

Michael H. Walter, Ph.D.
Associate Professor

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Education and Training:

1983-B.A. - Botany, University of California, Santa Barbara
1986-M.S. - Plant Pathology, Oregon State University, Corvallis
1991-Ph.D. - Plant Pathology, Washington State University, Pullman
1992-1995 - Postdoctoral Research Assistant, Dept of Plant Pathology, Kansas State University 1995-1997
- Postdoctoral Research Assistant, Dept of Plant Pathology, Iowa State University

Positions Held

2003-present: Associate Professor, Department of Biology, University of Northern Iowa
1997-2003: Assistant Professor, Department of Biology, University of Northern Iowa
1998: Visiting Scientist: The Institute for Molecular Biology and Medicine, University of Scranton, PA

Professional Affiliations, Memberships: American Society for Microbiology, ASM- North Central Division, Sigma Xi, Iowa Academy of Sciences, Council on Undergraduate Research, Iowa Biotechnology Association Board of Directors, American Association for the Advancement of Science

Honors and Awards: 1999-2000 - Excellence in Teaching Award - from the Delta Iota Chapter of Beta Beta Beta

Teaching, to date:

- **Non-Major & Introductory-level Biology Courses:** Life: The Natural World, Cell Structure & Function Lab, Environment, Technology, and Society (Capstone), Careers in Biology
- **Biology Major & Other Classes:** General Microbiology (Lec & Lab), Virology (my creation, Lec & Lab), Bioinformatics Applications for Biology (my creation), Undergraduate Research Seminar, Readings in Biology, Graduate Colloquium, Advanced Cell & Molecular Biology (*Apoptosis vs Virus Infection*), Special Problems, Professional Science Masters Seminar.

Service, to date:

- **Department, Committees:** PAC, Safety, Scholarships, PSM, Graduate Student Committees, Faculty Searches, Group Proposals
- **College, Committees:** PAC, NSF Bioinformatics Summer Institute Application ('05), CNS – Scholarship Selection & overseeing transformation from 'Math, Science & Technology Symposium, Computer Science Dept. Head Search, College Curriculum, Iowa Biotechnology Association-Board of Directors
- **University, Committees:** Faculty Advancement Committee to study the impacts of COVID-19 on faculty advancement (promotion and tenure), Faculty Senate (Member, Vice-Chair, Chair), Budget Committee, Search Committees (Associate Provost for Academic Affairs, Assistant to the President for Board and Governmental Relations), Faculty Senate Chair on UNI Presidential Search effort, Faculty Senate Chair – with Faculty Handbook Committee & United Faculty, TIER-Study & follow-up, Military Science Liaison and Oversight Committee, Higher Learning Commission, 10-year visit (2020/21), University Lab Safety Committee.
- **Community:**

- Humanitarian: Rotary Club of the Cedar Valley, JOURney Foundation (501c-3, LGBT support foundation), Board of Directors
- Cultural: Metropolitan Chorale (Board of Directors), Cedar Valley Chamber Music (Board of Directors)
- Professional: American Society for Microbiology-North Central Division, Member
- Educational: Drum Corps International-Dubuque Colts, Volunteer

Research Publications:

