CURRICULUM VITÆ

Theodore J. Carrigan-Broda
264 Belmont St. Apt. 3
Worcester, MA 01604
MOBILE: +1 (843) 212-6688
Theodore.Carrigan-Broda@umassmed.edu
www.linkedin.com/in/theodorebroda
https://orcid.org/0000-0002-0115-412X

BIOGRAPHY

I am an inquisitive, results-oriented translational therapeutics scientist. I integrate medicinal chemistry, pharmacology, comparative medicine, and molecular biology to advance innovative molecular modalities for diverse, impactful clinical applications. Currently, I am an MD/PhD candidate conducting thesis research in Dr. Anastasia Khvorova's lab in the RNA Therapeutics Institute at UMass Chan Medical School; my focus is design, synthesis, and characterization of modified siRNA architecture for optimized metabolic stability, potency, accumulation, and duration of effect in extrahepatic tissues. I am concurrently training in clinical medicine to better understand the concerns of patients and providers; ultimately, I will apply my physician-scientist training to address unresolved clinical needs by expanding the armamentarium of RNA therapeutics.

I began my scientific career with a bachelor's degree in biochemistry and chemistry at the College of Charleston, including synthetic chemistry research under Frederick Heldrich and a thesis characterizing novel organosilicon compounds under Gamil Guirgis. These experiences provided me with broadly applicable technical skills in chemical synthesis, spectroscopy, molecular modeling, experimental design, and scientific communication. Specifically, my studies of molecular modeling introduced me to pharmacophore modeling, which piqued my interest in medicinal chemistry as a practical application of my burgeoning scientific acumen.

Although I appreciated basic science training, I sought an applied research opportunity with pragmatic, meaningful outcomes. Consequently, I worked in the drug discovery lab of Mark Hamann at the Medical University of South Carolina, wherein I investigated novel semisynthetic derivatives of manzamine A for potential antimalarial and antineoplastic activity. I enjoyed this opportunity to investigate potential solutions to clinical problems using my ingenuity and knowledge of molecular science, motivating my current training in therapeutics research. Concurrently, I explored teaching and mentorship as a primary- and secondary-school substitute teacher for the Charleston County School District. I also trained as an Emergency Medical Technician to acquire clinical knowledge and patient interaction, which inspired me to align my research interests with my humanistic values and newfound clinical interests.

I subsequently joined the Medical Scientist Training Program at UMass Chan Medical School to obtain integrated physician-scientist training. I have completed my preclinical medical education, USMLE Step 1 board exam, medicine and neurology clerkships, and graduate school qualifying exam. I ultimately plan to advance my professional development in a Physician-Scientist Training Program and pursue my research niche in academic medicine or the pharmaceutical industry.

EDUCATION

UMass Chan Medical School, Worcester, MA — Jul. 2019–Jun. 2027 (EXPECTED)
Medical Scientist Training Program
MD/PhD in Biomedical Science

College of Charleston, Charleston, SC — Aug. 2014–Aug. 2017
Honors College
BS in Chemistry and Biochemistry (ACS-certified) — *summa cum laude* (GPA **3.98**)

