MAUREEN A. CAREY

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POSITIONS

Assistant Professor — Dec. 2020 – ongoing
Division of Infectious Diseases & International Health, Department of Medicine
University of Virginia School of Medicine, Charlottesville, VA

Co-Director of Data Science — July 2020 – ongoing
Trans-University Microbiome Initiative
University of Virginia School of Medicine, Charlottesville, VA

Postdoctoral Research Associate — Oct. 2018 – Nov. 2020
Division of Infectious Diseases & International Health, Department of Medicine
University of Virginia School of Medicine, Charlottesville, VA
Advisor: William Petri Jr., MD, PhD

EDUCATION

University of Virginia School of Medicine, Charlottesville, VA — 2014 – 2018
Doctorate of Philosophy, Microbiology, Immunology, and Cancer Biology
Advisors: Drs. Jason Papin and Jennifer Guler
Thesis Committee: Drs. Alison Criss, Norbert Leitinger, Herve Agaisse, and Young Hahn
Thesis Title: *Debugging parasite genomes: using metabolic modeling to accelerate antimalarial drug development*, doi: 10.18130/V3-XMD4-PZ89

Lafayette College, Easton, PA — 2010 – 2014
Bachelors of Science, Biology (with Minors in Mathematics and Philosophy)
Thesis advisors: Drs. Robert Kurt and Eric Ho
Cum Laude, with Honors

GRANTS AWARDED

2019 – 2020 PhRMA Foundation Postdoctoral Fellowship in Translational Medicine & Therapeutics
2018 – 2020 Univ. of Virginia's Engineering-in-Medicine Seed Grant award
- co-PI with Drs. William Petri & Jason Papin, awarded $80,000

2015 – 2017 Univ. of Virginia's Cell & Molecular Biology Training Grant (5T32GM008136-32)

HONORS

- Nominated for the Microbiology, Immunology, and Cancer Biology Most Outstanding Student Award (Univ. of Virginia, 2018 & 2019)
- Invited panelist, Community Standards and Resources, 5th Conference on Constraint-Based Reconstruction and Analysis (Seattle, WA, 2018)
- 2nd Place in Global Health Case Competition (Univ. of Virginia, 2017)
- Marquis Scholar (Lafayette College, 2010 – 2014)
- Willis Roberts Hunt Biology Award (Lafayette College, 2014)

- Howard Hughes Medical Institute Exceptional Research Opportunities Scholar (2013 – 2014)
- Dean's List (Lafayette College, 2010 – 2014)
- National Intercollegiate Women's Fencing Association All-Academic Team (2013 – 2014)
- Silver and Gold Student-Athlete Academic Honor Roll (Lafayette College, 2013 – 2014)
- Tuition Exchange Scholar (Lafayette College, 2010 – 2011)

