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2018

# Annual Biomedical Research Conference for Minority Students

Indianapolis Indiana





Concourse Exit Only  
Do Not Enter

*"Red Sea of Science"*

**"Always  
Go  
RED!"**





# Indianapolis “Naptown”







**“Rams  
in  
the  
House”**



# 2018 Poster Presentation Winner

Division  
of



**Tania Bellinger**  
Junior RISE Scholar  
Biology Major

**WINSTON-SALEM STATE UNIVERSITY**  
Biomedical Research Infrastructure Center

**A Rapid Entry into Thiochromanones via Conjugate Additions of Dialkylcuprates to Thiochromones**

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**Introduction**  
Significance of carbon-carbon (C-C) bond formation

Carbon-carbon bond formation is very valuable in forming the carbon skeletons of complex heterocyclic. Conjugate addition reaction is one of the most reliable C-C bond forming reactions. The successful development of the efficient carbon-carbon bond forming strategies in heterocyclic systems will rapidly generate structural complexity and diversity to reach complex heterocycles and their analogs for drug discovery.

Thiochromones, the isomeric replacement of the oxygen atom by sulfur atom, also exhibit many biological activities such as antimicrobial, antioxidant, inhibiting nitric oxide production, and antiangiogenic [1].

**Optimization of Reaction Conditions**

Organocuprate mediated 1,4-conjugate addition to  $\alpha$ , $\beta$ -unsaturated systems is one of the most reliable C-C bond forming strategies for organic chemists. In our preliminary study, we tried CuOTf<sub>2</sub>, CuI and CuCN. Monoorganocuprate gave good chemical yields at 70%. Di-*n*-butylcuprate gave the highest yield 91%.

entry	alkyl (R <sup>1</sup> , R <sup>2</sup> )	solvent	temperature	TMSCD yield %
1	1,2-di- <i>n</i> -butyl	MeCN	0	0
2	1,2-di- <i>n</i> -butyl	THF	0	0
3	2,4-di- <i>n</i> -butyl	THF	0	0
4	1,2-di- <i>n</i> -butyl	THF	0	0
5	1,2-di- <i>n</i> -butyl	THF	0	0
6	2,4-di- <i>n</i> -butyl	THF	0	0
7	1,2-di- <i>n</i> -butyl	THF	0	0

**Scope of Thiochromones**

A variety of substituted thiochromones with methyl, ethyl, propyl, and butyl groups worked well. Heterocyclic thiochromones also worked and gave good chemical yields. Some thiochromones are a problem as demonstrated by presence of methyl and propyl at  $\beta$ -position.

**Future Work**  
Sulfur analogs - *thiothiochromones*

The replacement of an oxygen atom by a sulfur atom is very commonly used for the design and synthesis of analogs, which is expected to improve bioavailability and bioactivity.

**Conclusions**

Thiochromones undergo conjugate addition reactions with dialkylcuprates to afford alkylthiochromanones with good to excellent yields, providing a straightforward synthetic approach to provide privileged 3-containing structural motifs and valuable precursors for many pharmaceuticals. The use of commercially available or easily prepared organometallic reagents will expedite the synthesis of a large library of thiochromanones for further synthetic applications and biological studies.

**Synthetic Applications of Thiochromanones**

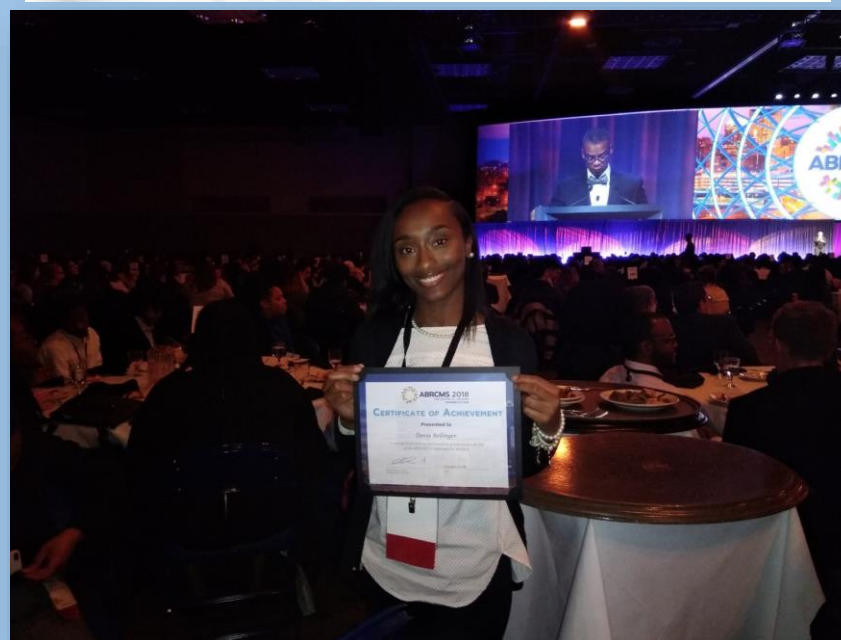
81% Chlorinated Thiochromones  
82% Zn, AcOH, MeCN  
79% sulfone  
82% 1,3-dicarbonyls  
82% Thiochromones

