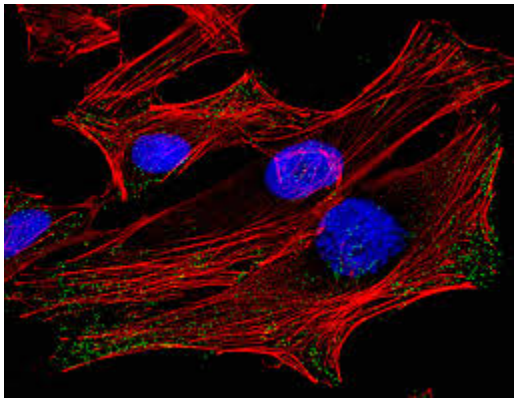
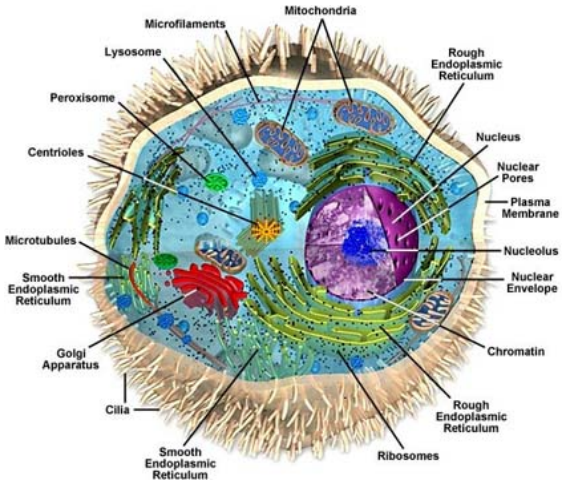
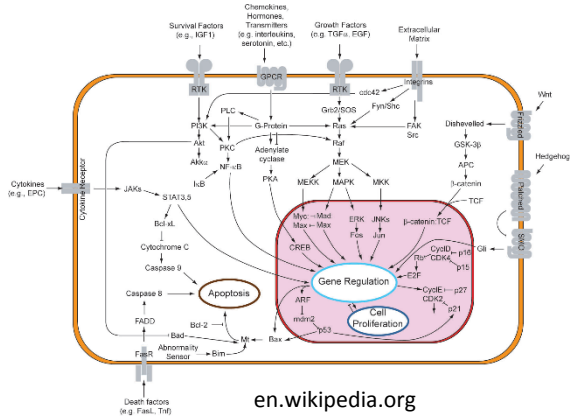


blindflaneur.com



www.mcb.ucdavis.edu

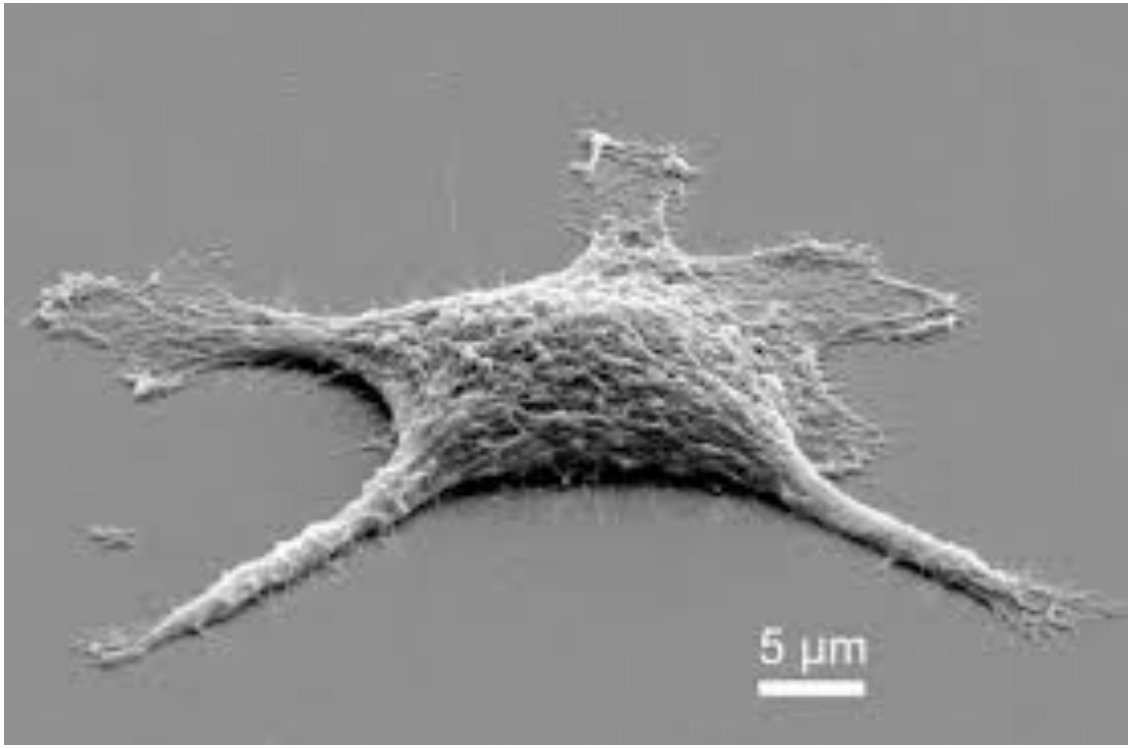


en.wikipedia.org

A slice of cell and molecular biology: A cell signaling and cell communication primer

Vassie C. Ware, Ph.D.

Biological Sciences, Lehigh University



www.dailymail.co.uk

What's going on inside this cell? How does it respond to its environment?