PEER-REVIEWED PUBLICATIONS

1. **Carey MA**, Medlock GL, Alam M, Kabir M, Uddin MJ, Nayak U, Papin JA, Faruque ASG, Haque R, Petri WA, Jr., Gilchrist CA. *Megasphaera in the stool microbiota is negatively associated with diarrheal cryptosporidiosis.* Clinical Infectious Diseases. doi: 10.1093/cid/ciab207.
2. **Carey MA**, Dräger A, Beber ME, Papin JA , Yurkovich JT (2020). *Community standards to facilitate development and address challenges in metabolic modeling*. Molecular Systems Biology. doi: 10.15252/msb.20199235.
3. **Carey MA** ↯, Steiner KL, Petri, WA, Jr. (2020). *Ten Simple Rules for reading a scientific paper.* PLOS Computational Biology. doi: 10.1371/journal.pcbi.1008032 ↯ corresponding author
   **** over 62,000 views since publication on July 30th, 2020*
4. **Carey MA***, Untaroiu AM*%, Guler JL, Papin JA (2019). *Computational predictions of metabolic drug targets in Chloroquine resistant Plasmodium falciparum for combination therapies*. BMC Bioinformatics. doi: 10.1186/s12859-019-2756-y *co-first authors, % undergraduate mentee (see teaching experience)
5. Huckaby A, Granum CS, **Carey MA**, Szlachta K, Al-Barghouthi B, Wang Y, Guler JL (2019). *Complex DNA structures trigger copy number variation across the Plasmodium falciparum genome*. Nucleic Acids Research. doi: 10.1093/nar/gky1268
6. Medlock GL, **Carey MA**, McDuffie DG, Giallourou N, Swann JR, Kolling GL, Papin JA (2018). *Inferring metabolic mechanisms of interaction within a defined gut microbiota.* Cell Systems. doi: 10.1016/j.cels.2018.08.003.
7. **Carey MA***, Covelli V*, Brown A, Medlock GL, Harren M, Cooper JG, Papin JA, Guler JL (2018). *Influential parameters for the analysis of intracellular parasite metabolomics*. mSphere. doi: 10.1128/mSphere.00097- 18. *co-first authors
8. **Carey MA**, Papin JA (2018). *Ten Simple Rules for biologists learning to program*. PLOS Computational Biology. doi: 10.1371/journal.pcbi.1005871.
   **** PLOS Computational Biology's most downloaded and shared article (2018), most viewed (2019)*
9. **Carey MA**, Papin JA, Guler JL (2017). *Novel Plasmodium falciparum metabolic network reconstruction identifies shifts associated with clinical antimalarial resistance*. BMC Genomics. doi: 10.1186/s12864-017-3905-1
10. **Carey MA**, Ho ES (2017). *A Transcriptome Study Of Borrelia burgdorferi Infection In Murine Heart And Brain Tissues*. Journal of Young Investigators. doi: 10.22186/jyi.33.1.28-41
11. Higgins MJ, Serrano A, Boateng KY, Parsons VA, Phuong T, Seifert A, Ricca JM, Tucker KC, Eidelman AS, **Carey MA**, Kurt RA (2016). *A multifaceted role for Myd88-dependent signaling in progression of murine mammary carcinoma*. Breast Cancer: Basic and Clinical Research. doi: 10.4137/BCBCR.S40075
12. Burgess SL, Buonomo E, **Carey M**, Cowardin C, Naylor C, Noor Z, Wills-Karp M, Petri WA, Jr. (2014). *Bone Marrow Dendritic Cells from Mice with an Altered Microbiota Provide Interleukin 17A-Dependent Protection against Entamoeba histolytica Colitis*. mBio. doi: 10.1128/mBio.01817-14

PREPRINTS or MANUSCRIPTS UNDER REVIEW

1. **Carey MA**, Medlock GL, Stolarczyk M, Petri, WA, Jr., Guler JL, Papin JA (2019). *Comparative genomics of parasitic pathogens using genome-scale metabolic modeling.* BioRxiv. doi: 10.1101/772467. Under review at *Cell Systems.*
2. Moutinho MJ, Neubert BC, Jenior ML, **Carey MA**, Medlock GL, Kolling GL, Papin JA (2019). *Functional Anabolic Network Analysis of Human-associated Lactobacillus Strains.* BioRxiv. doi: 10.1101/746420. Reviewed at *mSystems*.

IN PREP MANUSCRIPTS

1. **Carey MA*,** Arju T*, Cotton JA, Alam M, Kabir M, Nayak U, Ahmed T, Ma JZ, Faruque ASG, Berriman M, Haque R, Petri WA, Jr., Gilchrist CA. *Genomic analysis of Cryptosporidium parvum from Bangladesh.* Anticipated submission to Journal of Infectious Diseases, spring 2020. *co-first authors
2. **Carey MA**, Faruque ASG, Haque R, Petri WA, Jr*. Early life antibiotic use is associated with physiological growth faltering in Bangladeshi children*. Anticipated submission mid 2020.
3. Carey MA, Orsburn B, McCowin SE, Petri WA, Jr. *Metabolomics and network modeling reveals metabolic capacity for auxin synthesis in the diarrheal pathogen, Cryptosporidium parvum.* Anticipated submission mid 2020.

