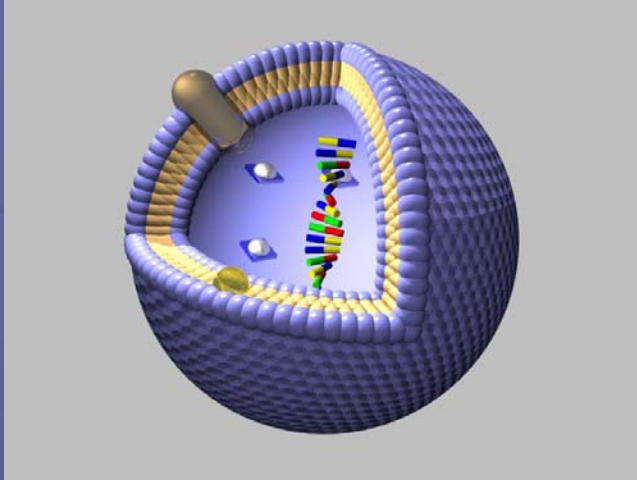


Optimization of Vesicle Adsorption to Form Lipid Bilayers

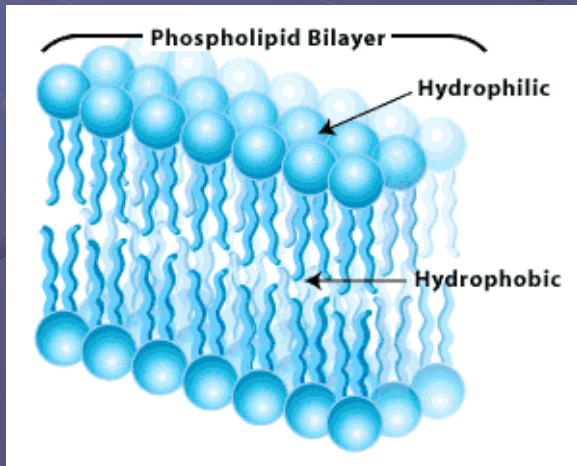
Ricardo Garcia, Allan Hancock College
Mechanical Engineering
Faculty Advisor: Jacob Israelachvili
Lab Mentor: Younjin Min
Funded by Corning Inc.



Lipid Bilayers

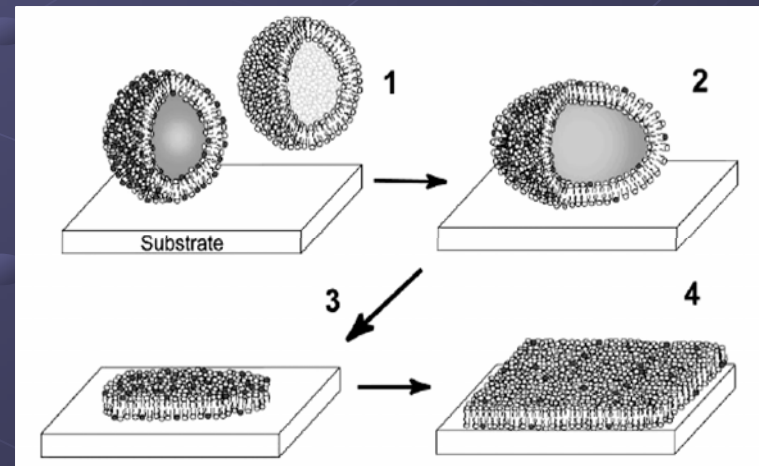


<http://www.uni-leipzig.de/~sfb294/Symposium2002/Vestext.htm>



<http://homepage.mac.com/huntington.c/Images/lipidbilayer.gif>

- A lipid bilayer is the outer structure of a cell membrane or vesicle consisting of a double layer of phospholipids molecules
- Hydrophilic polar head
- Hydrophobic non-polar tail
- Adsorption



<http://img.sparknotes.com/figures/A/a981208a1abd542364d5a13c08702881/phospholipid.gif>

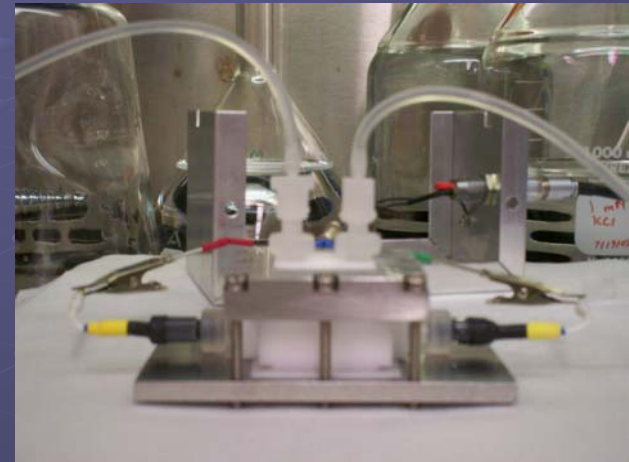
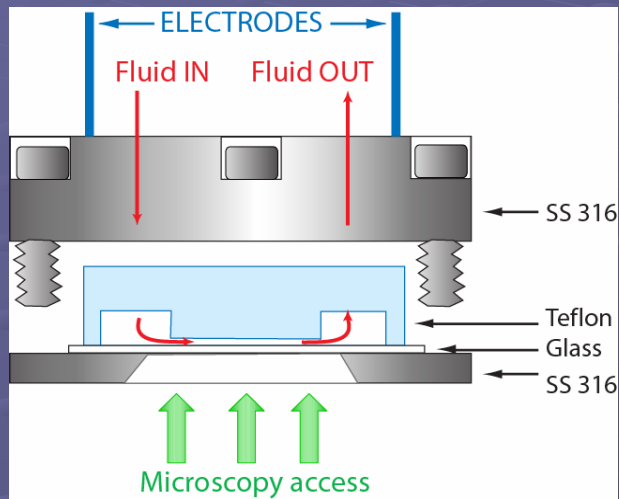
Why are Lipid Bilayers so Important?

