

UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES
GRADUATE FACULTY APPLICATION

1. Name: Stephanie Byrum
2. UAMS Graduate Program Sponsor: GPIBS Major field: Biochemisry
3. Present UAMS academic title or administrative position: Assistant Professor
- Date appointed this rank/position: July 2016 Employed by: Biochemistry

4. Comments of Department Chair/Head or Program Director including: evidence of scholarly development, effectiveness as a teacher, quality of publications and reallocation of duties if this application is approved.

Stephanie is one our earliest graduates from the Bioinformatics Graduate Program. She was a postdoctoral fellow with Alan Tackett for four years and became an instructor in 2013. She also currently serves as the core director on on Dr. Tackett's COBRE.

She actively publishes, and will soon begin serving a course director in the GPIBS Biochemistry and Molecular Biology Track. She will also begin serving on dissertation advisory committees.

Kevin Raney/Bobby McGehee

October 30, 2017

Robert Eoff

Department Chair/Head or Program Director

Date

Graduate Council Representative

I have read the comments of my Department Chair/Head or Program Director and I do, do not (circle one) wish to supply additional information in support of my application.

Stephanie Byrum
Applicant's Signature

October 30, 2017
Date

Approvals

G. Boyer
Chair, Graduate Faculty Committee

11/15/17
Date

Eric Peterson
Chair, Graduate Council

11/15/17
Date

T. Raney
Dean of the Graduate School

10/30/17
Date

5. **List your planned involvement in graduate education (courses, theses, dissertations):**

6. **Briefly summarize your experience in graduate-level classroom teaching:**

Stephanie has lectured in numerous courses in Proteomics and Methods in Biochemistry from 2009 to 2017.

7. **Briefly summarize your experience in research and student research mentoring:**

Taught methods to many students who rotated through Dr. Tackett's lab, summer undergraduates, graduate students, and post docs.

8. **Attach Curriculum Vita** showing educational background (including institutions attended, degrees awarded and dates), honors or awards received, scholarly or professional organization affiliations, teaching experience (give school, dates and advanced and graduate subjects taught), including student theses and/or dissertations supervised. Cite publications and research in progress.

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Education

Ouachita Baptist University, Arkadelphia, AR	B.S.	2000-2003	Biology
University of Arkansas for Medical Sciences/ University of Arkansas at Little Rock, Little Rock, AR	M.S.	2005-2007	Bioinformatics
University of Arkansas for Medical Sciences/ University of Arkansas at Little Rock, Little Rock, AR	Ph.D.	2007-2009	Bioinformatics
University of Arkansas for Medical Sciences, Little Rock, AR	Post-doctoral Fellow	2009-2013	Mass Spectrometry/ Epigenetics
University of Arkansas for Medical Sciences, Little Rock, AR	Instructor	2013-2015	Mass Spectrometry/ Epigenetics
University of Arkansas for Medical Sciences, Little Rock, AR	Research Assistant Professor	2016 - current	Mass Spectrometry/ Epigenetics/ Genomics/ Bioinformatics
Arkansas Children's Hospital Research Institute Little Rock, AR	Co-Director	2017-current	CTPR Systems Biology Bioinformatics Core

Professional Experience

- 2000-2003 Ouachita Baptist University, B.S., Biology with Chemistry and Mathematics Minors, Research advisor: Dr. Timothy Hayes. Undergraduate Research: Rb family protein complexes in the terminal differentiation of 3T3-L1 cells
- 2005-2007 University of Arkansas for Medical Sciences in conjunction with University of Arkansas at Little Rock, Masters research. Research advisor: Dr. Larry Suva, Carl L. Nelson Endowed Chair in Orthopaedic Creativity, Professor of Orthopaedic Surgery, Physiology and Biophysics, and Director of Center for Orthopaedic Research.

factors whose abundance varies in a manner consistent with the virulence gradient defined *in vivo*. Role: co-investigator