**References**

[1] *Synthesis: Containing Drugs and Medical Devices*, 2nd Edition, Daniel, L. A., Ed. Wiley: New York, 1989.  
Zhou, F.; Jeffrey, M. C.; Green, H. N.; Entman, S. A.; Pollard, D. A.; Paop, G.; Chen, H. Y. *Tetrahedron* **2017**, *73*, 1742-1750.  
Bhavs, S. A.; Parker, D. M.; Bellinger, T. J.; Fain, A. S.; Dibble, A. S.; Kanna, K. C.; Kishi, S. A.; Pollard, D. A.; Guo, F. *Molecules* **2018**, *23*(7), 1328.

**Acknowledgements**

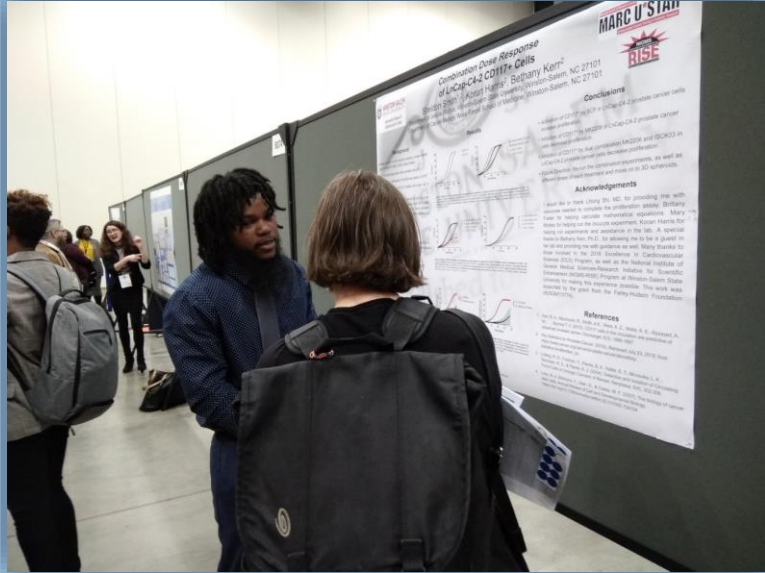
Funding provided by the National Institute of General Medical Sciences (MARC U STAR (P52AG029161) and RISE (P50NS103774) Programs. We also like to thank NSF HBCU-E-P RISA (no. 160897) and NSF I&E for generous financial support.



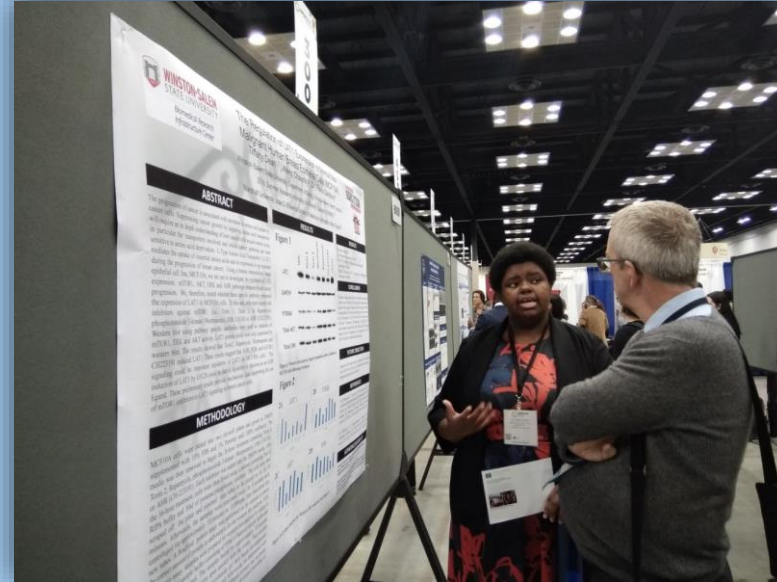
**A Rapid Entry into Thiochromanones via Conjugate Additions of Dialkylcuprates to Thiochromones**