PUBLICATIONS & PRESENTATIONS

1. **Carrigan-Broda, T. J.**; Yamada, N.; Gebert, L.; Caiazzi, J.; MacRae, I.; Yamada, K.; Khvorova, A. Identifying Novel SiRNA Guide Strand 5′-End Modifications for Enhanced Chemical Stability, Potency, and Extrahepatic *In Vivo* RNAi Activity. In *Oligonucleotide Therapeutics Society Annual Meeting*; 2023.
2. **Carrigan-Broda, T. J.**; Yamada, N.; Gebert, L.; Caiazzi, J.; MacRae, I.; Yamada, K.; Khvorova, A. Identifying Novel SiRNA Guide Strand 5′-End Modifications for Enhanced Chemical Stability, Potency, and RNAi Activity. In *RNA Society Annual Meeting*; 2023.
3. Pulliam, T.; Marshall, F. E.; **Carrigan-Broda, T.**; Hickman, D. V; Guirgis, G.; Grubbs, G. S. The Chirped Pulse, Fourier Transform Microwave Spectrum of 1-Chloromethyl-1-Fluorosilacyclopentane. *J. Mol. Spectrosc.* **2023**, *395*, 111793.
4. Stocka, J.; Platakyte, R.; Hickman, D.; **Carrigan-Broda, T.**; Ceponkus, J.; Sablinskas, V.; Rodziewicz, P.; Guirgis, G. A. Experimental (Raman and IR) and Computational (DFT, MP2) Studies of the Conformational Diversity of 1-Chloromethyl-1-Fluorosilacyclopentane Molecule. *J. Mol. Struct.* **2023**, *1272*, 134125.
5. Sablinskas, V.; Guirgis, G. A.; Rodziewicz, P.; **Carrigan-Broda, T. J.**; Hickman, D. V.; Macyte, J.; Ceponkus, J.; Platakyte, R.; Stocka, J. Conformational Diversity of Non-Aromatic Heterocyclic Molecular Compounds as Studied by Means of Matrix Isolation Infrared Spectroscopy. In *International Symposium on Molecular Spectroscopy*; 2022.
6. **Carrigan-Broda, T. J.** Characterizing Gastrointestinal Bleeding via CBC and BMP. In *UMass Chan Physician Scientist Forum*; 2021.
7. McFadden, T. M. C.; Platakyte, R.; Stocka, J.; Ceponkus, J.; Aleksa, V.; **Carrigan-Broda, T.**; Sablinskas, V.; Rodziewicz, P.; Guirgis, G. A. Experimental (Raman and IR) and Computational (DFT, MP2) Studies of Conformational Diversity of 1-Chloromethyl-1-Fluorosilacyclohexane. *J. Mol. Struct.* **2020**, *1221*, 128786.
8. **Carrigan-Broda, T. J.** Counteracting COVID-19: A Review of Remdesivir as a Promising Antiviral. In *University of Massachusetts Medical School COVID-19 Research Forum: Difficult Choices in a Time of Crisis*; 2020.
9. Marshall, F. E.; Duerden, A. J.; Moon, N.; Gillcrist, D. J.; Sedlacek, I.; Jones, G.; **Carrigan-Broda, T.**; Guirgis, G. A.; Grubbs, G. S. Structure Determination of 5 Membered Silane Rings Using Microwave Spectroscopy. In *73rd International Symposium on Molecular Spectroscopy*; 2018; p TJ10.
10. **Carrigan-Broda, T. J.** Conformational Preferences of Si-Substituted Silacycloalkanes: Synthesis, Infrared and NMR Spectroscopic Characterization, and Ab Initio Computational Modeling of Silepanes and Silinanes, College of Charleston Honors College, 2017.
11. **Carrigan-Broda, T. J.**; Gurgis, G. A. Conformational Preferences of Silepanes: Synthesis, Spectroscopic Characterization, and Ab Initio Modeling. In *Colonial Academic Alliance Undergraduate Research Conference*; 2017.
12. **Carrigan-Broda, T. J.**; Gurgis, G. A. Synthesis and In Silico Conformational Analysis of 1,1-Difluorosilepane. In *Southeastern Regional Meeting of the American Chemical Society*; 2016.