Cell Signaling from a Lehigh Perspective

http://www.youtube.com/watch?v=EgxUL91VXgo

http://www.youtube.com/watch?v=k0b-wIHNOwY

Lecture Outline:

I. Overview of the Cell

II. Overview of the Cell Signaling Challenge

III. Common themes among many different cell types

IV. Different types of signals: electrical, chemical, mechanical

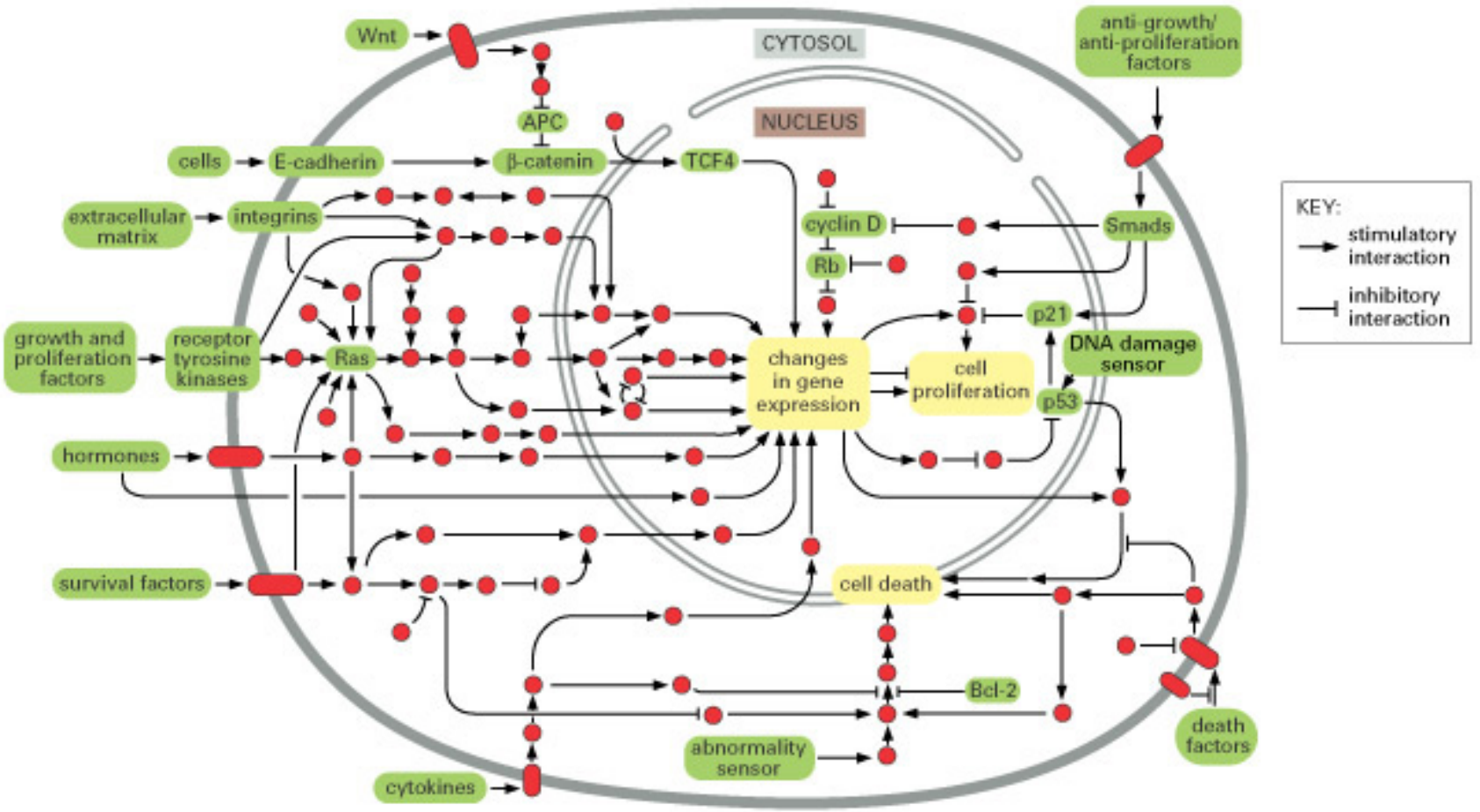
V. External stimulus → membrane interactions → intracellular cytoplasmic events → gene expression changes