7. **5RO1GM098922** (NIH/NIGMS). P.I. Raney. 09/01/2011-12/31/2017. Title: DNA helicases: mechanism and function. Identify how helicases perform their functions. Role: co-investigator

Past Fellowships and Funding

1. University of Arkansas for Medical Sciences, BRIN Student Research Fellowship, undergraduate fellowship. June 2003. Research advisor: Robert McGehee, Jr, Ph.D, Dean of UAMS Graduate School, Director of Arkansas Biosciences Institute, and Professor of Pediatrics/Neonatology at UAMS College of Medicine and Arkansas Children's Hospital. Research: Rb family protein complexes in the terminal differentiation of 3T3-L1 cells.
2. **NIH, F32 Postdoctoral Fellowship F32GM093614**, P.I. Stephanie Byrum. Awarded March 2011-2013. Title: Identification of combinatorial histone post-translational modifications within the positional context of the chromosome. Aims were 1) Optimize chemical cross-linking technology to prevent dynamic chromatin dissociation during isolation and purification of a specific chromosomal region and 2) Engineer a *S. cerevisiae* strain for the isolation of a particular chromosomal section that will be subjected to mass spectrometric identification of combinatorial histone PTMs and associated proteins. Role: Principal Investigator
3. **NIH/NIDA (R01DA025755)** Tackett (PI) 09/20/08-09/19/13
"Development of technology for high resolution epigenetic profiling of chromatin"
Objectives were 1) Development of a chromatin affinity purification (ChAP) technology that will permit efficient isolation of specific chromosomal fragments for use in epigenomic and proteomic profiling, 2) Devise an unambiguous readout strategy to be used in conjunction with ChAP analysis that permits discrimination between specific and non-specific protein/histone interactions with a defined chromosomal fragment, 3) Design microscale protocols to be used in conjunction with ChAP analysis for separating each core histone component of a given chromosomal fragment on the basis of PTM occupancy, thus allowing mass spectrometric profiling of histone PTMs, and 4) Use ChAP-MS to profile the epigenome and proteome of a histone acetyltransferase.
Role: Co-Investigator
4. **R01GM106024-01**, P.I. Alan Tackett. 4/01/2013 – 3/31/2017. Title: Using ChAP-MS to Study Macromolecular Chromatin Composition during Transcription. We have developed a new technology termed ChAP-MS that provides for the analysis of macromolecular protein interactions on chromatin at a single defined genomic position *in vivo*. Our planned extension of ChAP-MS to human cells and tissues will undoubtedly provide a major tool for epigeneticists to explore mammalian transcription regulation as well as the epigenetic dysregulation associated with human diseases.
Role: Co-Investigator
5. **BAA-BARDA-09-34**, P.I. Hauer-Jensen. 9/26/2011-9/25/2015. Title: Advanced Development of SOM230 as a Radiation Mitigator. The goal of this project is to use proteomics to monitor biomarkers of radiation exposure.

