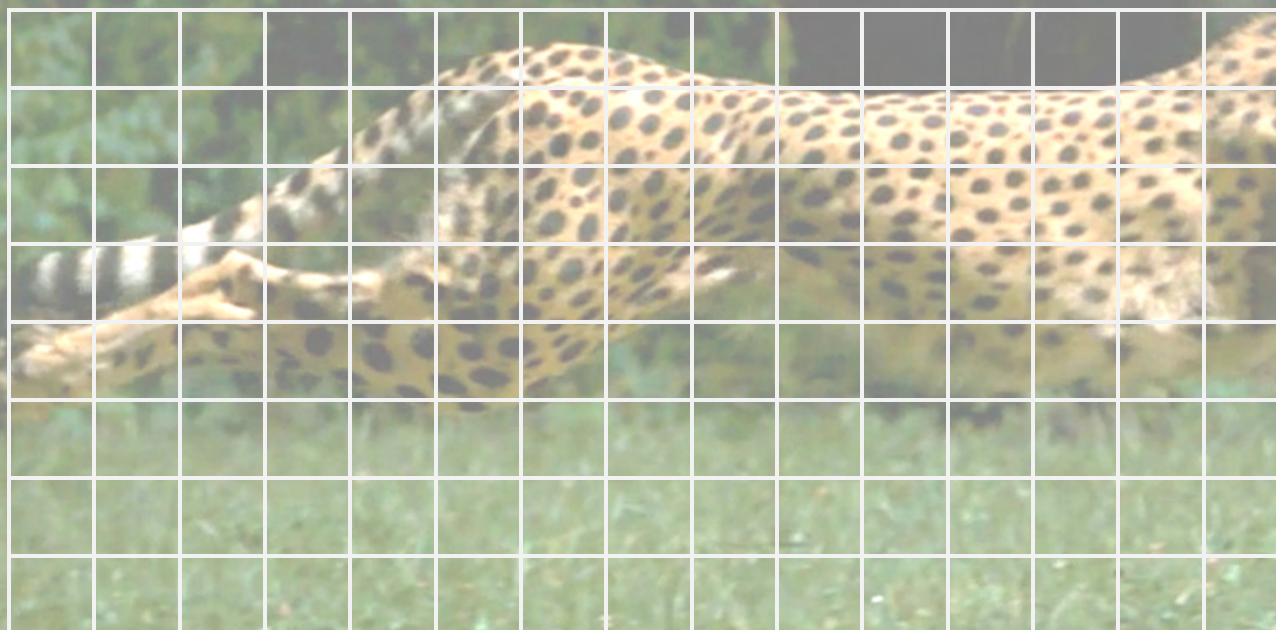
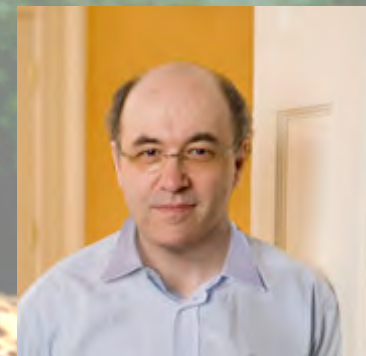
Game of life (Életjáték)

John Conway
a Véges Matematika professzora a
Princeton Egyetemen.

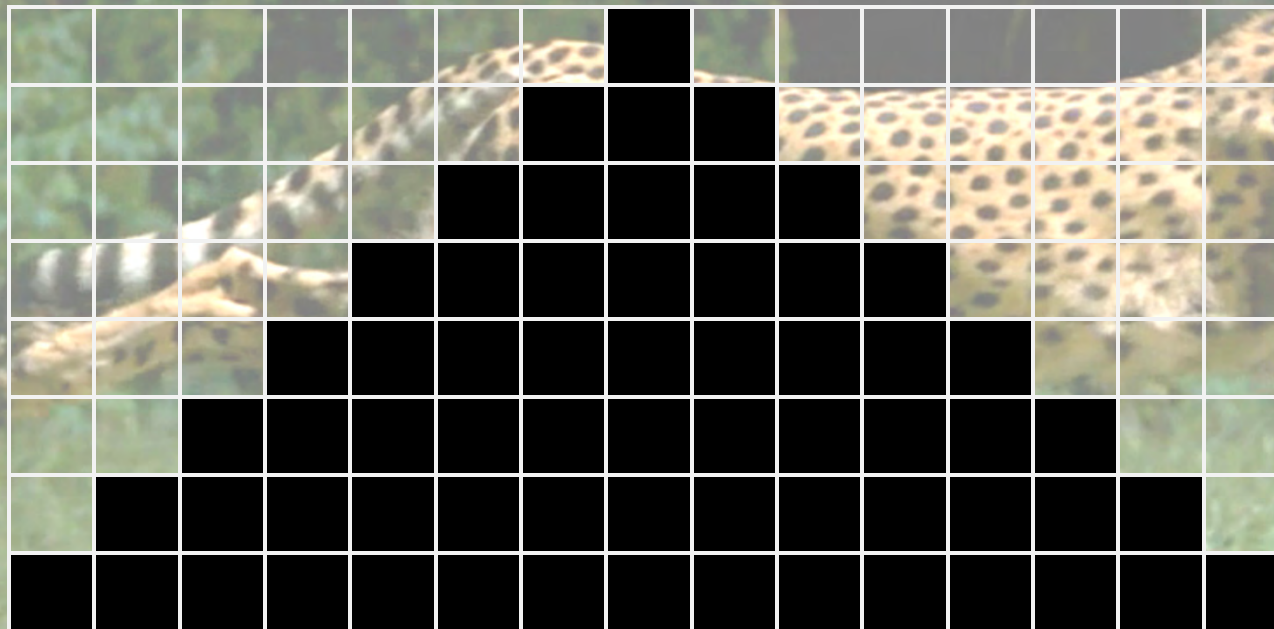


Sejtautomaták

Stephen Wolfram:
Lineáris sejtautomatáktól a bonyolultabbakig.