- Critical components in biology
 - Outer structure of a cell
 - Main composition of a cell membrane
 - Protection
 - Endocytosis
- Models for fundamental biological membranes
- Application in biosensors, semiconductors, protein mobilization

Goals

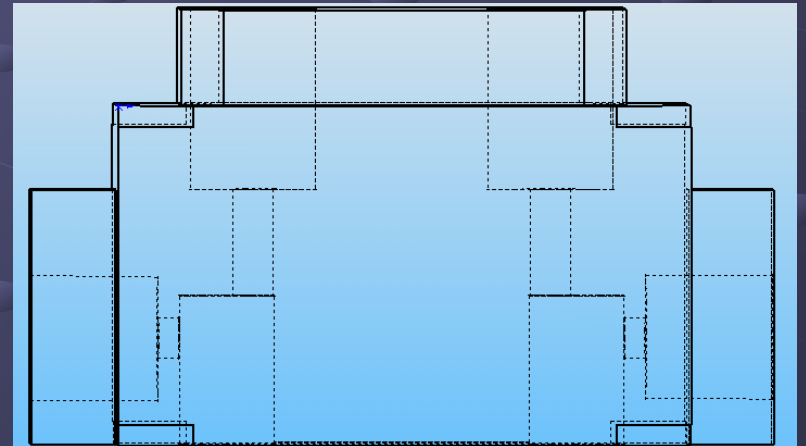
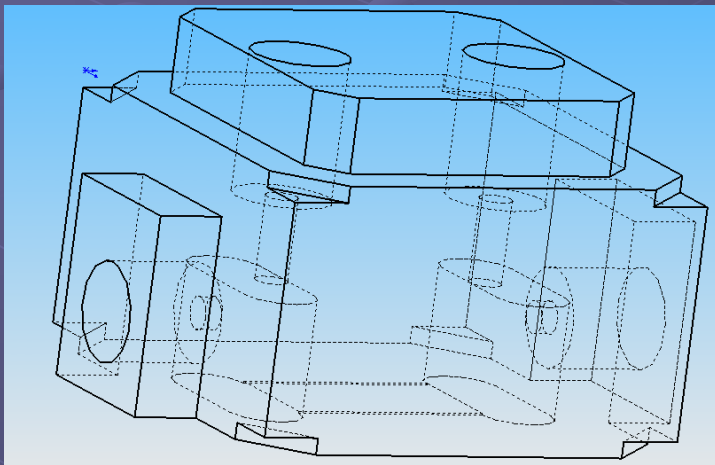
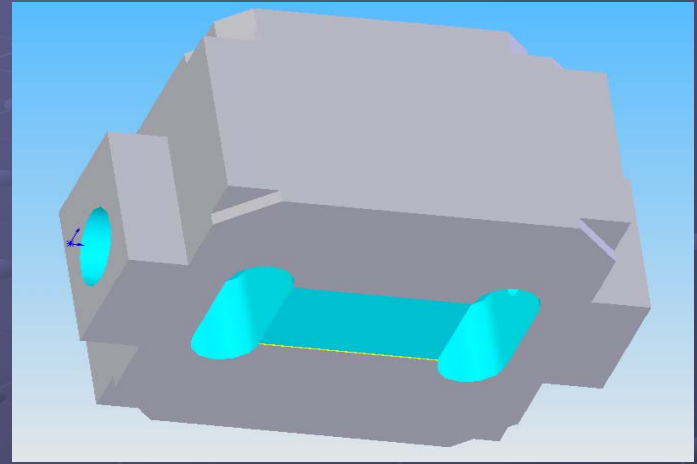
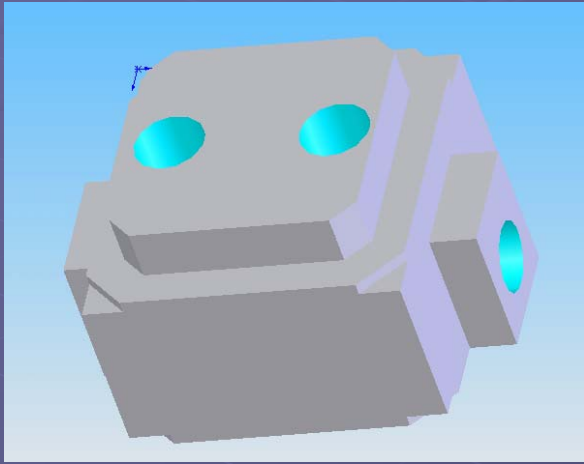
- Help redesign and test the streaming potential apparatus
- Experimentally determine the factors that optimize the adsorption of vesicles onto a glass surface
 - **Concentration of Lipid**
 - **Concentration of Aqueous Solution**
- Understand the interactions between the vesicles and surface as well as between the vesicles themselves