ACTIVITIES & DISTINCTIONS

Positions & Appointments

Oct. 2024–	*Neonate Cuddler*, Cuddle Buddies, Neonatal-Perinatal Unit, UMass Memorial Health
Sep. 2024–	*Member-at-Large*, Executive Board, Industry Exploration Club (IndEx), UMass Chan Medical School
Aug. 2024–	*Member*, Trainee-Invited Seminar Committee, RNA Therapeutics Institute, UMass Chan Medical School
Jul. 2024–	*Co-Chair*, Communications Committee, MSTP Student Council, UMass Chan Medical School
Jul. 2024–	*Co-Chair*, Community Development Committee, MSTP Student Council, UMass Chan Medical School
Mar. 2024	*Poster Judge*, American Physician Scientists Association Northeast Conference
Aug. 2023–Mar. 2024	*Chair*, Keynote Speaker Subcommittee, Planning Committee, American Physician Scientists Association Northeast Conference
Oct. 2022–	*Volunteer*, ScienceLIVE (science literacy outreach), RNA Therapeutics Institute, UMass Chan Medical School
Mar. 2022–	*Medical Records Volunteer*, Boston Marathon, Boston Athletic Association
Nov. 2021– May 2022	*Clinical Volunteer*, Vaccine Corps, Commonwealth Health
Oct. 2021–Oct. 2022	*Small-Group Facilitator*, Principles of Pharmacology course, T.H. Chan School of Medicine, UMass Chan Medical School
Jul. 2020–	*Graduate Student Researcher*, Khvorova Lab, RNA Therapeutics Institute, UMass Chan Medical School
Feb. 2020–	*Clinical Volunteer*, Worcester Free Clinic Collaborative
Jul. 2020–Jun. 2021	*Trainee*, NIH Ruth L. Kirschstein Institutional National Research Service Award, Medical Scientist Training Program, UMass Chan Medical School
Jun. 2020	*Rotation Student*, Thompson Lab, Dept. of Biochemistry & Molecular Biotechnology, UMass Chan Medical School
Apr. 2020	*Volunteer*, Project Read-Aloud, Worcester Public Schools
Jul. 2019	*Rotation Student*, Schiffer Lab, Dept. of Biochemistry & Molecular Biotechnology, UMass Chan Medical School
Mar.–May 2020	*Volunteer*, COVID-19 Emergency Medical Shelter Program, City of Worcester/UMass Chan Medical School
Sep. 2018–Jun. 2019	*Emergency Medical Technician (EMT)*, MEDUCARE Medical Transport Service
Mar.–Dec. 2018	*Research Assistant*, Hamman Lab, Dept. of Drug Discovery & Biomedical Sciences, Medical University of South Carolina
Jun.–Jul. 2018	*Career Explorer*, Pediatric ICU, MUSC Children's Hospital
Dec. 2017–Jun. 2018	*Substitute Teacher*, Charleston County School District
Aug. 2016–Aug. 2017	*Chaser*, Club Quidditch, College of Charleston
"	*Dancer*, Chuck de Raas (Dandiya-Raas troupe), College of Charleston
Jan. 2016–Aug. 2017	*Research Assistant*, Guirgis Lab, Dept. of Chemistry & Biochemistry, College of Charleston
Jan.–May 2017	*Staff Writer*, The Rival at College of Charleston

Nov. 2015–Apr. 2017	*Student Committeeperson*, Faculty Committee on Academic Standards, College of Charleston
May–Dec. 2016	*Treasurer*, Student Government Association, College of Charleston
Oct. 2015–May 2016	*Finance Committeeperson*, Honors Student Association, College of Charleston
Sep. 2015–Apr. 2016	*Parliamentarian*, Student Government Association, College of Charleston
Sep. 2014–Apr. 2016	*Senator*, Student Government Association, College of Charleston
May–Dec. 2015	*Research Assistant*, Heldrich Lab, Dept. of Chemistry & Biochemistry, College of Charleston

Honors

Oct. 2023	*Poster Award*, Oligonucleotide Therapeutics Society Annual Meeting
Oct. 2023	*Travel Award*, Oligonucleotide Therapeutics Society
May 2017	*Outstanding Student in Chemistry Award*, College of Charleston
"	*Departmental Honors*, Dept. of Chemistry & Biochemistry, College of Charleston
"	*Hypercube Scholar Award*, Hypercube, Inc. & College of Charleston
"	*Major Field Test Award*, Dept. of Chemistry & Biochemistry, College of Charleston
Dec. 2014–May 2017	*President's List Scholar*, College of Charleston
Apr. 2015	*New Student Leadership Award*, Higdon Student Leadership Center, College of Charleston
Apr. 2012	*Eagle Scout with Gold Palm*, Boy Scouts of America

Scholarships & Grants

Aug. 2015–May 2017	*LIFE Scholarship with STEM Enhancement*, South Carolina Commission on Higher Education
Mar. 2016	*Summer Undergraduate Research with Faculty Grant*, Undergraduate Research and Creative Activities Program, College of Charleston

Affiliations

Jul. 2023–	*Student Member*, Oligonucleotide Therapeutics Society (OTS)
Mar. 2023–	*Junior Scientist*, RNA Society
Mar. 2023–	*Full Member*, American Physician Scientists Association (APSA)
Nov. 2021–	*Medical Student Member*, American College of Emergency Physicians/Emergency Medicine Residents' Association (ACEP/EMRA)
Mar. 2016–Aug. 2017	*Brother*, Gamma Delta chapter, Alpha Chi Sigma (ΑΧΣ) chemistry fraternity
Feb. 2016–	*Student Member*, American Chemical Society (ACS)

