

CURRICULUM VITA

Ruth Ann Armitage

Department of Chemistry

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- EDUCATION:** Ph.D. 1998 Analytical chemistry, Texas A&M University. Dissertation: Radiocarbon dating of charcoal-pigmented rock paintings (Advisor: M.W. Rowe)
B.A. 1993 Chemistry, Thiel College, Greenville, PA *summa cum laude*
- EXPERIENCE:** Currently Professor, Eastern Michigan University
2014-2015 Visiting Researcher, University of Oxford, Research Laboratory for Archaeology and the History of Art
2006-2011 Associate professor (tenured), Eastern Michigan University
2001-2006 Assistant professor, Eastern Michigan University, Ypsilanti, MI
Courses taught: Instrumental Analysis lecture and laboratory (both 300- and 400-level)
Quantitative Analysis lecture and laboratory
Advanced Analytical Chemistry lecture (graduate level)
General Chemistry I and II lecture and laboratory
Archaeological Chemistry (undergraduate/graduate special topics course)
Chemistry Seminar (graduate level)
1998-2001 Assistant professor, St. Mary's College of Maryland, St. Mary's City, MD
Courses taught: Quantitative Analysis; Instrumental Analysis
Contemporary Chemistry; General Chemistry
Forensic Chemistry Senior Seminar
St. Mary's Projects and Independent Studies.
1993-98 Laboratory instructor, Texas A&M University
Courses taught: Instrumental Analysis laboratory
Quantitative Analysis laboratory
Freshman Honors/Majors General Chemistry laboratory
1990-93 Laboratory assistant, Thiel College, First-year Chemistry and Chemistry for Non-Science Majors
1992 Summer researcher, Archaeological Field Workshop, Wolf Creek site (36BT82), Slippery Rock (PA) University, E. Skirboll, director.
1991 Intern, Wheatland Tube Company, Galvanizing Plant Chemistry Laboratory

PROFESSIONAL ACTIVITIES: Short courses, workshops, and institutes

Scanning and Transmission Based Electron Microscopy and Spectroscopy, Pittcon 2016

DART-MS training course, JEOL Institute, August 2011

ACS Leadership Institute, Fort Worth, TX, January 2010

Workshop on "Chemistry and Materials Research at the Interface between Science and Art," NSF and the Andrew W. Mellon Foundation, Arlington, VA, July 2009

MaSC Workshop on GC-MS Data Analysis, National Gallery, London, April 2009

Pittcon and ACS Short Courses on GC-MS Troubleshooting and Maintenance and Solid Phase Extraction Methods

PROFESSIONAL SOCIETIES: American Chemical Society, Archaeological Chemistry Subdivision; Society for Archaeological Sciences (lifetime member), Mass Spectrometry and Chromatography Working Group, Sigma Xi, Phi Lambda Upsilon, Society for American Archaeology (associate member), American Rock Art Research Association

BOOKS CO-AUTHORED

1. *Archaeological Chemistry*, 3rd edition. A. M. Pollard, C. Heron, and R. A. Armitage. Royal Society of Chemistry. Published December 2016. ISBN 978-1-78262-426-4.

BOOKS EDITED

1. *Archaeological Chemistry VIII*, ACS Symposium Series, Volume 1147, 2013. Senior editor, with J. H. Burton as co-editor.
2. *Collaborative Endeavors in the Chemical Analysis of Art and Cultural Heritage Materials*, ACS Symposium Series, Volume 1103, 2012. Co-editor, with P. Lang as senior editor.

PEER-REVIEWED PUBLICATIONS (student coauthors underlined)

Journal Articles

1. Armitage, R. A.; Jakes, K. A., Sequencing Analytical Methods for Small Sample Dating and Dye Identification of Textile Fibers: Application to a Fragment from Seip Mound Group, Ohio. *Midcontinental Journal of Archaeology* **2015**, *20* (1), 1-15.
2. Armitage, R. A.; Jakes, K. A.; Day, C. J., Direct Analysis in Real Time-Mass Spectroscopy for Identification of Red Dye Colorants in Paracas Necropolis Textiles. *Science and Technology in Archaeological Research* **2015**, *1* (2), STAR2015122054892315Y.0000000009.
3. Armitage, R. A.; Day, C. J.; Jakes, K. A., Identification of Anthraquinone Dye Colorants in Red Fibers from an Ohio Hopewell Burial Mound by Direct Analysis in Real Time Mass Spectrometry. *Science and Technology in Archaeological Research* **2015**, *1* (2), STAR2015122054892315Y.0000000010.
4. Ruuska, A. K.; Armitage, R. A., Spider Man Cave: The Desecration of the Burnt Bluff Cultural Site and its Implications for Future Heritage Management. *Wisconsin Archaeologist* **2015**, *96* (1), 27-44.
5. Baker, S.; Armitage, R. A., Cueva la Conga: First Karst Cave Archaeology in Nicaragua. *Latin American Antiquity* **2013**, *24* (3), 309-329.
6. Fraser, D.; Selvius DeRoo, C.; Cody, R. B.; Armitage, R. A., Characterization of blood in an encrustation on an African mask: spectroscopic and direct analysis in real time mass spectrometric identification of haem. *Analyst* **2013**, *138*, 4470-4474.
7. Ruiz López, J. F.; Hernanz, A.; Armitage, R. A.; Viñas, R.; Gavira-Vallejo, J. M.; Rowe, M. W.; Rubio, A.; Gavrilenko, E.; Guilderson, T. A., Calcium oxalate AMS ¹⁴C dating and chronology of post-Paleolithic rock paintings in the Iberian Peninsula. Two dates from Abrigo de los Oculados (Henarejos, Cuenca, Spain). *J. Archaeol. Sci.* **2012**, *39* (8), 2655-2667.
8. Selvius DeRoo, C.; Armitage, R. A., Direct Identification of Dyes in Textiles by Direct Analysis in Real Time-Time of Flight Mass Spectrometry. *Anal. Chem.* **2011**, *83* (18), 6924.
9. Livingston, A.; Robinson, E.; Armitage, R. A., Characterizing the binders in rock paintings by THM-GC-MS: La Casa de Las Golondrinas, Guatemala, a cautionary tale for radiocarbon dating. *Int. J. Mass Spec.* **2009**, *284* (1-3), 142-151.
10. Fezzey, S.; Armitage, R. A., Pyrolysis GC/MS and THM-GC/MS studies of a black coating from Little Lost River Cave, Idaho. *J. Anal. Appl. Pyrolysis* **2006**, *77*, 102-110.
11. Armitage, R. A.; Minc, L.; Hill, D. V.; Hurry, S. D., Characterization of bricks and tiles from the 17th-century brick Chapel, St. Mary's City, Maryland. *J. Archaeol. Sci.* **2006**, *33* (5), 615-627.
12. David, B.; Armitage, R. A.; Rowe, M. W.; Lawson, E., Landscapes in Transition? New Radiocarbon Dates on Cave Drawings from the Mitchell-Palmer Limestone Belt (Northeastern Australia). *American Indian Rock Art* **2001**, *27*, 106-116.