Streaming Potential

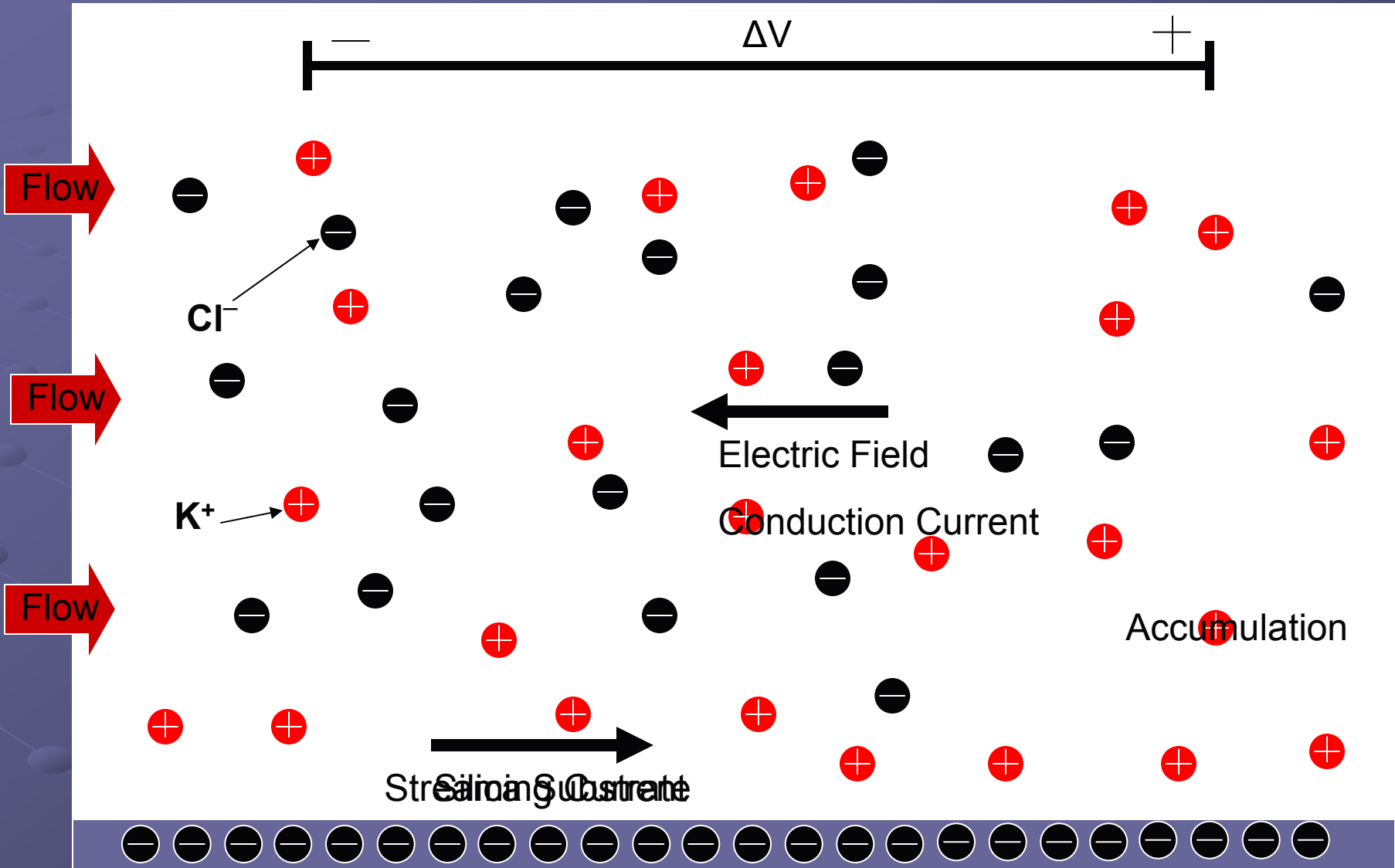


- This device is used to indicate when the glass substrate is completely adsorbed with lipid bilayers.
- Used as a tool to view adsorption of vesicles.