RESEARCH EXPERIENCE

A. Khvorova's RNA Therapeutics Research Group, RNA Therapeutics Institute, UMass Chan Medical School

Graduate Student Researcher — Jul. 2020–

Synthesize siRNA guide strands and derivatize them with novel 5′-end modifications; design novel nucleoside derivatives for incorporation into siRNA; screen modified siRNAs and anti-miRs *ex vivo* for efficacy, potency, and metabolic stability; prepare modified siRNA guide strands for RISC crystallography and pulldowns; conduct murine studies of siRNA activity in extrahepatic organs and central nervous system

HIGHLIGHTS:

- Applied for NIH F30 fellowship award (National Institute of Aging); proposed novel dual-therapy strategy for Alzheimer's Disease treatment using divalent siRNA scaffold to co-silence *APOE*, *IFNGR1*
- Presented posters at 2023 RNA Society Meeting and 2023 OTS Annual Meeting

P. R. Thompson's Chemical Biology Research Group, Dept. of Biochemistry & Molecular Biotechnology, UMass Chan Medical School
Rotation Student Jun. 2020

Derivatized L-citrulline with photocleavable protecting group; expressed recombinant proteins with site-specific protected L-citrulline residues in transfected eukaryotic cells via amber stop codon reassignment

C. A. Schiffer's Drug Discovery & Structural Biology Research Group, Dept. of Biochemistry & Molecular Biotechnology, UMass Chan Medical School
Rotation Student Jul. 2019

Designed and synthesized quinoxaline-based viral protease inhibitors; expressed and purified recombinant target protease; quantitated enzyme activity and inhibitor potency; performed protein-ligand docking; conducted protein-ligand crystallography experiments

M. T. Hamann's Drug Discovery Research Group, Dept. of Drug Discovery & Biomedical Science, Medical University of South Carolina
Research Assistant Mar.–Dec. 2018

Prepared custom boronate reagents; derivatized natural product (manzamine A) scaffold for bioactivity screens

G. A. Guirgis' Physical & Computational Chemistry Research Group, Dept. of Chemistry & Biochemistry, College of Charleston
Research Assistant Jan. 2016–Aug. 2017

Synthesized novel organometalloid compounds; characterized compounds via NMR, gas-phase FT-IR; computationally predicted physicochemical properties of molecules *ab initio*

HIGHLIGHTS:

- Co-authored three peer-review papers and completed undergraduate thesis
- Presented posters at 2016 ACS Southeastern Regional Meeting and 2017 Colonial Academic Alliance Undergraduate Research Conference
- Received Summer Undergraduate Research Fund grant from College of Charleston

F. J. Heldrich's Organic Synthesis Research Group, Dept. of Chemistry and Biochemistry, College of Charleston
Research Assistant May–Dec. 2015

Synthesized α,ω-bis(*p*-anisyl)alkanes and synthetic intermediates using organometallic synthetic methods; purified and validated products using chromatography and spectroscopy

CLINICAL EXPERIENCE

Pediatric Intensive Care Unit, MUSC Children's Hospital, Charleston, SC
Career Explorer/Observer — Jun.–Jul. 2018

Rounded with pediatric intensivist, resident physicians; attended lectures; followed allied health professionals during bedside duties; observed critical-care interventions, aseptic technique, diagnosis, EMR documentation, medical orders; suggested treatment plans; communicated with patients

MEDUCARE Medical Transport Service, Med-Trans/MUSC Health, Charleston, SC
Observer — Dec. 2017–Mar. 2018

Observed paramedics and nurses treat adult, bariatric, obstetric, pediatric, and neonatal patients during interfacility transfers and pre-hospital critical care on ground and air transport.