10. **Byrum, S.**, Smart, S.K., Larson, S. and Tackett, A.J. (2012) "Analysis of Stable and Transient Protein-Protein Interactions". Methods in Molecular Biology **833**: 143-52. PMID: 22183593
11. **Byrum, S.D.**, Washam, C., Montgomery, C. O., Tackett, A.J., Suva, L.J. (2011) "Proteomic Technologies for the study of Osteosarcoma." Sarcoma 2012:169416. PMID: 22550414
12. **Byrum, S.D.**, Raman, A., Taverna, S.D., and Tackett, A.J. (2012) "ChAP-MS: A Method for Identification of Proteins and Histone Posttranslational Modifications at a Single Genomic Locus." Cell reports **2**(1): 198-205. PMID: 22840409
*Commentary in Nature, 491: 143-147.
*Highlighted in FASEB annual review of NIH funding in Arkansas
13. **Byrum, S.D.**, Larson, S.K., Avaritt, N.L., Moreland, L.E., Mackintosh, S.G., Cheung, W.L., and Tackett, A.J. (2012) "Quantitative Proteomics Identifies Activation of Hallmark Pathways of Cancer in Patient Melanoma." J Proteomics and Bioinformatics **S12**: 001. doi:10.4172/jpb.S12-001. PMID: 23976835
*Commentary in Genetic Engineering and Biotechnology News, March 1, 2013
14. Lolis, A., Londhe, P., Beggs, B., **Byrum, S.D.**, Tackett, A.J., and Davie, J. (2013) "Myogenin recruits the FACT complex to promote nucleosome disassembly at muscle specific genes." J Biol Chem **288**(11): 7676-87. PMID: 23364797
15. **Byrum, S.D.**, Washam, C.L., Leitzel, K., Suhail, A.M., Tackett, A.J., Gaddy, D., Sundermann, S.E., Lipton, A., Suva, L.J. (2013) "Identification of PTHrP(12-48) as a plasma biomarker associated with breast cancer bone metastasis." Cancer Epidemiol Biomarkers Prev, March 5 [Epub ahead of print]. PMID:23462923
*Authors contributed equally to work
16. Mercado, C.P., Ziu, E., **Byrum, S.**, Singh, P., Beggs, M., Raj, V.R., Haun, R.S., and Kilic, F. (2013) "Impact of elevated plasma serotonin on global gene expression of murine megakaryocytes." PLoS One, **8**(8): e72580. PMID: 24013211
17. Zhu, B., Zhang, M., **Byrum, S.D.**, Tackett, A.J., and Davie, J.K. (2014) "TBX2 blocks myogenesis and promotes proliferation in rhabdomyosarcoma cells." Int J Cancer, **0**(2014). doi: 10.1002/ijc.28721. PMID: 24470334
18. **Byrum, S.D.**, Taverna, S.D., and Tackett, A.J. (2013) "Purification of a Specific Native Genomic Locus for Proteomic Analysis." Nucleic Acids Research, 1-6, doi: 10.1093/nar/gkt822. PMID: 24030711
19. Shao, Q., **Byrum, S.D.**, Moreland, L.E., Mackintosh, S.G., Kannan, A., Lin, Z., Morgan M, Stack BC Jr., Cornelius, L.A., Tackett, A.J., and Gao, L. (2013) "A proteomic study of human Merkel cell carcinoma." J Proteomics Bioinform, **6**:275-282. PMID: 25284964
20. Hammond, S.L., **Byrum, S.D.**, Namjoshi, S., Graves, H.K., Dennehey, B.K., Tackett, A.J., and Tyler, J.K. (2013) "Mitotic phosphorylation of histone H3 threonine 80." Cell cycle, **13**(3). PMID: 24275038

