Contributing to Student Success through Collaborative and Interdisciplinary Research in Structural Biology and Drug Discovery

I know the title is too long...

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Faculty Mentor, PB&J VIP Team
Georgia Southern University – Armstrong
Protein Biochemistry and Just About Everything in the Intersection of Chemistry and Medicine
The PB&J VIP was established in Fall 2022

Unofficial Objective: Have fun with proteins.
Maximizing the *druggability* of the human genome

Drug Discovery

Target Development

Pharmacogenomics

Real word, I swear
ANYTHING AND EVERYTHING!!

...and *anything* proteins.

- Structural Biology and Protein Dynamics
- Protein Engineering and Evolution
- All About Protein Tyrosine Phosphatases

Current big focus
This guy relays information
Can you spot the difference in phosphorylation states?
Aberrant phosphorylation leads to diseases. 

Such as cancers!
Protein Kinase Inhibitors

80, if you’re counting
Protein Phosphatase Inhibitors
Unlocking the Human PTPome

PTPome
(noun) a collection of all 107 protein tyrosine phosphatases; the next frontier in drug discovery?

We know some about

We know little about

We have inhibitors
Let’s use this DARK PTP as an example

DUSP27

Structure Determination

Biological Function

Probe and Drug Discovery

Protein Biochemistry · Biophysics · Cell Biology · Simulations
The VIP Goal
Dressed up VIPs

Highlighting some VIP practices
Personalized mentorship journey

Multi-project, Multi-area

Construct Design  Expression/Purification  Functional Assays  Structural Studies  Drug Screens

Structural Studies  Activity Design (Biochem Ed)  Survey Implementation

Drug Screens
Individual Development Plans

This form allows us to tailor your training while in our group to ensure your success. Answer the questions as honest and as detailed as you can. We will talk about this every beginning and end of the school year to evaluate your progress (as well as mine) as well as a final discussion before you graduate or leave the group.
Simplified IDP Structure for UGs

Ultimate goal in life?

Short-term research goal?

Short-term education goal?

Techniques and skills you want to learn?

Perceived strengths and opportunities for improvement?

Other things you want to discuss?

What have you gained or would like to gain from this group?
Perceived strengths and opportunities for improvement?

Strengths (Student A):

“I feel confident in my ability to teach routine techniques to new lab members. I have good study habits and time management. I am fairly good at multi-tasking. I have learned how to manage failures.”

Opportunities for Improvement (Student B):

“I am afraid to ask questions and feel that I lack the confidence in some situations. I always think that ‘I should know this’ and so it is inappropriate to ask. I need help with time management and consistency.”

Opportunities for Improvement (Student C):

“Sometimes I struggle connecting practical know-how and knowledge. I know the general steps for purification but I need to make sure I can master the use of the FPLC. I would like to improve my ability to analyze data.”

This student is a ‘peer-leader’
Strengths (Student A):

“I feel confident in my ability to teach routine techniques to new lab members. I have good study habits and time management. I am fairly good at multi-tasking. I have learned how to manage failures.”

Opportunities for Improvement (Student B):

“I am afraid to ask questions and feel that I lack the confidence in some situations. I always think that ‘I should know this’ and so it is inappropriate to ask. I need help with time management and consistency.”

Very near-peer mentorship!
Strengths (Student A):

“I feel confident in my ability to teach routine techniques to new lab members. I have good study habits and time management. I am fairly good at multi-tasking. I have learned how to manage failures.”

Opportunities for Improvement (Student B):

“I am afraid to ask questions and feel that I lack the confidence in some situations. I always think that ‘I should know this’ and so it is inappropriate to ask. I need help with time management and consistency.”

Intervention for Student B:

Set time in the lab and weekly day-to-day planning.
Ultimate goals in their lives

To contribute great things to the field of chemistry.
Make an impact in the lives of many people.
Pursue a PhD then mentor the next generation of scientists.
Manage a biomedical research lab and mentor students.
To remove the suffering of all living things.
To be happy.
To contribute to treatment of human diseases.
To reform society and contribute to the advancement of humanity.
Decrease human suffering and prevent destruction of the world.
Work in a lab.
Be happy, make money, and build something that will last generations.
Become a physician.
Make money.
To live a happy life.

How can the group help them get there?
#FAFO

Mess around and find out.

The lab as a playground.
Main Project: Structure and Dynamics of a Kinase

Side Project #1: Can we read SNIETORP?
Side Project #2: Alternative hosts for isotope labelled proteins.
From Very Near-Peer Mentoring to PI-in-Training

These are sub-groups
Current Sub-Groups
Protein Engineering (autonomous)
Kinase Characterization (*kinda*)
Unlocking the PTPome (dependent)
Drug Discovery (theme-based)
Structural Biology (theme-based)

This approach highly depends on "S1"

Me in the background

Mark

S1

S4

S5

S6
Multi-level managing using Discord

Roles help identify resource
PB&J’s Student Success Strategies

- Individual Development Plans
- Lab as a Playground Approach
- Sub-Groups and PIs-in-Training

Nothing new here, really.
We always appreciate feedback and advice to be better!

-- Recruiting other majors.

-- Optimization of on-boarding strategies.

-- Dealing with graduating seniors.

It’s hard when they leave the nest.
We need art in science!

Victoria Zhang
dC Group Member
Senior, Savannah Arts

Inspired by our lecture on protein engineering and evolution and the ‘CRISPR babies.’
Congratulations to our graduating seniors!!

Grace Bennett
Biochemistry
PTPome
--MS APS, GS

Ty Spencer
Biochemistry/Biology
ACS Outstanding Senior
Protein Engineering
--Chatham County (?)

Victoria Zhang
High School
Drug Discovery
--BS Chem, CalTech

Anna Feil
Biochemistry
PTPome
--MS APS, GS

Davis Rutan
Biochemistry
Kinase Structure
--PhD, UGA

Chase Yost
Biology (Bellarmine)
PTPome
--Researcher, UKy

Congratulations to our graduating seniors!!
Thank you for listening!

We love working with awesome folks. If you find any of our work interesting or just think we’re cool to work with, let us know!

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