BIO 120 B: Cell & Molecular Biology

Lecture 0 — Course Overview

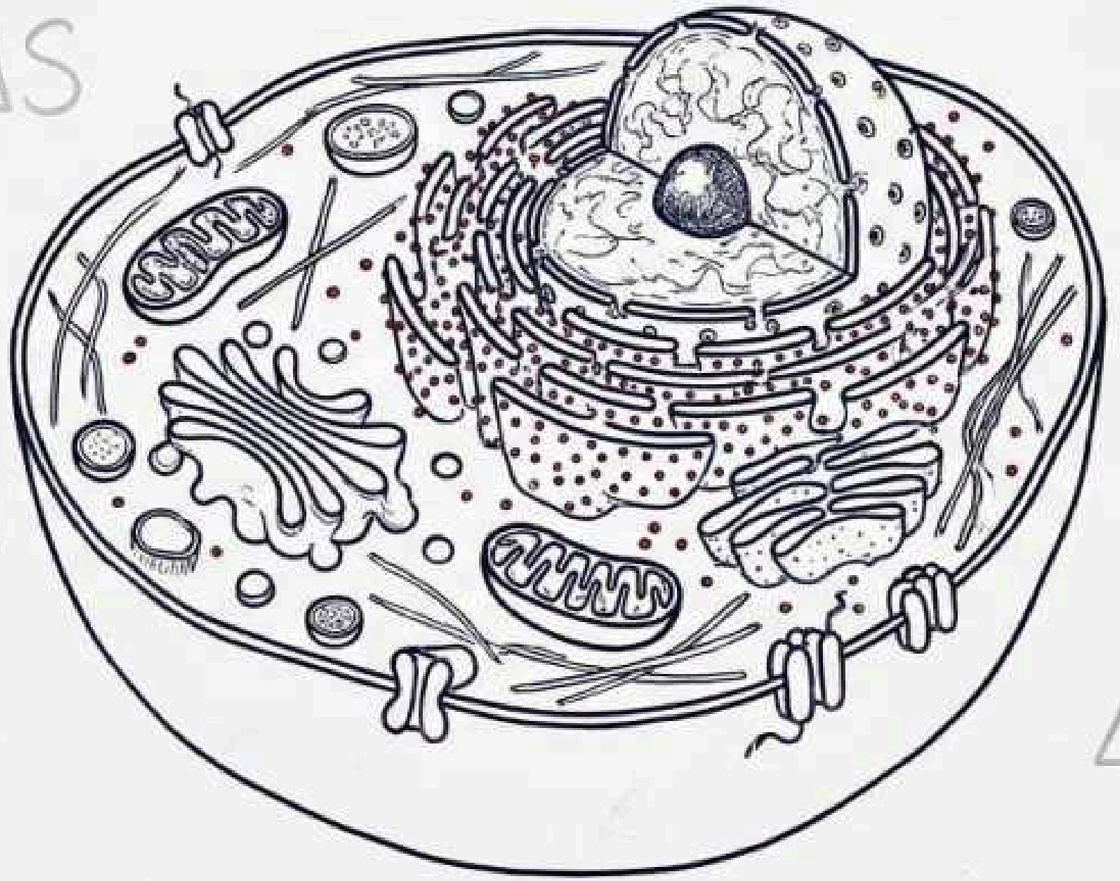
Welcome to the Anderson Academy.

$$\Delta G = \Delta H - T\Delta S$$

$$K_{eq} = e^{-\Delta G^\circ / RT}$$

$$ATP + H_2O \rightleftharpoons ADP + P_i$$

$$J = -D \cdot \frac{dc}{dx}$$



$$J = -D \frac{dc}{dx}$$

$$V_m = \frac{RT}{F} \ln\left(\frac{[K^+]_{out}}{[K^+]_{in}}\right)$$

$$\Delta V = V_{rest} + IR$$

[¶ 0.1]

