

Further Mathematical Biology

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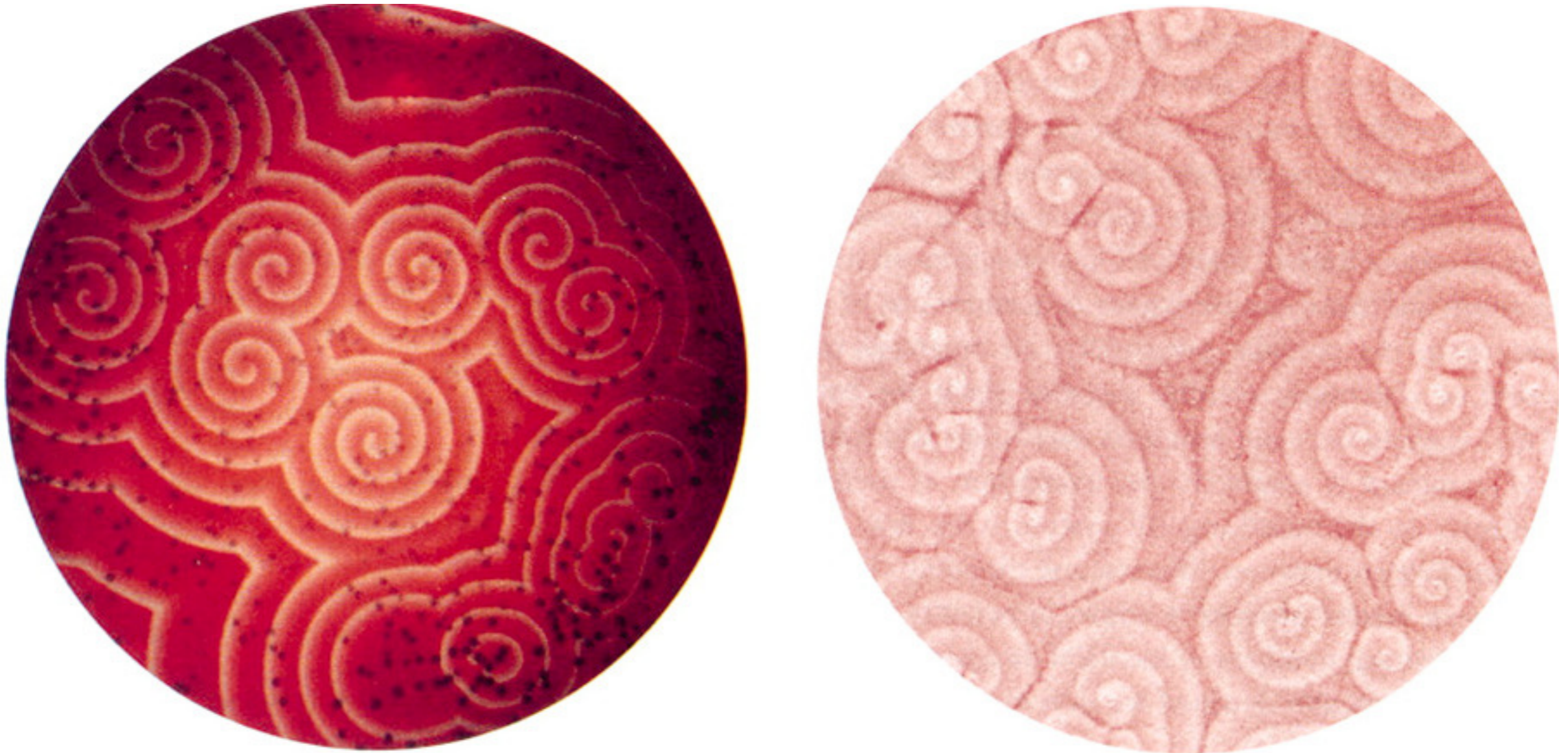
Lectures

- Times:
 - Monday 10am in L3
 - Wednesdays 11am in L2 (weeks 2 to 8)
 - Friday 1pm in L3 (week 1 only)
- Bring a copy of the lecture notes, plus paper for additional notes.
- Lecture notes, problem sheets etc. are on the web at
 - <http://www.maths.ox.ac.uk/courses/course/15792/material>