VI. Membrane composition and membrane function

VII. Gene expression events: Transcription (RNA synthesis)
Translation (protein synthesis)

VIII. Summary

Cells Respond in Diverse Ways to External Stimuli



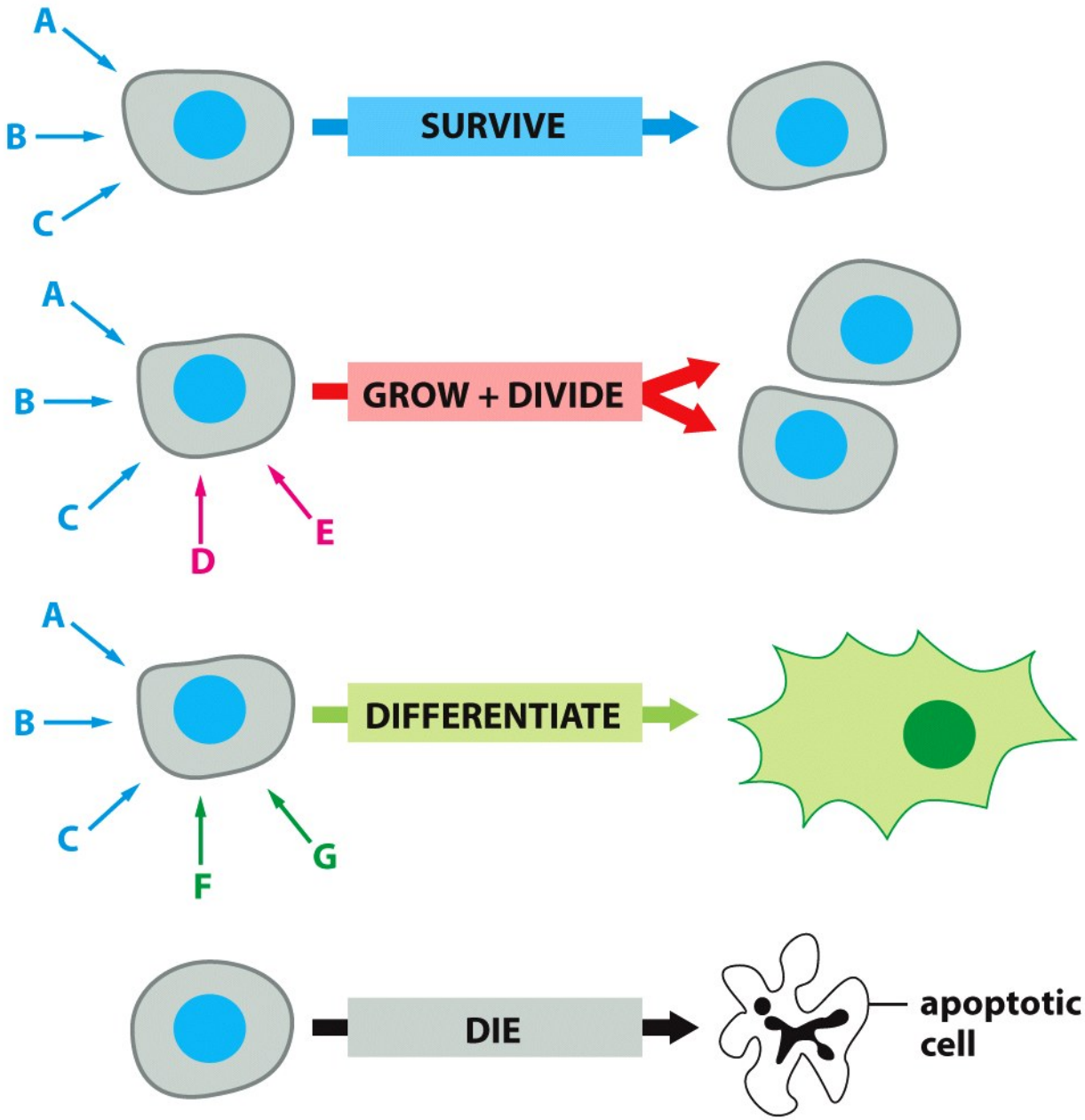


Figure 16-6 *Essential Cell Biology* (© Garland Science 2010)

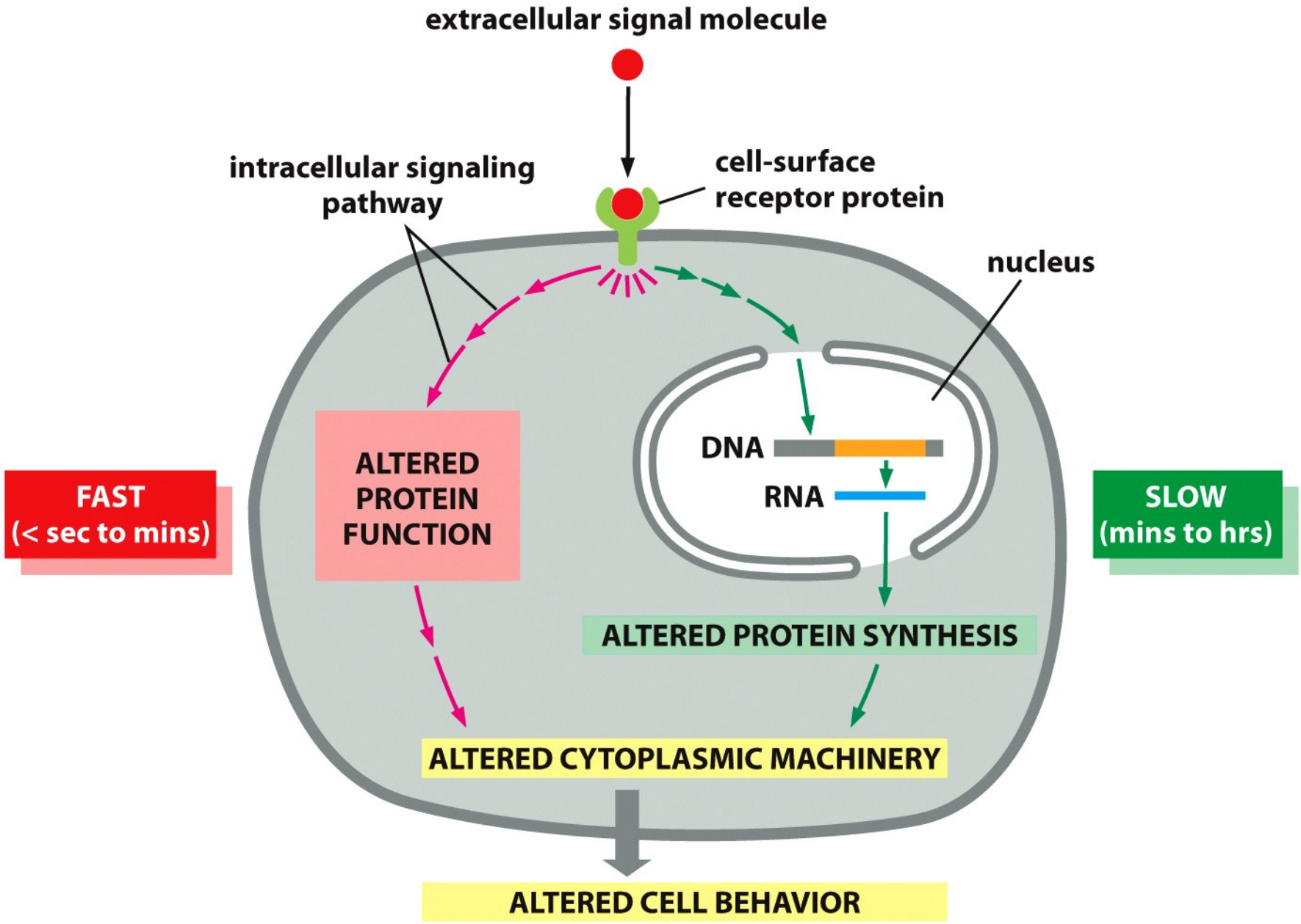


Figure 16-7 *Essential Cell Biology* (© Garland Science 2010)