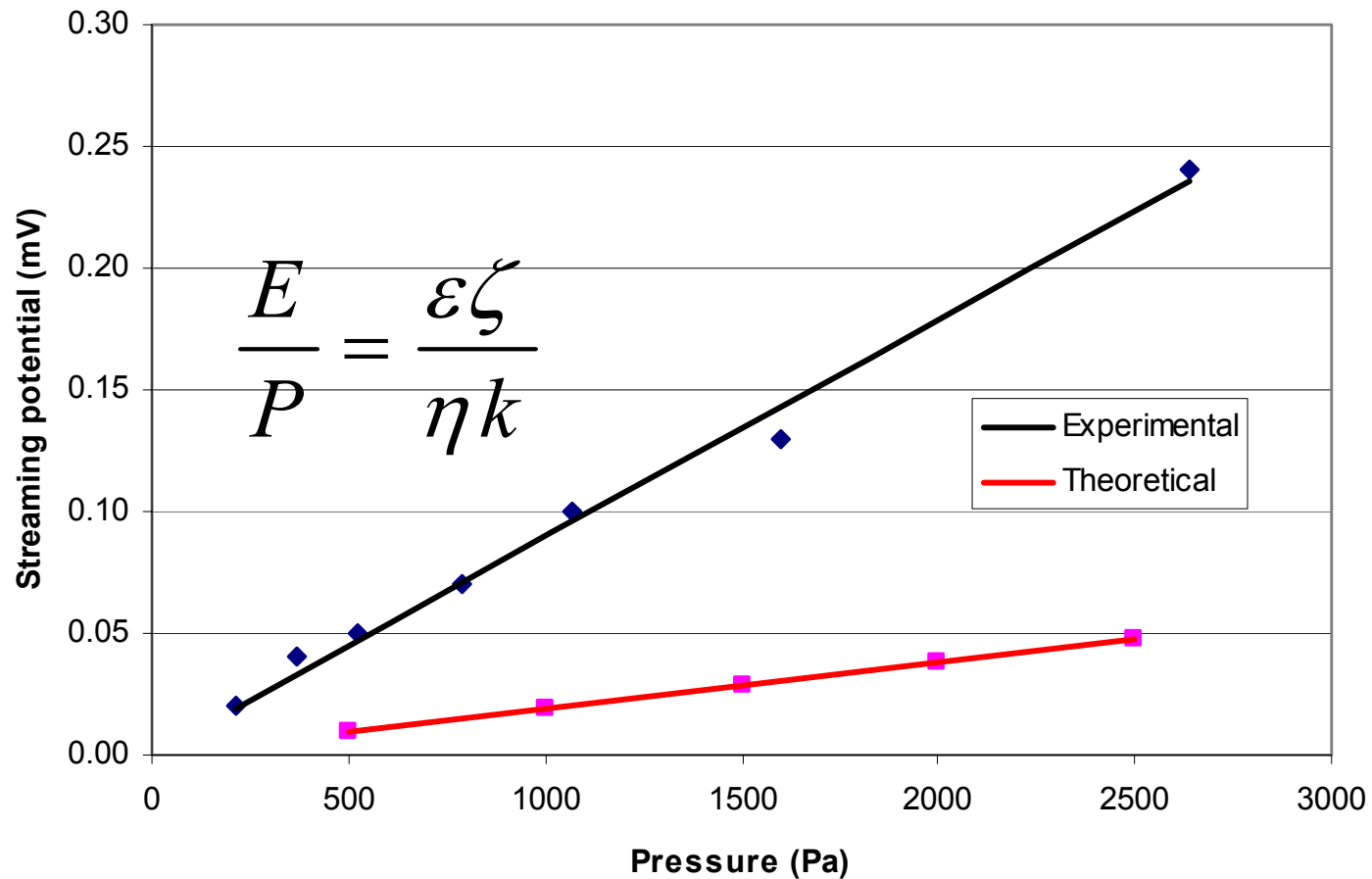
CAD Renderings



How It Works

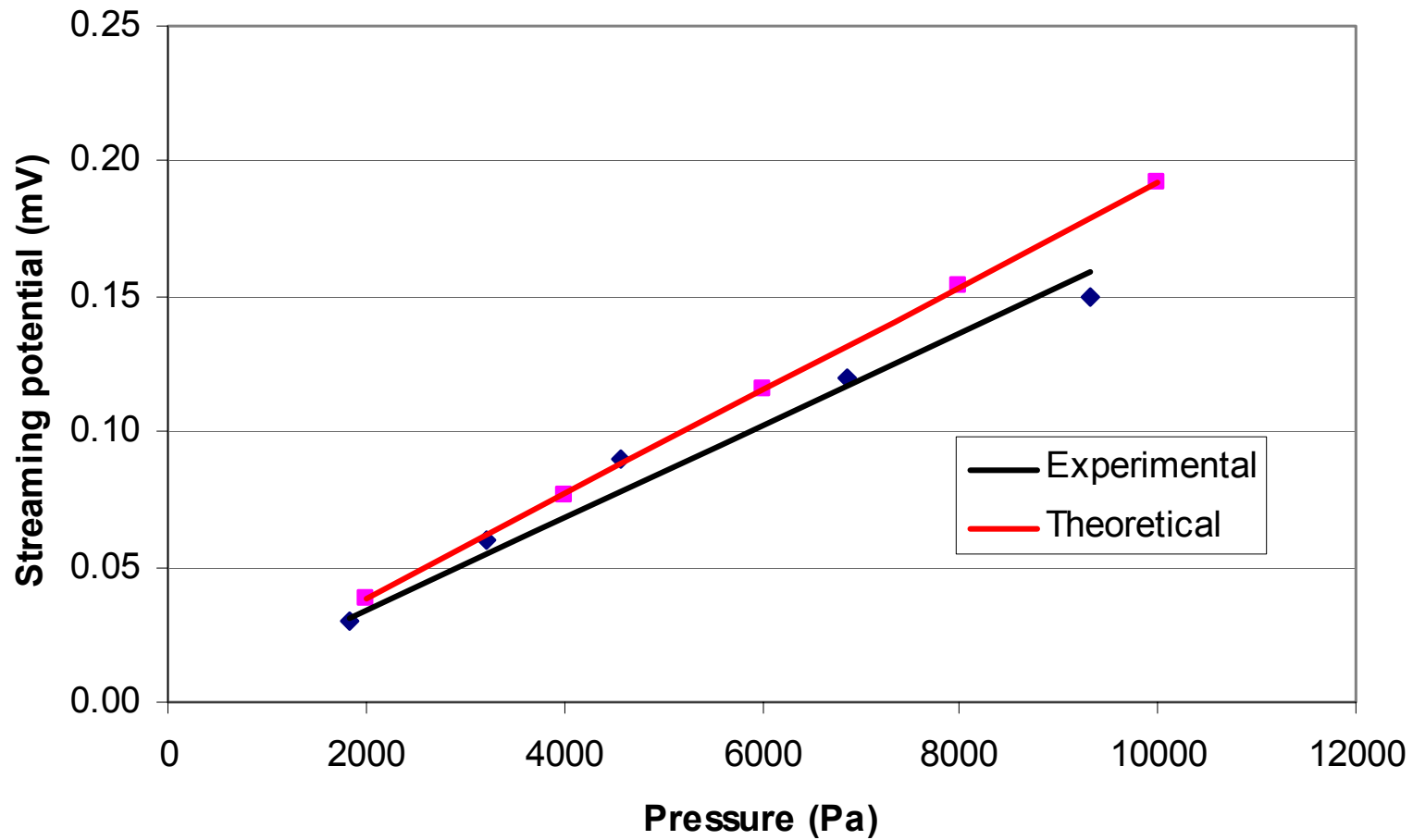


100 mM KCl with Old Teflon Piece



- Streaming potentials increased as applied pressures increased and salt concentrations decreased
- Pressure increased as flow rate increases and channel size decreases

100 mM KCl with New Teflon Piece



What Remains to be Done

● Complete my goals:

