Further Mathematical Biology

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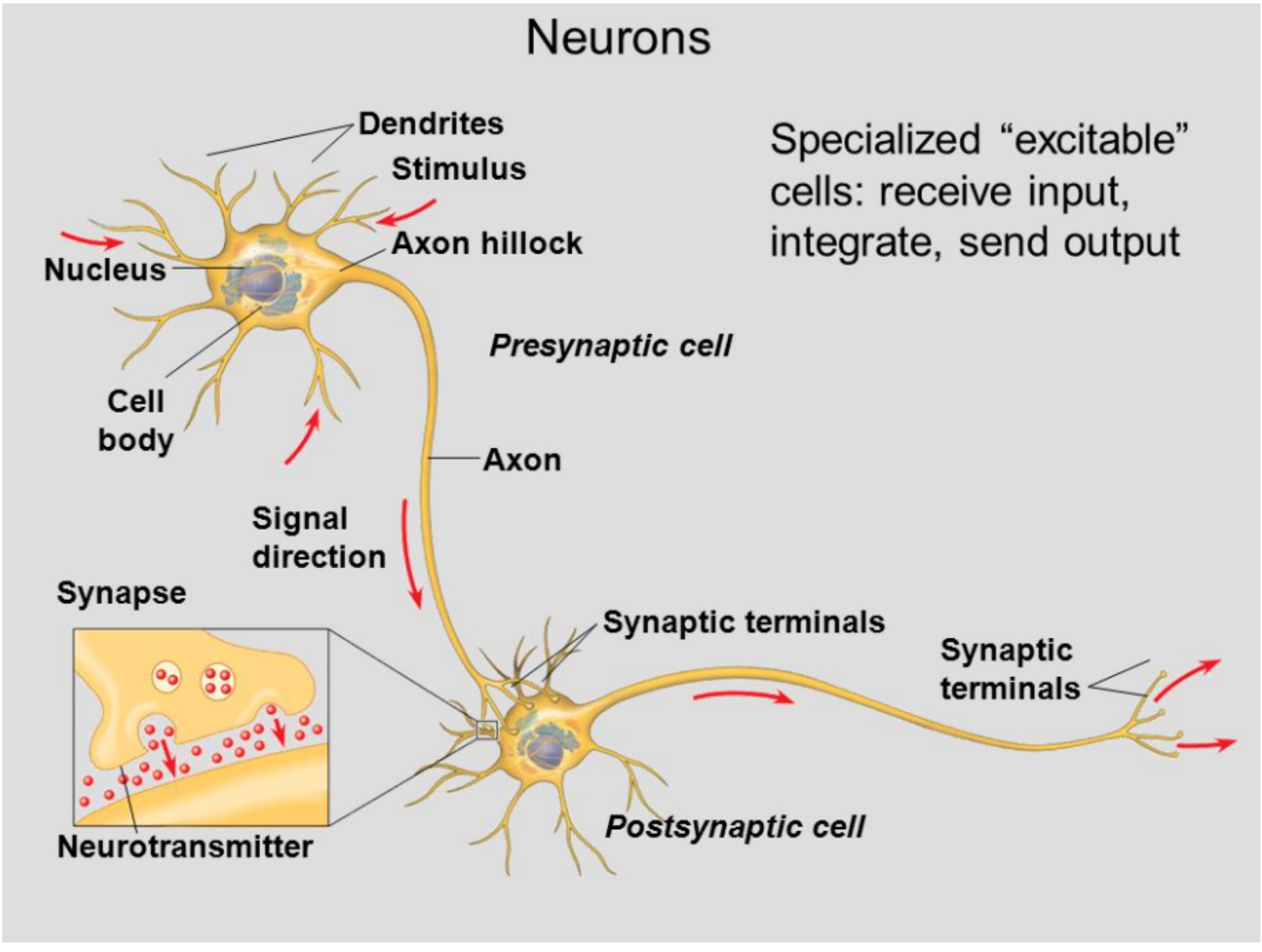