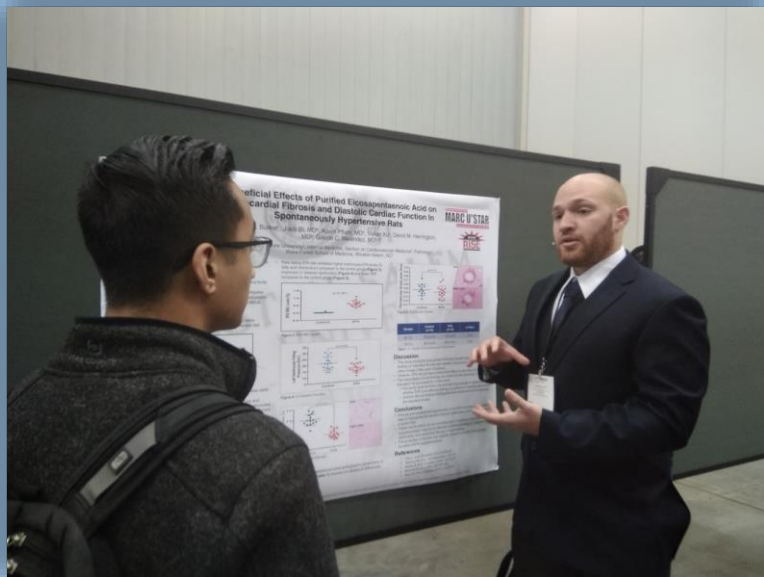
Sheldon Smith – Justice Studies/Biology



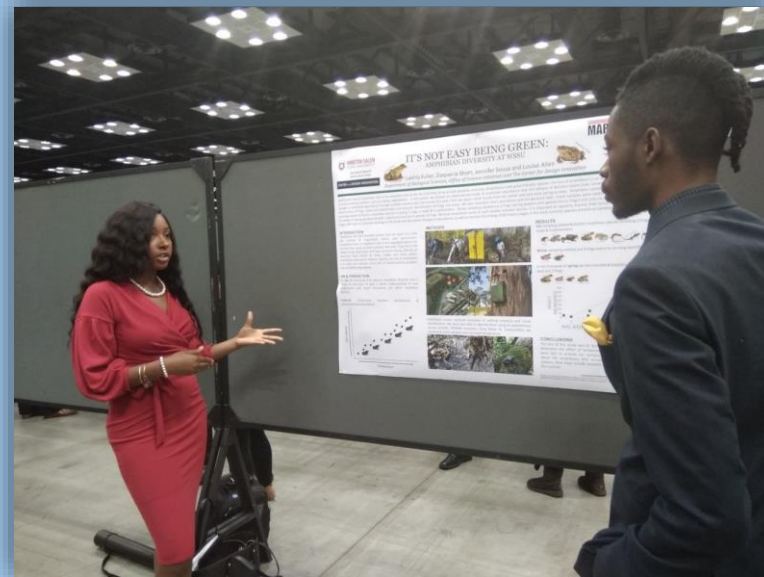
Tiffany Dean - Biology



Adam Burke – Exercise Science



Lakhia Fuller - Biology

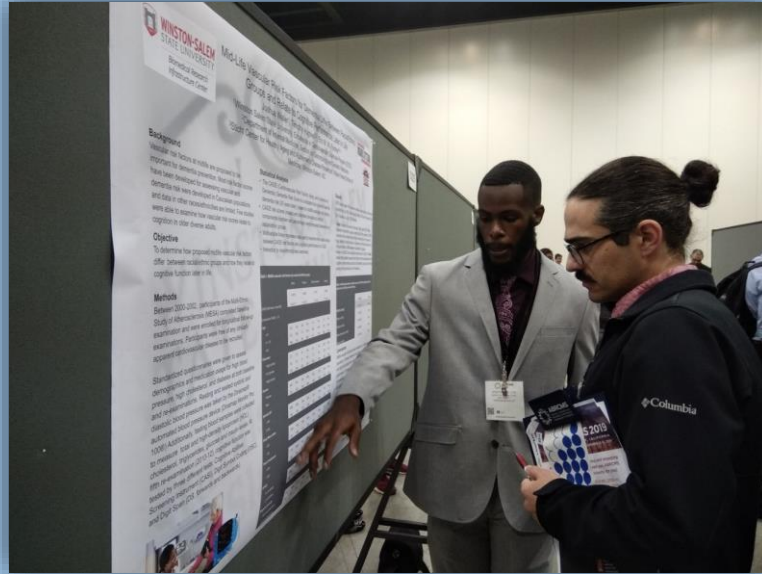




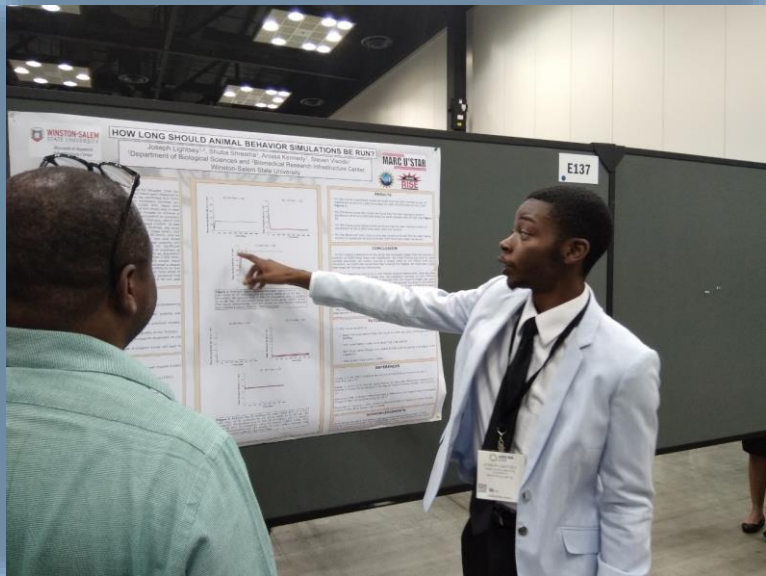
Imani Clark - Biology



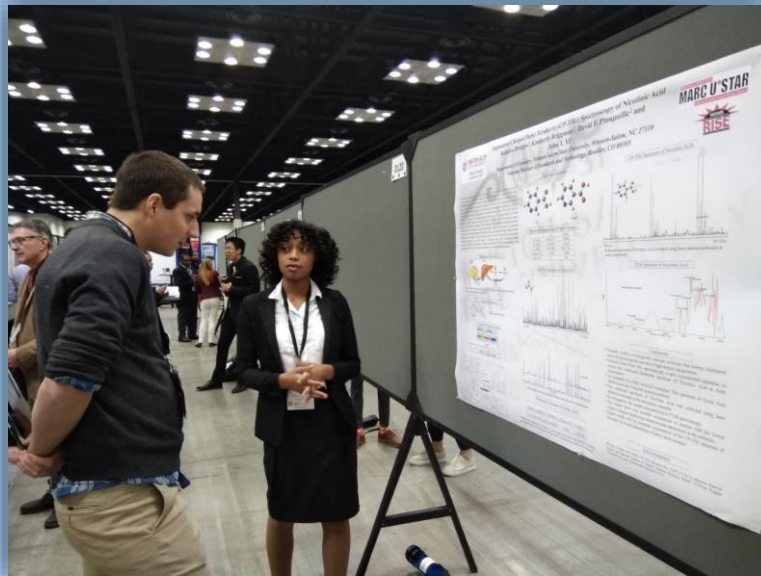