ORAL PRESENTATIONS

1. *Comparative analyses of parasites with a comprehensive database of genome-scale metabolic models.* Johns Hopkins University Future of Malaria Research Symposium, Rockville, MD. (Nov. 2019)
2. *Data science approaches to address early childhood diarrhea.* Research-in-Progress series for the University of Virginia's Infectious Disease Training Program, Charlottesville, VA. (Oct. 2019)
3. *Debugging parasite genomes: Using metabolic modeling to accelerate antiparasitic drug development*. Biomedical Engineering Society Annual Meeting, Atlanta, GA. (Oct. 2018)
4. *Debugging the malaria parasite's genetic code: Comparative genomics of P. falciparum and P. berghei using metabolic modeling*. Molecular Parasitology Meeting, Woods Hole, MA. (Sep. 2017)
5. *Computational analysis for antimalarial target identification*. Johns Hopkins University Future of Malaria Research Symposium, Rockville, MD. (Nov. 2016)
6. *A metabolic approach for the characterization of antimalarial resistance and the identification of combination therapy targets*. Molecular Parasitology Meeting, Woods Hole, MA. (Sep. 2016)

POSTER PRESENTATIONS

1. *The fecal microbiome associated with Cryptosporidium-infection and diarrheal symptoms in Bangladeshi children.* Annual meeting of the American Society for Tropical Medicine and Hygiene. (Nov. 2019)
2. *Debugging parasite genomes: Using metabolic modeling to accelerate antiparasitic drug development.* Advances in *Cryptosporidium* Research Meeting and Workshop, Grafton, MA (Dec. 2018)
3. *Models Constrained with Transcriptomics or Proteomics Data Generate Discordant Predictions.* 5th Conference on Constraint-Based Reconstruction and Analysis, Seattle, WA. (Oct. 2018)
4. *Debugging parasite genomes: Using metabolic modeling to accelerate antiparasitic drug development.* 5th Conference on Constraint-Based Reconstruction and Analysis, Seattle, WA. (Oct. 2018)
5. *Models Constrained with Transcriptomics or Proteomics Data Generate Discordant Predictions.* Biomedical Engineering Society Annual Meeting, Atlanta, GA. (Oct. 2018)
6. *Comparative genomics and network modeling of human parasites.* Molecular Parasitology Meeting, Woods Hole, MA (Sept. 2018)
7. *Comparative modeling of human parasites and closely related species.* ASM Microbe, Atlanta, GA (June 2018)

8. *Comparative genomics and modeling of Malaria parasites.* University of Virginia Infectious Disease Day, Charlottesville, VA (Mar. 2018)
9. *Debugging the malaria parasite's genetic code: Comparative genomics of P. falciparum and P. berghei using metabolic modeling*. Molecular Parasitology Meeting, Woods Hole, MA (Sep. 2017)
10. *A metabolic approach for the characterization of antimalarial resistance and the identification of combination therapy targets*. Data-driven Biotechnology: Bench, Bioreactor, and Bedside, Denmark (May 2017)
11. *A metabolic approach for the characterization of antimalarial resistance and the identification of combination therapy targets*. Microbiology Immunology, and Cancer Biology Annual Retreat Poster Session, Charlottesville, VA. (May 2017) and University of Virginia Infectious Disease Day, Charlottesville, VA (Mar. 2017)
12. *A metabolic approach for the characterization of antimalarial resistance and the identification of combination therapy targets*. Molecular Parasitology Meeting, Woods Hole, MA (Sep. 2016)
13. *Metabolic characterization of artemisinin resistant malaria parasites*. Microbiology Immunology, and Cancer Biology Annual Retreat Poster Session (May 2016) and Cell and Molecular Biology Training Grant Annual Symposium, Charlottesville, VA (May 2016)
14. *Explaining resistance with metabolic shifts induced by antimalarials*. Future of Malaria Research Conference, Baltimore, MD (Oct. 2015)
15. *Sequencing Bcl6 in Priest Lake Stickleback*. Howard Hughes Medical Institute (HHMI) EXROP Symposium. HHMI, Chevy Chase, MD (May 2014)
16. *A Transcriptome Analysis of Borrelia burgdorferi Infected Murine Heart and Brain Tissue*. Penn. Academy of Science Annual Meeting, Susquehanna University, Selinsgrove, PA (Mar. 2014)
17. *Antibiotic Resistance: A Growing Threat.* Biology Capstone Course Poster Session, Lafayette College. (Nov. 2013)
18. *Sequencing Bcl6 in Priest Lake Stickleback*. Summer Research Symposium, University of Texas at Austin (Aug. 2013)
19. *Enhancing HIV-1 Viral Replication Kinetics by Co-Packaging Ribonucleotide Reductase and Thymidine Kinase.* University of Rochester Summer Scholars Poster Session, Rochester, NY. (Aug. 2011) and Summer Research Poster Session, Lafayette College (Sep. 2011)