13. Armitage, R. A.; Brady, J. E.; Cobb, A.; Southon, J. R.; Rowe, M. W., Mass spectrometric radiocarbon dates from three rock paintings of known age. *Am. Antiq.* **2001**, *66* (3), 471-480.
14. Armitage, R. A.; Hyman, M.; Rowe, M. W.; Loendorf, L. L.; Southon, J. R., Dated Rock Paintings at Red Cliffs, Arizona. *The Kiva* **2000**, *65* (3), 253-266.
15. Hyman, M.; Sutherland, K.; Armitage, R. A.; Southon, J.; Rowe, M. W., Radiocarbon analyses of rock paintings: Hueco Tanks, Texas. *Rock Art Research* **1999**, *16* (2), 75-88.
16. David, B.; Armitage, R. A.; Hyman, M.; Rowe, M. W.; Lawson, E., How old is north Queensland's rock-art? A review of the evidence, with new AMS determinations. *Archaeology in Oceania* **1999**, *34*, 103-120.
17. Armitage, R. A.; David, B.; Hyman, M.; Rowe, M. W.; Tuniz, C.; Lawson, E.; Jacobsen, G.; Hua, Q., Radiocarbon Determinations for Chillagoe Rock Paintings: Small Sample AMS. *Records of the Australian Museum* **1998**, *50* (3), 285-292.
18. Armitage, R. A.; Hyman, M.; Southon, J.; Barat, C.; Rowe, M. W., Rock art image at Fern Cave, Lava Beds National Monument, California: not the A.D. 1054 supernova. *Antiquity* **1997**, *71* (273), 715-719.

Book Chapters

- Armitage, R. A., Chemistry in Archaeology. In *The SAS Encyclopedia of Archaeological Science*, Lopez Varela, S., Ed. Wiley-Blackwell: 2017. (Invited)
- Kaktins, M.; Marquis, M.; Armitage, R. A.; Fraser, D., Mary Washington's Mended Ceramics: A Study of Eighteenth-Century Glues. In *Ceramics in America*, Hunter, R., Ed. Chipstone Foundation: 2017.
- Armitage, R. A., Gas Chromatography. In *Encyclopedia of Geoarchaeology*, Gilbert, A. S., Ed. Springer: Netherlands, 2015. (Invited)
- DeRoo, C. S.; Armitage, R. A., Analysis of Organic Dyes in Textiles by Direct Analysis in Real Time—Time-of-Flight Mass Spectrometry. In *Textile Specialty Group Postprints*, 2014; Vol. 24, pp 113-115.
- Fraser, D.; Kaktins, M.; Armitage, R. A., 18th-Century Glue Recipes: Towards Identifying Glue Residues from Ferry Farm, George Washington's Boyhood Home. In *Archaeological Chemistry VIII*, Armitage, R. A.; Burton, J. H., Eds. American Chemical Society: 2013; Vol. 1147, pp 109-121.
- Dhakal, B.; Armitage, R. A., GC-MS Characterization of Carbohydrates in an Archaeological Use Residue: A Case Study from the Coahuila Desert. In *Archaeological Chemistry VIII*, Armitage, R. A.; Burton, J. H., Eds. American Chemical Society: 2013; Vol. 1147, pp 157-170.
- Day, C. J.; Selvius DeRoo, C.; Armitage, R. A., Developing Direct Analysis in Real Time Time-of-Flight Mass Spectrometric Methods for Identification of Organic Dyes in Historic Wool Textiles. In *Archaeological Chemistry VIII*, Armitage, R. A.; Burton, J. H., Eds. ACS: Washington, DC, 2013; Vol. 1147, pp 69-85.
- Li, R.; Baker, S.; DeRoo, C. S.; Armitage, R. A., Characterization of the Binders and Pigments in the Rock Paintings of Cueva la Conga, Nicaragua. In *Collaborative Endeavors in the Chemical Analysis of Art and Cultural Heritage Materials*, Lang, P. L.; Armitage, R. A., Eds. American Chemical Society: 2012; Vol. 1103, pp 75-89.
- Hopkins, J.; Armitage, R. A., Characterizing Organic Residues on Ceramics by Direct Analysis in Real Time Time-of-Flight Mass Spectrometry. In *Collaborative Endeavors in the Chemical Analysis of Art and Cultural Heritage Materials*, Lang, P. L.; Armitage, R. A., Eds. American Chemical Society: 2012; Vol. 1103, pp 131-142.
- Geiger, J.; Armitage, R. A.; Selvius DeRoo, C., Identification of Organic Dyes by Direct Analysis in Real Time-Time of Flight Mass Spectrometry. In *Collaborative Endeavors in the Chemical Analysis of Art and Cultural Heritage Materials*, Lang, P. L.; Armitage, R. A., Eds. American Chemical Society: 2012; Vol. 1103, pp 123-129.
- Armitage, R. A.; Ellis, M. E.; Merrell, C., New Developments in the 'Nondestructive' Dating of Perishable Artifacts Using Plasma-Chemical Oxidation. In *Collaborative Endeavors in the Chemical Analysis of Art and Cultural Heritage Materials*, Lang, P. L.; Armitage, R. A., Eds. American Chemical Society: 2012; Vol. 1103, pp 143-154.

19. Armitage, R. A.; Bates, J.; Johnson, A. F.; Lindsay, H., A Creative Scientific Inquiry Experience in Organic Chemistry and Quantitative Analysis: Pharmaceuticals in the River Raisin. In *It's All in the Water: Studies of Materials and Conditions in Fresh and Salt Water Bodies*, Benvenuto, M. A.; Roberts-Kirchhoff, E. S.; Murray, M. N.; Garshott, D. M., Eds. ACS: 2011; Vol. 1086, pp 51-60.
20. Perumplavil, R.; Armitage, R. A., Surface Analysis of a Black Deposit from Little Lost River Cave, Idaho. In *Archaeological Chemistry: Analytical Techniques and Archaeological Interpretation*, Glascock, M. D.; Speakman, R. J.; Popelka-Filcoff, R. S., Eds. American Chemical Society: Washington, DC, 2007; pp 152-166.
21. Armitage, R. A.; Minc, L.; Hurry, S. D.; Doolin, M., Characterization of building materials from the brick chapel at Historic St. Mary's City. In *Archaeological Chemistry: Analytical Techniques and Archaeological Interpretation*, Glascock, M. D.; Speakman, R. J.; Popelka-Filcoff, R. S., Eds. ACS: Washington, DC, 2007; pp 364-375.
22. Armitage, R. A.; Hyman, M.; Rowe, M. W.; Southon, J. R.; Barat, C., Fern Cave Rock Paintings at Lava Beds National Monument, California: Not the AD 1054 Supernova. In *Current Studies in Archaeoastronomy: Conversations Across Time and Space*, Fountain, J.; Sinclair, R. M., Eds. Carolina Academic Press: Durham, N.C., 2005.

Conference Proceedings

23. Fraser, D.; Armitage, R. A., Clinical test strips for rapid identification of binder materials in rock paintings. In *Proceedings of the 37th International Symposium on Archaeometry*, Turbanti-Memmi, I., Ed. Springer: Berlin, 2011; pp 205-210.
24. Armitage, R. A.; Minc, L.; Hill, D. V.; Hurry, S. D., Characterization of Bricks and Tiles from 17th-Century Maryland. In *Proceedings of the 34th International Symposium on Archaeometry*, Perez-Arantegui, J., Ed. Institucion «Fernando el Catolico»: Zaragoza, Spain, 2006; pp 387-392.
25. Armitage, R. A.; Hyman, M.; Rowe, M. W., Plasma-chemistry for dating pictographs by AMS. In *Advances in Dating Australian Rock-markings: Papers from the First Australian Rock-Picture Dating Workshop*, Ward, G.; Tuniz, C., Eds. Australian Rock Art Research Association, Melbourne (Australia): Lucas Heights, Australia, 2000.

PUBLICATIONS, NOT PEER-REVIEWED

36. "The Use of Mass Spectrometry to Differentiate Blue Dyes from Indigo and Woad" Precious Humphrey and R. A. Armitage. *McNair Scholars Research Journal*, **9** (2017).
37. "DART-MS Analysis of Historic Tobacco Pipes to Investigate the Preservation of Nicotine Residues" Sylvia Torres and R. A. Armitage. *McNair Scholars Research Journal*, **7** (2014). <http://commons.emich.edu/mcnair/vol7/iss1/11/>
38. "Los Fechamientos del Arte Rupestre y la Arqueología en la Casa de las Golondrinas, San Miguel Dueñas, Sacatepéquez" E. Robinson, M. Garnica, R. A. Armitage, and M. W. Rowe. In *XX Simposio de Investigaciones Arqueológicas en Guatemala, 2006*, Laporte, J. P., Arroyo, B., Mejía, H. E., Eds.; Ministerio de Cultura y Deportes: Guatemala, 2007, pp. 959-972. In Spanish.
39. "FTIR-ATR Studies of Plasma-Oxidized Materials: Implications for 'Nondestructive' Radiocarbon Dating" J. Kirkland and R. A. Armitage. *Society for Archaeological Sciences Bulletin*, **30** (2007): 15-17.