Feedback Welcome



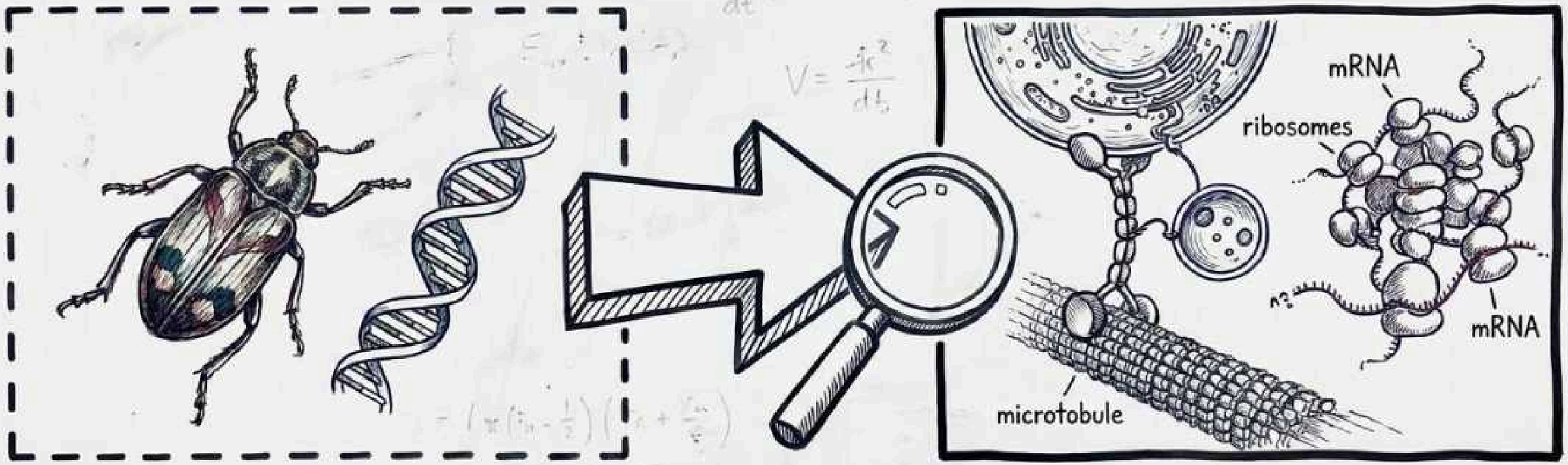
Email: garyanderson@mail.grokbot.com



X / Twitter: @garyanderson

The Academy: Free, ~1-hour university courses.

[¶ 0.2]

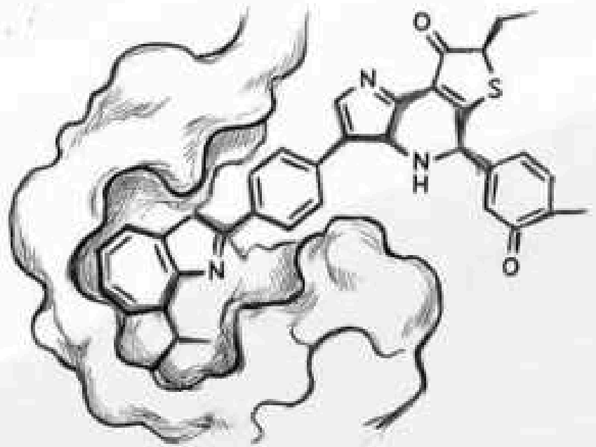


BIO 101 B (Foundation):
The Cell, Energy, Heredity, Evolution, Ecology.

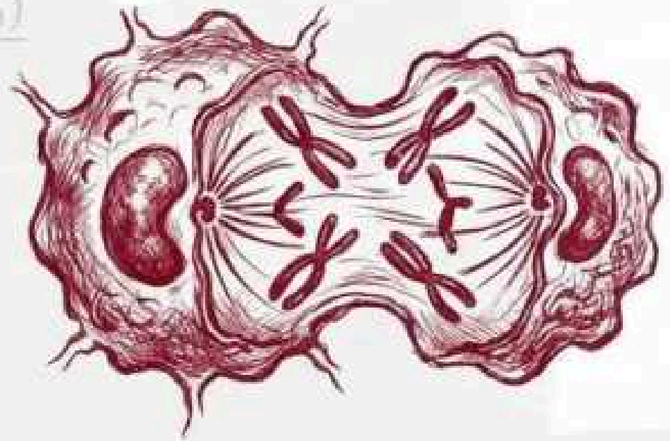
BIO 120 B (This Course):
Inside the cell. How the machinery works.

Why study the cell at this depth?