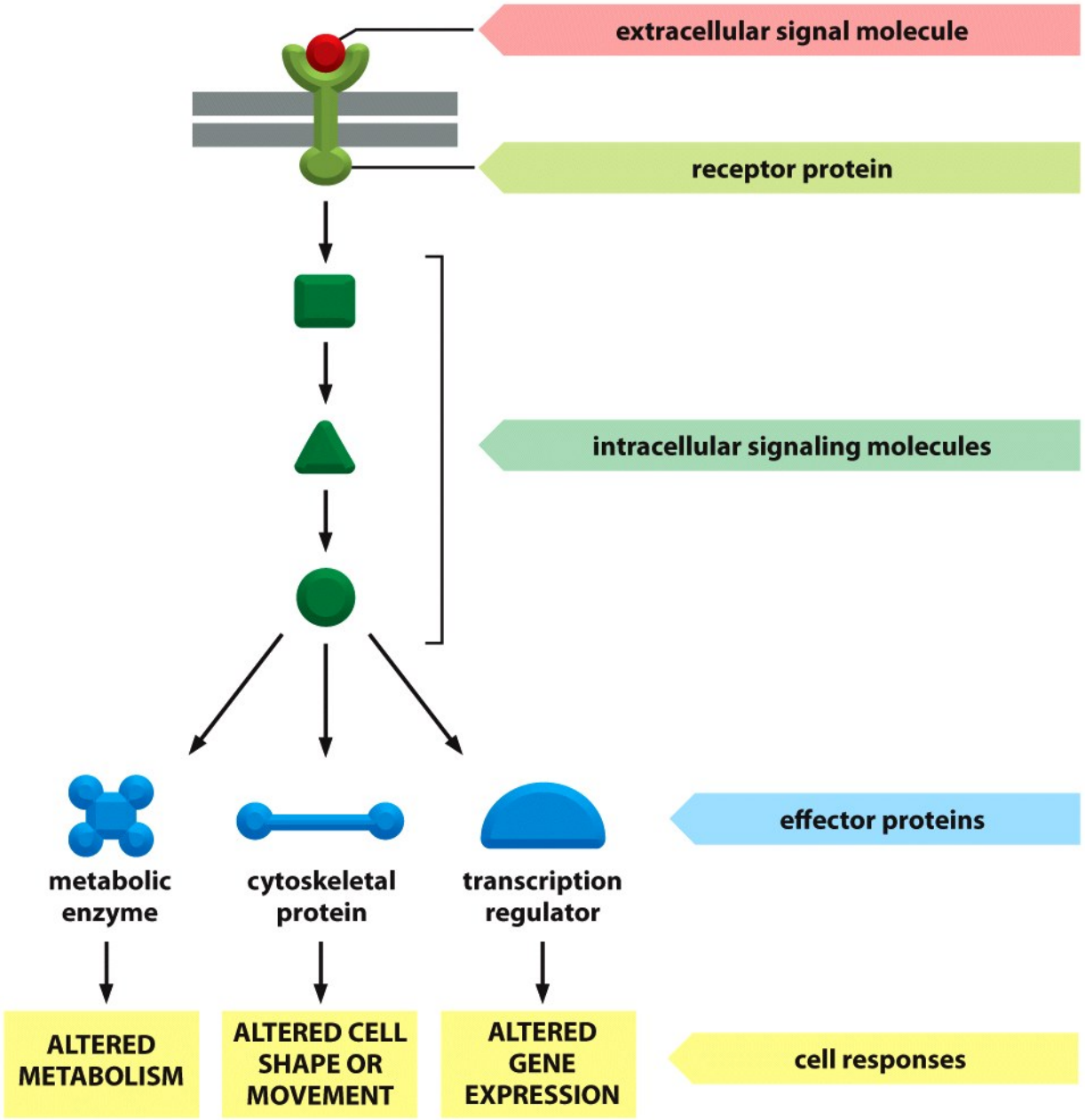
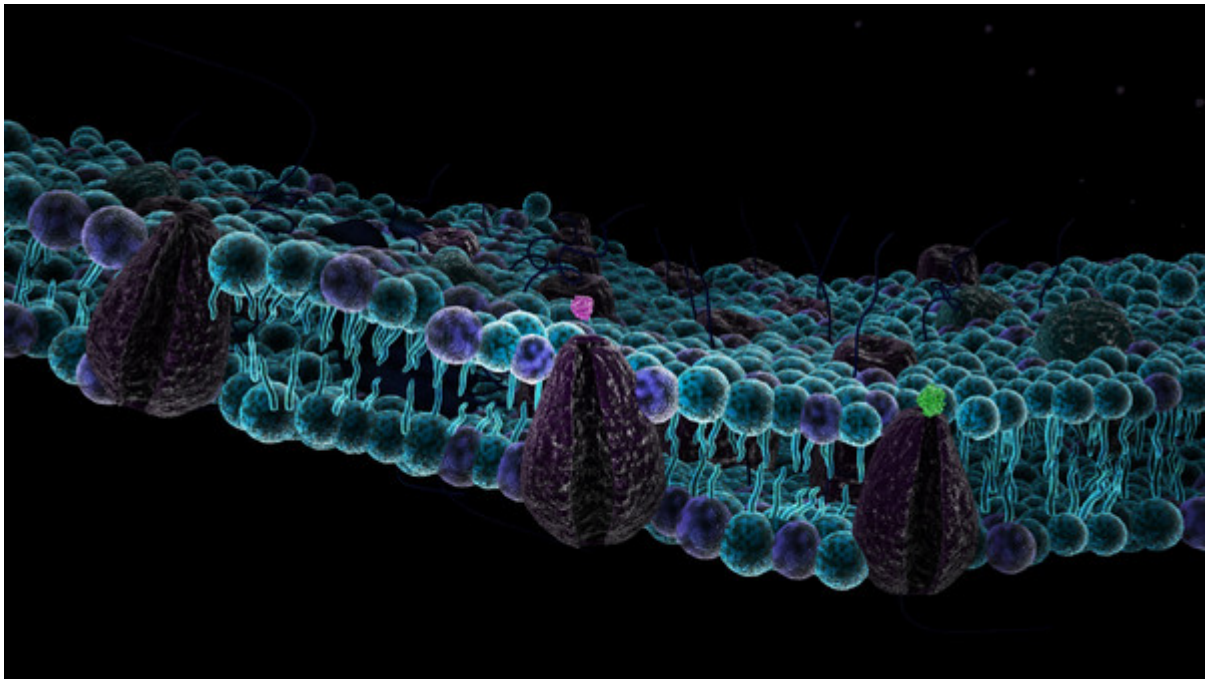