- Test under different concentration
- Introduce vesicles
- Experimentally determine the factors that optimize the adsorption of vesicles onto a glass surface
- Understand the interactions between the vesicles and surface as well as between the vesicles themselves

Acknowledgments

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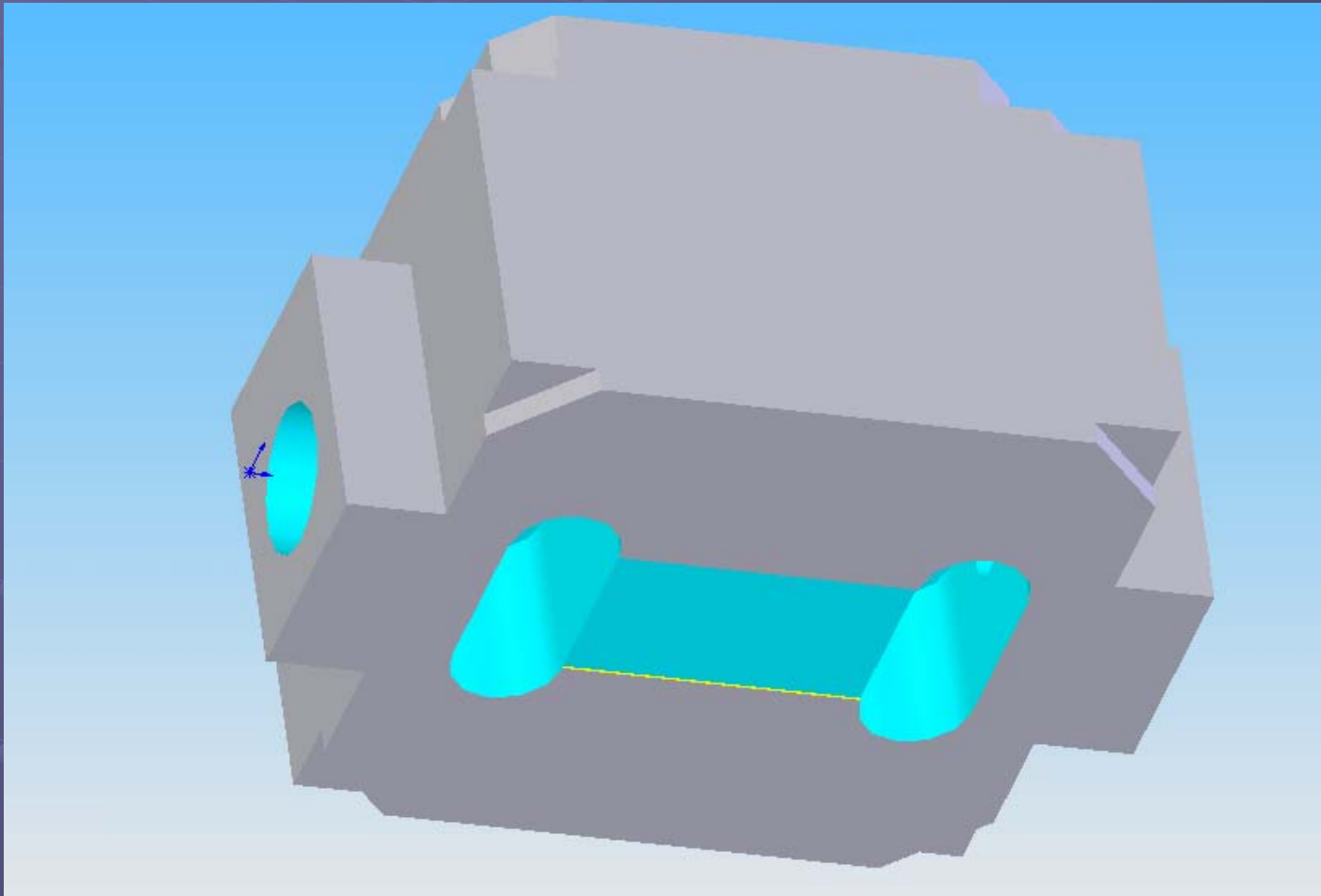
Noshir Pesika