MENTORSHIP

1. Undergraduate journal club leader, University of Virginia (2017, 2019-2020), 2-8 students/semester
2. Graduate mentorship, University of Virginia
    a. Catalina Alvarez (2021 –), Biomedical Engineering PhD Student
    b. Michał Stolarczyk (2017 – 2018), visiting Masters Student (day-to-day mentorship only)
    Current affiliation: Univ. of Virginia, Center for Public Health Genomics
3. Staff, University of Virginia
    a. Haritha Guttikonda, MS (2020 – 2021), Data Scientist
    Current affiliation: Comscore
4. Undergraduate mentorship, University of Virginia
    a. Olufolakemi Olusanya, Howard University '21 (2020 – current)
    Summer '20: UVa NSF REU in Multi-Scale Systems Bioengineering & Biomedical Data Science
    Oral presentation at the Annual Biomedical Research Conference for Minority Students 2020
    b. Isabelle Talicuran '22 (2019 – current)
    c. Sarah Steenson '22 (2019 – 2020)
    Selected for the Univ. of Virginia's Summer Research Internship Program, postponed until 2021
    d. Ana Untaroiu '18 (2015 – 2018), Beckman Scholar, (2016 – 2017)

Oral presentations at the Biomedical Engineering Society Annual Meeting in 2016 & 2017
Current affiliation: Medical College of Wisconsin, Medical student

e. William Pavlis ’17 (2017)
Current affiliation: University of Miami Miller School of Medicine, MD-MPH program

f. Andrew Kubiak ’16 (2015 – 2016)
Current affiliation: Software Engineer at General Dynamics Mission Systems

g. Julius Ha ’15 (2015)
Current affiliation: Brigham Young University Marriott School of Business, MPA program & graduate research associate

TEACHING

1. *Tomorrow’s Professor Today* Program, Univ. of Virginia Center for Teaching Excellence (2019 – 2020)
2. EuPathDB lecture and tutorial, University of Virginia (July 2017)
3. Intro to computational modeling lecture, *Synthetic Biology*, Univ. of Virginia (Mar. 2017)
4. Tutor, *Calculus (I, II, & III)*, Lafayette College (Aug. 2013 – May 2014)
5. Tutor, *General Biology*, Lafayette College (Aug. 2013 – Dec. 2013)
6. Teaching Assistant: *Modeling Applied to Biology* (Jan. 2013 – May 2013)

LEADERSHIP AND SERVICE

1. EngineerGirl Writing Contest Judge, Society of Women Engineers, University of Virginia (2019)
2. Biosafety lab manager, Guler Lab at the University of Virginia (2015 – 2018)
3. Committee member, University of Virginia Department of Microbiology, Immunology, and Cancer Biology Student Seminar Committee (2017 – 2018)
4. Diversity Day demonstration leader, University of Virginia (Sep. 2017)
5. Application judge, University of Virginia Undergraduate Summer Research Internship (Mar. 2017)
6. Advisor and judge, University of Virginia High School Global Health Case Competition (Feb. 2017)
7. Mentorship (see teaching experience above)

SCIENTIFIC CONFERENCES AND WORKSHOPS

- Future of Malaria Research Conference, Baltimore, MD (2015, 2016, 2019)
- American Society for Tropical Medicine and Hygiene Annual Meeting, National Harbor, MD (2019)
- American Society for Clinical Pharmacology & Therapeutics Annual Meeting, Washington DC (2019)
    - Award winner: PhRMA Foundation Postdoctoral Fellowship in Translational Medicine & Therapeutics
- Advances in *Cryptosporidium* Research Meeting and Workshop, Grafton, MA (2018)
- PyData DC, Washington, DC (2018)
- Conference on Constraint-Based Reconstruction and Analysis, Seattle, WA (2018)
    - Invited panelist: Community Standards and Resources
- Biomedical Engineering Society Annual Meeting, Atlanta, GA (2018)
- Molecular Parasitology Meeting, Woods Hole, MA (2016, 2017, 2018)
- American Society for Microbiology: Microbe, Atlanta, GA (2018)
- EuPathDB Workshop, Athens, GA (2017)
- Data-driven Biotechnology: Bench, Bioreactor, and Bedside, Hillerød, Denmark (2017)
- Scientific Communication workshop (locally via the Alan Alda Center for Communicating Science), Charlottesville, VA (2016)
- Pennsylvania Academy of Science, Selinsgrove, PA (2014)
- American Public Health Association, Boston, MA (2013)