Joshua Waller – Exercise Science



Joseph Lightsey - Biology

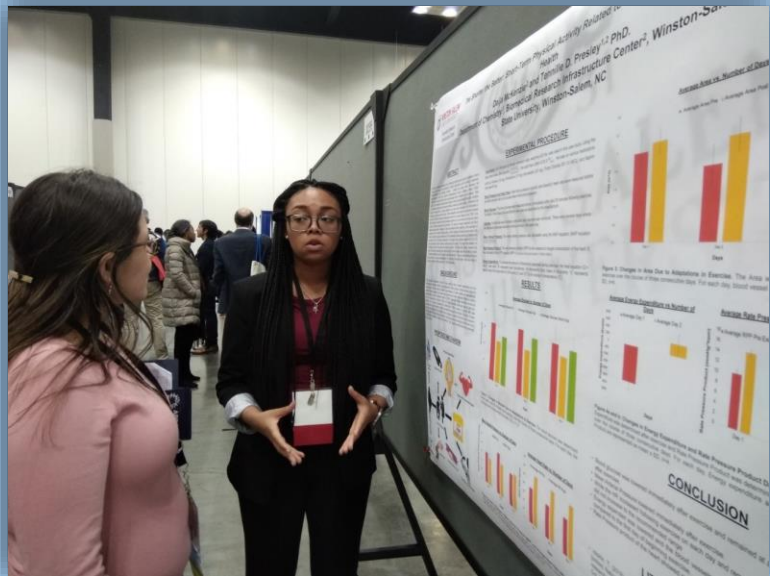


Kamiyah Bridges - Biology

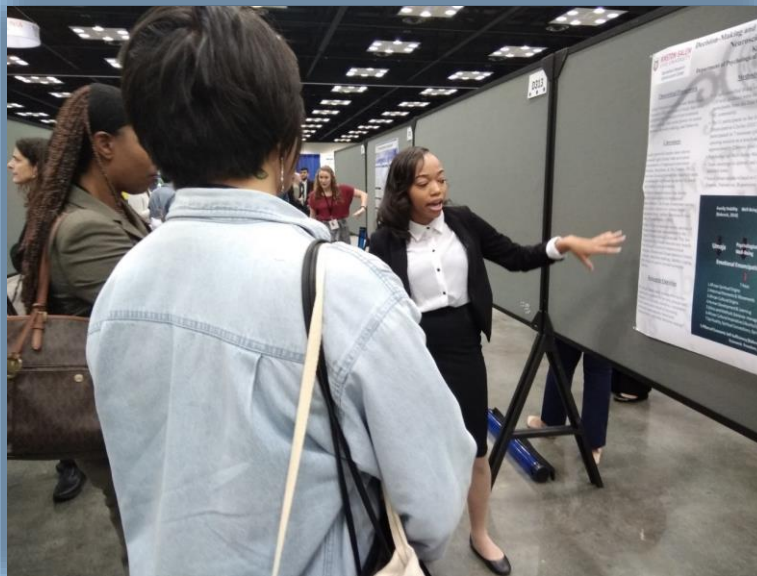




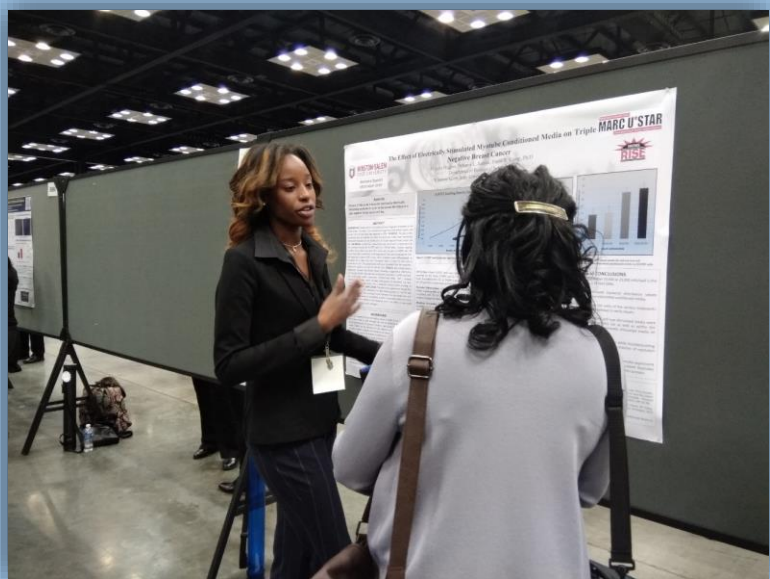
Daija McKenzie – Exercise Science



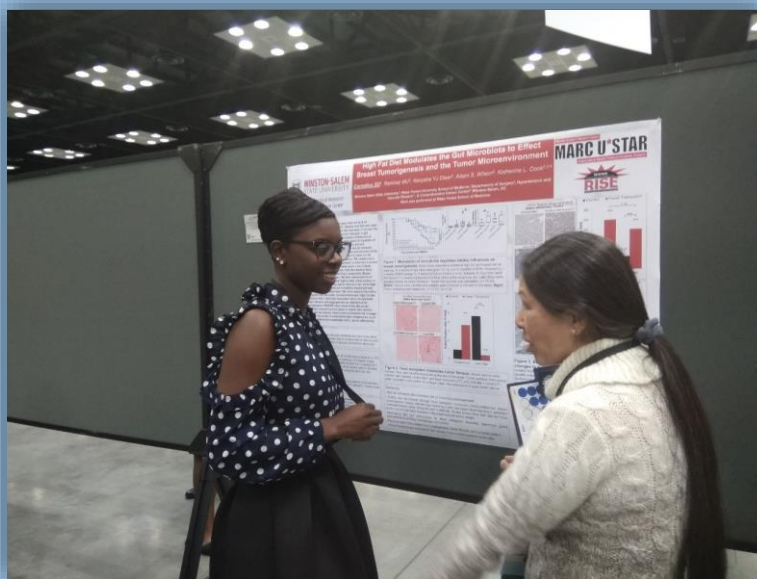
Kearia Green - Psychology