- Jaci Donath, Anissa Forero, Emily Cornelius and **Michael H. Walter**. 2021. Sampling and increase methods influence observed size-range and morphology of bacteriophages from planted prairie soil. Applied and Environmental Microbiology - rejected. In preparation for submission to journal: PHAGE, Therapy, Applications, and Research-Mary Ann Liebert, Inc., publishers.
- Cheng-Han Chung, **Michael H. Walter**, Luobin Yang, Shu-Chuan Chen, Vern Winston, Michael A. Thomas. 2017. Predicting Genome Terminus Sequences of *Bacillus cereus*-group Bacteriophage using next generation sequencing data. 2017. *BMC Genomics*. 18:350-363. DOI 10.1186/s12864-017-37440-363.
- Xiaofeng Fu, **Michael H. Walter**, Angel Paredes, Marc C. Morais, Jun Liu. 2011. The mechanism of DNA ejection in the *Bacillus anthracis* spore-binding phage 8a revealed by cryo-electron tomography. *Virology*. 2011 Dec 20;421(2):141-8. Epub 2011 Oct 21.
- **Patent: # 7,374,874, Issued (Awarded) May 20, 2008.** Bacteriophages that Infect Bacillus Bacteria (ANTHRAX). The invention provides bacteriophages that infect Bacillus bacteria, including Bacillus anthracis, and compositions containing the bacteriophages. The invention also provides methods for using the bacteriophages of the invention to prevent and treat infection of an organism by Bacillus bacteria. Methods and materials to decontaminate a surface or an organism that is contaminated with Bacillus bacteria or Bacillus spores is also provided. Filed April 22, 2003.
- **Walter, M. H.** 2003. Efficacy and durability of *Bacillus anthracis* bacteriophages used against spores. *Journal of Environmental Health* 66(1):9-15.
- **Walter, M. H.** and Dylan D. Baker. 2003. Three *Bacillus anthracis* bacteriophages from topsoil. *Current Microbiology* 47:55-58.
- **Walter, M. H.**, W. J. Kaiser, R. E. Klein and S. D. Wyatt. 1992. Association between tobacco streak ilarvirus seed transmission and anther tissue infection in bean. *Phytopathology* 82:412-415.
- **Walter, Michael H.** and H. R. Cameron. 1991. Double-stranded RNA isolated from grapevines affected by Rupestris stem pitting disease. *Am. Jour. Enol. Vitic.* 42(3):175-179.

Research Presentations:

- Walter, M.H.** 2021. Virtual Planning Meeting-Poster, 2022 Iowa NSF EPSCoR submission-Chemurgy 2.0 - IA EPSCoR 2022, Oct 30, 2021.
- Selecting for Durability in Bacillus cereus / anthracis Bacteriophages.** Alexis J. Moore and Michael H. Walter. 2021. Poster. American Society for Microbiology-North Central Division Annual Meeting-Online, Nov 19-20, 2021.
- Durable Phage Structural Proteins of 'Stability-Selected' Bacteriophages.** 2021. Virtual Planning MeetingPoster, 2022 Iowa NSF EPSCoR submission-Chemurgy 2.0 - IA EPSCoR 2022, Oct 30, 2021.
- Selecting for Durability in Bacillus cereus / anthracis Bacteriophages.** Alexis J. Moore and Michael H. Walter. 2021. Poster. Summer Undergraduate Research Program-LSAMP (Louis Stokes Alliances for Minority Participation), July 30, 2021, UNI-Mauker Union Ballroom.
- **Size and Morphology of Bacillus Bacteriophages from Prairie Soil are Influenced by Increase Methods.** J. Donath, E. Cornelius, A. Forero, M. H. Walter. 2020. Poster-Accepted for Session Title: HMB07 Phage-Host Interactions, Friday, June 19, ASM Microbe 2020, June 18-22, in Chicago, Illinois. Meeting Cancelled due to COVID-19.
- **Does Preparation Method Affect Size-Type Distribution in the Bacteriophage Population?**