- Howard Hughes Medical Institute Exceptional Research Opportunities Program Annual Meeting,Chevy Chase, MD (2013, 2014)
- International AIDS Conference, Washington, DC (2012)

PREVIOUS RESEARCH EXPERIENCES

1. Honors Thesis, Lafayette College (Aug. 2013 – May 2014)
   Mentor: Eric Ho, Ph.D., Professor of Biology and Computer Science
   Committee: Robert Kurt, Ph.D. and Laurie Caslake, Ph.D.
   Conducted a transcriptome analysis of *B. burgdorferi*-infected murine heart and brain tissue; cultured *B. burgdorferi* and infected mice for analysis.
2. Howard Hughes Medical Institute (HHMI) Exceptional Research Opportunities Program, University of Texas at Austin (June – Aug. 2013)
   Mentor: Daniel Bolnick, Ph.D., Professor of Biology, HHMI Early Scientist
   Designed primers and sequenced Bcl6 gene in two species of stickleback fish; aligned and analyzed sequence results. (Invited for HHMI Capstone Experience)
3. NIH Summer Institute of Biostatistics, Boston University (June – July 2012)
   Instructor: Lisa Sullivan, Ph.D., Associate Dean of Education, Professor and Chair of Biostatistics
   Studied biostatistics & epidemiology, design and analysis of observational studies and clinical trials.
4. Research Assistant, Lafayette College (Jan. – May 2012)
   Mentor: Robert Kurt, Ph.D., Professor and Chair of Biology
   Aided with tumor cell suppression research; treated tumor cells with prepared RNA in various dosages and monitored resultant changes in MyD88 production, mitotic arrest, and cell death.
5. Summer Scholars Program, University of Rochester Medical Center (May – Aug. 2011)
   Mentor: Baek Kim, Ph.D., Professor of Microbiology and Immunology
   Created a viral vector to enhance HIV-1 transduction efficiency and replication kinetics in terminally differentiated cells by converting the cell's rNTP pool into dNTP.

OTHER WORK EXPERIENCES

1. Intern, International AIDS Society, Geneva, Switzerland (Oct. – Dec. 2012)
   Duties: Conducted a literature review on community based research in the study of HIV/AIDS, wrote evaluation and briefing reports, aided in fellowship promotion. Supervisor: Ulrike Brizay, Ph.D.

REVIEWER EXPERIENCE

- mSystems, Quarterly Review of Biology, PLOS Computational Biology (2019 – current)
- With collaborators: Nucleic Acids Research, PLOS Neglected Tropical Diseases (2019 – current)
- With mentor supervision: Nature Biotechnology, Scientific Reports, BMC Systems Biology, Journal of Clinical Infectious Diseases (2016 – current)

PROFESSIONAL SOCIETIES

- American Society for Tropical Medicine and Hygiene, Graduate Women in Science, Biomedical Engineering Society, American Institute of Chemical Engineers, Society of Biological Engineering, American Society of Microbiology, 2018 - current

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SKILLS

- Programming (R, Python, Unix, MATLAB, and [limited] SAS)
- Computational analytics (data wrangling, statistical and bioinformatic analysis, metabolic network analysis, machine learning)

- Laboratory skills (antibiotic-free *Plasmodium falciparum* culture, *Cryptosporidium parvum* invasion assays, BSL2, genetic & biochemical assays)
- Technical writing for grant applications
    - NIH F32 Postdoctoral Fellowship submitted 08/2019, impact score: 30
    - NIH P50, resubmitted 08/2020 (Lead Scientist, Microbiome & Metabolomics Core)
    - NIH U19, submitted 05/2020 (PI/Director, Bioinformatics Core)
    - NIH DP2, submitted 11/2020 (PI)

OTHER INTERESTS

- Officer of the City of Charlottesville Elections (2019 – ongoing)
- Running (2008 – ongoing)
    - Marathon PR: 4:34:48 (Richmond, 2018)
    - Volunteering for local races
- Music (2002 – ongoing)
    - Flutist, Crozet Community Orchestra (2016 – ongoing)
    - Principal flutist, Concert Band, Chamber Orchestra, & Contemporary Music Ensemble at Lafayette College (2010 – 2014)
- Fencing (2013 – 2014), Division I Varsity, Lafayette College (2013 – 2014)