Course Outline

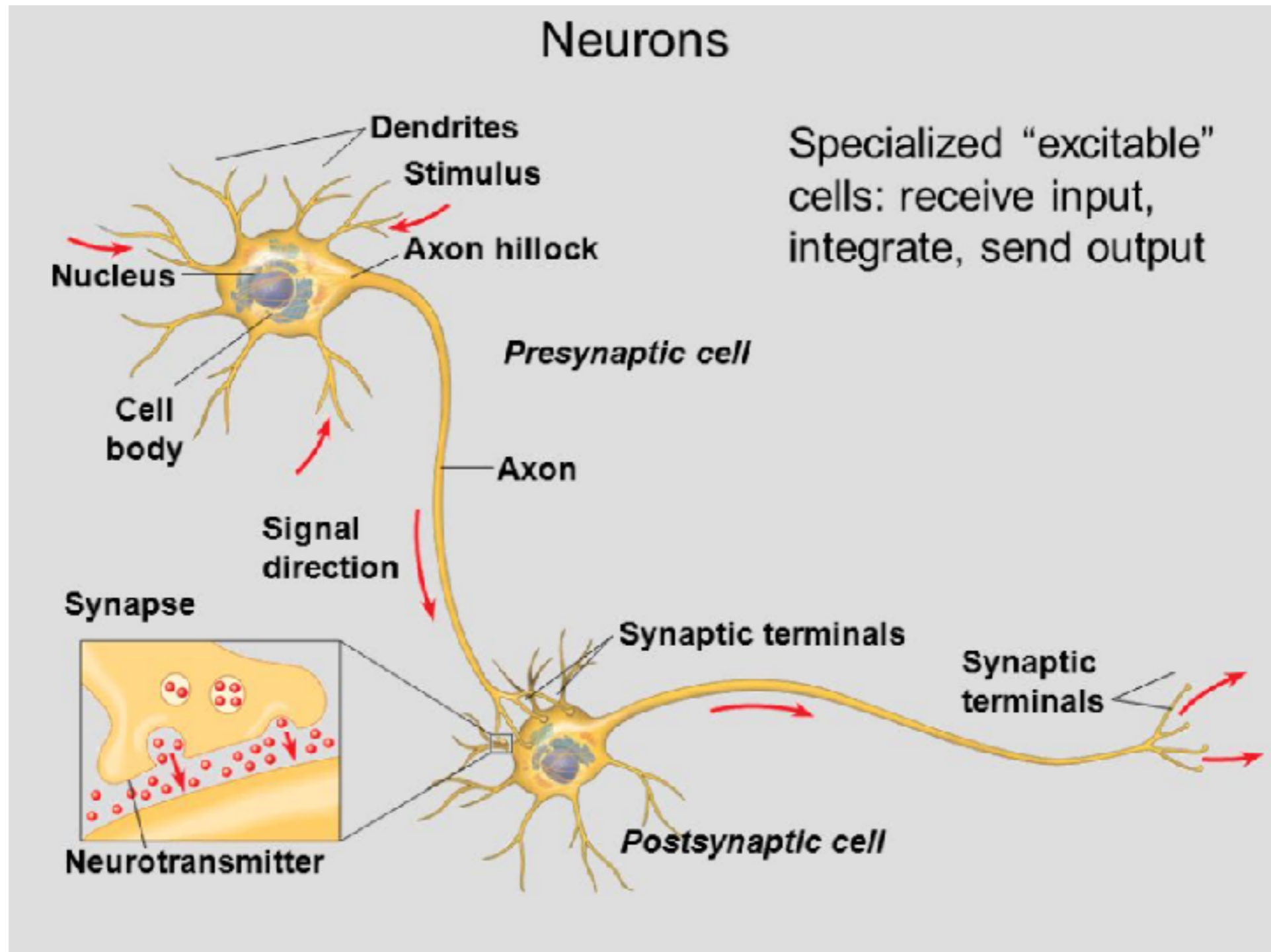
- [3 lectures] Enzyme Kinetics - Michaelis-Menten Kinetics - Law of Mass Action
- [2 lectures] Ion channels and excitable systems
- [2 lectures] Spatial models - morphogen gradients, positional information
- [2 lectures] Travelling waves and Fisher's equation
- [3 lectures] Pattern formation
- [2 lectures] Domain growth
- [2 lectures] Discrete to continuum modelling (and age-structured models)