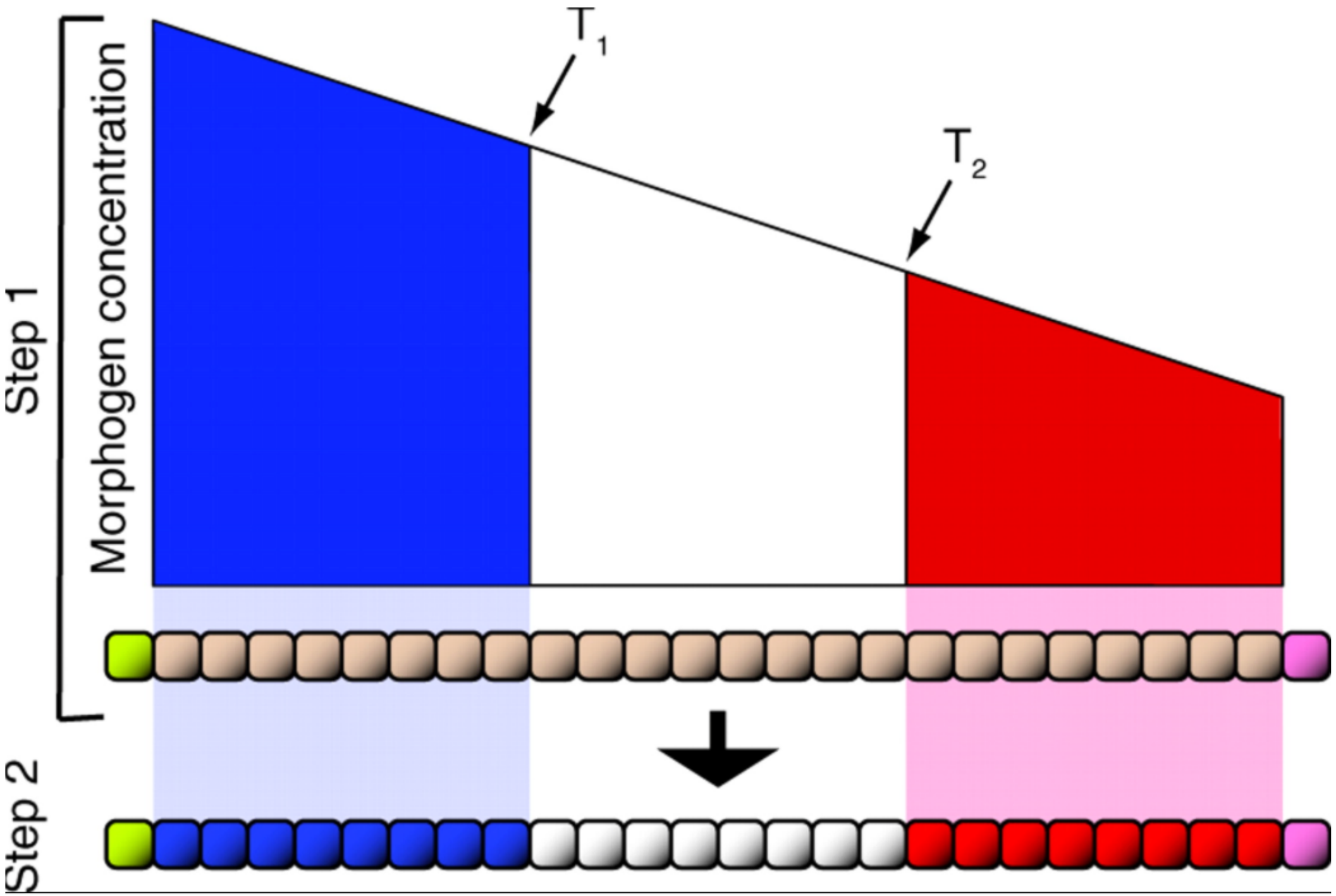
Chemical Reactions and Law of Mass Action