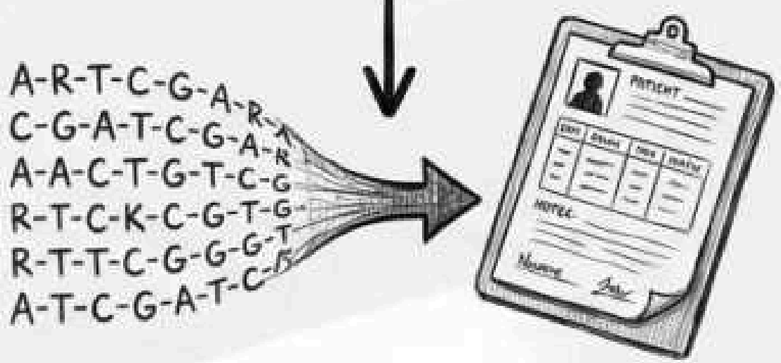
[¶ 0.3]



Targeting: How drugs reach molecular targets.

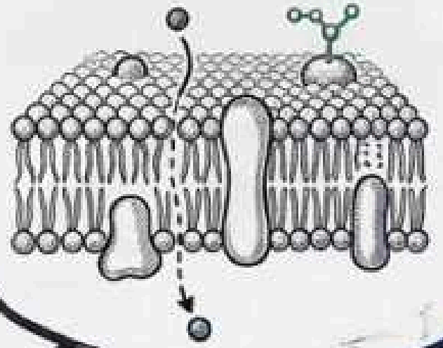


Pathology: Why cancer cells persistently divide.

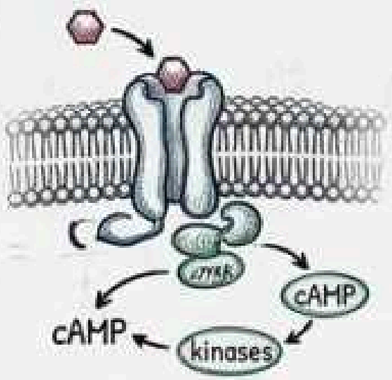


Genetics: How genetic code alters clinical treatment.

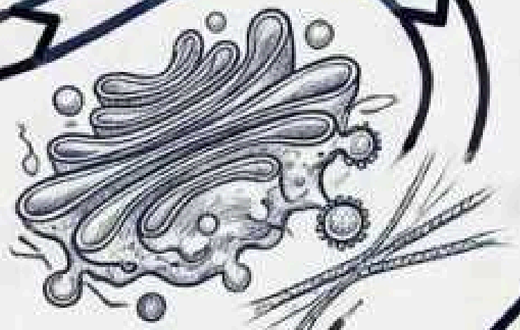
[¶ 0.4]



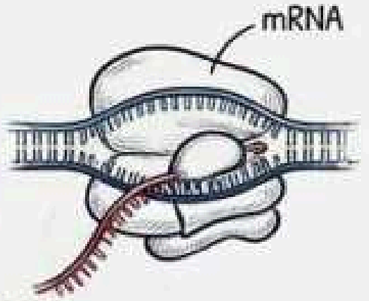
L1: Membrane
(Crossing substances)



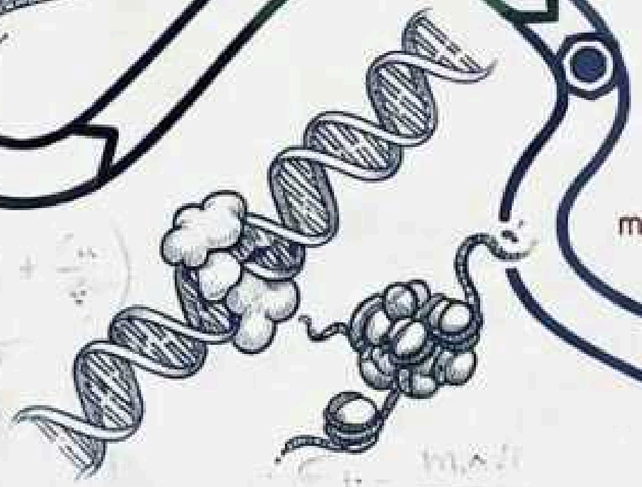
L3: Signals
(Receiving & relaying)



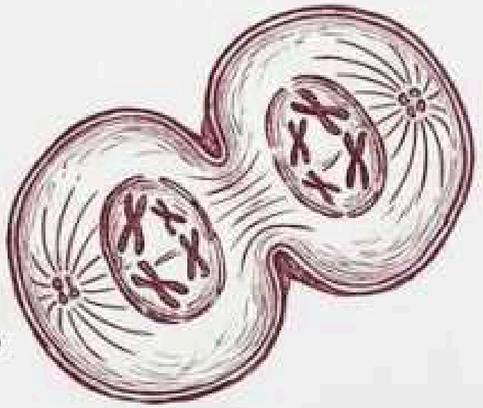
L2: Organelles
(Traffic & protein skeleton)