Chemical Reactions and Law of Mass Action

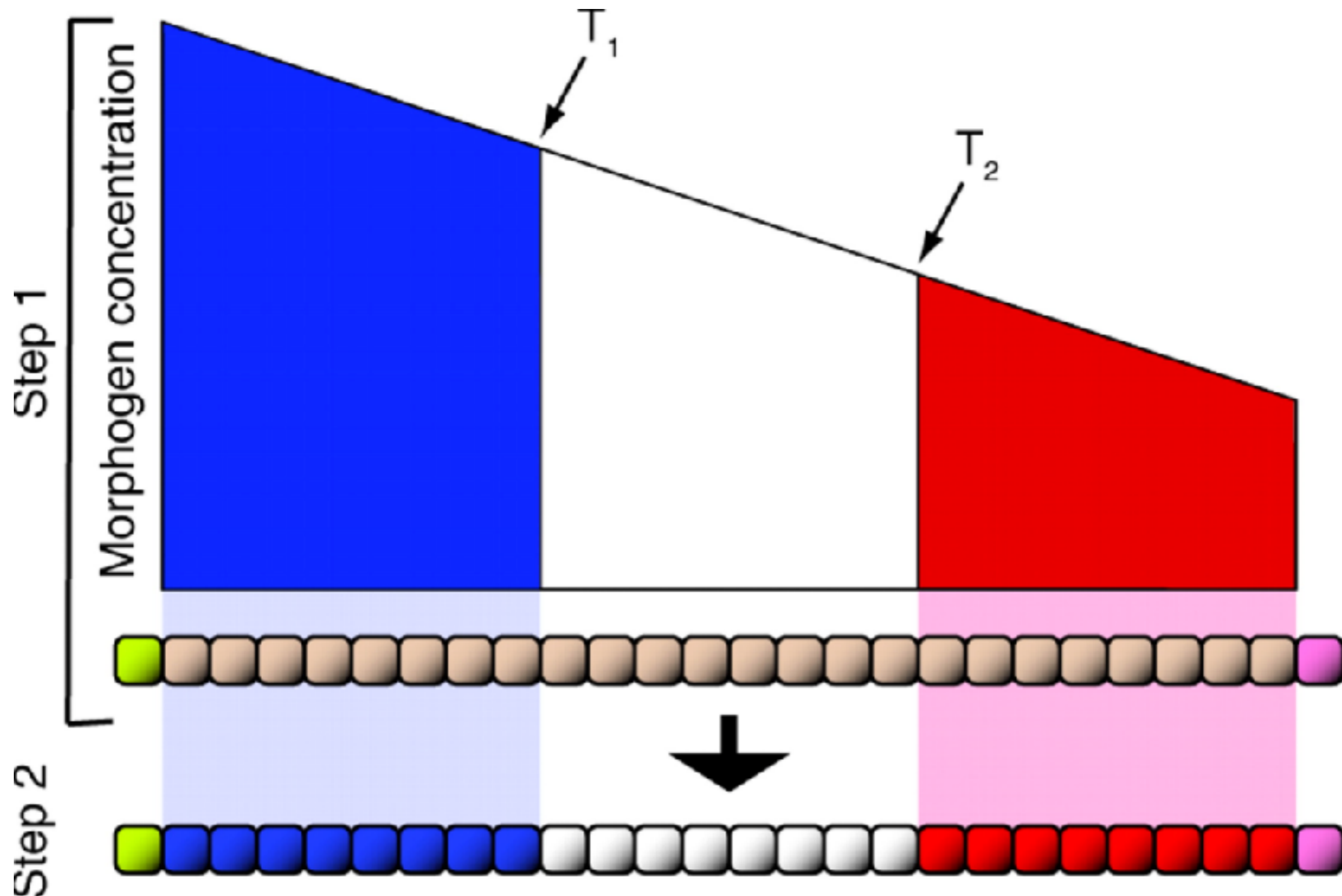


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- The Belousov-Zhabotinsky reaction

Ion Channels and Excitable Systems (Hodgkin Huxley Equations)