- Images?** Anissa Forero & Michael H. Walter, Ph.D., October 25-26th, **2019**, Poster-North Central Branch of the American Society for Microbiology, Duluth, MN.
- How Does 2-D Electrophoresis Assist in Characterizing Small Bacteriophages?** Jaci Donath & Michael H. Walter, Ph.D. September 28-29, **2018**, Poster-North Central Branch of the American Society for Microbiology, Mankato, MN.
- What is The True Ratio Between Small and Large Soil Bacteriophages?** Hneiva Uranga, Kashif Shaikh, Michael Walter, PhD. September 28-29, 2018, Poster-North Central Branch of the American Society for Microbiology, Mankato, MN.
- Phage applications: decontamination & detection of anthrax spores.** Michael H. Walter, Dec 5, 2016. Presentation. TEconomy Meeting, December 6, 2016, MSH 245.
- Prediction of Phage Genome Terminus by NGS data: Genetic Characterization and Cleavage Site of Terminus Sequences Prediction for Novel Bacillus cereus-group Bacteriophages from Topsoil.** **2014.** ChengHan Chung, Christian Denny, Michael H. Walter, Shu-Chuan (Grace) Chen & Michael A. Thomas. Poster - Molecular Genetics of Bacteria and Phages Meeting, University of Wisconsin – Madison. August 5-9.
- Soil bacteriophage as anti-microbials.** Michael H. Walter, Gabe Connell, Marc Morais. Apr 4, **2013.** Presentation, Great Plains Emerging Infectious Diseases Conference.
- Diversity, structure and affinity reagent applications of Bacillus anthracis bacteriophage from Iowa soil.** 2011. Gabe Connell and Michael Walter, PhD- UNI, 71st Annual Meeting North Central Branch of the American Society for Microbiology to Des Moines University, Oct 7-8, **2011**
- Biology through bacteriophage research,** Seminar, Wartburg College, Jan 28, **2011** **-Diversity, structure and affinity reagent applications of Bacillus cereus bacteriophage from Iowa soil.** **2010.** Poster Gabriel Connell and Michael Walter. Department of Biology, MSH-144, University of Northern Iowa, Cedar Falls, Iowa 50613. Sixth Biennial All Iowa Virology Symposium. University of Iowa, Nov 12-13, 2010
- Application and structure of selected Bacillus anthracis bacteriophages.** Walter, M. H. Invited Seminar, Mar 23, **2010**, Plant Pathology Department, Iowa State University.
- Bacteriophage Affinity Reagents Allow Rapid Electronic Detection of Airborne Bacillus anthracis Spores.** Michael H. Walter, Associate. Prof., Univ. of Northern Iowa, Poster. 2010 American Society for Microbiology Biodefense Research Meeting, Baltimore. **Feb 21-24, 2010**
- Bacteriophage Sbp8A Sequence, Bioinformatics & Structural Update.** **2009.** Michael Walter, Michael Thomas & Marc Morais. **Oral Presentation.** The 2009 Idaho State University Practical Bioinformatics Workshop, “From Genome to Phenotype”, ISU’s 5th Practical Bioinformatics Workshop, which focuses on emerging applications and approaches for complex, data intensive analyses. **Oct 15-18, 2009** **-The Three-Dimensional Structure of Bacillus anthracis Spore-Binding Phage 8a by Cryo-electron Tomography.** **2009.** Marc C Morais, Xiaofeng Fu, Mitul Sahal, Emilio Reyes-Aldrete, Michael H Walter, and Jun Liu. **Oral Presentation.** The 2009 Idaho State University Practical Bioinformatics Workshop, “From Genome to Phenotype”, ISU’s 5th Practical Bioinformatics Workshop, which focuses on emerging applications and approaches for complex, data intensive analyses. **Oct 15-18, 2009**
- Walter, M. H. & Connell, G.** 2008. Bacillus anthracis soil bacteriophage species richness drives applied research. Invited departmental seminar speaker, ISU Pocatello, Oct 2, '08.
- Walter, M H.** 2008. Into the second year of ‘Bioinformatics Applications for Biologists’ 4th Annual Idaho State University Practical Bioinformatics Workshop: The Symposium on Evolutionary Bioinformatics.
- Walter, M. H.** 2007-Oct 19. Talk on ‘Bio-Technology: Where are we coming from? Where are we now? Where are we going to? Masons - Elks Club, Waterloo, IA. Special Guest: The Honorable Senator Chuck Grassley
- Walter, M. H.** (Department of Biology, University of Northern Iowa), King, K. V. & Aldenderfer, R. (Midwest Research Institute, Kansas City, MO). Bacteriophage co-inoculations with Bacillus anthracis spores do not prevent anthrax in mice. 2007. 17th International Evergreen Phage Biology Meeting August 12-17, 2007, Evergreen College, OR.