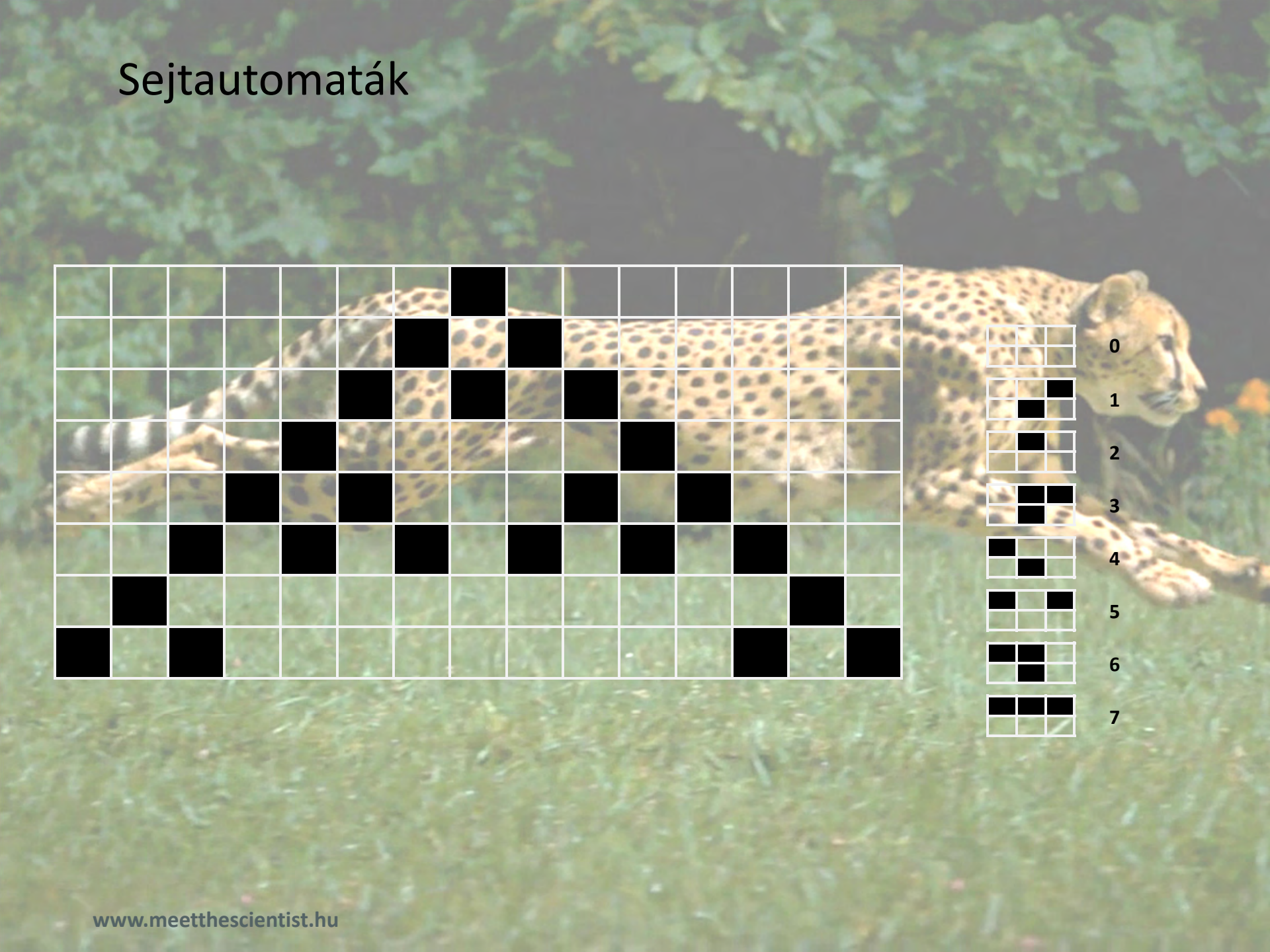


Sejtautomaták



0
1
2
3
4
5
6
7

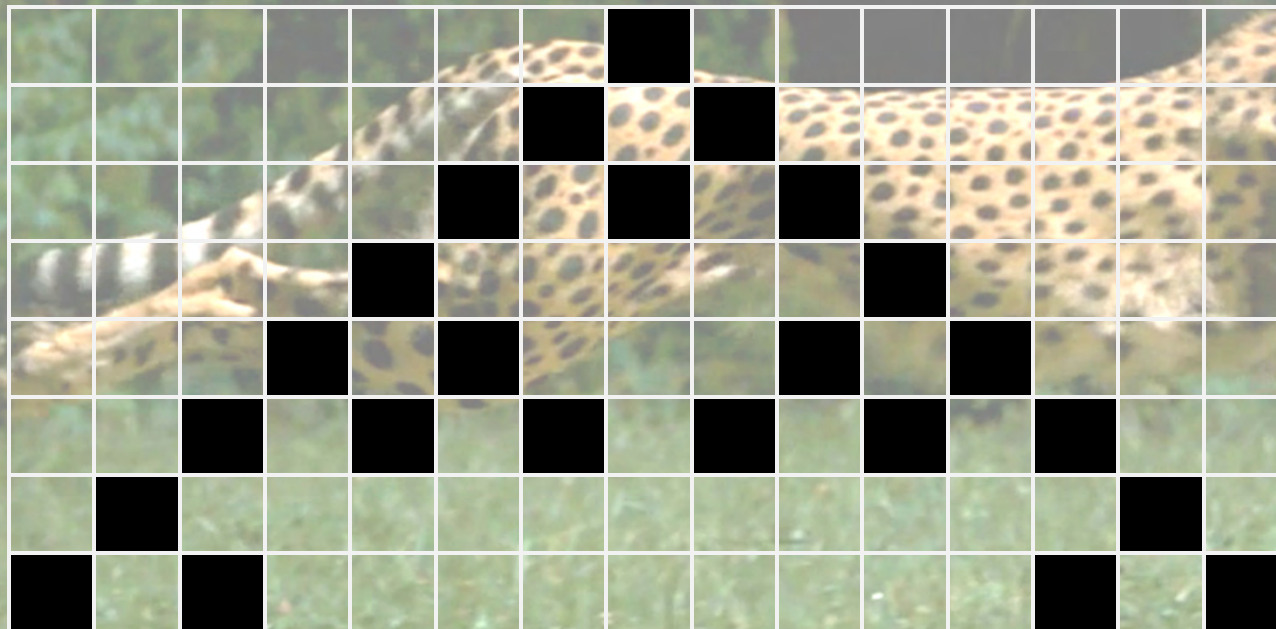
Sejtautomaták



A cheetah is lying down in a grassy field with trees in the background. A grid is overlaid on the cheetah's body, with some cells filled with black. To the right of the grid is a legend with 8 rows, each showing a 3x3 grid pattern and a corresponding number from 0 to 7.