30. Wu TP, Wang T, Seetin MG, Lai Y, Zhu S, Lin K, Liu Y, **Byrum SD**, Mackintosh SG, Zhong M, Tackett A, Wang G, Hon LS, Fang G, Swenberg JA, Xiao AZ. DNA methylation on N(6)-adenine in mammalian embryonic stem cells. *Nature*. 2016 Apr 21;532(7599):329-33. doi: 10.1038/nature17640. Epub 2016 Mar 30. PubMed PMID: 27027282; PubMed Central PMCID: PMC4977844.
31. Atanassov BS, Mohan RD, Lan X, Kuang X, Lu Y, Lin K, McIvor E, Li W, Zhang Y, Florens L, **Byrum SD**, Mackintosh SG, Calhoun-Davis T, Koutelou E, Wang L, Tang DG, Tackett AJ, Washburn MP, Workman JL, Dent SY. ATXN7L3 and ENY2 Coordinate Activity of Multiple H2B Deubiquitinases Important for Cellular Proliferation and Tumor Growth. *Mol Cell*. 2016 May 19;62(4):558-71. doi: 10.1016/j.molcel.2016.03.030. Epub 2016 Apr 28. PubMed PMID: 27132940; PubMed Central PMCID: PMC4874879.
32. Loughran AJ, Gaddy D, Beenken KE, Meeker DG, Morello R, Zhao H, **Byrum SD**, Tackett AJ, Cassat JE, Smeltzer MS. Impact of sarA and Phenol-Soluble Modulins on the Pathogenesis of Osteomyelitis in Diverse Clinical Isolates of Staphylococcus aureus. *Infect Immun*. 2016 Aug 19;84(9):2586-94. doi: 10.1128/IAI.00152-16. Print 2016 Sep. PubMed PMID: 27354444; PubMed Central PMCID: PMC4995912.
33. **Byrum SD**, Burdine MS, Orr L, Mackintosh SG, Authier S, Pouliot M, Hauer-Jensen M, Tackett AJ. Time- and radiation-dose dependent changes in the plasma proteome after total body irradiation of non-human primates: Implications for biomarker selection. *PLoS One*. 2017 Mar 28;12(3):e0174771. doi: 10.1371/journal.pone.0174771. eCollection 2017. PubMed PMID: 28350824; PubMed Central PMCID: PMC5370149.
34. Hartman JH, Miller GP, Caro AA, **Byrum SD**, Orr LM, Mackintosh SG, Tackett AJ, MacMillan-Crow LA, Hallberg LM, Ameredes BT, Boysen G. 1,3-Butadiene-induced mitochondrial dysfunction is correlated with mitochondrial CYP2E1 activity in Collaborative Cross mice. *Toxicology*. 2017 Mar 1;378:114-124. doi: 10.1016/j.tox.2017.01.005. Epub 2017 Jan 9. PubMed PMID: 28082109; PubMed Central PMCID: PMC5319481.
35. Shields BD, Mahmoud F, Taylor EM, **Byrum SD**, Sengupta D, Koss B, Baldini G, Ransom S, Cline K, Mackintosh SG, Edmondson RD, Shalin S, Tackett AJ. Indicators of responsiveness to immune checkpoint inhibitors. *Sci Rep*. 2017 Apr 11;7(1):807. doi: 10.1038/s41598-017-01000-2. PubMed PMID: 28400597; PubMed Central PMCID: PMC5429745.

Patents Awarded

1. Biomarkers for Determining Breast Cancer Bone Metastasis. Inventors: Byrum S.D., Washam C., and Suva L.J., US 9,362,094 B2
2. Breast Cancer Diagnostic using PTHrP 12-48. Inventors: Byrum S.D., Washam C., and Suva L.J., Disclosed and pending
3. Methods for Isolation and Analysis of a Specific Genomic Locus. Inventors: Tackett, A.J., Byrum, S., Taverna, S. Disclosed and pending

9. "Quantitative Analysis of Histone Exchange during Chromatin Purification", Southeastern Regional Yeast Meeting(SERYM), Little Rock, AR (March 2010)
10. "A quantitative proteomic analysis of FFPE melanoma" Tackett, A.J.*, Byrum, S.D., Avaritt, N.L., Reynolds, Matthew, Southeastern Regional IDeA Meeting, New Orleans, LA (September 2011)
11. "Technology development for the Identification of protein-protein associations on chromatin", University of Arkansas at Little Rock, Biosciences Seminar series (October 2011)
12. "Purification of a Specific Native Genomic Locus for Proteomic Analysis" Southeastern Regional IDeA Meeting, Little Rock, AR (November 15-17, 2013)
13. "Using TAL and CRISPR enrichment for proteomics of specific genomic loci", FASEB Science Research Conference entitled "Genome Engineering: Cutting-Edge Research and Application." Nassau, Bahamas (June 22-28, 2014)