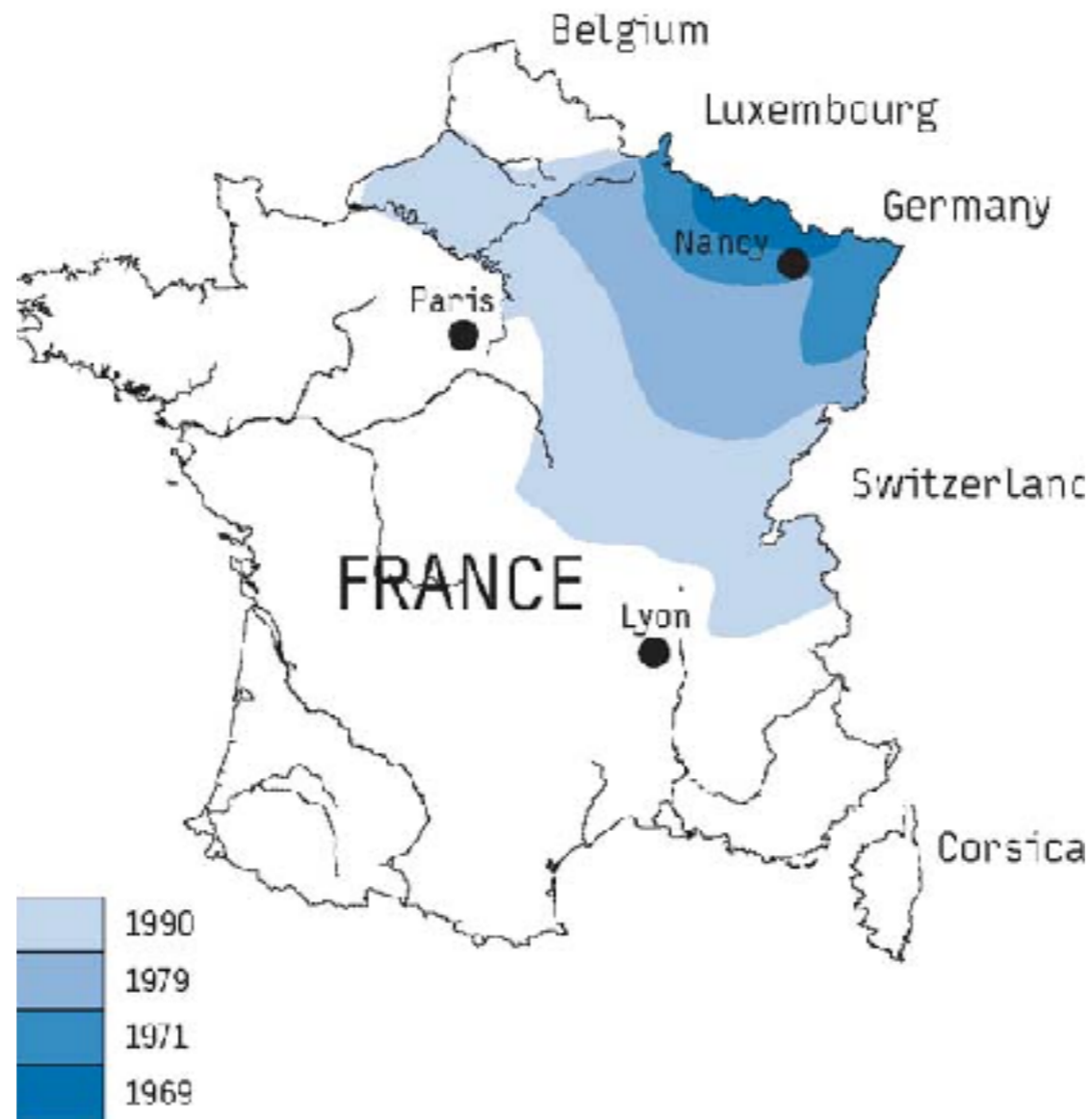


Morphogen Gradients: The French Flag Model



Fisher's Equation

Situation of the enzootic