GRANTS AND FUNDING

External Funding

NSF Major Research Instrumentation: Recovery and Reinvestment, Office of Integrative Activities, 2009, "MRI-R2: Acquisition of a High-Resolution Time-of-Flight Mass Spectrometer for Research and Education", \$207,708, (PI) funded.

Internal Funding

EMU Women in Philanthropy, \$3000 for Seip textile project

Sabbatical Leave, \$12,000 to support salary and research for a one-year leave, "An Immersive Research Experience in the Archaeological Chemistry of Ancient Textiles at the Research Laboratory for Archaeology and the History of Art at the University of Oxford," awarded for AY2014-15.

Provost's Research Support Award, \$1500 per year from 2012 to 2017.

Faculty Research and Creative Activity Fellowship, EMU Provost's Office, \$3000 + 50% release (AY 2017-18), \$2000 + full release time (Winter 2016); \$2000 + 50% release (AY 2013-2014); \$3000 + full release (Fall 2010 and Winter 2009); \$2000 + full release time (Fall 2006); \$1300 (Winter 2007); \$1900 + half release time (2004-5).

Undergraduate Research Stimulus Program, \$2000 to student summer researchers, 4 students.

World College Faculty Travel Fund, \$250 (2004), \$250 (2006), \$250 (2008)

Graduate School Research Support Fund 2003-2004, \$2000

Josephine Nevins Keal Development Fund

College of Arts and Sciences Dean's Travel Fund

Sellers' Research Fund Grant, Eastern Michigan University Chemistry Department: approx. \$40,000 over 17 years

SERVICE ACTIVITIES

Research-related Service Activities

Speaker, Ypsilanti March for Science, 22 April 2017

Associate Editor, Archaeological Chemistry, *SAS Bulletin*, 2010-2017

Session chair, Anachem Symposium 2015, Graduate Mass Spectrometry Research

Reviewed book proposals for ACS Books

Co-chair, 12th Archaeological Chemistry Symposium, ACS National Meeting, April 2013, New Orleans.

Panel reviewer, National Science Foundation, May 2011

Session chair, Pittcon 2010, *Aptamer Generation and Purification and Education/Teaching*

Moderator, oral session, Undergraduate Symposium, EMU, 2008, 2009

Session chair for "Spectroscopy in Cultural Heritage", Eastern Analytical Symposium 2007

Reviewer for ACS Symposium Series on Archaeological Chemistry

Reviewer for journals: *Science Advances*, *Analytical Chemistry*, *Rapid Communications in Mass Spectrometry*, *Archaeometry*, *Plains Anthropologist*, *Journal of Archaeological Science*, *Archaeological and Anthropological Sciences*, *The Chemical Educator*, *Analytical Methods*, *Molecules*

Reviewed grant proposals for NSF Archaeometry program

Reported on 34th ISA and Archaeological Chemistry Symposium for *SAS Bulletin*

Chair, Archaeological Chemistry Symposium, ACS Central Regional Meeting, 2002

American Chemical Society Service

Email list administrator, ACS Huron Valley Section, 2010-2014.

Newsletter Editor, ACS Huron Valley Section, 2012-2014

Chair, ACS Huron Valley Section, 2011.

Chair-elect, ACS Huron Valley Section, 2010. Obtained Innovative Program Grant (\$3000) to hold ChemExpo.

ACS National Speakers Bureau participant

Organized inaugural Huron Valley Chemistry Expo, October 2010.

Education, Outreach and Volunteer Activities

Volunteer, River Raisin Watershed Council, 2014

Science Magic Show presenter, Peoples Presbyterian Church VBS, July 2014

Presenter, University of Michigan Chemistry Professional Development Organization "Preparing for Life after Graduate School" Workshop, February 2012

Department representative, Explore Eastern, March 2004, April 2005, October 2011

Department representative, Presidential Scholarship Competition Academic Fair, 2009, 2013

Upward Bound Career Day presenter, 2009

CSIE/ISC workshop participant, 2007

"Take Our Daughters to Work Day" leader, 2006

Wrote/revised Instrumental Analysis laboratory manuals for Chem 381 and 481, 2004-current
Wrote/revised new CSIE Quantitative Analysis laboratory manual, 2008 and 2010.
Workshop leader, SummerQuest, "Chromatography in Forensic Analysis", June 2004.
Judge, Spring Arbor Academy Science Fair, April 2003
Participant, EMU Chemistry's "Saturday Morning at the Lab", 2001, 2002, 2003
Participant, Brighton High School Visitation, 2003
FTIR demonstrator, Polymers and Coatings Summer Institute and High School Visitation Program, 2002
Judge, 3rd Annual Undergraduate Research Symposium in the Chemical and Biological Sciences, UMBC, 2000
Faculty Advisor, St. Mary's ACS Student Affiliate Chapter (SMACS) and Anime Club, 1998-2000
Judge, St. Mary's County Science and Engineering Fair, 1999

Graduate and undergraduate outreach activities: Judge, Brazos Valley Regional Science and Engineering Fair, 1997-1998; Participant, TAMU National Chemistry Week Open House, 1997; Judge, College Station Junior High School Science Fair, 1995-1997; Judge, Bryan High School Science and Engineering Fair, 1995-1997; President and Vice-president, Thiel College Chapter, ACS-Student Affiliates, 1991-1993; Columnist, Newspaper in Education Science Question Box, Greenville (PA) *Record-Argus*, 1992; Group leader, Chemistry Saturdays for Kids, Thiel College, 1990

Departmental service and committees

Personnel Committee, 2008-2011, 2012-2014 (Chair, 2012-2013 and 2016-17), 2015-2018
Summer Student Research Initiative Planning Committee, 2014-present
Undergraduate Research Advisory Committee, 2008-2014
Seminar coordinator, 2008-2012
Instruction Committee, 2002-2008
Assessment Committee, 2003-2010 (past chair)
Faculty Search Committees, 2003, 2005, 2006, 2008
Chemical instrumentation maintenance, rooms 351-351A, including HPLC, FTIR, GC, AAs, electrochemistry
Varian Saturn 2000 GC-MS and JEOL AccuTOF-MS maintenance (research)

HONORS AND AWARDS

Professional

- Nominated for the William Fennel Symposium Faculty Mentor Award
- Sarah H. Huyvaert Mentor Award, McNair Scholars Program, for mentoring Sylvia Torres, 2014
- Ronald W. Collins Distinguished Faculty Award, Research II, 2011.
- Nominated by students for recognition as an instructor at the Celebration of Student Success, 2011.
- Nominated for Outstanding Faculty in Classroom Instruction Award, EMU Holman Learning Center, 2005.
- Nominated for "You Make the Difference" award for teaching excellence of First Year Students, 2003.
- Young Alumna Award, Thiel College, 2002.
- Spring-Summer Award, EMU, "Applications of Analytical Chemistry to Archaeological Materials," 2002.
- Faculty Development Grant Program, Office of the Provost, St. Mary's College of Maryland. "Archaeological Chemistry: Analysis of Rock Painting Binders" FY2001

Graduate

Graduate Student Council 1997 Research Competition, First Place paper, Physical Sciences; U.S. Department of Education Graduate Assistantship in Areas of National Need Fellowship, 1994-97; Graduate Student Council Second Annual All-University Research Poster Competition, Third Place poster, Social Science/Humanities, 1995; Industry-University Cooperative Chemistry Program (IUCCP) Fellowship and Welch Fellowship, '93-94