Ranulfo Morales

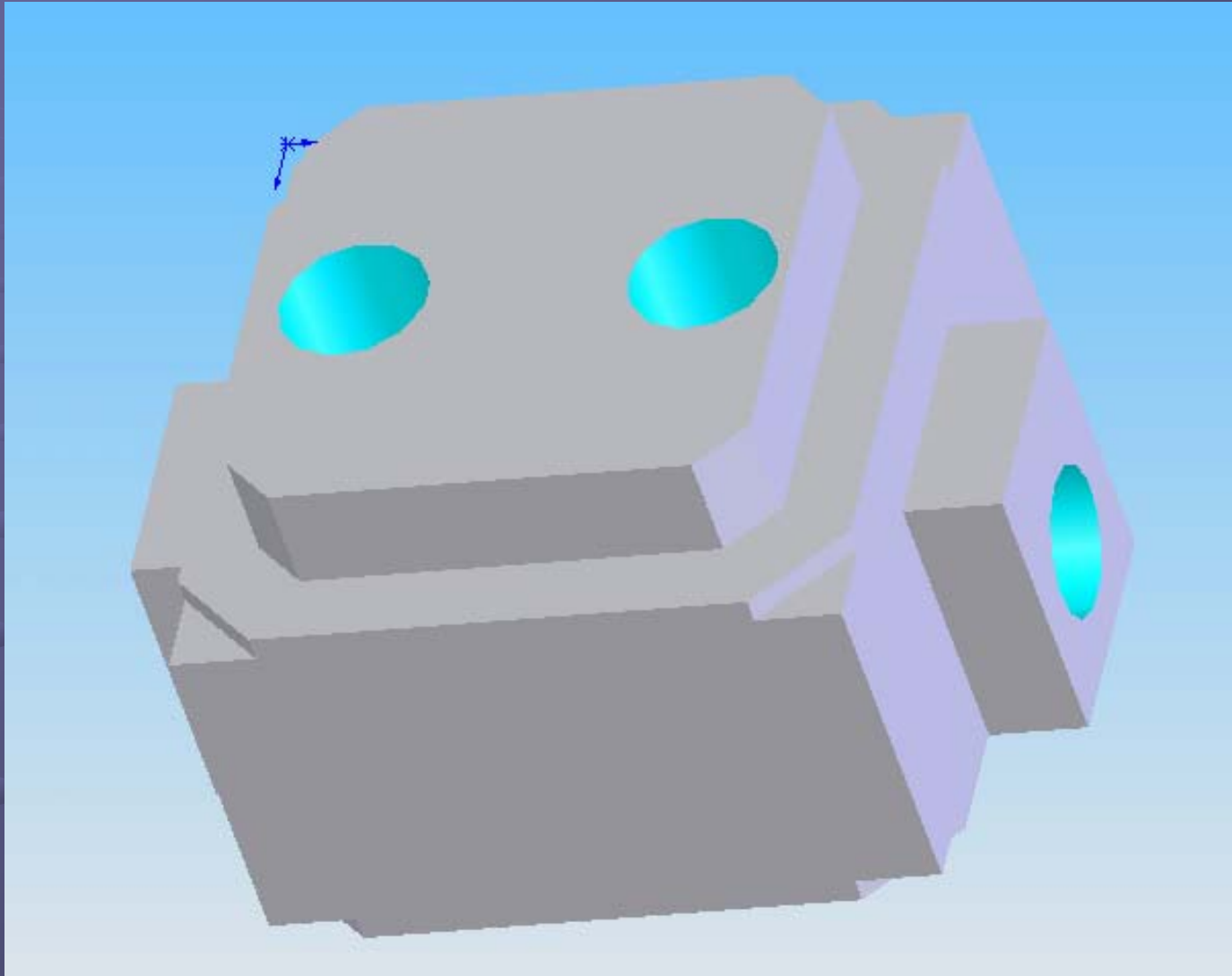
Thank You,

Questions?