VOLUNTEER EXPERIENCE

ScienceLIVE, Office of Community and Government Relations, UMass Chan Medical School, Worcester, MA
STEM Educator — Oct. 2022–

Lead science-focused learning activities with underprivileged middle-school students; create experiment kits; distribute science literacy materials; mentor primary, secondary students about STEM careers

Boston Marathon, Boston Athletic Association, Worcester, MA
Medical Records Volunteer — Nov. 2022–

Document and file patient records at field site; assess patient presentations and vital signs

Vaccine Corps, Commonwealth Medicine, Worcester, MA
Clinical Volunteer — Nov. 2021–

Document and administer adult and pediatric COVID-19 and influenza vaccines at public clinic events

Worcester Free Care Collaborative, Worcester, MA
Clinical Volunteer — Feb. 2020–

Perform medical, administrative documentation; elicit patient histories and perform examinations; counsel patients and address concerns with physicians, refer patients to external resources; contribute to empathetic environment

Vaccine Corps, Commonwealth Medicine, Worcester, MA
Clinical Volunteer — Nov. 2021–

Document and administer adult and pediatric COVID-19 and influenza vaccines under the supervision of attending physicians at free public clinic events in Worcester County

COVID-19 Emergency Medical Shelter Program, City of Worcester/UMass Chan Medical School, Worcester, MA
Clinical Volunteer — Mar.–May 2020

Assisted in provision of *ad hoc* amenities for medical care, isolation, shelter, health screenings, PPE distribution, and education for homeless persons in Worcester, MA exposed to/infected with COVID-19 during alpha variant surge

LEADERSHIP EXPERIENCE

Faculty Committee on Academic Standards, College of Charleston, Charleston, SC
Voting Student Committeeperson — Nov. 2015–Apr. 2017

Considered sensitive student petitions for post-deadline grade changes; deliberated proposed academic policy changes and issued non-binding recommendations thereon to Faculty Senate

HIGHLIGHTS:

- Researched academic policies of peer post-secondary institutions; co-drafted policy change recommendation in cooperation with staff, faculty

Student Government Association (SGA), College of Charleston, Charleston, SC
Student Body Treasurer — May–Dec. 2016
Parliamentarian — Sep. 2015–Apr. 2016
Senator — Sep. 2014–Apr. 2016

As treasurer: directed allocation and disbursal of $55,000 in student activity fees to 200+ student organizations and supervised internal SGA expenditures; as parliamentarian: advised SGA on parliamentary procedure and aided vice-president in arbitration of bylaw disputes; as senator: drafted policy change resolutions, served on *ad hoc* committees, and implemented student life initiatives

HIGHLIGHTS:

- Introduced non-binary gender options on application forms in cooperation with Office of Admissions, Office of Legal Affairs
- Negotiated expansions of Cougar Shuttle, Maroon Meals programs in response to feedback

WORK EXPERIENCE

MEDUCARE, Lifeguard Ambulance Service/MUSC Health, Charleston, SC
Emergency Medical Technician (EMT) — Sep. 2018–Jun. 2019

Assessed and transported patients; initiated BLS interventions; documented transports; inventoried ambulance equipment; assisted aeromedical and pediatric critical-care personnel

Kelly Educational Staffing, Charleston County School District, Charleston, SC
Substitute Teacher — Dec. 2017–Jun. 2018

Instructed public, charter school students in grades K–12 towards learning outcomes; adapted lesson content to students' abilities; nurtured proper student conduct

HIGHLIGHTS:

- Remediated disadvantaged students with behavioral/learning issues at Liberty Hill Academy
- Facilitated Montessori education at James Simons Elementary School

CERTIFICATION & LICENSURE

- BLS (CPR & AED) Provider (AHA), 1hruaqomh6grmkykvizjpavs, Aug. 2024–Aug. 2026
- Emergency Medical Technician (NREMT), E3410347, Aug. 2018–Mar. 2021

TEST SCORES

- *USMLE Step 1*: **233** (Apr. 2021)
- *Medical College Admissions Test (MCAT)*: **518** (Jun. 2017)
- *ETS Major Field Test (Chem.)*: **190** (Mar. 2017)
- *GRE General Test*: **168** [verb.], **163** [quant.], **4.5** [writing] (Oct. 2016)
- *GRE Subject Test (Chem.)*: **760** (Oct. 2016)

COMPUTER SKILLS

Basic	HTML/XHTML, PyMOL, Maestro, GnuPG, Windows and Linux command prompts
Proficient	Microsoft Excel and PowerPoint, Mendeley, ChemOffice, MestReNova, GraphPad Prism, Epic EMR, GIMP

ADDITIONAL INFORMATION

Languages	German: Anfänger in der Schriftsprach, der gesprochenen Sprach und der Kultur (beginner of written language, spoken language and culture)
Interests	Photography and photo editing, graphic design, hiking, boating, vegetarian cooking, home canning and brewing, philosophy, history, calligraphy