Figure 16-12 *Essential Cell Biology* (© Garland Science 2010)

CELL MEMBRANES



- Semi-permeable to ions and organic molecules (allows selective influx and efflux)
- Protects cell from surroundings; responds to surroundings
- Comprised of phospholipids and embedded proteins
- Protein composition is most variable part between different types of cells

Phospholipids

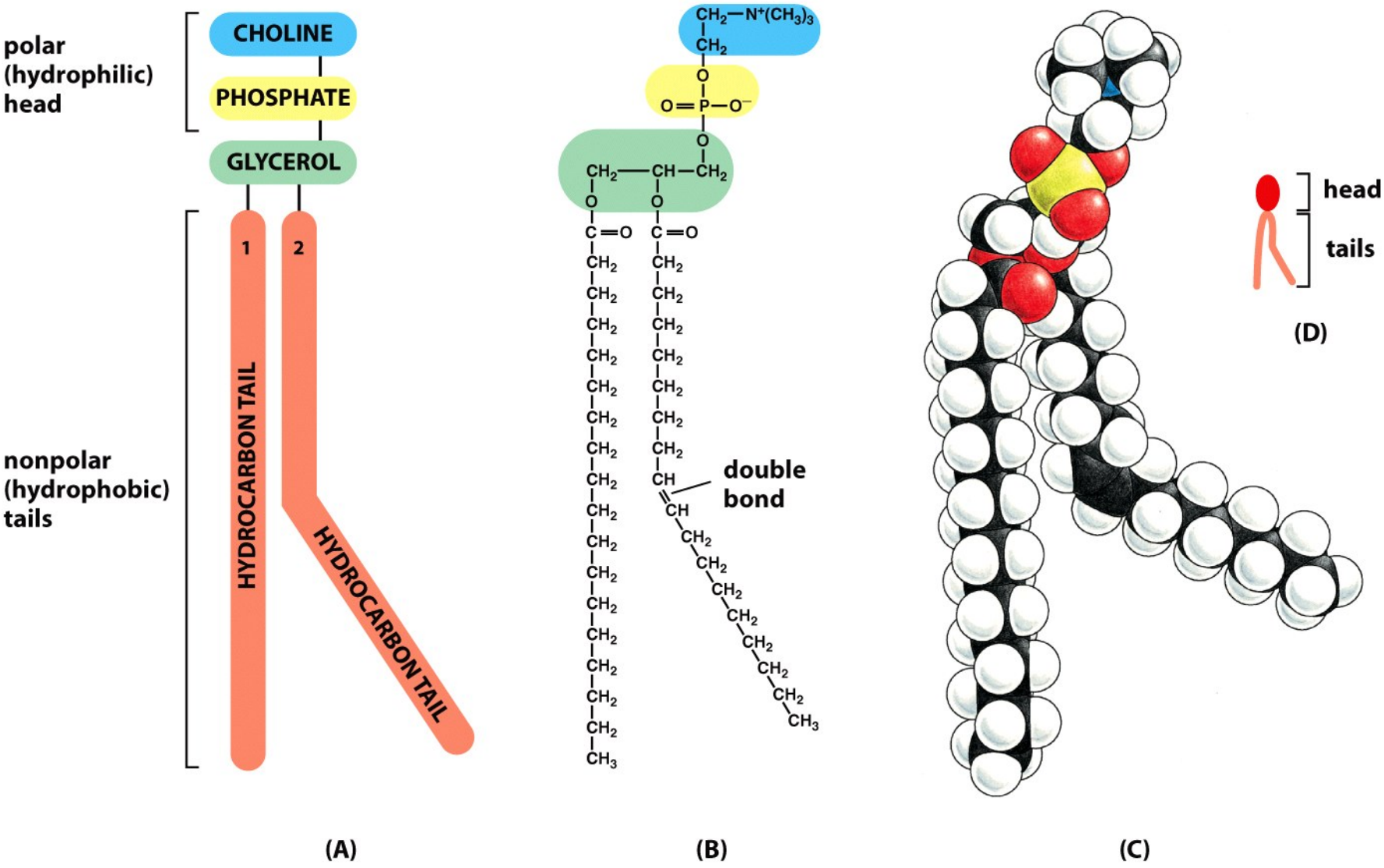


Figure 11-6 *Essential Cell Biology* (© Garland Science 2010)