Undergraduate

Chemistry Departmental Honors; Dean's Key and Medal (for Dean's List 1989-93); Senior Commencement Orator; American Institute of Chemists Award; Irene Wintersteen Memorial Science Scholarship; Sigma Xi Richard L. Brown Award for Best Research Presentation, April 1992; Society of Analytical Chemists of Pittsburgh 1992 College Chemistry Award; ACS Penn-Ohio Border Section Junior Award; Undergraduate Award for Achievement in Organic Chemistry; Alpha Chi National Honorary (National Convention Theta Chapter Delegate 1993); Cary F. Yelin Award in Analytical Chemistry; ACS Student Affiliate Chapter Sophomore Award; CRC Press Freshman Chemistry Achievement Award; Honors Program participant and William A. Passavant Scholarship, 1989-93

INVITED TALKS

1. "The Fabric of the Past: Archaeological Chemistry of Ancient Textiles," ANACHEM Fall Speaker, Ypsilanti, MI (5 October 2016)
2. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Kansas Local Section, McPherson, KS (29 April 2016)
3. "Colors of the Past: Archaeological Chemistry of Natural Dyes," ACS Oklahoma Local Section, Edmond, OK (28 April 2016)
4. "Colors of the Past: Archaeological Chemistry of Natural Dyes," ACS Tulsa Local Section, Tulsa, OK (27 April 2016)
5. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Northern Oklahoma Local Section, Ponca City, OK (26 April 2016)
6. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS MoKanOk Local Section, Pittsburg, KS (25 April 2016)
7. "Colors of the Past: Archaeological Chemistry of Natural Dyes," ACS Fall Scientific Meeting, Saginaw Valley State University, Saginaw, MI (24 October 2015)
8. "Direct Analysis in Real Time Mass Spectrometry for Characterizing Dyes and Residues" RLAHA Department Seminar, Research Laboratory for Archaeology and the History of Art, University of Oxford, Oxford, UK (5 February 2015)
9. "Plasma-Chemical Oxidation for Radiocarbon Dating Charcoal Rock Paintings," Gabinete de Arqueología, Oficina de la Historiador de La Ciudad de Habana, Havana, Cuba (June 2014)
10. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Lake Superior Local Section, Duluth, MN (May 2014)
11. "From Charcoal to Textiles: Archaeological Chemistry Research at Eastern Michigan University," 2014 Fryxell Award Symposium: Papers in Honor of Marvin W. Rowe, Society for American Archaeology National Meeting, Austin, TX (April 2014)
12. "Colors of the Past: Archaeological Chemistry of Natural Dyes," Columbia College Symposium Series, Chicago, IL (April 2014)
13. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," College of Wooster Chemistry Seminar, Wooster, OH (February 2014)
14. "Colors of the Past: Archaeological Chemistry of Natural Dyes," Brewing Chemistry, ACS Detroit Local Section Science Café, Detroit, MI (November 2013)
15. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Lexington Local Section, Lexington, KY (October 2013)
16. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Central Arizona Local Section, Phoenix, AZ (May 2013)

17. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Upper Ohio Valley Local Section, Marietta, OH (December 2012)
18. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS East Texas Local Section, East Texas Baptist College, Marshall, TX (November 2012)
19. "Applications of Direct Analysis in Real Time – Time of Flight Mass Spectrometry to Cultural Heritage Materials" Anachem Award Special Session on Ambient Pressure Ionization Methods in Mass Spectrometry, Anachem Symposium, Livonia, MI (November 2012)
20. "Your Questions about Vitamins, Drugs and Your Health," Philanthropic Educational Organization, Milan Chapter, Milan, MI (January 2012)
21. "Archaeological Chemistry: Analyzing the Past," Huron Valley Chapter of the Michigan Archaeological Society, Ann Arbor, MI (November 2011)
22. "Archaeological Chemistry: Analyzing the Past," Saginaw Chapter of the Michigan Archaeological Society, Saginaw, MI (October 2011)
23. "DART-MS Applications for Analysis of Cultural Heritage Materials," Art and Chemistry Symposium, ACS Central Regional Meeting, Indianapolis, IN (June 2011)
24. "A Chemist's Adventures Outside the Lab: Chemistry and Archaeology of Rock Paintings," ACS Detroit Local Section/Canadian Institute of Chemistry Awards Banquet, Detroit, MI (May 2011)
25. "A Chemist's Adventures Outside the Lab: Chemistry and Archaeology of Rock Paintings," Illinois Institute of Technology Sigma Xi Research Day Speaker, Chicago, IL (April 2011)
26. "A Chemist's Adventures Outside the Lab: Chemistry and Archaeology of Rock Paintings," ACS Huron Valley Local Section, Eastern Michigan University, Ypsilanti, MI (April 2011)
27. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," Analytical Seminar, Wayne State University, Detroit, MI (November 2010)
28. "Adventures in Chemistry: Dating the Rock Art of Cueva La Conga, Nicaragua," ACS Penn-Ohio Border Section, Thiel College, Greenville, PA (October 2010)
29. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," Adrian College Chemistry Seminar Series, Adrian, MI (April 2010)
30. "A 'Nondestructive' Radiocarbon Dating Method for Microgram-Sized Samples," Michigan Archaeological Society Annual Meeting, Lansing, MI (April 2010)
31. "Cueva La Conga: First Cave Archaeology in Nicaragua," World Cave Archaeology Symposium, 75th Annual Meeting of the Society for American Archaeology, St. Louis, MO (April 2010)
32. "Adventures in Chemistry: Analyzing Ancient Rock Paintings," Philanthropic Educational Organization, Milan Chapter, Milan, MI (March 2010)
33. "Plasmas for Radiocarbon Dating Microgram-Sized Samples," University of Michigan Museum of Anthropology Brown Bag Seminar Series, Ann Arbor, MI (November 2009)
34. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," Illinois Institute of Technology Chemistry Colloquium Series, Chicago, IL (October 2009).
35. "Radiocarbon Dating and Chemical Characterization of Rock Paintings," FACSS, Louisville, KY (October 2009)
36. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS St. Joseph Valley Section Dinner Meeting, Notre Dame, IN (May 2009).

37. "Nondestructive' Radiocarbon Dating of Textiles and Perishable Artifacts: A Review of Progress to Date" with M. W. Rowe, part of a special session "Second Impressions: Alternative Methods for Exploring Archaeological Perishables" at the 74th Annual Meeting of the Society for American Archaeology, Atlanta, GA (April 2009).
38. "The Archaeological Dating Game: Radiocarbon, Rock Art and Residues" Brewing Chemistry, ACS Detroit Section Younger Chemists Committee, Detroit, MI (November 2008)
39. "Characterization of Organic Matter in Rock Paintings: Binder or Background?" Conservation Science Annual, Eastern Analytical Symposium, Atlantic City, NJ (November 2007).
40. "Chemistry and Rock Art: Dating and Characterization," Chemistry and Art Symposium, Southeastern Regional ACS Meeting, Greenville, SC (October 2007).
41. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Chicago Section Dinner Meeting, Chicago, IL (June 2007).
42. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," Implications of Science and Technology Group, Institute for Retired Professionals, West Bloomfield, MI (May 2007).
43. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Penn-Ohio Border Section Meeting, Greenville, PA (February 2007).
44. "Archaeological Chemistry of Rock Paintings: Radiocarbon Dating and Chemical Analysis," ACS Detroit Section Meeting, Detroit, MI (January 2007).
45. "Radiocarbon Analysis of Rock Paintings," Andrews University Chemistry Department Seminar Series, Benton Harbor, MI (October 2003).
46. "Characterization of 17th Century Bricks from Historic St. Mary's City, Maryland," Oakland University Chemistry Department Seminar Series, Rochester, MI (March 2003).
47. "Investigating the Composition of 17th Century Bricks" R. A. Armitage, EMU Chemistry Department Seminar Series, Ypsilanti, MI (September 2002)
48. "Dating a Rock Artist: Radiocarbon Dating and Chemical Analysis of Rock Paintings" Evenings with the Professors Program, Asbury-Solomons Community, Solomons Island, MD (April 2001).
49. "Dating a Rock Artist: Radiocarbon Dating and Chemical Analysis of Rock Paintings," Natural Science and Mathematics Division Colloquium Series, St. Mary's College of Maryland at Historic St. Mary's City (April 2001).
50. "Dating a Rock Artist: Radiocarbon and Cave Paintings." Faculty Seminar, St. Mary's College of Maryland, St. Mary's City, MD (March 2000).
51. "Materials Analysis: Chemistry in Archaeology," Maryland Archaeological Conservation Laboratory School, St. Leonard, MD (June 2000)
52. "The Fern Cave Rock Paintings: The Supernova of 1054 AD?" Thiel College ACS Student Affiliates, Greenville, PA (October 1996).