* indicates presenter other than Byrum

Posters Presented

1. INBRE Spring 2006 Undergraduate Research Conference, Fayetteville, AR, Philip Williams, Stephanie Moulton, Bioinformatics Programming on Multiprocessor systems, June 6-12, 2006.
2. , MCBIOS IV- The Fourth Annual Conference of the MidSouth Computational Biology and Bioinformatics Society, New Orleans, LA, Byrum, S., Leitzel, K., Lipton, A., Suva, L.J., The Diagnostic Fingerprint of Metastatic Breast Cancer determined by SELDI-TOF MS Feb. 1-3, 2007. (Won 3rd place)
3. Student Research Week, UAMS, Little Rock, AR, Byrum, S., Leitzel, K., Lipton, A., Suva, L.J., The Diagnostic Fingerprint of Metastatic Breast Cancer, April 4, 2007.
4. Skeletal Complications of Malignancy V, Philadelphia, PA, Byrum, S., Leitzel, K., Lipton, A., Suva, L.J., The identification of plasma protein profile indicative of bone metastases from breast cancer, October 25-27, 2007.
5. Student Research Week, UAMS, Little Rock, AR, Byrum, S., Leitzel, K., Lipton, A., Suva, L.J., The identification of plasma protein profile indicative of bone metastases from breast cancer, April 16, 2008.
6. NIH, NCRR 2nd Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE), Washington, DC, Byrum, S., Leitzel, K., Lipton, A., Suva, L.J., A plasma protein profile predicts breast cancer metastasis to bone, August 6-8, 2008.
7. American Society for Bone and Mineral Research 30th Annual Meeting, Montreal, Quebec, Canada, Byrum, S., Leitzel, K., Lipton, A., Suva, L.J., A plasma protein profile predicts breast cancer metastasis to bone, September 12-16, 2008.
8. Abcam Chromatin Structure & Function, Costa Rica, Byrum, S., Taverna, S.D., and Tackett, A.J., Quantitative analysis of histone exchange during chromatin purification, November 16-19, 2009.
9. Student Research Week, UAMS, Little Rock, AR, Byrum, S., Mackintosh, S. G., Taverna, S. D., and Tackett, A. J., Quantitative analysis of histone exchange during chromatin purification, April 19, 2010.
10. Chromatin Structure and Function Gordon Research Conference, Smithfield, RI, Byrum, S. and Tackett, A.J.*, Quantitative analysis of histone exchange during chromatin Purification, July 26-30, 2010.
11. UAMS Biochemistry Departmental Poster Session, Little Rock, AR, Byrum, S., Mackintosh, S. G., Taverna, S. D., and Tackett, A. J., Quantitative analysis of histone exchange during chromatin purification, August 19, 2010.

4. Served as a poster judge for the 5th Annual Summer Research Symposium

Manuscript reviewer

1. *Cutaneous Pathology* (1 manuscript)
2. *Pathology* (1 manuscript)
3. *Proteome Research* (2 manuscripts)
4. *PLoS One* (1 manuscript)
5. *Analytical Chemistry* (1 manuscript)
6. *Journal of Proteome Research* (2 manuscripts)
7. *BioTechniques* (1 manuscript)
8. *Data in Brief* (1 manuscript)
9. *Environmental Pollution* (1 manuscript)
10. *Journal of Radiation Oncology* (1 manuscript)
11. *Proteome Science* (1 manuscript)
12. *Radiation Research* (2 manuscripts)

Memberships in Professional Societies

1. Member, American Society for Bone and Mineral Research (ASBMR). 2008-2009
2. Alpha Epsilon Lambda Honor Society for Graduate Students
3. UALR Bioinformatics club vice president (2007)
4. UALR Bioinformatics club president (2008-2009)
5. Member, International Society for Computational Biology (ISCB). 2015
6. Member, American Society for Mass Spectrometry (ASMS). 2016

Organized workshops

1. NCBI workshop, University of Arkansas for Medical Sciences, Little Rock, AR, Correlation of Disease Genes to Phenotypes and Map Viewer Quick Start, hosted by Bioinformatics club