0	1	2	3	4	5	6	7

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1

2

3

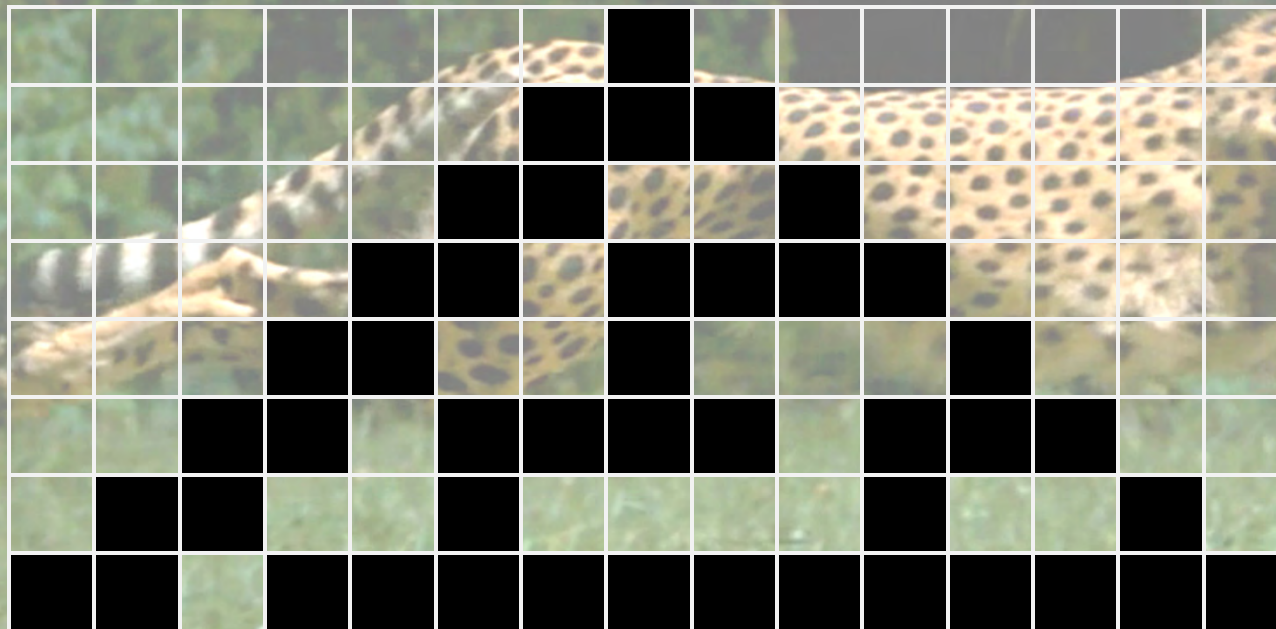
4

5

6

7

Sejtautomaták



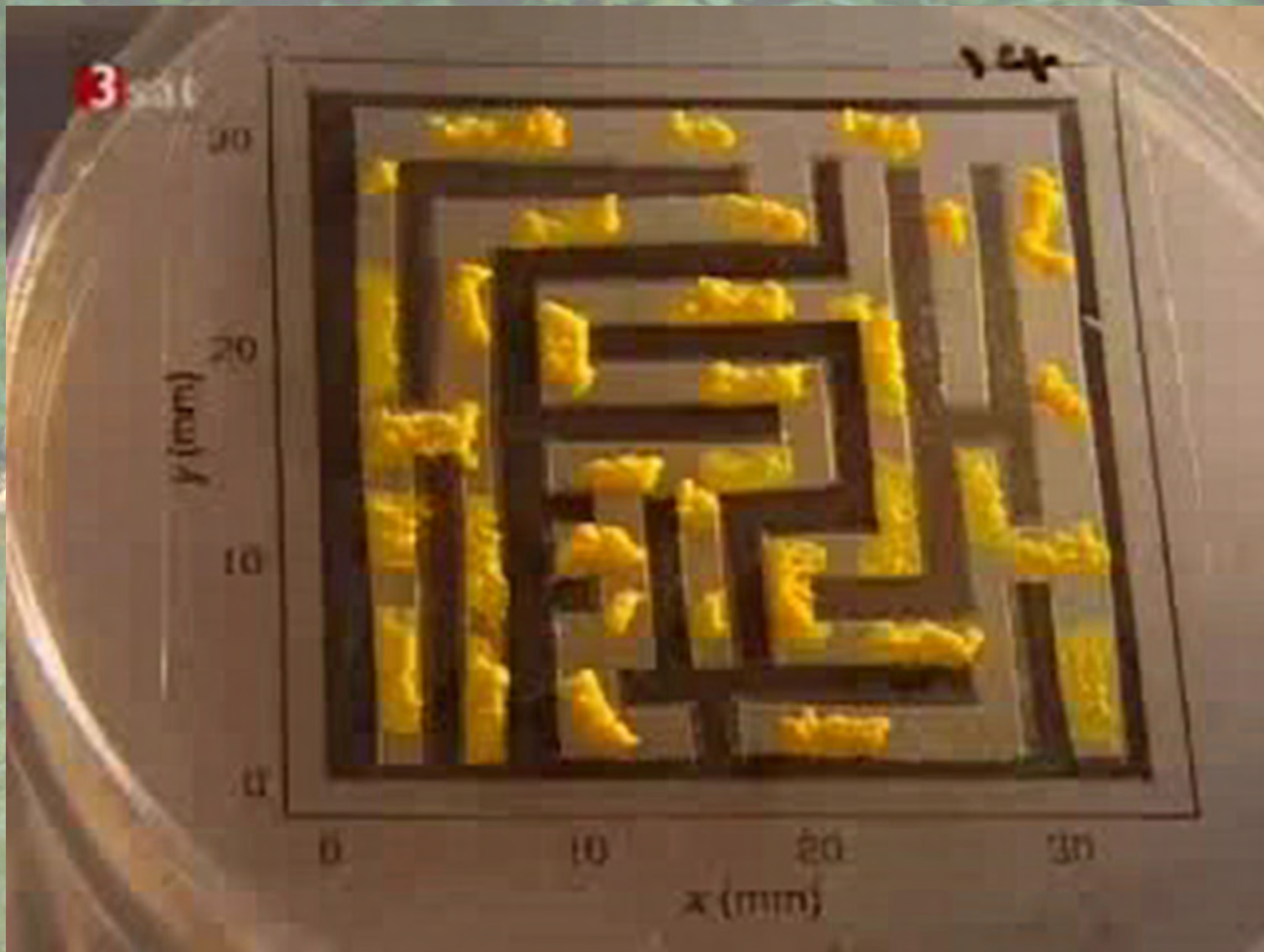
0
1
2
3
4
5
6
7

A cheetah is captured in a full sprint across a lush green field. The cheetah's body is low to the ground, with its legs extended forward and back, showing the characteristic spotted pattern of its fur. The background consists of dense green foliage and trees, slightly out of focus. The overall scene conveys a sense of speed and natural habitat.