CONFERENCE PRESENTATIONS AND SEMINARS (Presenter bolded; Students underlined; [†]graduate students, [‡]undergraduates)

ACS Central Regional Meeting, Dearborn, MI, June 2017

1. "Chemical Analysis and Radiocarbon Dating of Archaeological Textile Fragments from the Seip Mound" **M. Repaska**[‡], K. Jakes, and R. A. Armitage.
2. "Identifying Fibers in South American Paracas Period Mummy Textiles by Peptide Mass Fingerprinting" **D. Bailey**[†], M. Repaska, and R. A. Armitage.
3. "Mass Spectrometry for Differentiating Blue Dyes in Archaeological Textiles" **P. Humphrey**[†] and R. A. Armitage.

Pittcon 2017, Chicago, IL, March 2017

4. "Identification of the Contents of a Civil War-Era Bottle" **M. Repaska**[‡], K. Gonzales, B. Hatch, and R. A. Armitage.
5. "Further Studies of Glue Residues on Mended Ceramics from George Washington's Boyhood Home" **D. Fraser**, M. Kaktins, and R. A. Armitage.
6. "Ambient Mass Spectrometric Characterization of South American Dyes from the Saltzman Collection" **R. A. Armitage** and D. Fraser.

41st International Symposium on Archaeometry, Kalamata, Greece, May 2016

7. "Peptide Mass Fingerprinting for Identification of Wild Silks in Archaeological Contexts" **R. A. Armitage**.
8. "Characterization of 17th-Century Glues: Further Studies of Mended Ceramics from George Washington's Boyhood Home" **D. Fraser**, M. Kaktins, and R. A. Armitage.

Pittcon 2016, Atlanta, GA, March 2-6, 2016

9. "Maximizing the Information Obtained from Small Archaeological Samples by Sequencing DART-MS and Plasma-Chemical Oxidation for AMS Radiocarbon Dating" **R. A. Armitage**, K. Jakes, and S. Baker.

Ohio Archaeological Council Meeting, Columbus, OH, October 2015

10. "Recent investigations of textiles from Seip Mound Group" **Kathryn Jakes**, Joy Cain, and Ruth Ann Armitage.

Joint Great Lakes/Central Regional ACS Meeting, Grand Rapids, MI, May 2015

11. "Identification of Red Dyes by DART-MS: Examples from North and South American Archaeological Contexts" **R. A. Armitage** and K. Jakes.
12. "Characterizing 18th-Century Glues on Ceramics from Ferry Farm, George Washington's Boyhood Home" **D. Fraser**, R. A. Armitage, and M. Kaktins
13. "DART-MS: A Confirmatory Test for Heme in Bloodstains on Fabric" **Sylvia Torres**[‡] and Ruth Ann Armitage.
14. "Natural Anthraquinone Dyes and Dye Mixtures: Microwave Synthesis and Characterization by Direct Analysis in Real Time (DART) Mass Spectrometry" **Steven Augustin**[†], Timothy Friebe, and Ruth Ann Armitage.

7th MaSC Meeting, Chicago, IL, May 2015

15. "Identification of Red Dyes by DART-MS: Examples from North and South American Archaeological Contexts" **R. Armitage** and K. Jakes.

Materials Group Seminar, Research Laboratory for Archaeology and the History of Art, University of Oxford, Oxford, UK, February 2015

16. "Proteomics of Silk: Can we use proteins to differentiate wild from cultivated?" **R. A. Armitage**

40th International Symposium on Archaeometry, Los Angeles, CA, May 2014

17. "Anthraquinone Dye Colorants in Red Fibers from the Seip Mound, Ohio" K. Jakes, **R. A. Armitage**, and **C. Day**[‡].
18. "DART-MS for Identification of Dye Colorants in Paracas Textiles" **R. A. Armitage**, K. Jakes, and **C. Day**[‡].
19. "Rapid Identification of a Blood Encrustation on an African Ritual Mask by DART-MS" **D. Fraser**, C. Selvius DeRoo, R. Cody, **S. Torres**[‡], and R. A. Armitage

42nd Annual Meeting of the American Institute of Conservation of Historic and Artistic Works, San Francisco, CA, May 28-31, 2014

20. "Analysis of Organic Dyes in Textiles by Direct Analysis in Real Time – Time-of-Flight Mass Spectrometry" **C. Selvius DeRoo** and R. A. Armitage.

Pittcon 2014, Chicago, IL, March 2-6, 2014

21. "DART-MS Analysis of Historic Tobacco Pipes to Investigate the Preservation of Nicotine Residues" **S. Torres**[‡], S. D. Hurry, and R. A. Armitage.

22. "Identification of Red Dyes in Archaeological Textile Fragments by DART-MS Before and After Sample Cleaning" **C. Day**[‡], K. Jakes, and R. A. Armitage.
23. "DART-MS Applications to the Analysis of Art and Archaeological Materials" **R. A. Armitage**

Anachem Symposium, Livonia, MI, November 7, 2013

24. "DART-MS Analysis of Historic Tobacco Pipes to Investigate the Preservation of Nicotine Residues" **S. Torres**[‡], S. D. Hurry, and R. A. Armitage.
25. "Identification of Red Dyes in Archaeological Textile Fragments by DART-MS Before and After Sample Cleaning" **C. Day**[‡], K. Jakes, and R. A. Armitage.

ACS Spring National Meeting, 12th Archaeological Chemistry Symposium, New Orleans, LA, April 7-11, 2013

26. "Characterizing Organic Colorants in Mock-ups of a 15th Century Iranian Timurid Qur'an by Direct Analysis in Real Time-Time of Flight Mass Spectrometry" **C. Varney**[†], R.A. Armitage, and C. Selvius DeRoo
27. "Recent Development in Using Direct Analysis in Real Time Mass Spectrometry for Rapid Characterization of Organic Residues on Ceramics" **J.Hopkins**[‡] and R.A. Armitage (poster)
28. "Identification of Organic Dyes in Tapestry Fibers from the Detroit Institute of Arts by Direct Analysis in Real Time Mass Spectrometry" **C. Day**[‡], R.A. Armitage, and C. Selvius DeRoo (poster)
29. "Characterizing Glues from the Mary Ball Washington Collection" **D. Fraser**, R. A. Armitage, and M. Kaktins
30. "Developments in Ambient Ionization Mass Spectrometry for Analysis of Cultural Heritage Materials" **R. A. Armitage**

Anachem Symposium, Livonia, MI, November 1, 2012

31. "Characterizing Organic Colorants in Mock-ups of a 15th Century Iranian Timurid Qur'an by Direct Analysis in Real Time-Time of Flight Mass Spectrometry" **C. Varney**[†], R.A. Armitage, and C. Selvius DeRoo
32. "Recent Developments in Using Direct Analysis in Real Time Mass Spectrometry for Rapid Characterization of Organic Residues on Ceramics" **J.Hopkins**[‡] and R.A. Armitage
33. "Developing DART-MS Methods for Identification of Organic Dyes in Historic Textiles" **C. Day**[‡], C. Selvius DeRoo, and R.A. Armitage