- Walter, M. H.**, Maduka, U. P., Callaghan, A. M., King, K. V. and L. Choromanski. 2005. Characterization of selected bacteriophages and bacteriophage assemblages for use against *Bacillus anthracis* spores. ASM-North Central Regional Meeting, Sept. 23-24, '05. Iowa State University. Poster.
- Walter, M.H.** 2005. Anthrax Spore Control, Detection, Therapy & Decontamination. Board of Regents, State of Iowa: Innovation Iowa Meeting, Feb 15, '06. Pappajohn Education Center, Des Moines, Iowa. Poster.
- Maduka, Uche P. and **Walter, M.H.** 2005. Toward Determining Species Richness Index of *Bacillus Anthracis* Bacteriophages. Poster-July 29, 2005. University of Northern Iowa, College of Natural Science, Summer Undergraduate Research Program.
- Walter, M.H.** 2005. Investigations of Bacteriophages used against *Bacillus anthracis* spores – Applied: controlling anthrax. Invited presentation. Feb 17, 2005. Department of Biological Sciences, Idaho State University, Pocatello, ID.
- Walter, M.H.** 2004. ‘Bacteriophage In Vivo Efficacy Against *Bacillus anthracis* spores’. UNI Research Foundation Meeting. Oct 7th.
- Callaghan, A., Coon, S. and **Walter, M.H.** 2004. Binding aspects of soil bacteriophages to *Bacillus cereus*. Presentation. University of Northern Iowa, College of Natural Science, Summer Undergraduate Research Program.
- Walter, M.H.** 2004. Bacterial growth is diminished following spray treatment of dried *Bacillus anthracis* spores with phages. ASM-Bacteriophage Summit, Aug 2-5, Key Biscayne, Fla.
- Walter, M.H.** 2003 Applications of Bacteriophages Against *Bacillus anthracis*, the Anthrax Bacterium. UNIDept. Of Biology Seminar Nov 3rd.
- Walter, M.H.** 2002. ‘Anti-Anthrax / Bioterrorism Research’. Meeting of the Iowa Bio-Tech Consortium at UNI, Dec 6.
- Walter, M. H.**, Baker, D. and Timmerman, S. 2000. Destroying Bacterial Bio-Warfare Agents: Growth, Stability and Genetic Characterization of Bacteriophage CP-51, Lytic on *Bacillus anthracis* and *B. cereus*. 100th ASM General Meeting - Los Angeles, May 21-25, 2000.
- Walter, M. H.**, S. D. Wyatt and W. J. Kaiser. 1995. Comparison of the RNAs and some physicochemical properties of seed-transmitted tobacco streak virus isolate Mel 40 and infrequently seed-transmitted isolate Mel F. *Phytopathology* 85:1394-1399.
- Walter, M. H.** and L. A. Heaton. 1994. Tomato bushy stunt binds swine sheep, calf and horse erythrocytes but hemagglutinates only swine erythrocytes. Presented at the 13th Annual Meeting of the American Society for Virology, University of Wisconsin-Madison, Madison, Wisconsin July 9-13, 1994.
- Walter, M. H.** and L. A. Heaton. 1994. Turnip crinkle carmovirus-specific binding of erythrocytes in vitro is further evidence of saccharide binding by icosahedral plant virus particles. Presented at the Annual Meeting of the American Phytopathological Society, Albuquerque, New Mexico, August 6-10, 1994.
- Walter, M. H.** and Heaton, L. A. 1992. Hemagglutination of swine blood cells by tomato bushy stunt virus suggests saccharide binding by the virus. *Phytopathology* 82:995.

Grants and Proposals:

2024-\$510,023 - Carver Charitable Trust - Acquisition of Combined Scanning Electron / Atomic Force Microscope for Interdisciplinary Science. Kidd, Peters, Shand, Giese, Sebree & Walter. Submitted April 2024.

2023-Nov. \$500,961. Submitted. Equipment: MRI: Track 1 Acquisition of Atomic Force Microscope for Interdisciplinary Research. Kidd, Walter, Stollenwerk, Peters. Submitted Nov 15, 2023

2023-Feb. \$364,342. Not Funded. Equipment: MRI: Track 1 Acquisition of Atomic Force Microscope for Interdisciplinary Research. Kidd, Walter, Stollenwerk, Peters.