Cell Membrane showing orientation of phospholipids in the bilayer

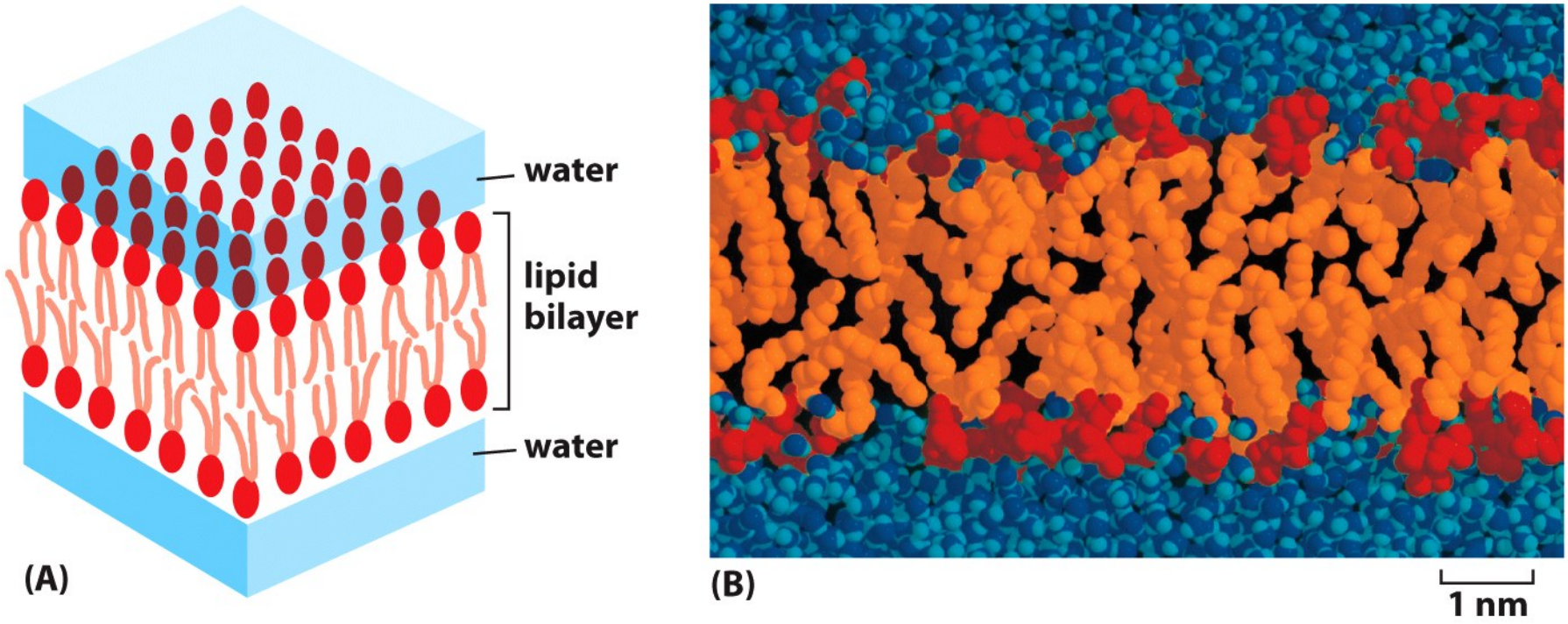
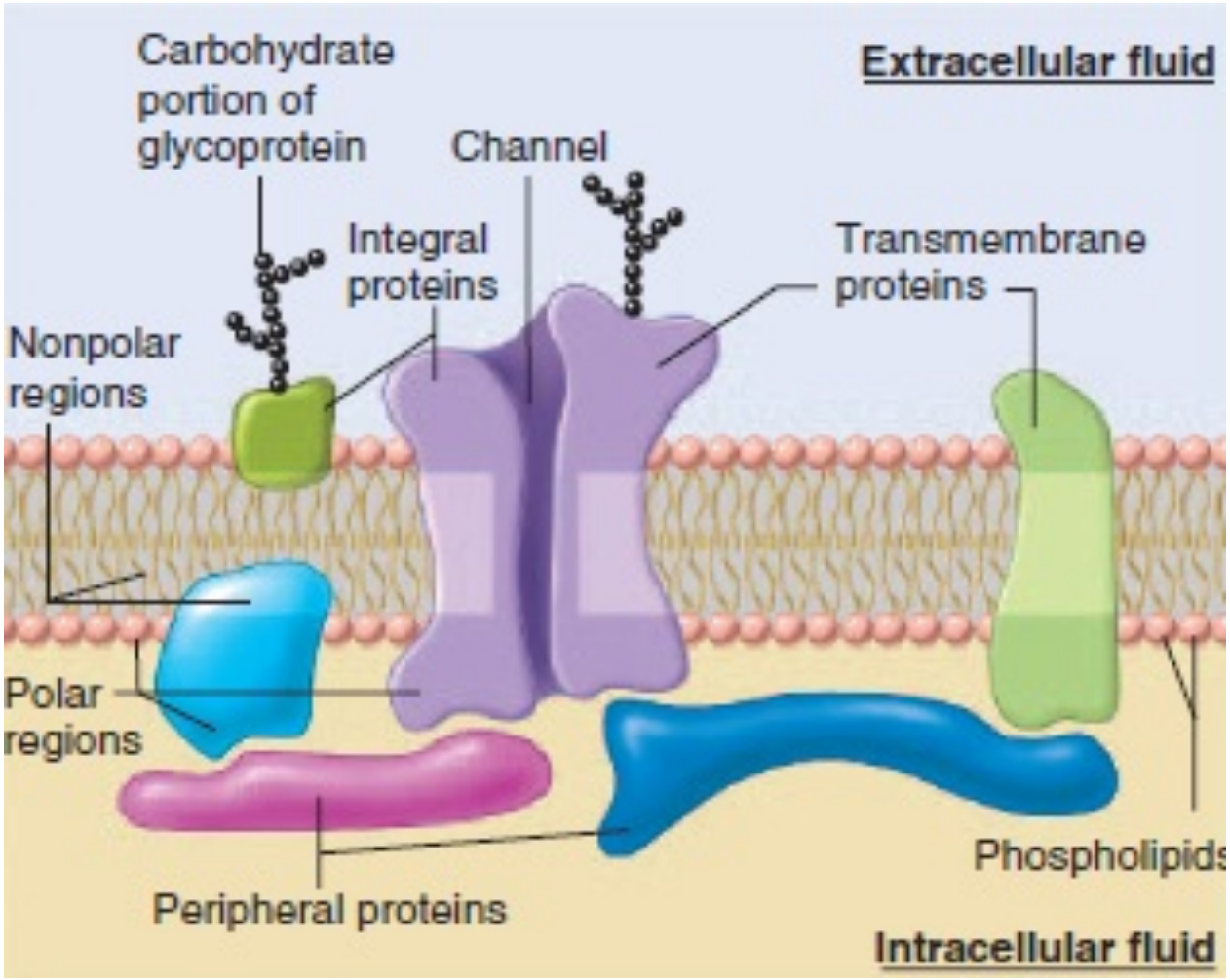


Figure 11-11 *Essential Cell Biology* (© Garland Science 2010)

Protein Components of Membranes



http://science-naturalphenomena.blogspot.com/2011/12/cell-membrane-structure.html