L4: DNA
(Copy, repair, pack)



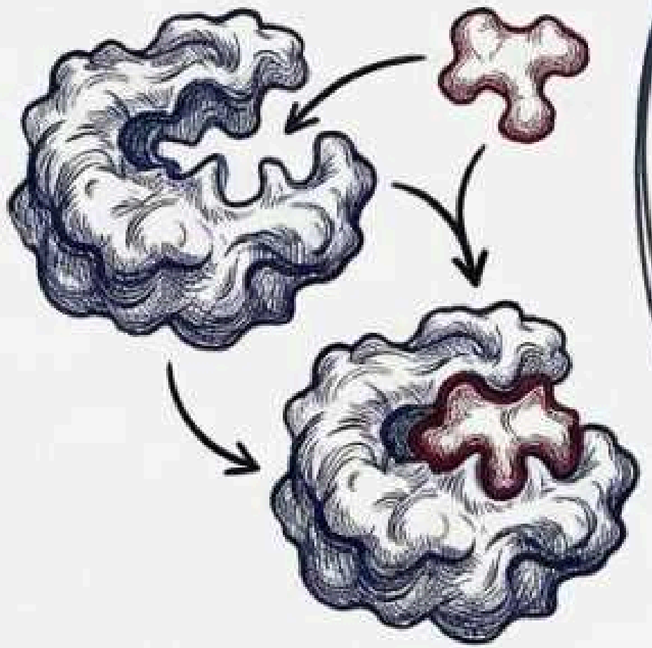
L5: Expression
(Transcription to translation)



L6: The Cell Cycle
(Cancer & molecular toolkit)

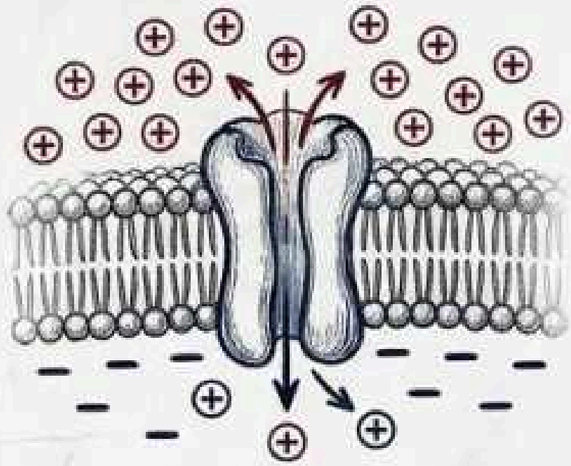
1. Structure & Function

A molecule's **shape** decides its capability.



2. Gradients

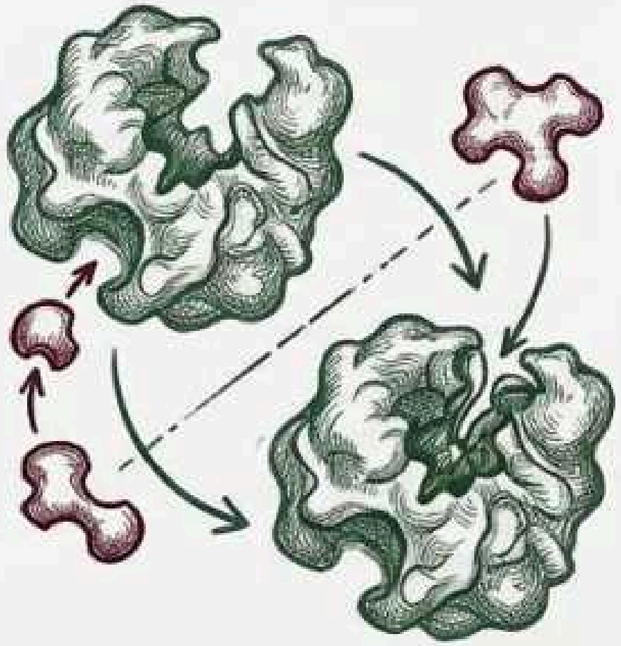
Energy stored as concentration and charge differences.



$$\mathcal{E}_{ion} = \frac{RT}{zF} \ln\left(\frac{[C]_{out}}{[C]_{in}}\right)$$

3. Control

No accidents; every process has **switches.**



[¶ 0.6]

$$1\,\mu m \times \frac{10^{-6}\,m}{1\,\mu m} \times \frac{10^{9}\,nm}{1\,m} = 1000\,nm$$

Expected Base

Concept of a "Molecule"
+ BIO 101 B concepts.