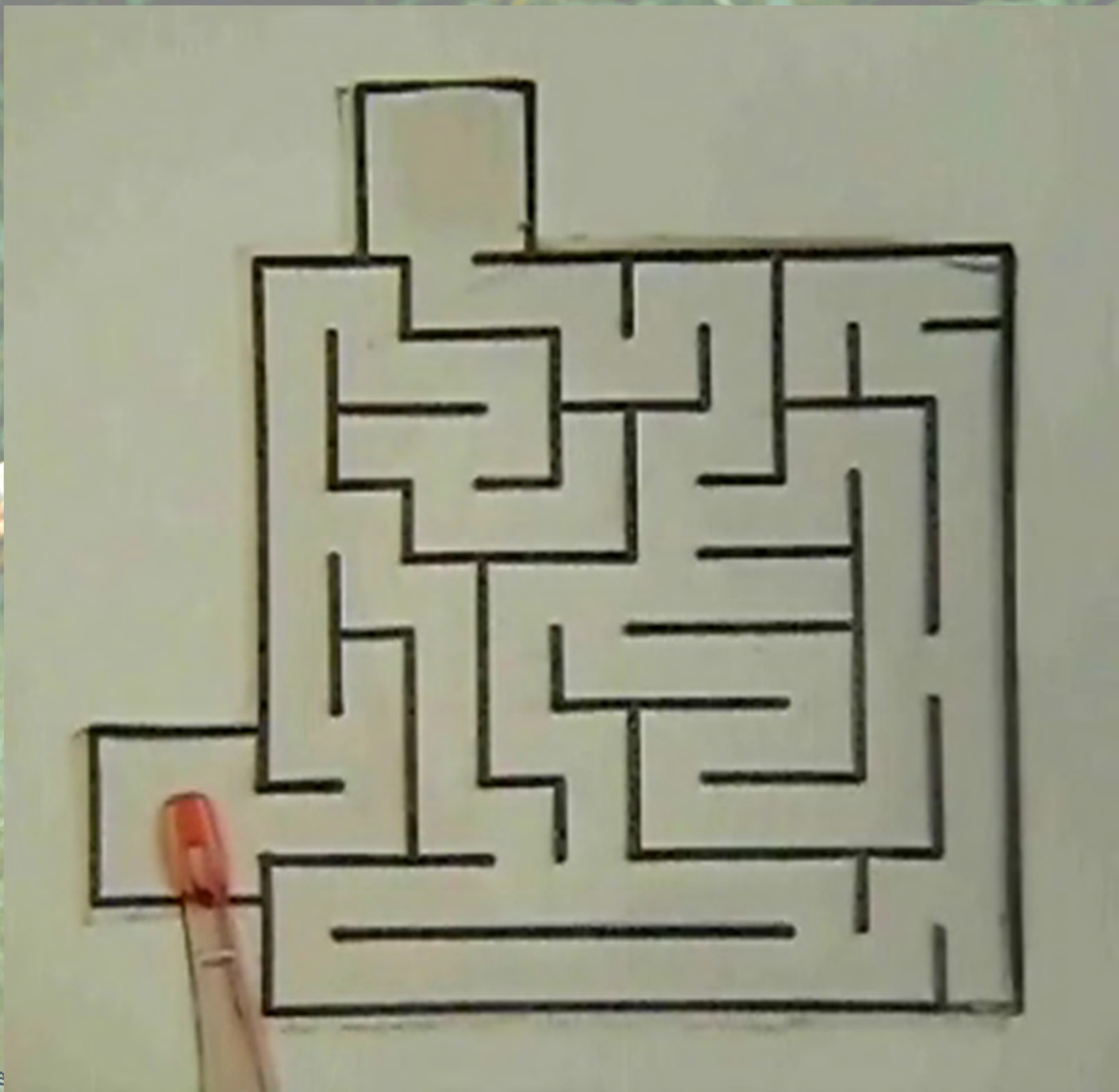
Játsszunk egy kicsit vele

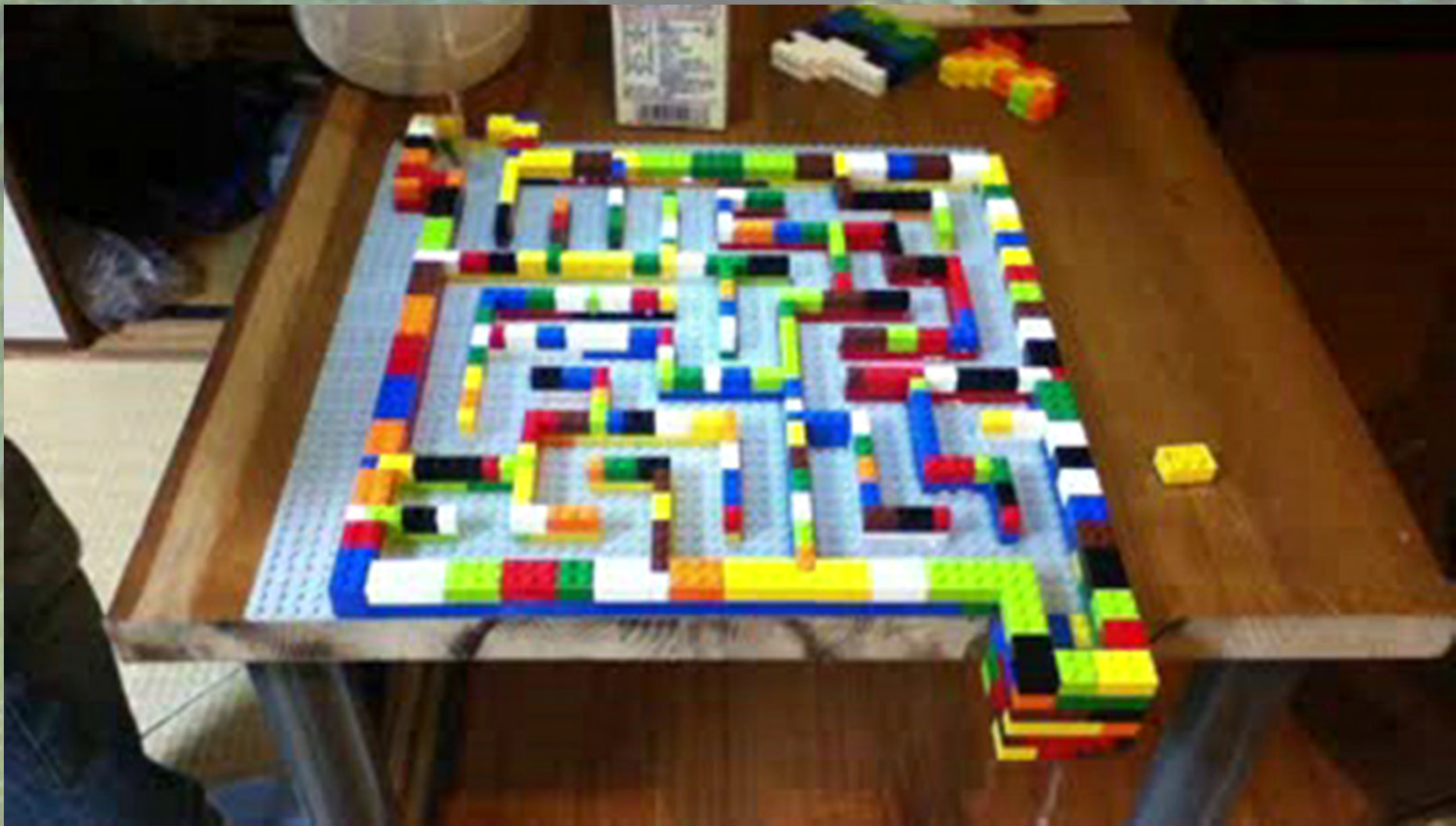
A cheetah is captured in a full sprint across a lush green field. The cheetah's body is low to the ground, with its legs extended forward and back, showing the characteristic spotted pattern of its fur. The background is filled with dense green foliage and trees, slightly out of focus, emphasizing the cheetah's movement. The overall scene conveys a sense of speed and natural habitat.