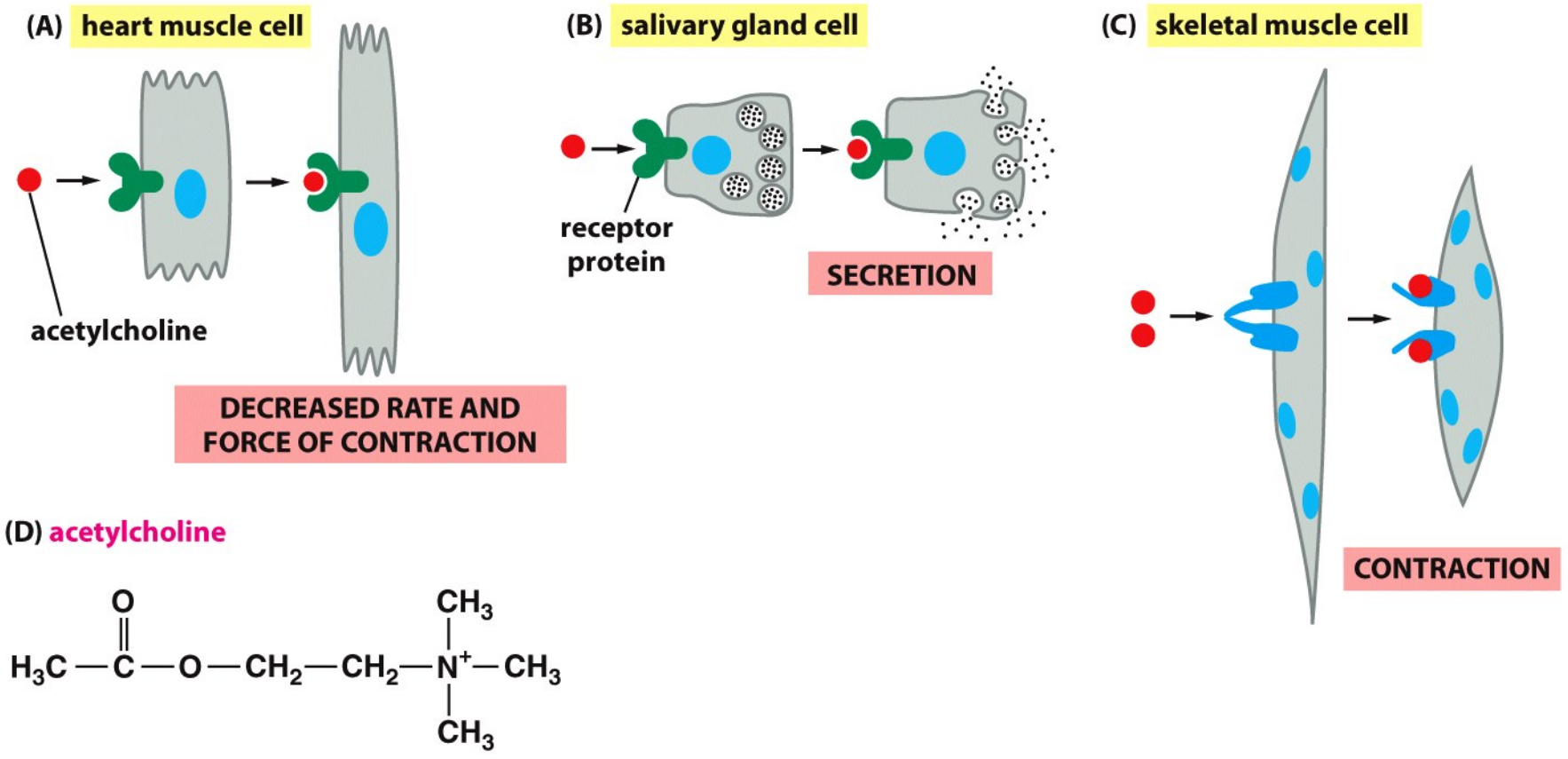
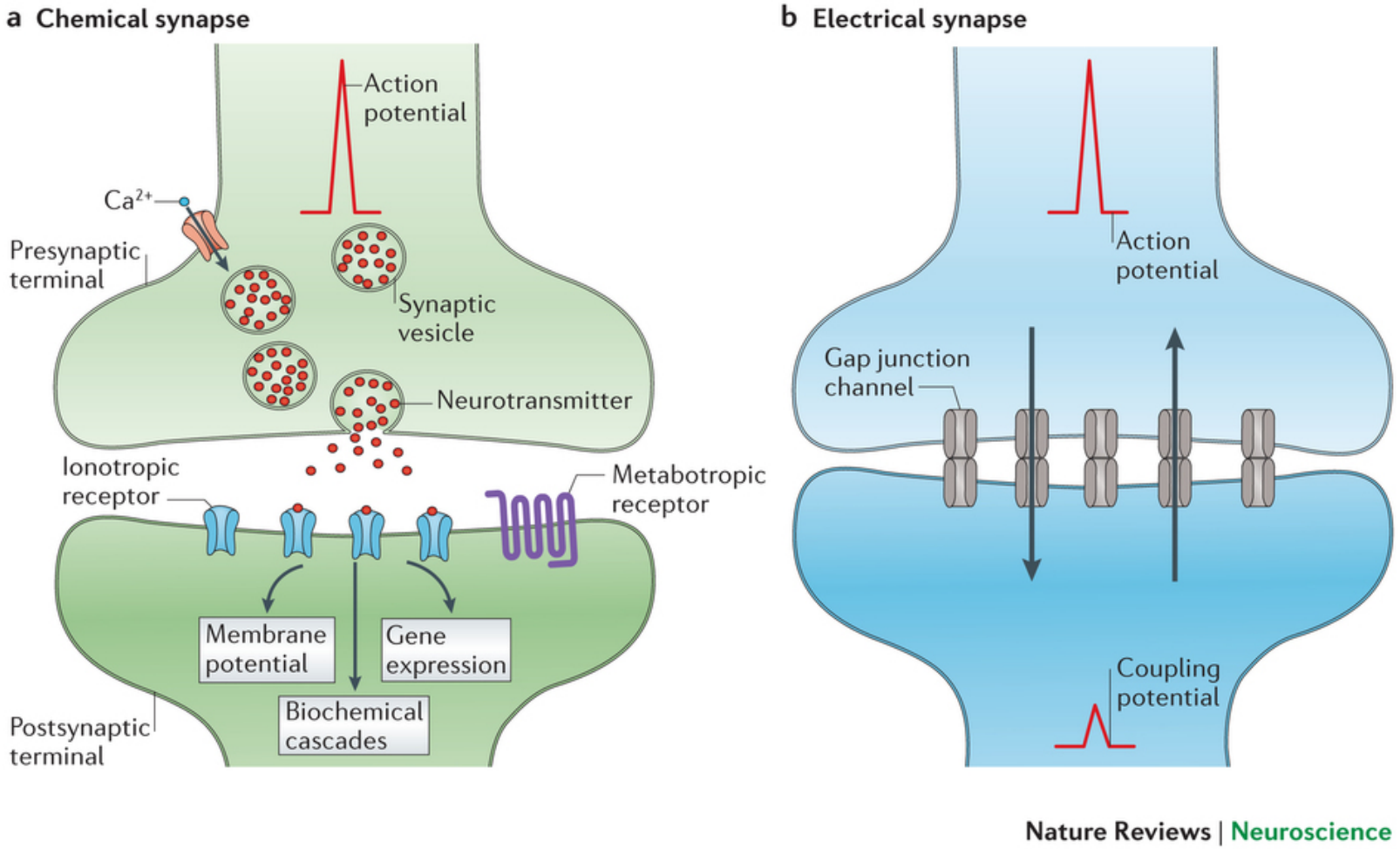