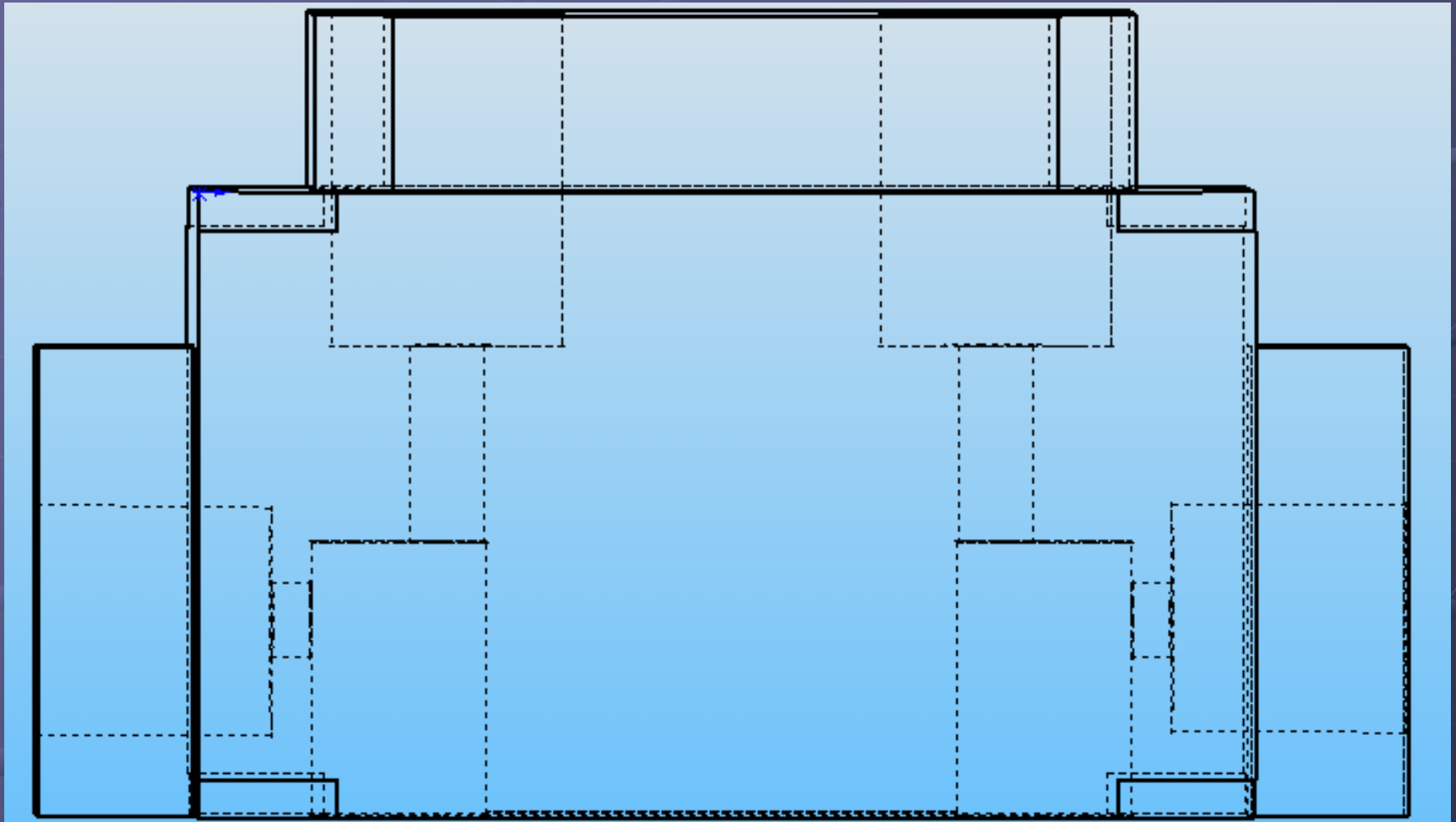
Three Dimensional Bottom View



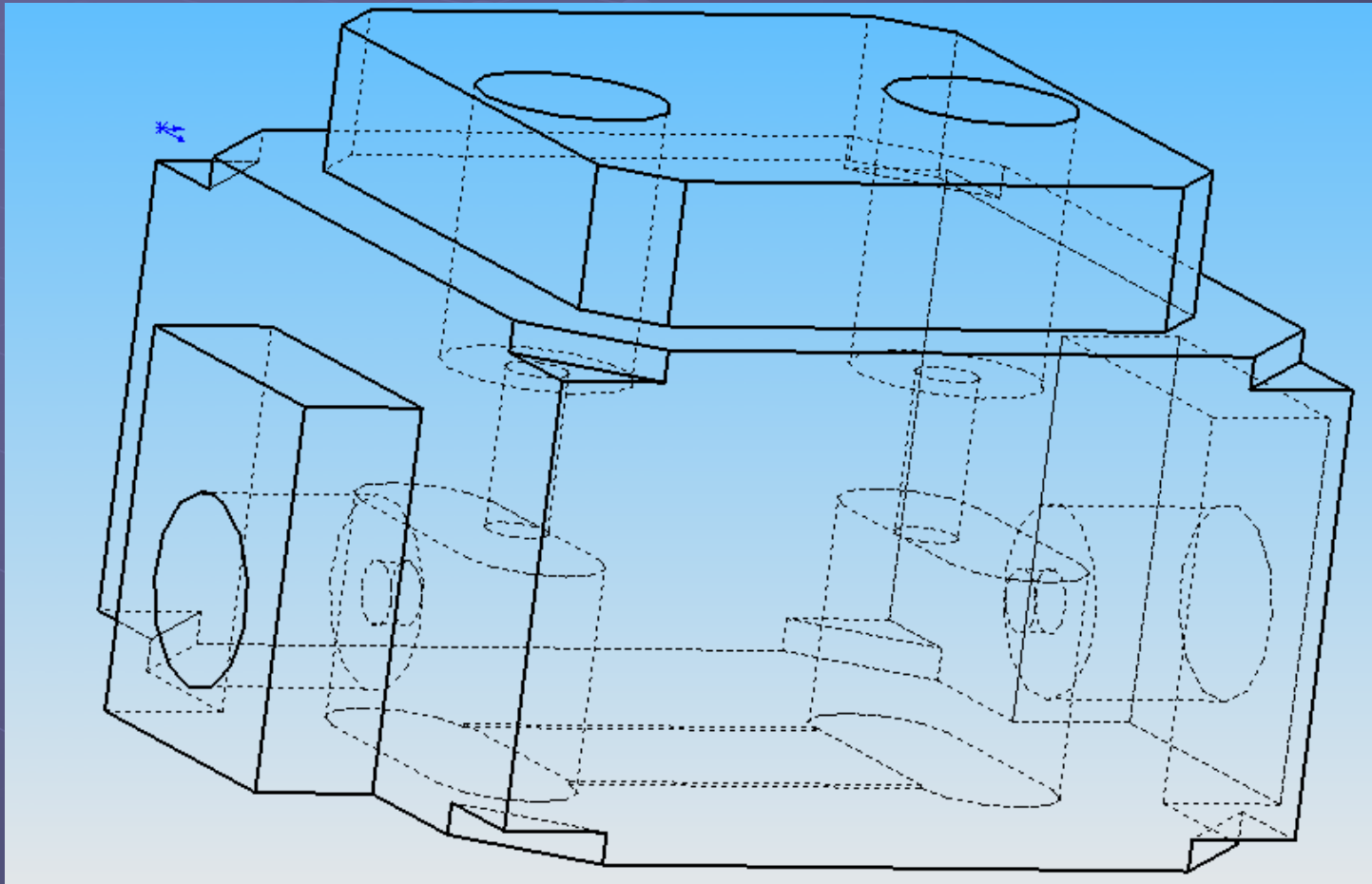
Three Dimensional View of Top



Skeletal Side View

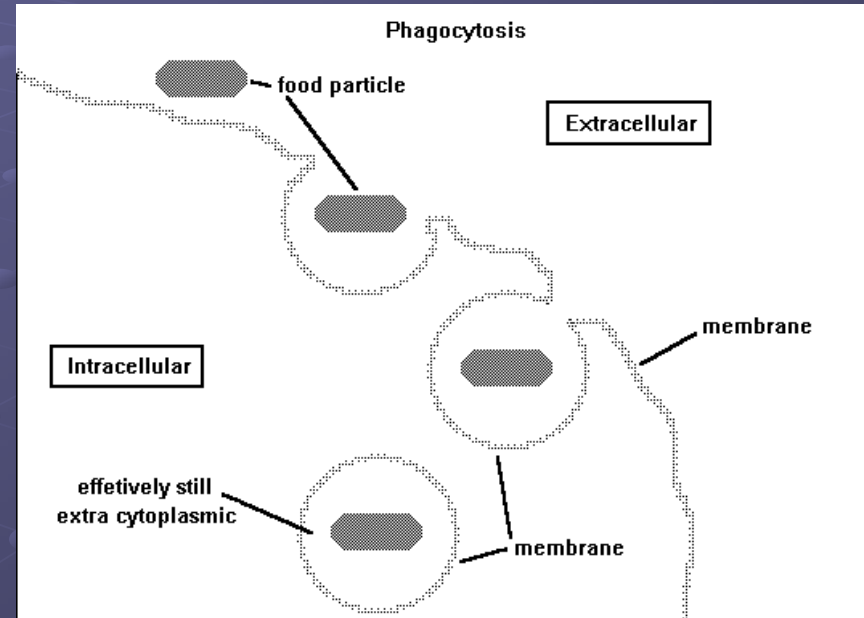


Skeletal View



Endocytosis

- Is the cellular process of engulfing solid or liquid particles by the cell membrane to form an internal “food vesicle”



<http://www.mansfield.ohio-state.edu/~sabedon/039phago.gif>

How it Works