- The Belousov-Zhabotinsky reaction

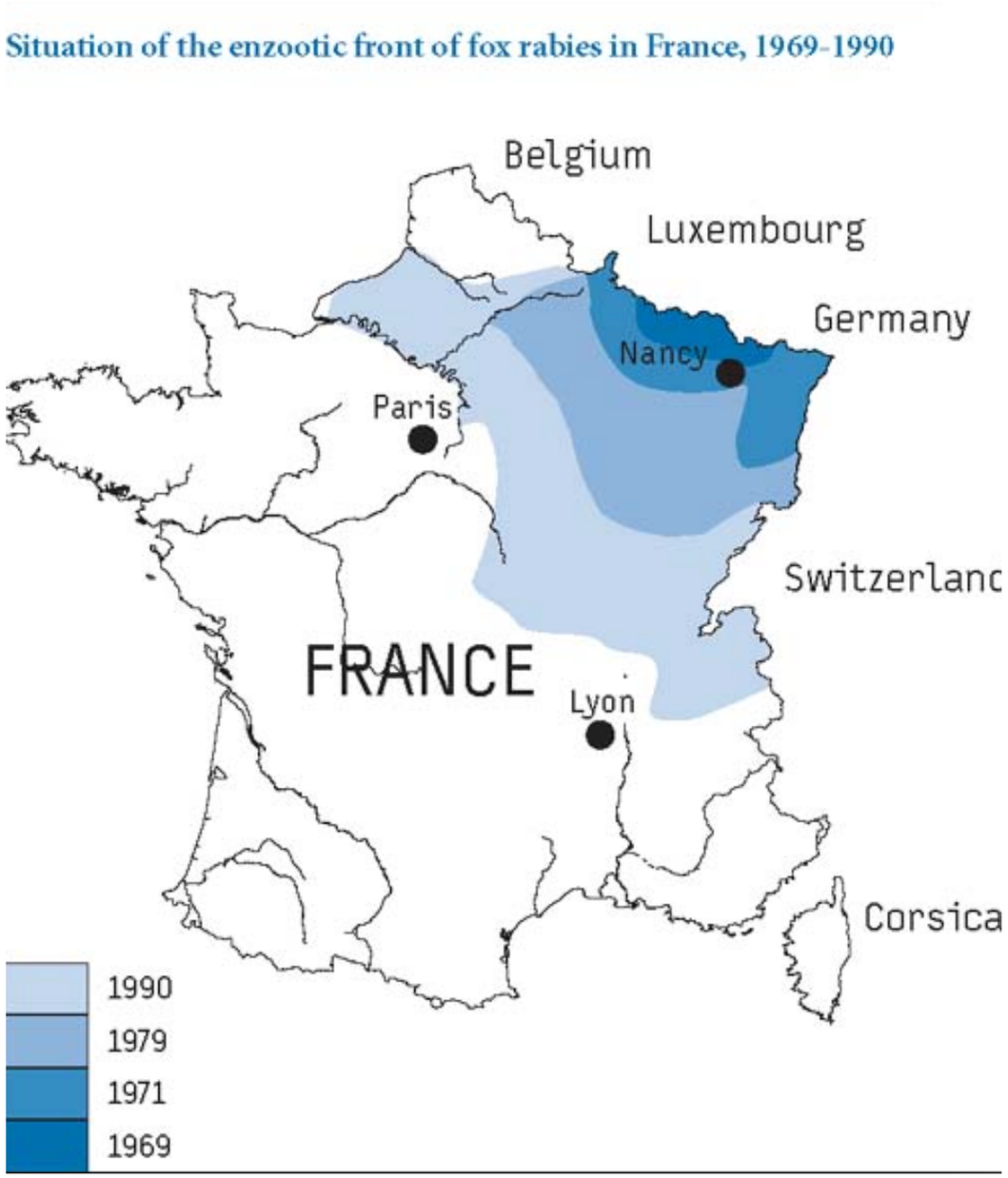
Ion Channels and Excitable Systems (Hodgkin Huxley Equations)