Alvysa Hughes - Biology

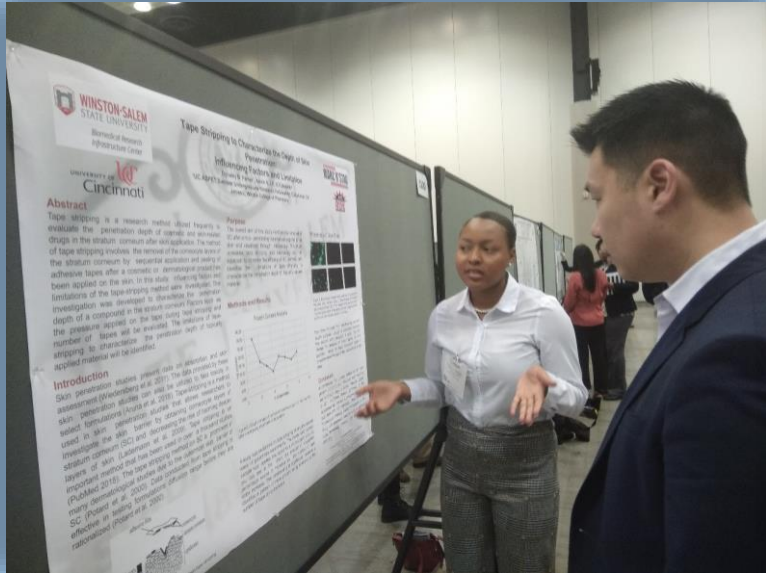


Zipporah Cornelius - Biology





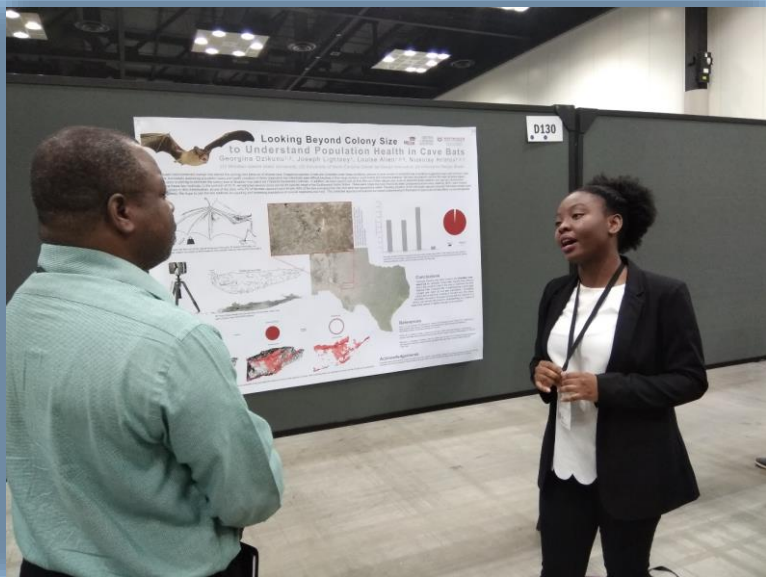
## Dynasty Parker - Chemistry



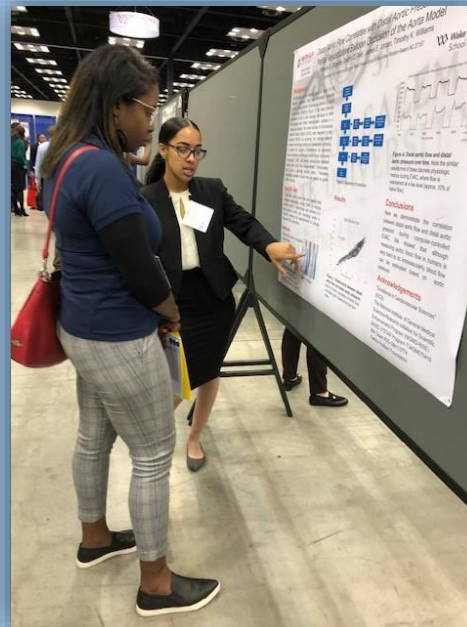
## Dexter Perkins – Exercise Science



## Georgina Dzikunu - Biology



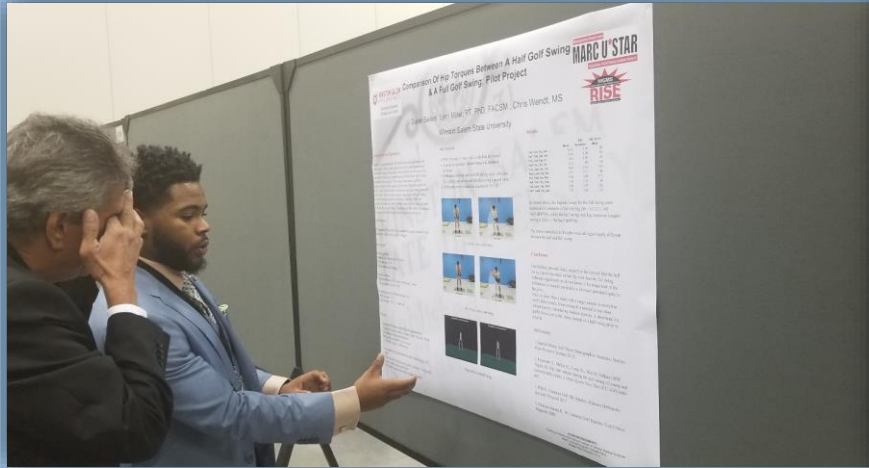