front of fox rabies in France, 1969-1990



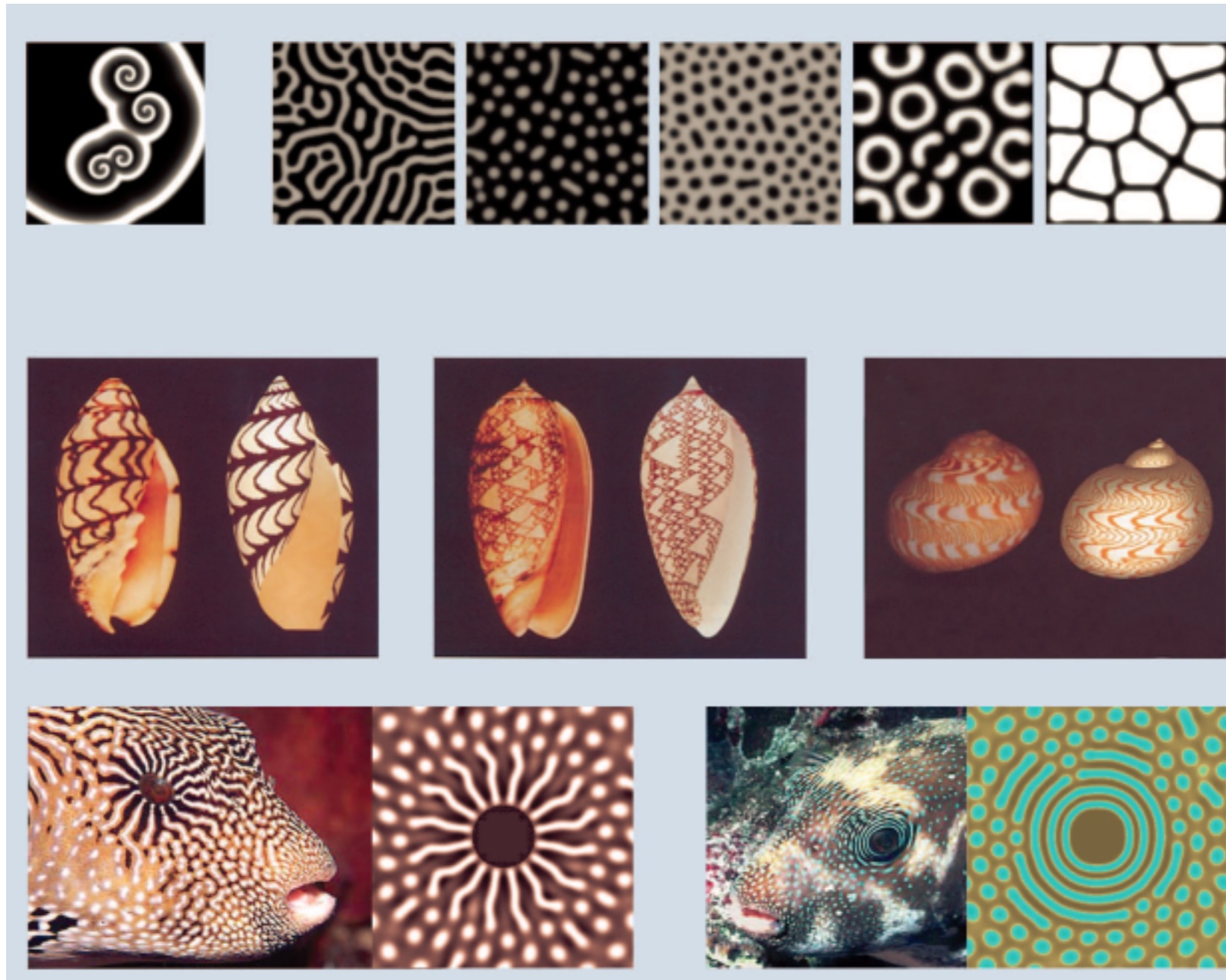
- The spatial spread of fox rabies in France