Morphogen Gradients: The French Flag Model

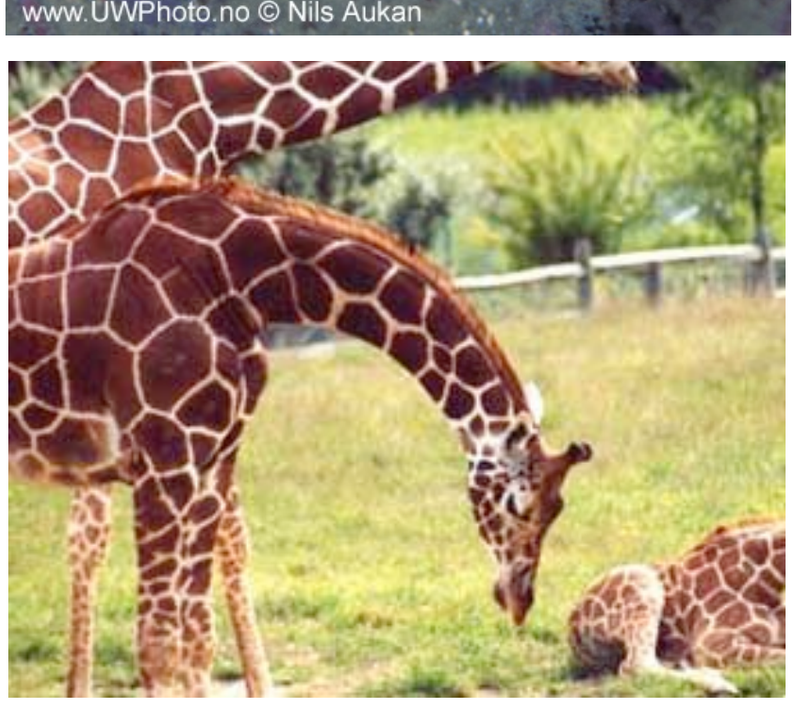


Fisher's Equation



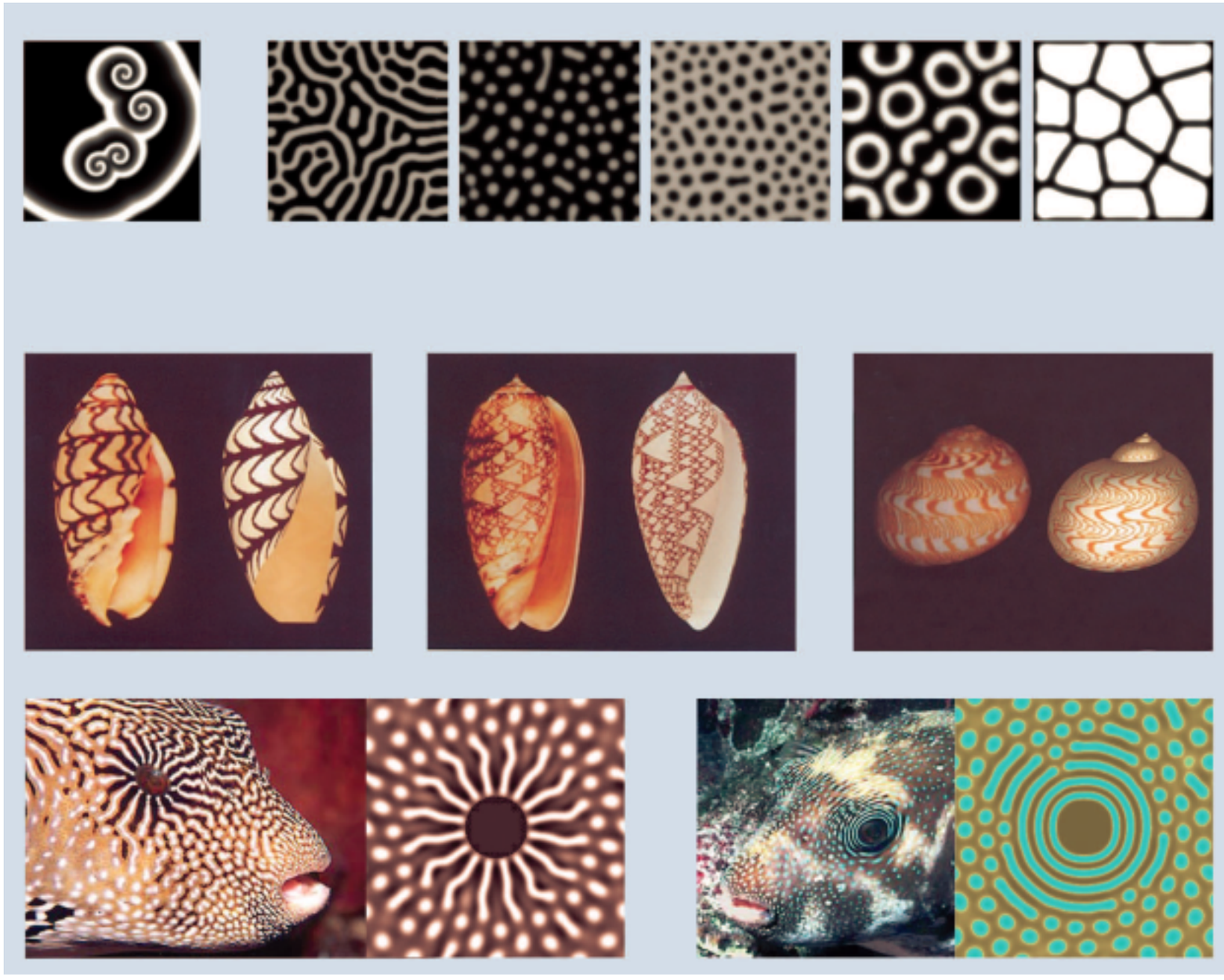
- The spatial spread of fox rabies in France