Biennial Conference on Chemical Education, State College, PA, July 2012

34. "Creative Science Inquiry Experience in Organic Chemistry and Quantitative Analysis" **A. Flanagan Johnson**, H. Lindsay, and R.A. Armitage

IFRAO-SIARB International Congress on Archaeology and Rock Art, La Paz, Bolivia, June 2012 (due to lack of funding, these papers were presented by others as indicated)

35. "Chemical Characterization of the Pictographs of Cueva la Conga, Nicaragua" R.A. Armitage, R. Li[†], C. Selvius DeRoo, and S. Baker. In session "Dating and chemical analysis of rock art," presented by **M. W. Rowe** (session organizer).
36. "Cueva La Conga: First karst cave archaeology in Nicaragua" S. Baker and R. A. Armitage. In session "Rock art and archaeological cultures of present-day Central America: a link between Mesoamerica and the Andean region," presented by **M. Strecker** (conference organizer).

ACS Central Regional Meeting, Dearborn, MI, June 2012

37. "Direct Analysis in Real Time Mass Spectrometry for Identification of Organic Dyes" **R.A. Armitage**, J. Geiger[‡], and C. Selvius DeRoo
38. "Identification of Heme in Aged Blood by Direct Analysis in Real Time Mass Spectrometry" **D.Fraser** and R.A. Armitage

39th International Symposium on Archaeometry, Leuven, Belgium, May 2012

39. "Characterizing Organic Colorants in a 15th Century Iranian Timurid Qur'an by Direct Analysis in Real Time-Time of Flight Mass Spectrometry" **C. Varney**[†], R.A. Armitage, and C. Selvius DeRoo

40. "Direct Analysis in Real Time Mass Spectrometry for Identification of Organic Dyes" **R.A. Armitage**, J. Geiger[‡] and C. Selvius DeRoo
41. "Potential of Direct Analysis in Real Time Mass Spectrometry for Rapid Characterization of Organic Residues on Ceramics" **J.Hopkins[‡]** and R.A. Armitage
42. "Identification of Heme in Aged Blood by Direct Analysis in Real Time Mass Spectrometry" **D.Fraser** and R.A. Armitage

Anachem Symposium, Livonia, MI, November 3, 2011

43. "Characterizing Organic Colorants in a 15th Century Iranian Timurid Qur'an by Direct Analysis in Real Time Time-of-Flight Mass Spectrometry" **C. Varney[†]**, R.A. Armitage, and C. Selvius DeRoo
44. "Characterizing Organic Dyes in a Textiles by Direct Analysis in Real Time Time-of-Flight Mass Spectrometry" **J. Geiger[‡]**, R.A. Armitage, and C. Selvius DeRoo
45. "Characterizing Organic Residues on Ceramics by Direct Analysis in Real Time Time-of-Flight Mass Spectrometry" **J.Hopkins[‡]** and R.A. Armitage

ACS Central Regional Meeting, Indianapolis, IN, June 2011

46. "Determining the Survival of Potential Biomarkers in Archaeological Materials by DART-MS" **D. Fraser** and R.A. Armitage
47. "Development of GC-MS and DART-MS Methods for the Qualitative and Quantitative Analysis of Carbohydrates in Rock Paintings" **B. Dhakal[†]** and R.A. Armitage

Pittcon 2011, Atlanta, GA, March 2011

48. "Characterizing Archaeological Residues by Direct Analysis in Real Time Mass Spectrometry" **R.A. Armitage**
49. "Development of GC-MS and DART-MS Methods for the Qualitative and Quantitative Analysis of Carbohydrates in Rock Paintings" **B. Dhakal[†]** and R.A. Armitage

Anachem Symposium, Livonia, MI, October 28, 2010

50. "Characterization of Carbohydrates in Archaeological Materials" **B. Dhakal[†]** and R.A. Armitage

2010 ACS Central Regional Meeting, Dayton, OH, June 2010

51. "Recent developments in nondestructive radiocarbon dating of fragile organic artifacts and textiles" **R.A. Armitage** and D. Hardemon[‡]
52. "Hemoglobin: A Reliable Indicator of Blood in Archaeological Materials?" **D. Fraser** and R.A. Armitage
53. "Quantitative Analysis of Non-steroidal Anti-inflammatory Drugs in the River Raisin by GC-MS" **J. Bates[‡]** and R.A. Armitage
54. "Qualitative and Quantitative Analyses of Lipidic Binders in Rock Paintings" **C. Phillips[†]** and R. A. Armitage.

38th International Symposium on Archaeometry, Tampa, FL, May 2010

55. "Cueva La Conga: Report on dating and characterization of the first known painted cave in Nicaragua" **R.A. Armitage**, S. Baker, and R. Li[†]. Oral presentation, Integrated site studies session
56. "Recent developments in nondestructive radiocarbon dating of fragile organic artifacts and textiles" **R.A. Armitage** and D. Hardemon[‡]
57. "Further studies on the survival of hemoglobin in rock paintings" **D. Fraser** and R.A. Armitage.

Pittcon 2010, Orlando, FL, March 2010

58. "Characterization of the Binders in the Rock Art of Cueva La Conga, Nicaragua" **R. Li[†]** and R. A. Armitage.
59. "Non-destructive Sample Preparation for Radiocarbon Dating of Textiles and Other Perishable Archaeological Materials" **R. A. Armitage** (Oral presentation)
60. "An Integrated Analytical and Organic Chemistry Creative Scientific Inquiry Experience" **R. A. Armitage**, H. Lindsay, A. Flanagan Johnson (Oral presentation)

61. "Determining the Efficacy of Non-Destructive Pre-Treatment Methods on Known Age Textile Samples by Gas Chromatography-Mass Spectrometry Analysis" **D. Hardemon**[†] and R. A. Armitage
62. "Methodological Study of Two Derivatization Methods for Proteinaceous Binders in Rock Paintings" **G. Maxwell**[‡] and R. A. Armitage
63. "Qualitative and Quantitative Analyses of Lipidic Binders in Rock Paintings" **C. Phillips**[‡] and R. A. Armitage

Anachem Symposium, Livonia, MI, October 29, 2009

64. "Characterization of the Binders in the Rock Art of Cueva La Conga, Nicaragua" **R. Li**[†] and R. A. Armitage. Oral presentation
65. "Determining the Efficacy of Non-Destructive Pre-Treatment Methods on Known Age Textile Samples by Gas Chromatography-Mass Spectrometry Analysis", **D. Hardemon**[†] and R. A. Armitage ****Award for Best Undergraduate Research Presentation****
66. "Qualitative and Quantitative Analyses of Lipidic Binders in Rock Paintings", **C. Phillips**[‡] and R. A. Armitage
67. "Methodological Study of Two Derivatization Methods for Proteinaceous Binders in Rock Paintings" **G. Maxwell**[‡] and R. A. Armitage

ACS Central Regional Meeting, Cleveland, OH, May 2009

68. "Characterization of the Rock Art of Cueva La Conga, Nicaragua: Preliminary Results" **R. A. Armitage** and R. Li[†]
69. "Qualitative and Quantitative Analyses of Proteinaceous Binders in Rock Paintings," **W. Malcolm**[‡], G. Maxwell[‡] and R. A. Armitage

3rd MaSC Meeting, London, England, April 2009

70. "Qualitative and Quantitative Analyses of Proteinaceous Binders in Rock Paintings," W. Malcolm[‡], G. Maxwell[‡] and **R. A. Armitage**