Mi van a való életben?

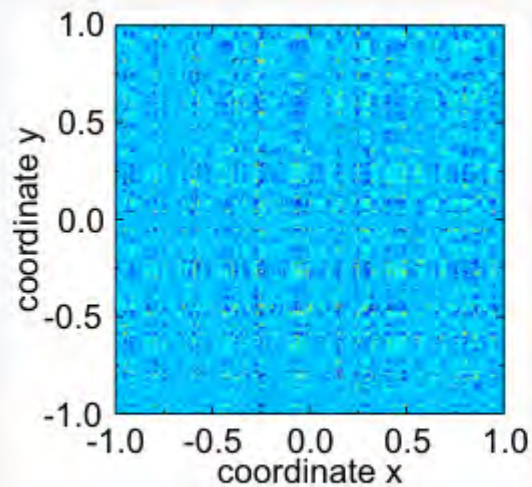
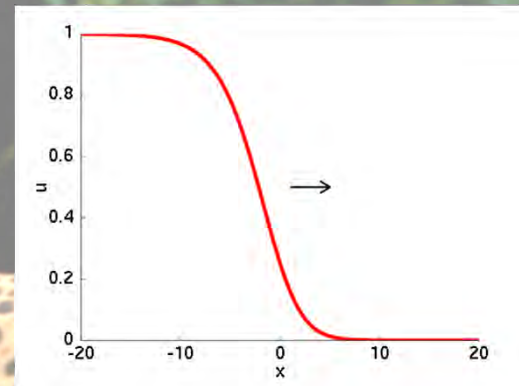




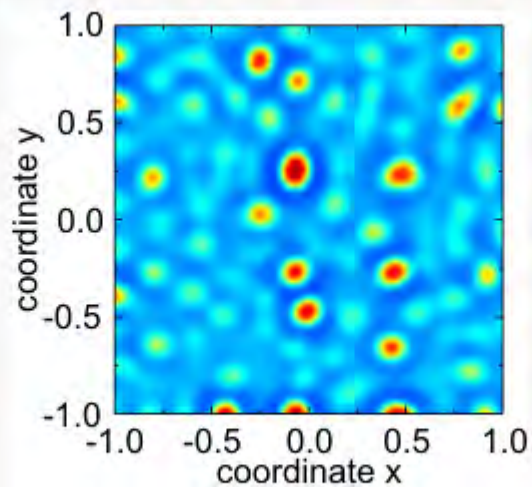




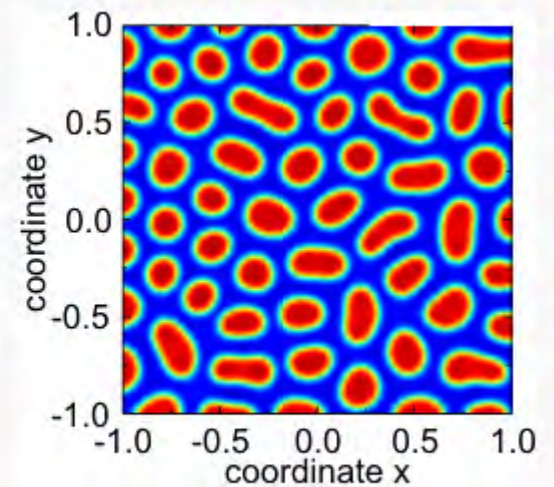
$$\partial_t q = \underline{\underline{D}} \nabla^2 q + R(q).$$



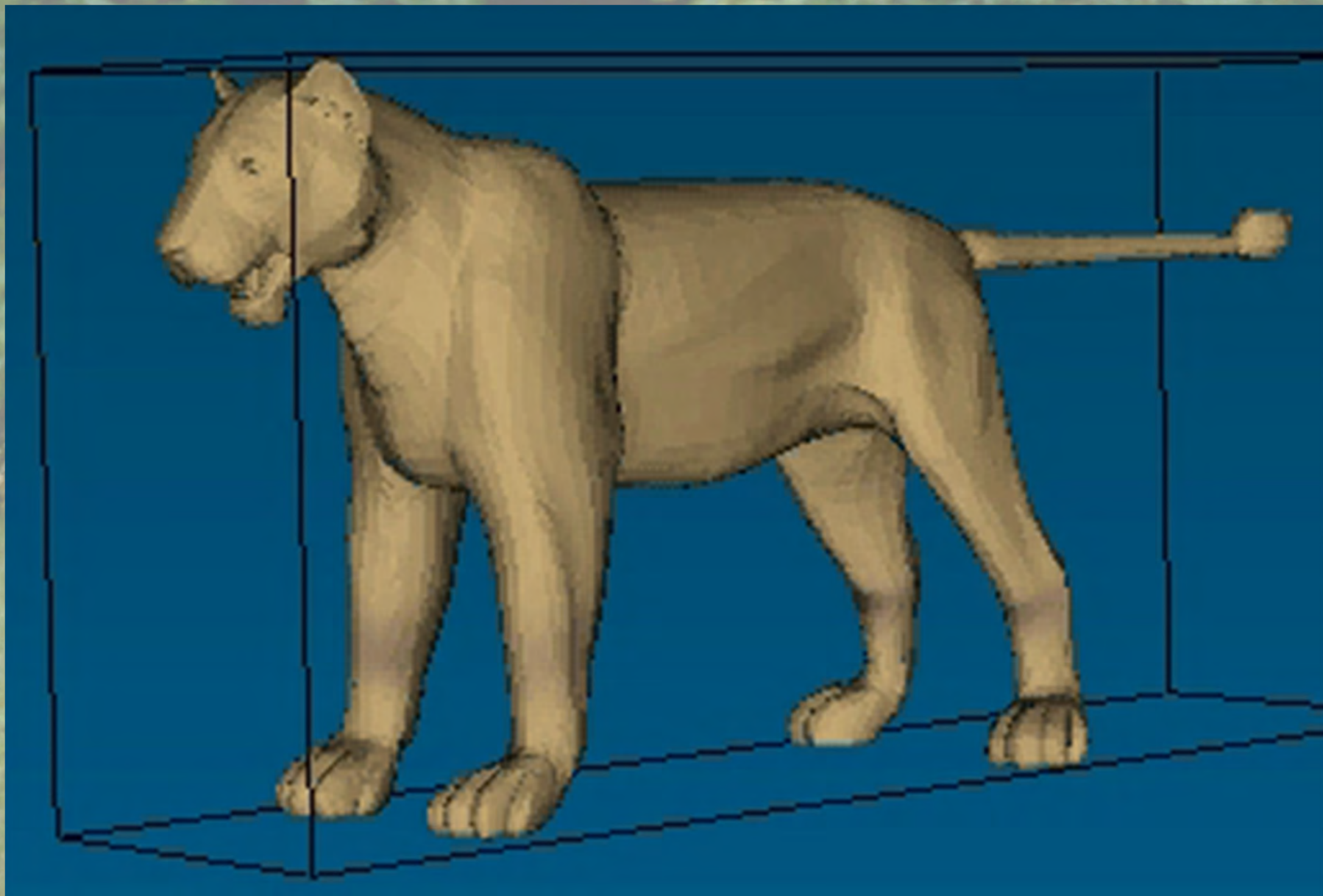
Noisy initial conditions at $t=0$.