Pattern Formation



- Diffusion-driven instability and Turing systems

Pattern Formation and Domain Growth



Domain growth: multicellular spheroids

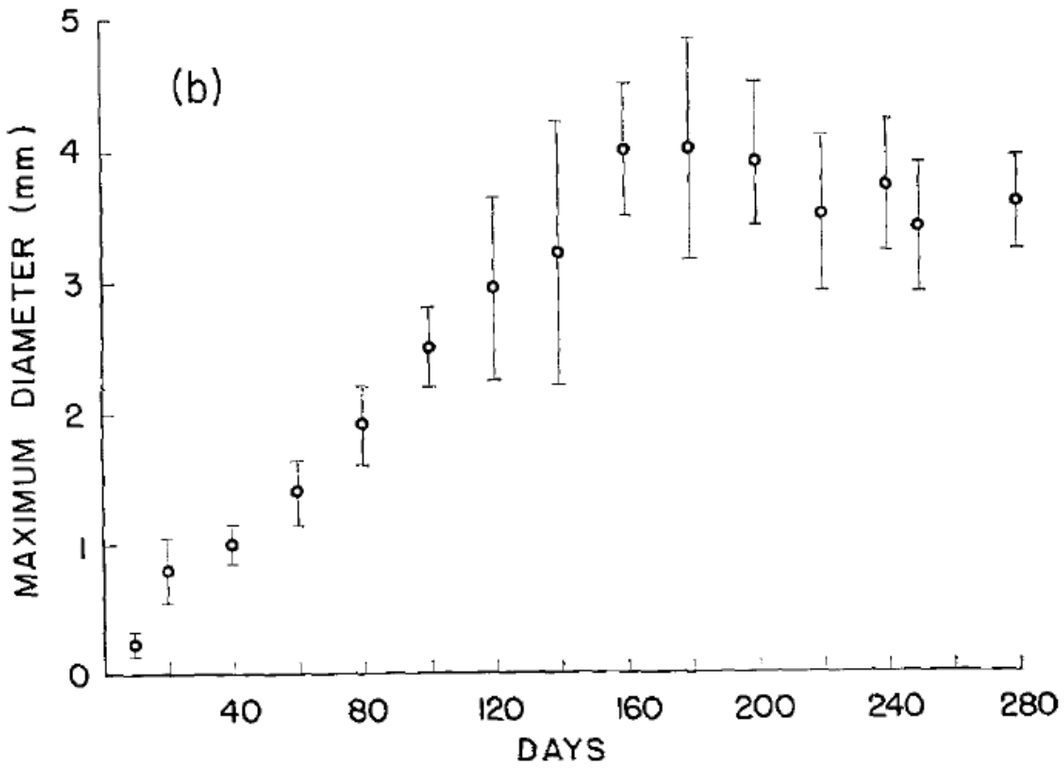