2021-22 -\$337,078 Funded. Roy J. Carver Charitable Trust - Introducing High Performance Computing into the University of Northern Iowa Curricula. Aleksandar Poleksic, Pavel Lukashev, Ali Tabei, Tilahun Abebe, Michael Walter, Justine Radunzel, Syed Kirmani, Marius Somodi, Douglas Mupasiri, Nalin Goonesekere, Nate

Klostermann, Peter Callaghan, Wesley Jones, Maureen Clayton. Submitted Aug 15, 2021. Approved Oct 22, 2021.

2020-\$375,000 – Funded – Carver Trust - Acquiring a Robust LC-MS System for Multidisciplinary Undergraduate Education in Mass Spectrometry. Strauss, Manfredi, Abebe, Walter, Rodriguez, Shen. **2020-\$10,000-Not Funded-** UNI Capacity Building Grant - Genome-Linked & Structural Proteins of Bacillus Soil Bacteriophages.

2017-18 - \$313,511 – Funded – for **\$250,000**. Carver Microbiology Teaching Proposal. Walter, Sliwinski, Abebe, Jurgenson.

2017-18 - \$1250 – Funded. Protein & DNA Characterization of Small Bacillus anthracis soil bacteriophages.

2017 – Summer. \$6735 - Funded. Improving isolation methods for small bacteriophages of Bacillus anthracis. 8 week Summer Fellowship-Graduate College.

2015-16. \$10,666 – Funded. Isolation methods and structural protein analysis of small bacteriophages of Bacillus anthracis -Federal EPSCoR -Capacity Building Funds. Completed

2016. \$1225 – Funded. Small Bacillus anthracis soil bacteriophage selection and size characterization.

COLLEGE OF HUMANITIES, ARTS AND SCIENCES -Faculty Research/Creative Activity Grant. Current.

2015 – \$3285 – Funded. 4 week Summer Fellowship. Improving isolation methods for small bacteriophages of Bacillus anthracis. UNI-Graduate College. Completed.

2014-2015 Collaborative – Manfredi, 2014-15 - **\$17,137** – funded: Botanicals as Antimicrobials and Preservatives in Soaps and Personal Care Products – Manfredi & Walter. Capacity Building-Scholarship Grant. President's office: incentive.

2014 – 2016 – Funded. \$10,666 Isolation methods and structural protein analysis of small bacteriophages of Bacillus anthracis. -Federal EPSCoR. Underway. Anticipated completion, August 2016.

2013 - \$3500 – Funded. Bacteriophage Structural Protein Adherence Kinetics: O'Hara-Walter. Student-Fac Collab'n-President's Office, Incentive.

2013- \$1500 – Funded: Identifying major structural proteins in the UNI phage database. Capacity BuildingScholarship Grant- President's office: incentive.

2012-13: \$1000 – Funded. Bacteriophage structural protein sequencing. UNI 2012-13 Capacity Building Scholarship Grant – CHAS.

2012-13: \$1000 – Funded. Calibrating the VERSA 110 Robotic Fluidics Handler Instrument. UNI 2012-13 Capacity Building Scholarship Grant – CHAS.

2013-Fall: Salary-Professional Development Assignment - Funded. PDF-Fall 2013. DNA sequencemapping, structural protein determination and analysis two *Bacillus anthracis* spore-adhering bacteriophages.

UNI – Graduate College of Natural Science.

2013-Summer: \$6442-Summer Fellowship, 8-week - Funded. Growth, Enrichment and Characterization of Smaller, Relatively Rare *Bacillus anthracis* bacteriophages from Cultures of Iowa Topsoil. UNI – Graduate College of Natural Science.

2012-Summer Support: \$1500 – Funded. Purification, shipping, protein sequencing and related analysis. NSF–EPSCoR-OSP.

2012: ~\$50K- Funded. Partial Contribution to application to the Carver Equipment Fund Grant.

2010: \$5900 – Funded. Enrichment and size-characterization of smaller phages for use in phage-based QCM bio-agent detector applications. Walter, M.H. May-June 2010, *UNI - Graduate College, Summer Fellowship*.