Pittcon 2009, Chicago, IL, March 2009

71. "Qualitative and Quantitative Analyses of Proteinaceous Binders in Rock Paintings," **G. Maxwell**[‡], M. Doolin[‡], W. Malcolm[‡], and R. A. Armitage
72. "Development of Effective Chemical Pretreatments for "Non-destructive" Radiocarbon Dating of Fragile Artifacts," **R. A. Armitage** and M. E. Ellis[†]
73. "Determining the Efficacy of an Alternative Cleaning Method for Radiocarbon Dating Archaeological Textiles," **D. Hardemon**[†], **C. Phillips**[‡], and R. A. Armitage
74. "Analysis of Archaeological Soils After 30 Years of Storage: Implications for Site Usage Determinations," **C. Dean**[‡], S. D. Hurry, and R. A. Armitage
75. "Clinical test strips for rapid identification of binder materials in rock paintings," **D. Fraser** and R.A. Armitage

Anachem Symposium, Livonia, MI, October 29, 2008

76. "Testing Pre-treatment Methods for Nondestructive Radiocarbon Dating of Textiles," **D. Hardemon**[†], **C. Phillips**[‡], R. A. Armitage
77. "Detection of DDT in the Environment: Water Analyses Using Solid-Phase Extraction and Gas Chromatography-Mass Spectrometry," **C. Van De Car**[†] and R. A. Armitage

10th Graduate/Undergraduate Chemistry Research Symposium, Wayne State University, Detroit, MI, October 4, 2008

78. "Soil Analysis for Comparison of Archaeological Samples," **C. Dean**[‡] and R. A. Armitage
79. "Little Lost River Cave, Idaho: I. Characterization of a Black Residue and Implications for Radiocarbon Dating," **G. Maxwell**[‡], J. Brown-Sinha[†], C. Merrell, and R. A. Armitage

20th Biennial Conference on Chemical Education, Bloomington, IN, July 2008

80. "Assessing the impact of an integrated analytical and organic chemistry experience," **A. Johnson**, R.A. Armitage, H. Lindsay

37th International Symposium on Archaeometry, Siena, Italy, May 2008

81. "Qualitative THM-GC-MS and Quantitative Analysis of Proteins and Amino Acids in Rock Painting Binders," **M. Doolin**[†] and R. A. Armitage
82. "Characterization of a Use Residue on a Unique Stone Tool from the Coahuila Desert," J. Van Gemert[‡], J. Stambek[†], **M. Rowe**, R. Mallouf, and R. A. Armitage
83. "Clinical test strips for rapid identification of binder materials in rock paintings," **D. Fraser** and R.A. Armitage
84. "Characterizing the Organic Material in Rock Paintings by THM- and Conventional GC-MS: Implications for Radiocarbon Dating of Rock Art," **R. A. Armitage**
85. "Little Lost River Cave, Idaho: I. Characterization of a Black Residue and Implications for Radiocarbon Dating," **G. Maxwell**[‡], J. Brown-Sinha[†], C. Merrell, and R. A. Armitage
86. "Little Lost River Cave, Idaho: II. Development of Effective Chemical Pretreatments for "Non-destructive" Radiocarbon Dating of Fragile Reed and Bark Artifacts," **M. E. Freund-Ellis**[†], C. Merrell, and R. A. Armitage

Anachem Symposium, Livonia, MI, October 2007

87. "THM-GC-MS analysis of rock paintings from Casa de Las Golondrinas, Guatemala: Implications for radiocarbon dating" **A. Livingston**[†] and R. A. Armitage

2nd MaSC Meeting, Philadelphia, PA, September 2007

88. "The Use of THM-GC-MS for the Evaluation of Chemical Pretreatments for Removing Humic Substances from Archaeological Artifacts" **M. E. Ellis**[†] and R.A. Armitage
89. "Characterization of Binder Materials in Rock Paintings by GC-MS," **R.A. Armitage** (Oral presentation)

233rd ACS National Meeting, Chicago, IL, March 2007

90. "GC-MS for quantitative analysis of lipids in a coating associated with rock paintings in Little Lost River Cave, Idaho" **G. Maxwell**[‡] and R. A. Armitage
91. "THM-GC-MS analysis of possible binders in rock paintings: comparisons to authentic pictographs and the effect of pretreatment" **M. Doolin**[†] and R. A. Armitage
92. "Characterization of copal incense from Mesoamerica: Identification of residues by GC-MS" **J. Van Gemert**[‡] and R. A. Armitage
93. "THM-GC-MS analysis of rock paintings from Casa de Las Golondrinas, Guatemala: Implications for radiocarbon dating" **A. Livingston**[†] and R. A. Armitage

Pittcon 2007, Chicago, IL, March 2007

94. "Surface Analysis of Plasma-Oxidized Materials: Implications for 'Nondestructive' Radiocarbon Dating" **J. Kirkland**[†] and R. A. Armitage

2nd Archaeological Sciences of the Americas Symposium, Tucson, AZ, September 12, 2006

95. "FTIR-ATR Studies of Plasma-Oxidized Materials: Implications for "Nondestructive" Radiocarbon Dating" J. Kirkland[†] and **R. A. Armitage**
96. "Characterization of a Black Residue in Little Lost River Cave, Idaho Using Chromatographic and Spectroscopic Techniques" J. Brown[†], S. Fezzy[†], R. Perumplavil[†], **R.A. Armitage**

36th International Symposium on Archaeometry, Quebec City, Quebec, Canada, May 2006

97. "Characterization of a Black Residue in Little Lost River Cave, Idaho Using Chromatographic and Spectroscopic Techniques" J. Brown[†], S. Fezzy[†], R. Perumplavil[†], **R.A. Armitage**
98. "Characterization of building materials from the brick chapel at Historic St. Mary's City" **R. A. Armitage**, L. Minc, S.D. Hurry, D.V. Hill, and M. Doolin[†]

231st ACS National Meeting, Archaeological Chemistry Symposium, Atlanta, GA, March 2006.

99. "Pyrolysis and THM-GC-MS Characterization of a Black Residue in Little Lost River Cave, Idaho" **J. Brown**[†], S. Fezzey[†], and R. A. Armitage (Oral presentation)
100. "Surface Analysis of a Black Coating from Little Lost River Cave, Idaho" **R. Perumplavil**[†] and R. A. Armitage (Oral presentation)
101. "Characterization of building materials from the brick chapel at Historic St. Mary's City" **R. A. Armitage**, L. Minc, S.D. Hurry, and D.V. Hill (Oral presentation)

Anachem Symposium, Livonia, MI, October 2005

102. "Pyrolysis and THM-GC-MS Characterization of a Black Residue in Little Lost River Cave, Idaho" **J. Brown**[†], S. Fezzey[†], and R. A. Armitage (Oral presentation) **** Brown received best student research presentation award****

Pittcon 2005, Chicago, IL, March 2005

103. "Characterization of Black Deposit Associated with Rock Paintings in Little Lost River Cave, Idaho using Pyrolysis GC/MS" **S. Fezzey**[†] and R. A. Armitage ****Fezzey received Sigma Xi award at GRF****
104. "Depth Profiling and X-ray Photoelectron Spectroscopy Analysis of a Black Deposit Associated with Rock Paintings in Little Lost River Cave, Idaho" **R. Perumplavil**[†], R. A. Armitage, and S. Garrett

Anachem Symposium, Livonia, MI, October 2004

105. "Characterization of Black Deposit Associated with Rock Paintings in Little Lost River Cave, Idaho using Pyrolysis GC/MS" **S. Fezzey**[†] and R. A. Armitage (Oral presentation)
106. "Depth Profiling and X-ray Photoelectron Spectroscopy Analysis of a Black Deposit Associated with Rock Paintings in Little Lost River Cave, Idaho" **R. Perumplavil**[†], R. A. Armitage, and S. Garrett (Oral presentation) ****awarded Best Student Presentation**
107. "Plasma Chemical Oxidation and Accelerator Mass Spectrometric Radiocarbon Analysis of Little Lost River Cave Black Residue" **T. Drane**[†] and R. A. Armitage