Pattern Formation

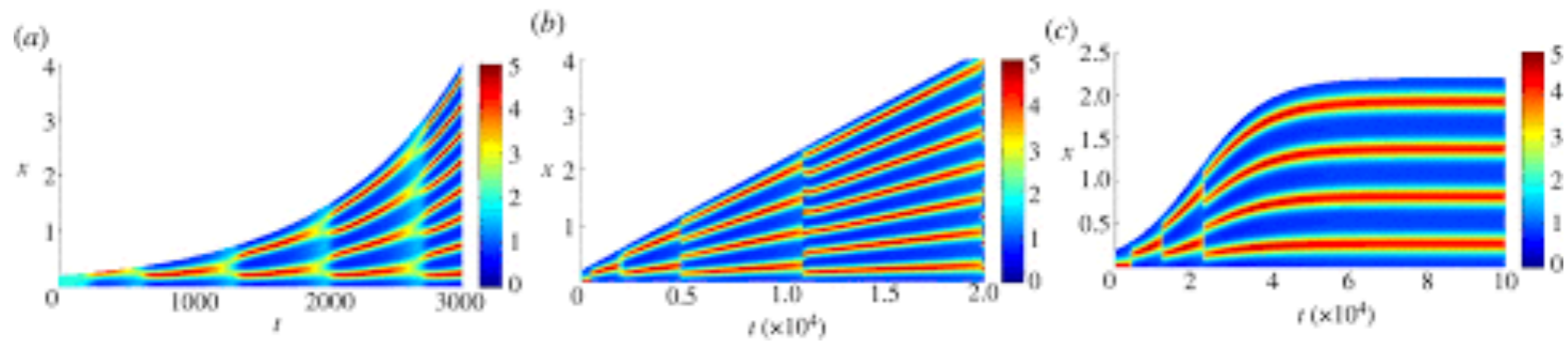


- Diffusion-driven instability and Turing systems

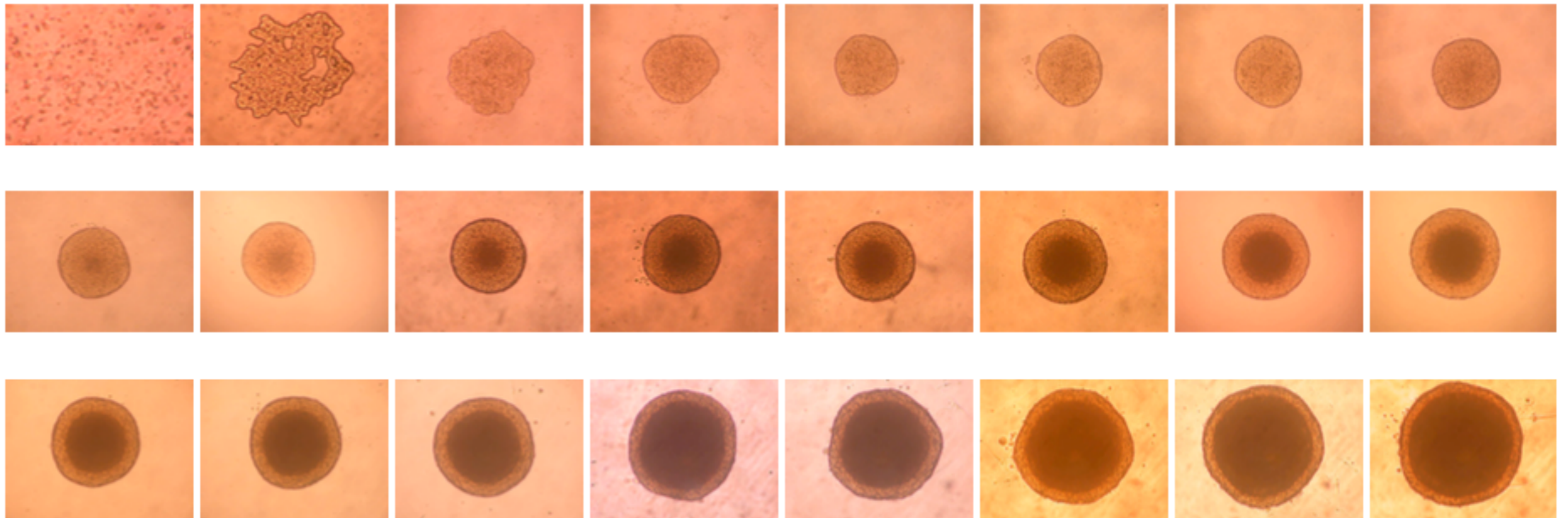
Pattern Formation and Domain Growth



Pattern Formation and Domain Growth



Domain Growth and Multicellular Spheroids