State of the system at $t=10$.

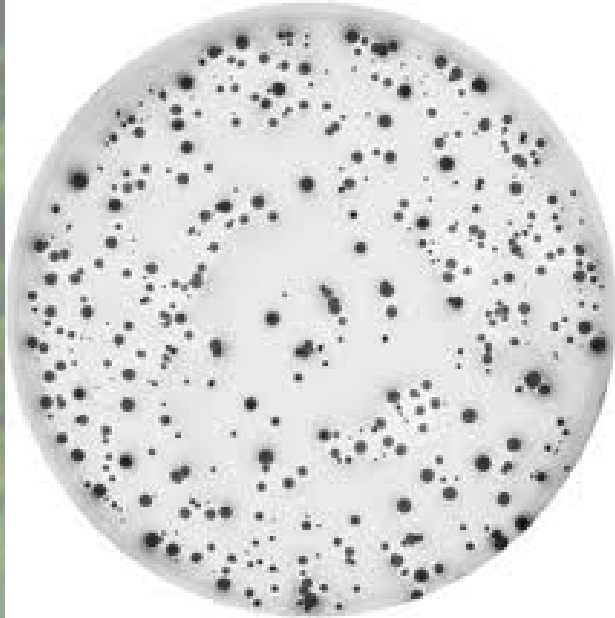


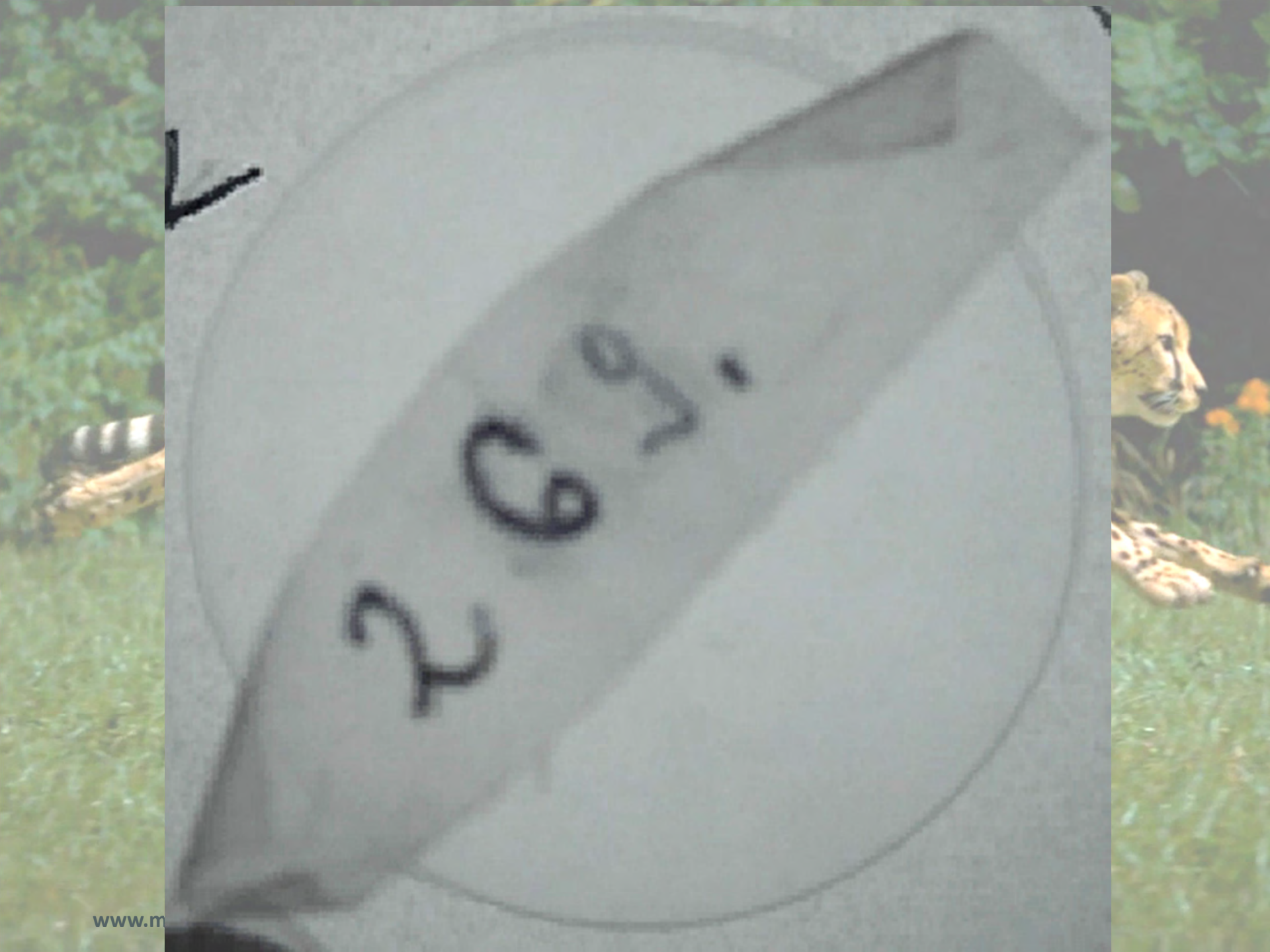
Almost converged state at $t=100$.



A cheetah is captured in a full sprint across a lush green field. The cheetah's body is low to the ground, with its legs fully extended. Its distinctive spotted coat is clearly visible. In the background, there are dense green trees and foliage, slightly out of focus. The overall scene conveys a sense of speed and natural habitat.