(No advanced chemistry required.
We build on what is useful).

+

Our Approach

- Metric Units exclusively.
- Calculations walked through together, step-by-step.

=



[¶ 0.7]

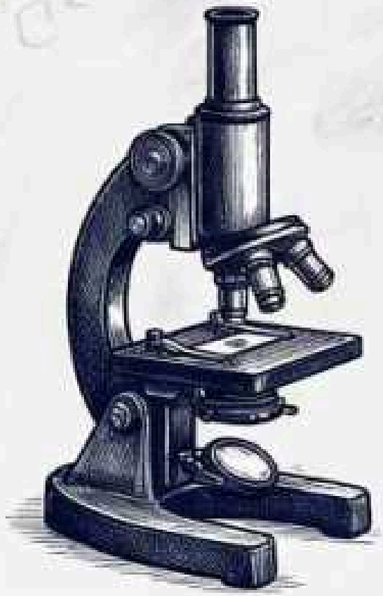


(Math verified by code)

Find an error? Mistakes can slip through.
Use the paragraph numbers (e.g., ¶ 0.7)
to report the exact location.

[¶ 0.8]

Education



For Education Only.
Science evolves quickly; uncertain or debated details will be clearly flagged.

Medical



Not Medical Advice.
Cannot diagnose or treat anything. Consult a qualified clinician for health concerns.

[¶ 0.9]

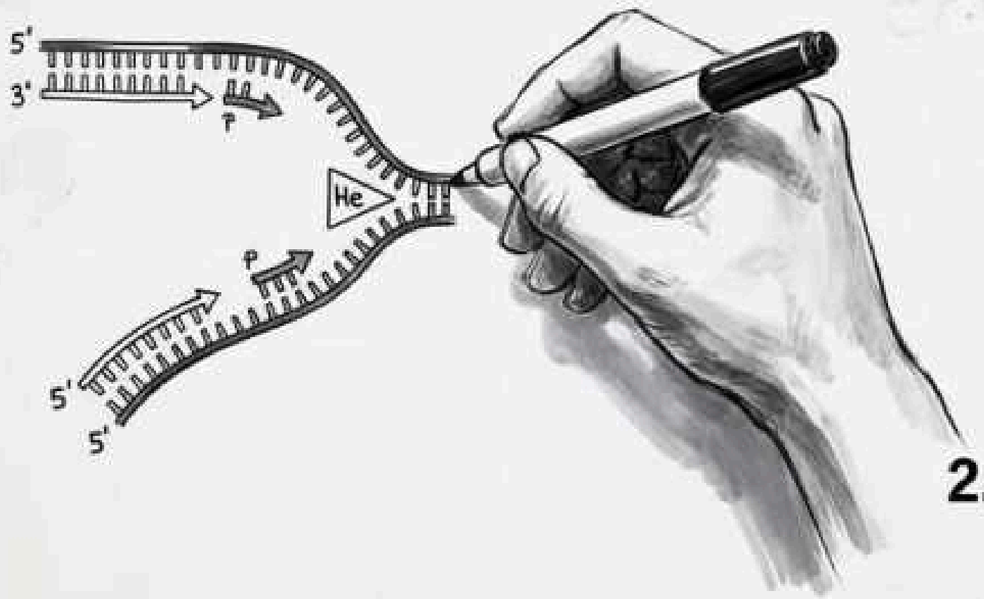
1. **Consume**
   Watch the video, read the transcript, or do both.

2. **Navigate**
   Paragraph numbering perfectly maps to concepts (e.g., 3.5 = Lecture 3, Paragraph 5).

3. **Assess**
   - Quizzes: 5 questions per lecture (answer keys point back to specific paragraphs).
   - Final Examination: 50 standard questions + 6 long-form "Tripos" questions.

[¶ 0.10]

1. Sketch Blind: Draw the system from memory immediately immediately post-lecture (e.g., the membrane, signal pathway, replication fork).