2008: \$2,841-Funded. Characterization of *Bacillus anthracis* Sterne bacteriophages selected for operation in an **electronic sensor.**” *UNI Faculty 2008 Summer Fellowship*, UNI Graduate College. **Completed**.

2006: \$169,349 Walter, M. H. Robotics-Deployed Detection of Biological Agents. Sept 2006 – June 2009. **Awarded**. Research Underway.

2006: \$10,000 Walter, M. H. -Funded Selection of bacteriophage affinity reagents for quartz-crystal electrode anthrax detectors. March 1, 2006-August 31, 2006. Grow Iowa Values Fund

2006: \$50,000- Not funded. Drenner, **Walter**, Hays, Burt, Budenske *ReconRobotics LLC*. April 14, 2006.

Robot-hosted detection and neutralization of the bio-agent anthrax. **U.S. Army Proposal #: A064-029-0257**.

Topic: A06-T029, Proposal #: A064-029-0257.

Grants and Proposals, Continued;

2006: \$33,000- Not funded. Drenner, **Walter**, Hays, Burt, Budenske, *ReconRobotics LLC*. Jan 12, 2006. Autonomous Mini-Robot for Detecting and Neutralizing Chem/Bio Agents Deployed via UAV, UGV, or Throwing. **AF06-127 SBIR Phase I Proposal**. Topic Number: AF06-127, Techniques for Remotely /Autonomously Detecting and Destroying Chem/Bio Agents.

2006: \$33,000- Not funded. Drenner, **Walter**, Hays, Burt, Budenske, *ReconRobotics LLC*. Jan 12, 2006. Mini-Robotic Biological Detection and Neutralization System. **DTRA SBIR Phase I Proposal**. Topic Number: DTRA06-012, Sub-Topic : Chemical and Biological Agent Deny.

2005: \$70,000: UNI \$23,000 (\$16,000 option) -Not Funded. Budenske, **Walter**, Drenner, Burt, Hays, *ReconRobotics LLC*. Dec 2005. Throwable Mini-Robotic Bio-Agent Detector/Neutralizer. **DOD/A05-168 - SBIR Phase I Proposal**. –**Not Funded** Topic Number: A05-168, Robotic Bioagent Detector for Combat Casualty Care & Force Protection.

2005: \$100,000: UNI \$33,000 -Not Funded. Hays, **Walter**, Drenner, Burt, Budenske, *ReconRobotics LLC*. Aug 29, 2005. Throwable Mini-Robotic Biological Detection System. **DHS/H-SB05.2-001 SBIR Phase I Proposal**. Topic Number: H-SB05.2-001, Handheld Biological Detection System.

2005: \$5200-Funded. Walter, M. H. Summer 2005 Research Fellowship for ‘Diversity and Utility of Naturally Occurring Phages of Anthrax Bacteria’.

2004-2005: \$79,728-Funded. Walter, M. H. UNI Research Foundation support for ‘Bacteriophage In Vivo Efficacy Against *Bacillus anthracis* spores. Study completed.

2003: \$5200-Funded. Walter, M. H. 2003. ‘Selection of useful isolates of naturally occurring phages of anthrax bacteria’. U.N.I. Summer Fellowship.

2002-2004: \$50,000-Funded. Patent Application Support: UNI and the UNI Foundation, in support of the patent application approximately. Complete.

2001: \$3000 – Funded. **Walter, M. H.** 2001. ‘Controlling anthrax bacteria with naturally occurring bacterial viruses. U.N.I. Summer Fellowship. \$3,000.

1999: \$5,100-Funded. Walter, M. H. 1999. ‘Using molecular and classical microbiological methods to identify bacteria of honey bee parasitic mites.’ U.N.I. Summer Fellowship.

1999:: \$14,650. Walter, M. H. 1999. ‘The Bacterial Microflora of Parasitic Mites of Honey Bees.’ Applied Technology Research Grant College of Natural Sciences, University of Northern Iowa.

1998:\$25,000-Funded. **Walter, M. H.** ‘General Proposal to Describe the Properties / Bacteriophage Infecting *Bacillus anthracis*, a Bio Warfare Agent.’ Applied Technology Research Grant. College of Natural Sciences, University of Northern Iowa.