



Lynn Tarkington

Graduate Student Fellow



**I am here to add “New”  
science into your curriculum.**

**“New” science is the research  
that is being done in labs all  
over the world.**

# A little info about me...

- The only native Texan in my family.
- Born in Corpus Christi
- Grew up in San Antonio
- Moved to Houston in 2005



- Family vacations are in Wisconsin.
- With Mom's side of the family



# A little info about me...

- Graduated in the top 10% in High school
- Robert E Lee HS
- Loved AP Biology



- Went to Southwestern University.
- Georgetown, TX.
- B.S. in Chemistry



# A little info about me...

- Worked for small biotech company, Encysive.
- 1 yr as Biologist
- 1 yr as Chemist
- Laid off



- Started at the University of Houston in 2007.
- Department of Chemistry
- Organic Division
- T R Lee Group



# A little info about me...

- I am a Ph. D. candidate.
- I've passed my qualifying exam which is the equivalent of a master's degree.
- In my free time:
  - Movies
  - Museums
  - The Beach
  - Wii
  - Friends



# My Research



## Synthesis and Study of Unsymmetrical Phosphatidyl Cholines Designed to Serve as 2-D Surfactants in Langmuir-Blodgett Monolayers

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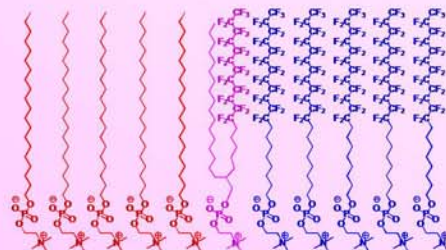


### Introduction

- Line-active molecules ("linactants") relieve surface tension and induce phase separation in chemically dissimilar mixed monolayer systems.
- In monolayer films derived from mixtures of cholesterol-terminated phosphatidyl choline (PC) and hydrocarbon-terminated PCs, where the amphiphilic components are likely to undergo phase separation, the targeted linactants should offer control over the size of the phase-separated domains, thereby mimicking the role that surfactants play in modulating the behavior of micelles and related three-dimensional aggregates.
- The study of these monolayers will facilitate an understanding of the mechanisms of domain formation and film stability as a function of linactant composition and structure.
- This investigation explores the synthesis and study of a series of amphiphilic linactants having PC headgroups and cholesterol and hydrocarbon tailgroups.

### Linactants

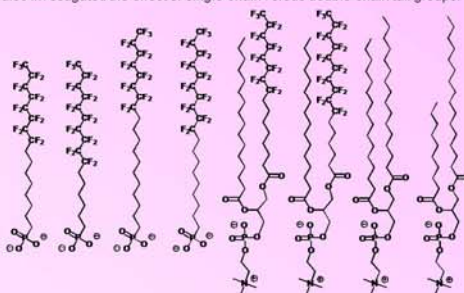
- Linactants are similar to three-dimensional surfactants in their ability to relieve line tension and induce phase separation.
- Linactants are of interest for the reduction of line tension on a molecular level, which can lead to the stabilization of nanoscale surface structures.
- Linactants might lead to an improved understanding of biological membranes and provide a way to manipulate the local structure of monolayer films.



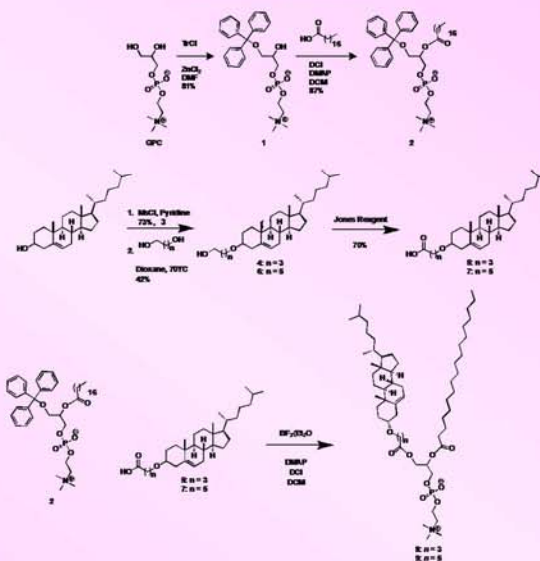
- The molecule in pink represents a linactant at a phase boundary in a monolayer.

### Previously Studied Linactants

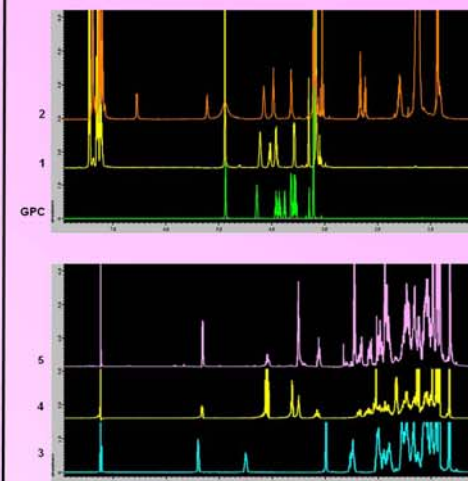
- We have previously studied linactants having phosphonic acid and phosphatidyl choline headgroups. The tailgroups we have studied possess hydrocarbon and fluorocarbon chains. We have also investigated the effect of single-chain versus double-chain tail groups.



### Synthetic Approach



### <sup>1</sup>H NMR Spectra



### Conclusions

- Intermediate precursors for a series of cholesterol-containing phosphatidyl choline derivatives having either a hydrocarbon chain or a cholesterol tailgroup were prepared in yields ranging from 34-87%.
- Current synthetic efforts are directed toward completing the synthesis of this series of linactants.
- We will generate Langmuir-Blodgett monolayers with these linactants and study their phase behavior using Brewster angle microscopy and atomic force microscopy.

### Acknowledgments

We thank the National Science Foundation (DMR-0906727) for generously supporting this research.

# My goals for this year

- To open your minds to the idea of pursuing a degree in science.
- To pursuing a higher degree (Masters or Ph.D.)
- To strive for the best despite the challenges.
  
- Biology is fun. It's not all memorization.
- Introduce college level material to the class.
- Introduce Nanotechnology.