Figure 16-5 *Essential Cell Biology* (© Garland Science 2010)

Neuronal Communication and Signaling



www.nature.com

http://www.dnalc.org/resources/3d/cellsignals.html

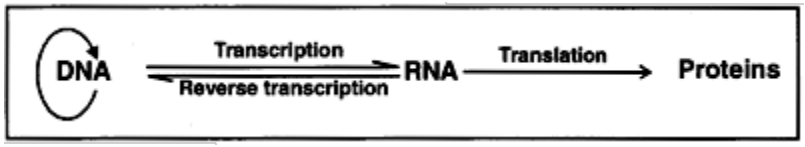
Optional video to reinforce signaling themes

Gene Expression Events

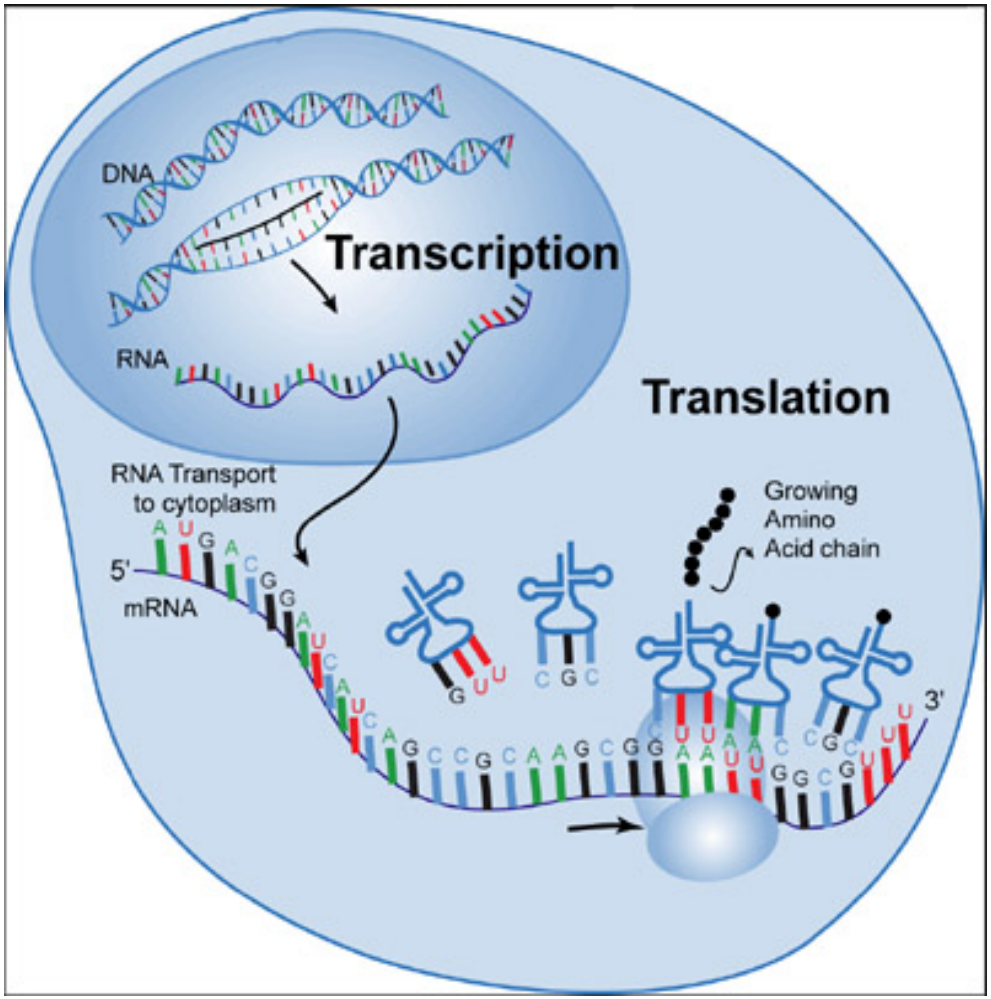
Transcription (RNA Synthesis)

Translation (Protein Synthesis)

Central Dogma of Molecular Biology



www.2classnotes.com



www.tokresource.org

Summary

Cells communicate with their environment through interactions at the cellular membrane

Membrane proteins are essential features that enable cellular communication by interacting with signals (e.g., chemical, electrical, mechanical)

Signaling at the membrane causes intracellular changes that affect different pathways depending on the type of cell

Cell signaling can stimulate changes in gene expression at the nuclear level, resulting in the production of new proteins