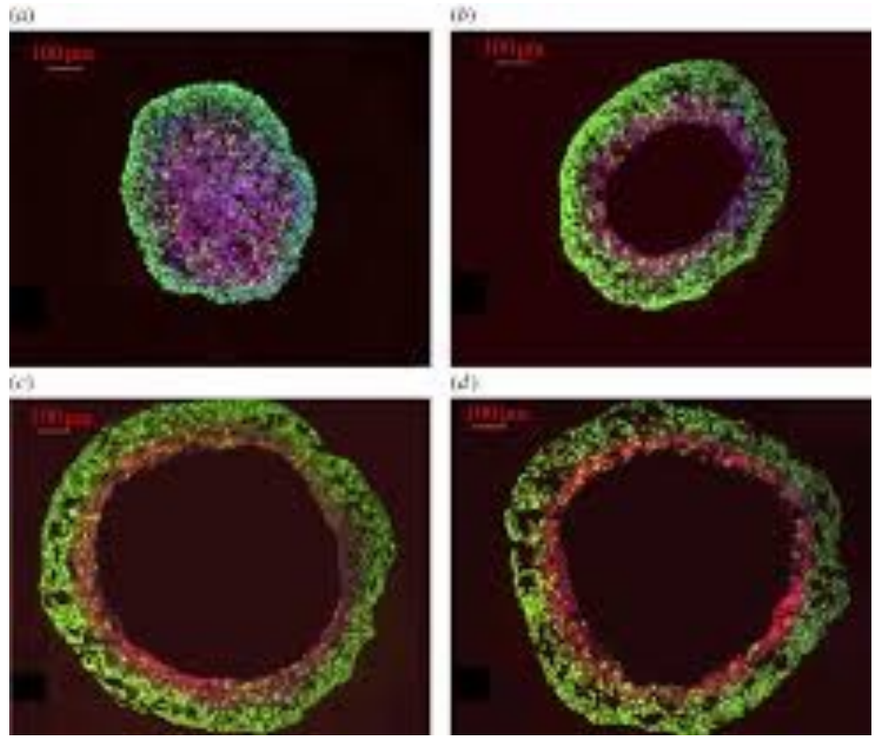
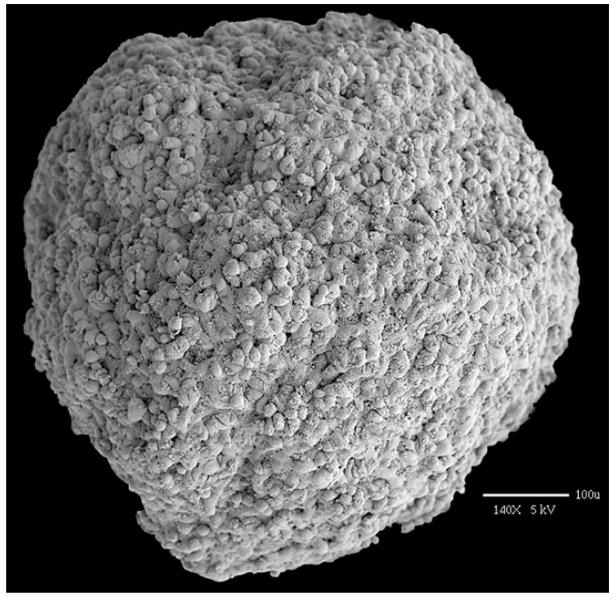
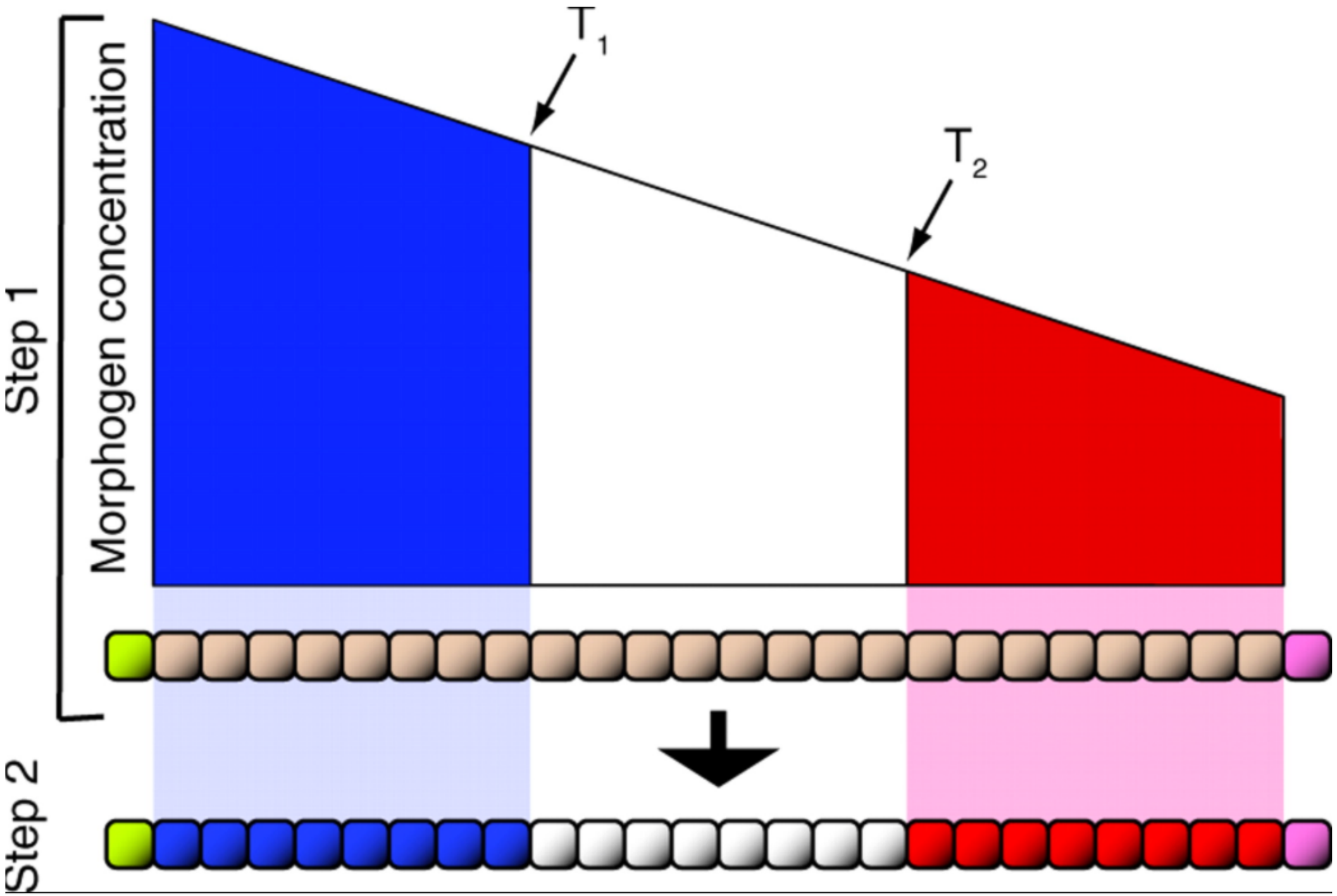