Domain growth: multicellular spheroids

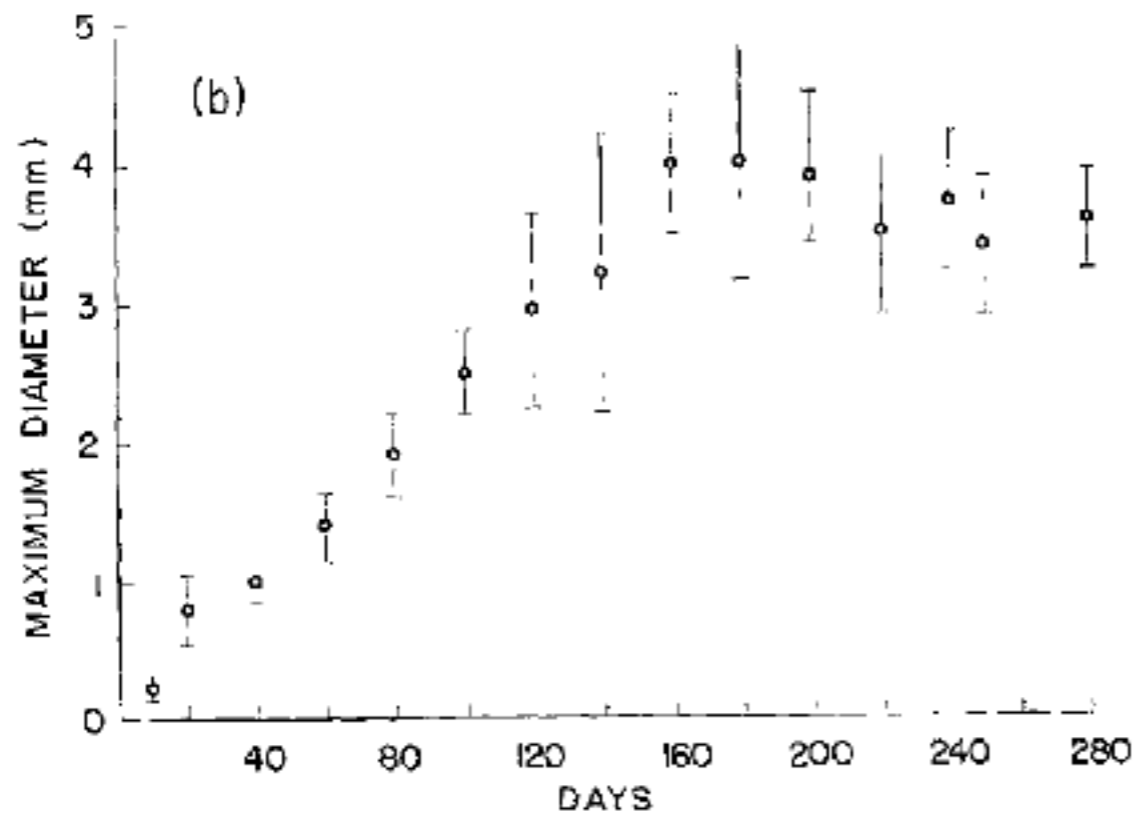
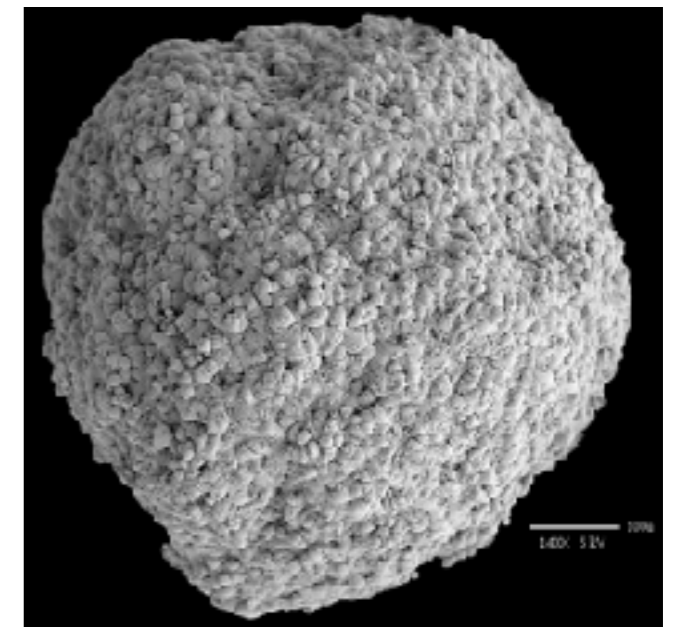
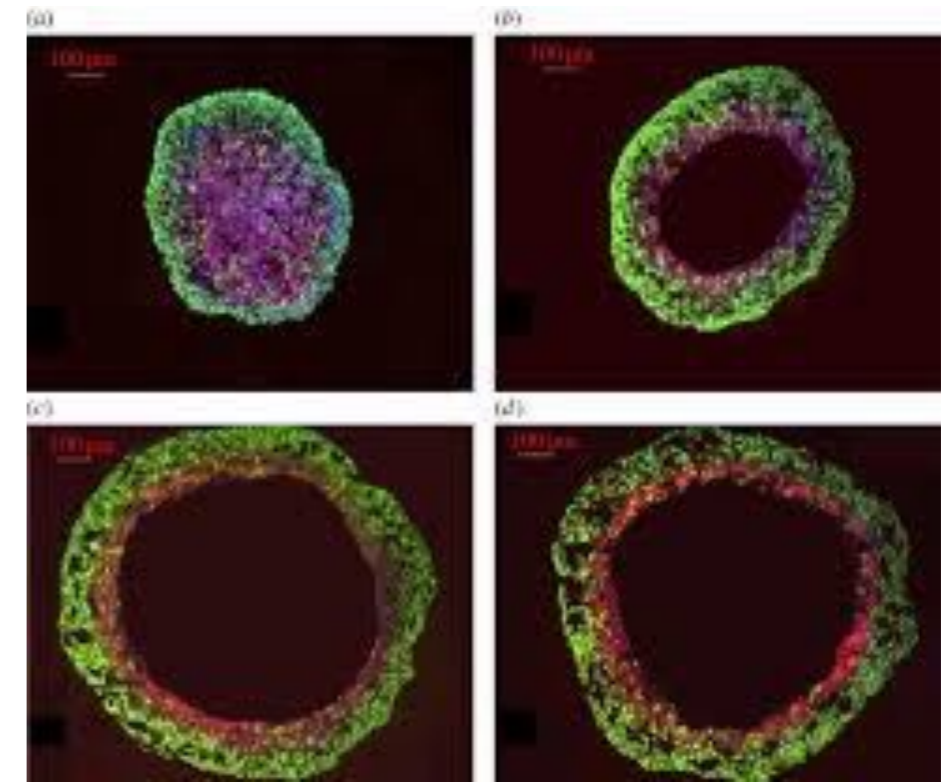
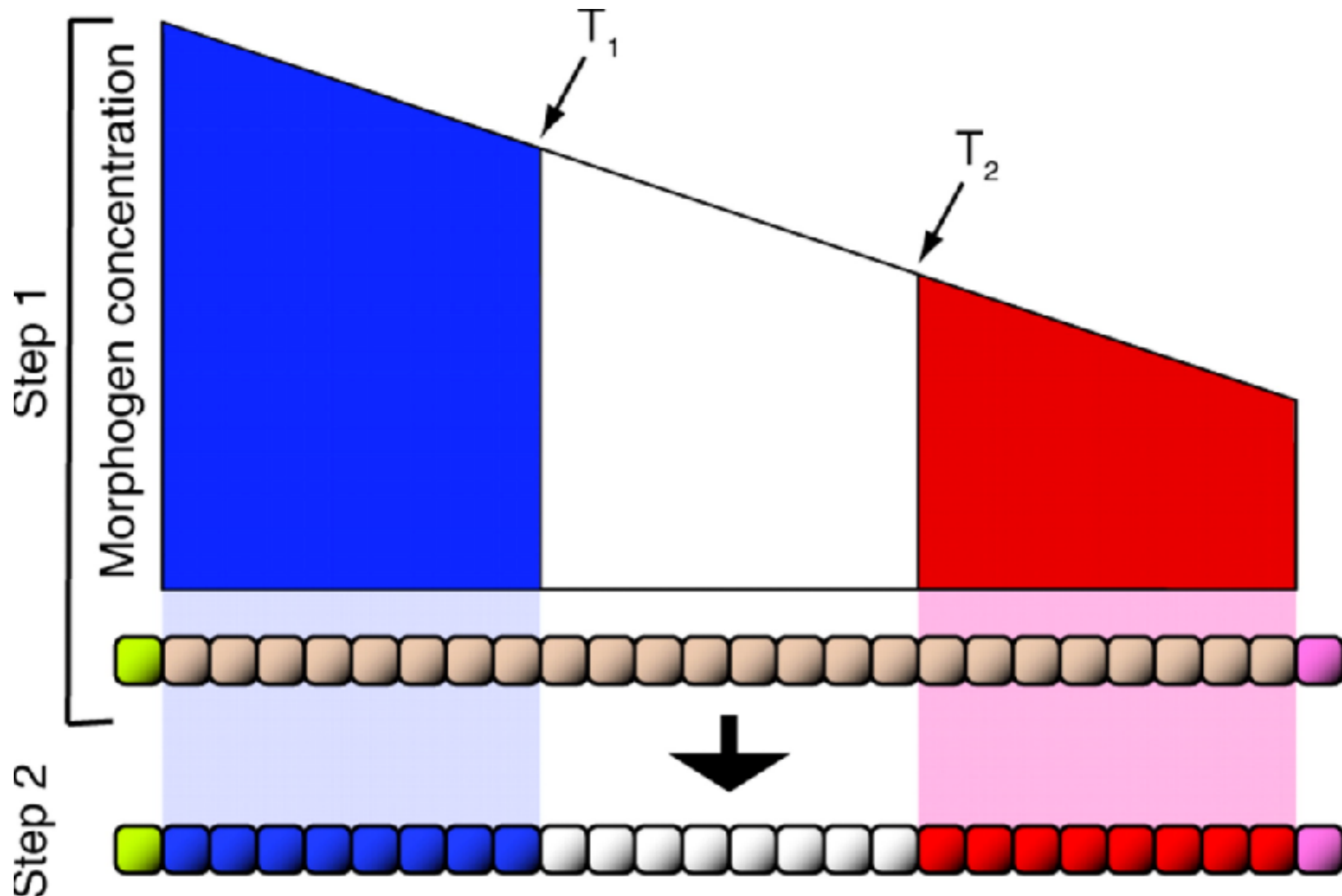


FIG. 2 *b*. Mean diameter and standard deviation of 70 isolated spheroids of V-79 cells, treated similarly to the L-5178Y cells. Very old spheroids occasionally shattered and were discarded. Therefore, mean diameter after 200 days represented approximately 30 colonies.



From Discrete to Continuum



Age-structured models