2. Compare: Check your blank-page sketch against the transcript.

3. Review: The exact spots you went blank reveal precisely what you need to study.

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$\Delta G = \Delta H - T\Delta S$

Fick's Law: $J = -D\frac{dc}{dx}$

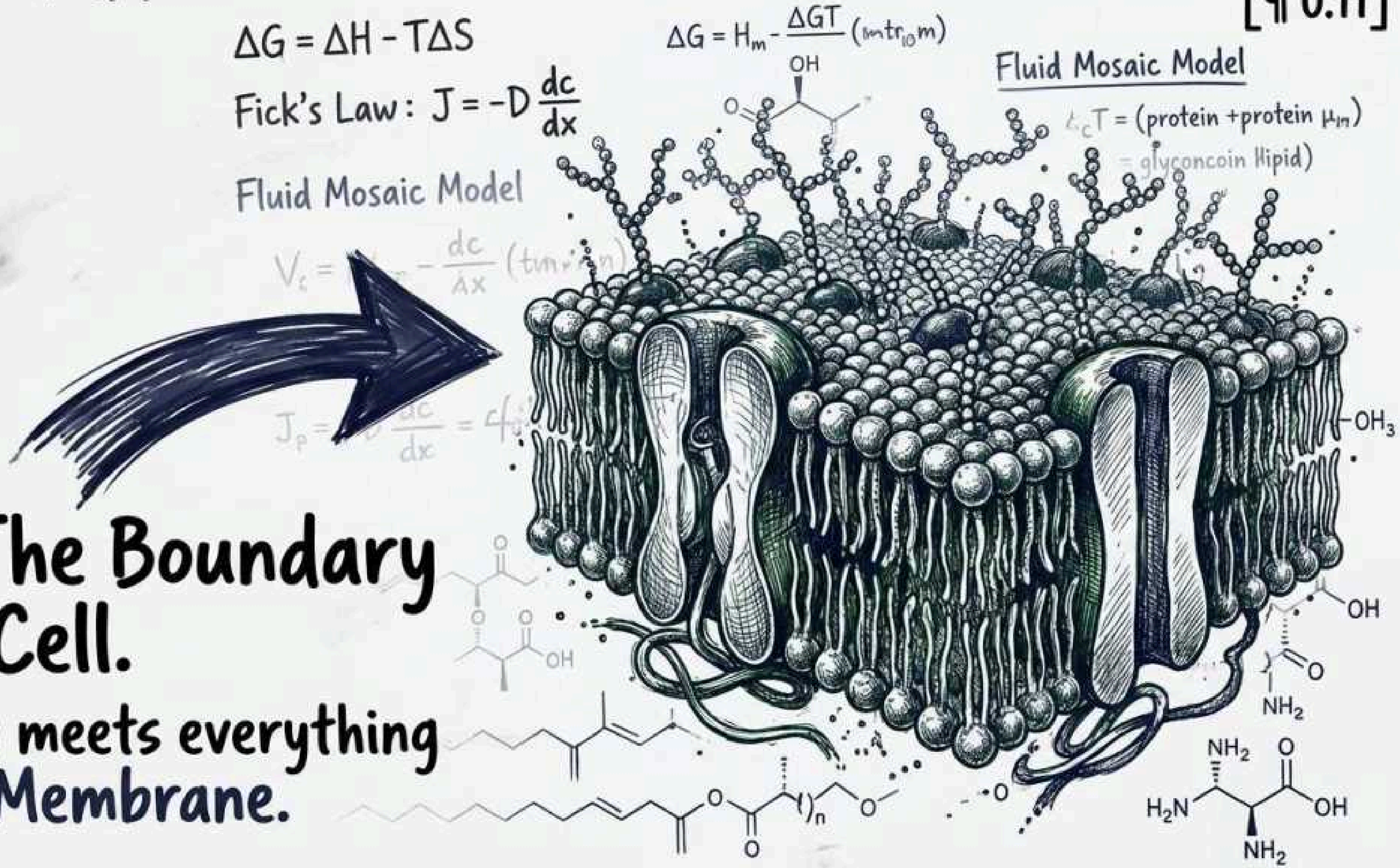
Fluid Mosaic Model

$\Delta G = H_m - \frac{\Delta GT}{(tm\,tr_{10}\,m)}$

Fluid Mosaic Model

$\mu_c T = (\text{protein} + \text{protein}\ \mu_{tm})$

= glyconcoin lipid)



Next: The Boundary of the Cell.

Where life meets everything else: The Membrane.