## Mykasia Simpkins - Biology



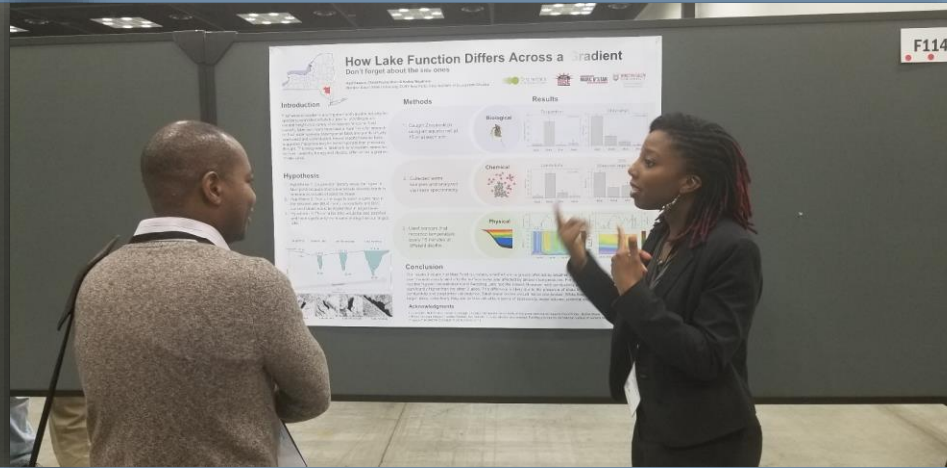
Mentors  
Support



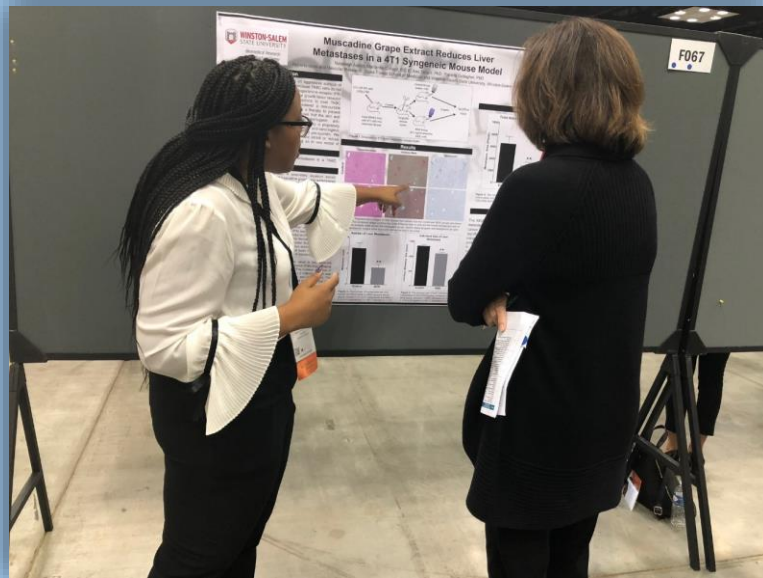
Dustin Sellars – Exercise Science



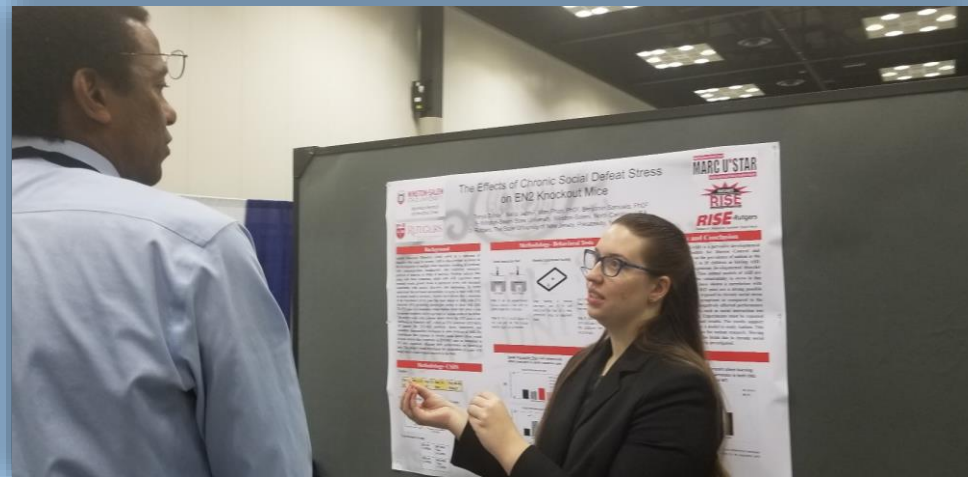
Kari Dawson - Biology



Nataleigh Austin - Biology



Tanya Zubov- Biology





**STUDENT****MAJOR**

Ziaqueria Short  
Joshua Waller  
Lakhia Fuller  
Zakiyah Henry  
Tanya Zubov  
Imani Clark  
Brandon Travis  
Dynasty Parker  
Kari Dawson  
Tiffany Dean  
Nataleigh Austin  
Tania Bellinger  
Kamiya Bridges  
Adam Burke

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Biology  
Exercise Science

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Anijah Carter  
Zipporah Cornelius  
Alysa Dempsey  
Georgina Dzikunu  
Jada Graves  
Keaira Green  
Alvysha Hughes  
Christopher McCoy  
Dajia McKenzie  
Dexter Perkins  
Dustin Sellers  
Mykasia Simpkins  
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Terrence Smith  
Faris Wright  
Kelsey Douglas  
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