Inaugural Symposium on Archaeological Sciences of the Americas, Tucson, AZ, September 2004

108. "Characterization of Bricks and Tiles from 17th-Century Maryland," **R. A. Armitage**, L. Minc, D. V. Hill, and S. D. Hurry
109. "Re-analysis of archived archaeological soils," R. A. Armitage, S.D. Hurry, and **D. Fraser**

36th Central Regional ACS Meeting, Indianapolis, IN (June 2004)

110. "Re-analysis of archived archaeological soils," R. A. Armitage, S.D. Hurry, and **D. Fraser**
111. "Characterization of Black Deposit Associated with Rock Paintings in Little Lost River Cave, Idaho using Pyrolysis GC/MS" **RA Armitage** and S Fezzey[†]
112. "Characterization of Bricks and Tiles from 17th-Century Maryland" **R.A. Armitage**, S.D. Hurry, L. Minc, D. Hill

34th International Symposium on Archaeometry, Zaragoza, Spain, May 2004

113. "Characterization of Bricks and Tiles from 17th-Century Maryland," **R. A. Armitage**, N. Richards[‡], L. Minc, D. V. Hill, and S. D. Hurry

25th Annual Sigma Xi Student Research Symposium, Toledo, OH, April 2004

114. "Characterization of black deposit associated with rock paintings in Little Lost River Cave, Idaho using pyrolysis GC/MS," **S. Fezzey**[†] and R. A. Armitage

Anachem Symposium, Livonia, MI, November 2004

115. "Compositional Analysis of 17th-Century Brickmaking Technology in the Chesapeake Region" **R. A. Armitage**, L. Minc, D. V. Hill, and S. D. Hurry

Pittcon 2003, Orlando, FL, March 2003

116. "Post-excavational Changes in Soil Chemistry: An Archaeological Curation Problem" R. A. Armitage and S. D. Hurry

225th National ACS Meeting, New Orleans, LA, March 2003

117. "Characterization of clays and 17th century bricks from Historic St. Mary's City" **N. Houser**[‡] and R. A. Armitage

Anachem Symposium, Livonia, MI, November 2002

118. "Investigating the Composition of 17th Century Bricks" R. A. Armitage and **N. Houser**[‡]

34th Central Regional ACS Meeting, Archaeological Chemistry Symposium, Ypsilanti, MI, June 2002

119. "Investigating Changes in Soil Chemistry" **R. A. Armitage**, S. Lesko[‡], M. Pratt[‡], B. McMullen[‡], S. D. Hurry

120. "Composition of 17th century brick by neutron activation analysis" C. Zalma[‡], L. Minc, S. D. Hurry and **R. A. Armitage**

121. "Use of Clinical Test Strips for Identification of Blood as a Rock Painting Binder Material" **D. Fraser** and R. A. Armitage

Pittcon 2001, New Orleans, LA, March 2001

122. "Establishing a Plasma-Oxidation System for Radiocarbon Dating Rock Paintings," **R. A. Armitage** and M. W. Rowe

123. "Development of an arson analysis laboratory experiment using SPME-GC-MS," **A. L. Leis**[‡] and R. A. Armitage

124. "Teaching forensic drug testing in the undergraduate laboratory" **J. L. Frahm**[‡] and R. A. Armitage

125. "Heavy metal exposure of white-tailed deer by GFAAS" **T. Seith**[‡], R. Gonser and R. A. Armitage

126. "Investigation of phosphate change in archaeological soil samples during storage" **K. Crowley**[‡], S. Hurry, D. M. Fraser and R. A. Armitage

3rd Annual Undergraduate Research Symposium in the Chemical and Biological Sciences, Baltimore, MD, October 2000

127. "Identifying the binder in ancient Texas rock paintings" **M. L. Pignone**[‡] and R. A. Armitage

128. "Radiocarbon Dating of Rock Paintings from Texas and Australia" **P. Kapur**[‡] and R. A. Armitage

220th ACS National Meeting, Washington, DC, August 2000

129. "Investigating 17th century brick composition" **P. Kapur**[‡], and R. A. Armitage

130. "Identifying the binder in ancient Texas rock paintings" **M. L. Pignone**[‡], **R. Thomas**[‡] and R. A. Armitage

131. "Soil phosphate: A reinvestigation after 20 years of storage" **K. Crowley**[‡] and R. A. Armitage

Graduate School Presentations

132. "Radiocarbon Dating of Rock Paintings at Hueco Tanks State Historical Park, Texas." IUCCP Symposium, College Station, TX (September 1997).

133. "Radiocarbon Dating of Rock Paintings from Hueco Tanks State Historical Park, Texas." Southwestern and Rocky Mountain Regional Meeting of the American Association for the Advancement of Science, College Station, TX (May 1997)

134. "The Fern Cave Rock Paintings: The Supernova of 1054 AD?" Graduate Student Council 1997 Research Competition, College Station, TX (March 1997) ***award for best student presentation***

135. "Radiocarbon determinations for Chillagoe rock paintings: small sample AMS." Sixth Australasian Archaeometry Conference, Sydney, Australia (February 1997)

136. "Rock art image at Fern Cave, Lava Beds National Monument, California: Not the A.D. 1054 Supernova." Poster, IUCCP Symposium, College Station, TX (October 1996)

137. "Radiocarbon Dating of Pictographs from Arizona and West Texas." Poster, International Symposium on Archaeometry, Urbana, IL (May 1996)

COLLABORATORS

- A. Mark Pollard**, Research Laboratory for Archaeology and the History of Art, University of Oxford, Oxford, UK
Proteomics and stable isotope characterization of silks
- Renée Stein**, Carlos Museum, Emory University, Atlanta, GA
DART-TOF-MS and paper spray mass spectrometry of South American dyestuffs
- Kathryn Jakes**, Ohio State University, Columbus, OH
Identification of natural dyes in pre-Columbian Peruvian and Woodland textiles
- Adelphine Bonneau**, Université Laval, Quebec City, QC
Validation of plasma-chemical oxidation for radiocarbon dating rock art
- Suzanne Baker**, Archaeological/Historical Consultants, Oakland, CA
Archaeology and radiocarbon dating and analysis of paintings from Central America
- Robert “Chip” Cody**, JEOL USA, Peabody, MA
New methods for DART-MS characterization of cultural heritage materials
- Daniel Fraser**, Lourdes University, Sylvania, OH
Development of ambient ionization methods for identification of biologically-relevant compounds in archaeological samples
- Alex Carroll Ruuska**, Northern Michigan University, Marquette, MI
Burnt Bluff pictograph site, Garden Peninsula, Michigan
- Marvin Rowe**, Professor Emeritus, Department of Chemistry, Texas A&M University, College Station, TX
Graduate advisor
- Carolynne Merrell**, University of Idaho, Moscow, ID
Analysis and dating of paintings and artifacts from Little Lost River Cave, and other sites in Idaho
- Leah Minc**, Oregon State University Radiation Center, Corvallis, OR
Ceramic residues analysis; materials analysis of brick, clay, and pottery using neutron activation analysis
- Silas Hurry**, Archaeology Research Laboratory, Historic St. Mary’s City, St. Mary’s City, MD
Historic archaeology projects in Tidewater region of Maryland and Virginia
- Mara Kaktins**, George Washington Foundation, Fredericksburg, VA
Identification of glues and adhesives on Washington ceramic objects
- Tim Bennett**, Warner Site, Brighton, MI
Soil chemical analysis as a teaching tool in Quantitative Analysis; characterizing a patent medicine residue
- Tom Guilderson**, Lawrence Livermore Nat’l Laboratory Center for Accelerator Mass Spectrometry
AMS analysis of plasma-generated CO₂ from rock paintings