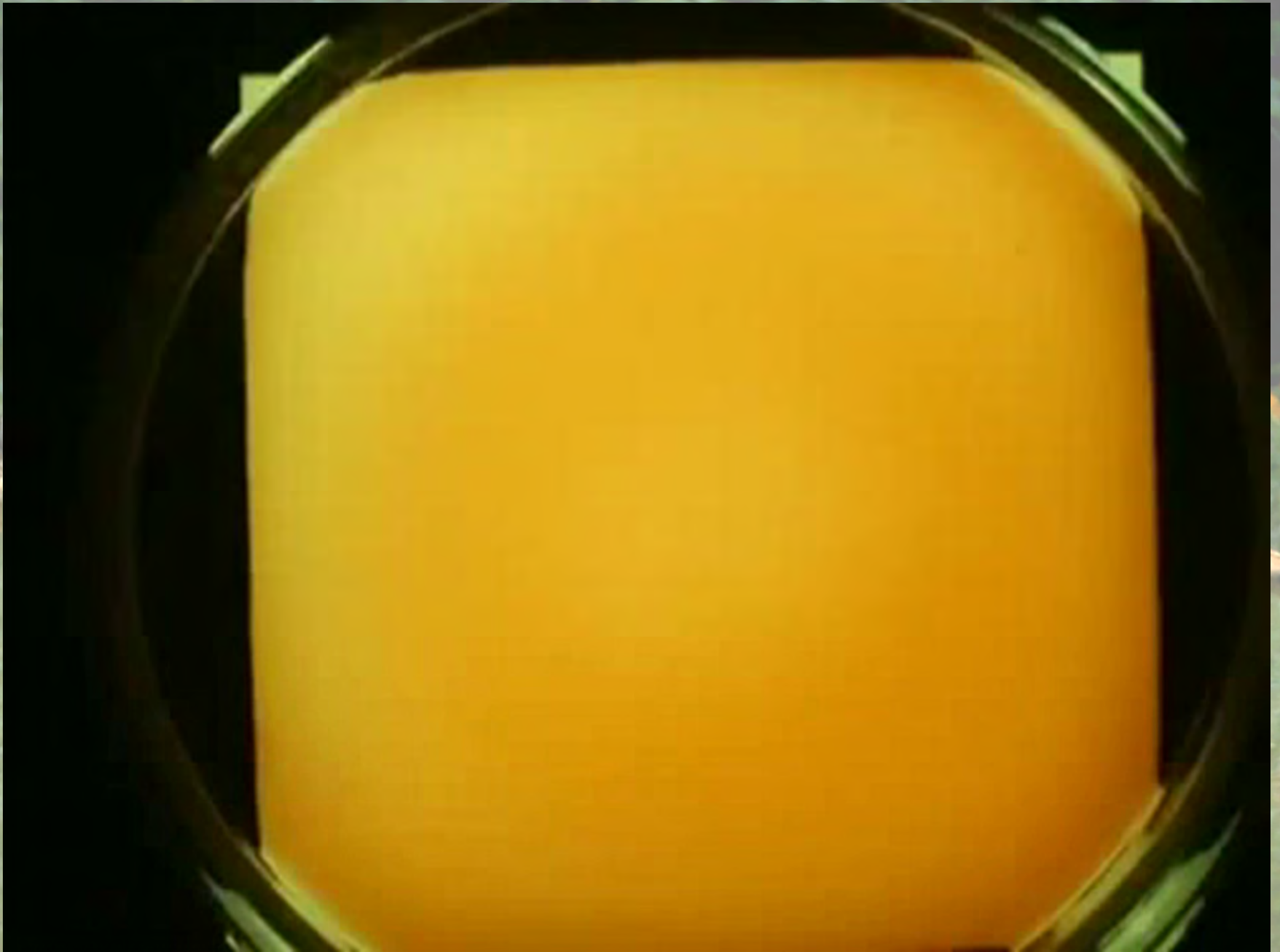
Mi van a való életben?