FIG. 2 *b*. Mean diameter and standard deviation of 70 isolated spheroids of V-79 cells, treated similarly to the L-5178Y cells. Very old spheroids occasionally shattered and were discarded. Therefore, mean diameter after 200 days represented approximately 30 colonies.

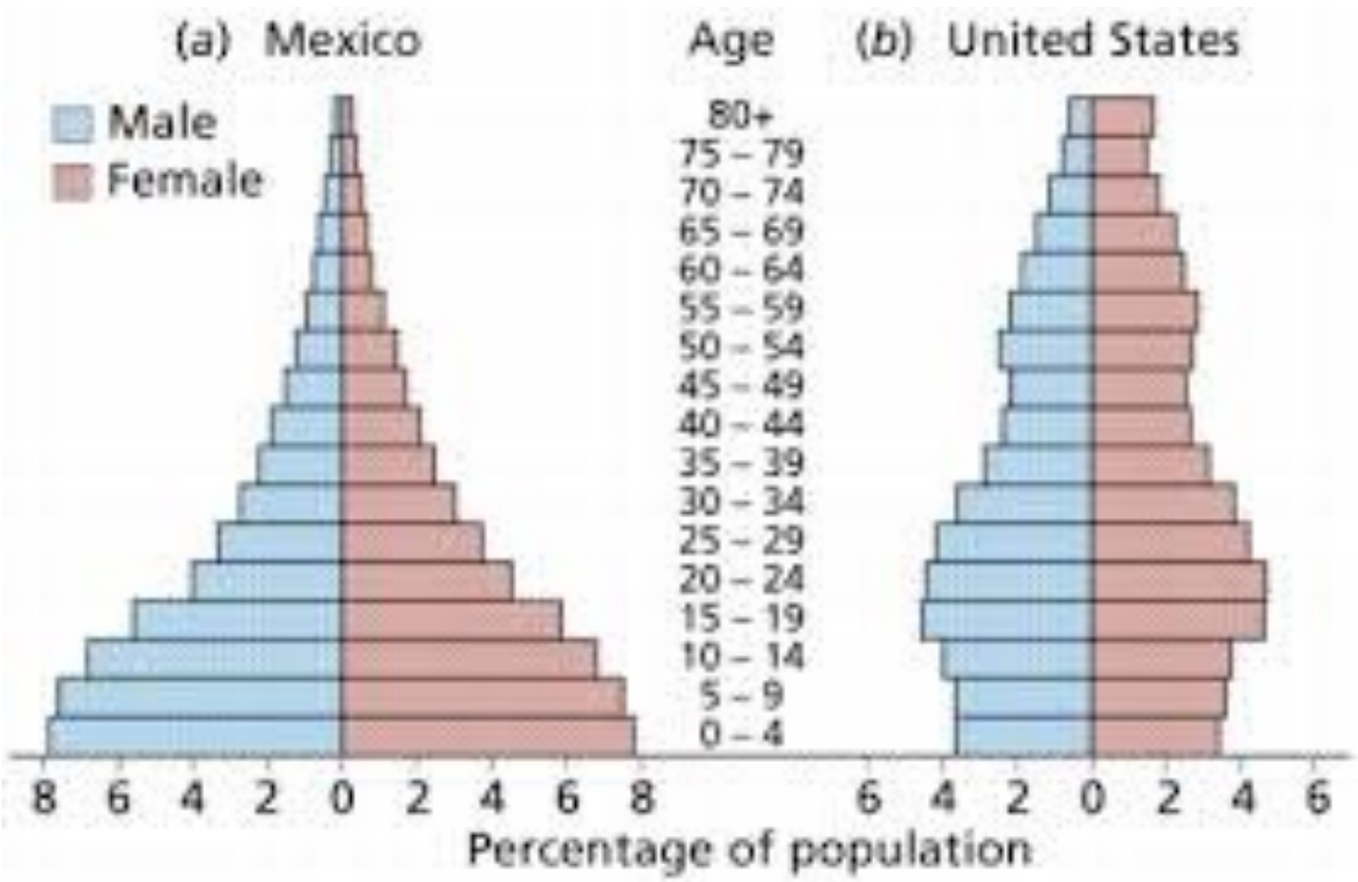




From Discrete to Continuum



Age-structured models



Course Outline

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

Lectures

- Monday 9am in L2 (weeks 1-4 and 6-7)
- **Tuesday 1pm in L1 (weeks 2 and 3)**
- **Tuesday 3pm in L2 (week 7)**
    - Thursdays 2pm in L1 (weeks 1-4 and 6-8)

- 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