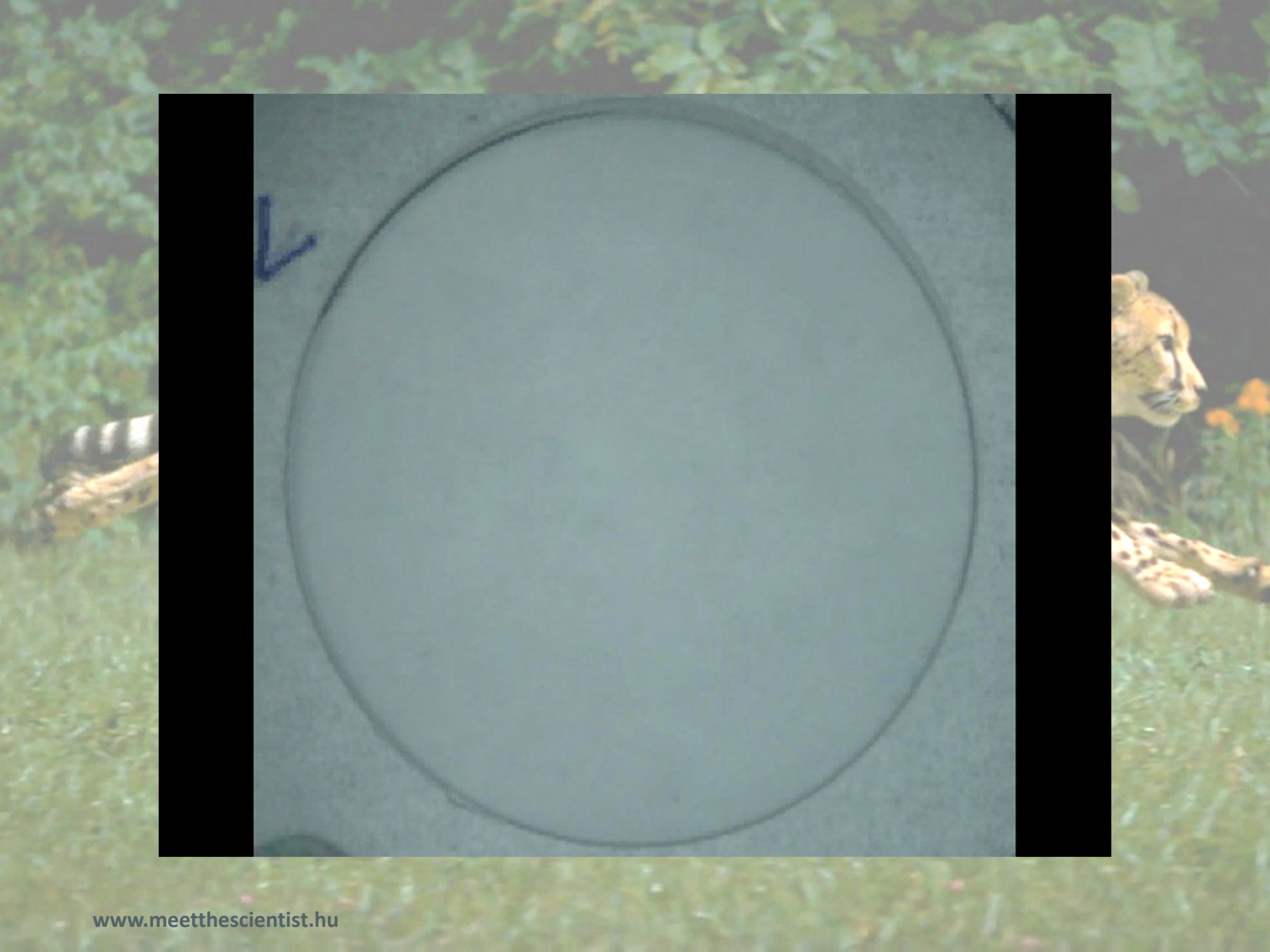


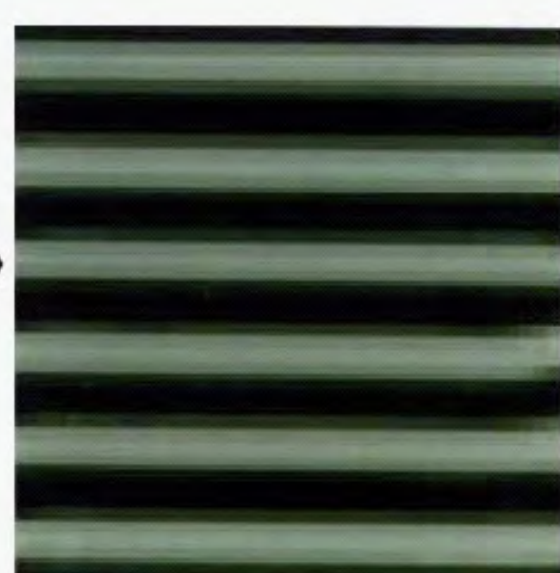
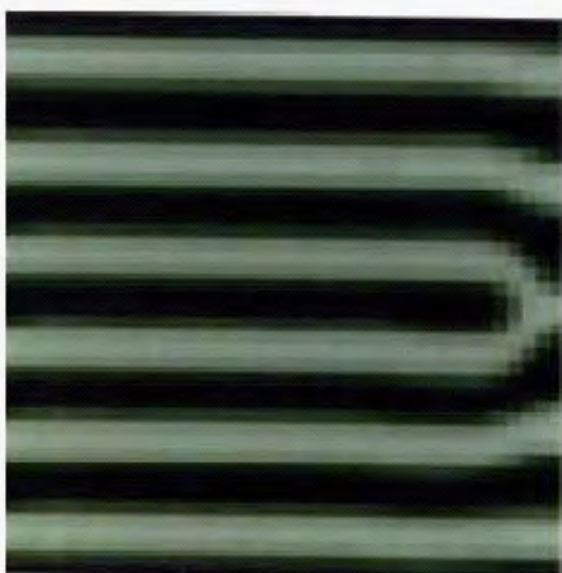
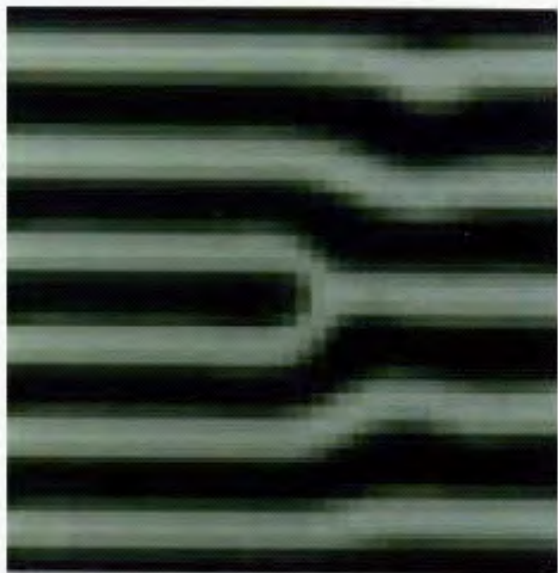


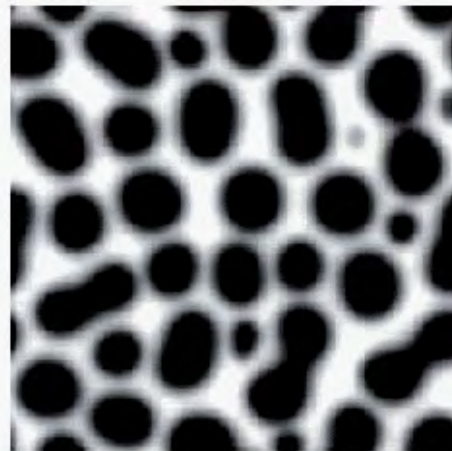
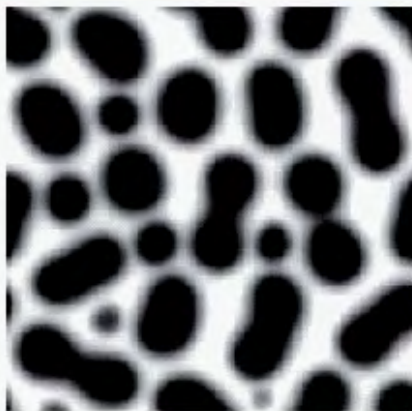
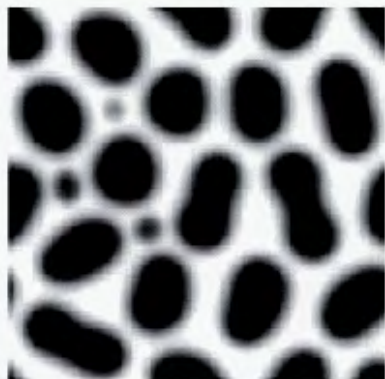
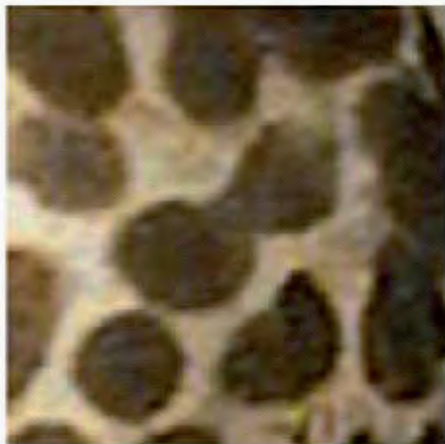






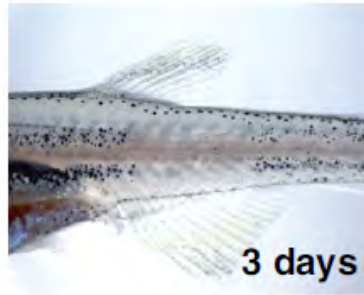




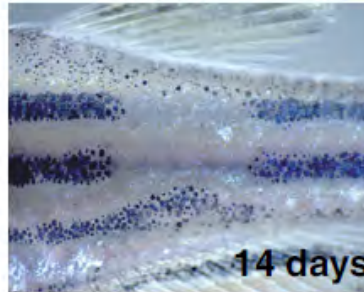




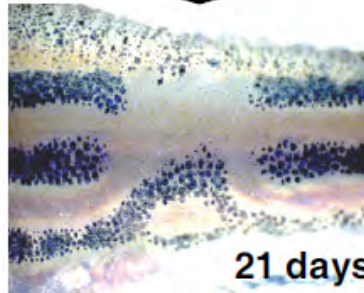
A



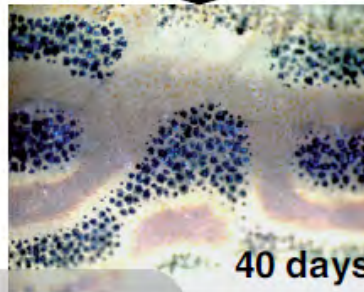
3 days



14 days



21 days



40 days

B

