Nicole T. Comfort

LinkedIn
https://www.linkedin.com/in/nicole-comfort/
Personal Website
ncomfort.github.io
ORCiD: 0000-0002-6827-3043

E-mail
nicolecomfort3@gmail.com
Cell
(978)-987-0016

Education

2016 – **Columbia University Mailman School of Public Health** (New York, NY)
Ph.D. Program in Environmental Health Sciences, anticipated 2021
Cumulative GPA: **3.89**/4.0
Relevant Courses: Biochemistry I & II, Survey of Neuroscience, Biostatistics, Statistics for Basic Sciences, Data Science, Responsible Conduct of Research, Toxicokinetics, Intro to Epidemiology, Design/Conduct of Observational Epidemiology, Applied Regression I & II, Analysis of Categorical Data, Advanced Analytic Methods in Environmental Health Science

2016 – 2017 **Columbia University Mailman School of Public Health** (New York, NY)
M.A., Columbia University Graduate School of Arts & Sciences, Oct. 2017

2016 **Boston University School of Public Health (SPH)** (Boston, MA)
Non-degree coursework
Courses: Intro. to Toxicology, Foundations of Environmental Health
Cumulative GPA: **4.0**/4.0

2011 – 2015 **Northeastern University** (Boston, MA)
B.S., Behavioral Neuroscience
Cumulative GPA: **3.985**/4.0, *summa cum laude, University Honors Distinction*
Relevant Courses: Biology Capstone, Neural Systems & Behavior, Functional Human Neuroanatomy, Behavioral Endocrinology, Organic Chemistry, Biochemistry, Genetics & Microbiology, Seminar in Biological Psychology, Psychobiology, Environmental Science

Work Experience

2018- **Doctoral Candidate, Columbia University**
Department of Environmental Health Sciences
Primary advisor: Dr. Andrea Baccarelli
Thesis project: Ambient Air Pollution, Salivary Extracellular Vesicles, & Asthma Severity in Children with Asthma

2016 – 2017 **Graduate Student Researcher**
Research rotations
Department of Genetics & Development
Advisors: **Dr. Timothy Bestor, Dr. Matthieu Boulard,** Dr. Olya Yarychkivska
Project: Regulation of DNA Methyltransferase 1 (DNMT1)

Techniques: PCR, Bisulfite sequencing, Western blot, cell culture

Department of Environmental Health Sciences
Advisor: Dr. Diane Re
Project: Organophosphate toxicity in stem cell-derived motor neurons; examine potential common mechanisms and vulnerability for organophosphate-induced delayed neuropathy and amyotrophic lateral sclerosis (ALS)
Techniques: Primary cell culture, extracellular vesicle isolation from human brain tissue and mouse astrocytes, tissue sectioning, antibody staining of spinal cord tissue and neuromuscular junctions, slide mounting, motor neuron counting, imaging using flash cytometer and analysis using MetaMorph® to assess neuronal outgrowth

Advisor: Dr. Andrea Baccarelli
Project: Assess the effect of phthalate exposure on male infertility using mitochondrial lesions as a biomarker of phthalate exposure and DNA damage, quality control assays
Techniques: PCR, PicoGreen dsDNA quantification assay, DNA lesions quantification assay, gel electrophoresis, data analysis in R

May 2015 – June 2016 **Research Associate, Environmental Health Dept., Boston University School of Public Health**
Advisors: **Dr. Kimberly Sullivan, Dr. Roberta F. White**
Research Areas: Gulf War Illness, clinical research; Identify plasma biomarkers of Gulf War Illness using "omic" technology, assess efficacy of intranasal insulin on memory and attention functioning, mood, and overall physical health in Gulf War veterans with chronic multi-symptom illness
Techniques: Various neuropsychological assays for cognitive function including CPT3, COWAT (FAS), Finger tapping test, Grooved pegboard test, Block design, Trail-making, CVLT-II, and TOMM

- Identify plasma biomarkers of Gulf War Illness using "omic" technology; assess efficacy of daily intranasal insulin on memory and attention functioning, mood, and overall physical health in Gulf War veterans with chronic multi-symptom illness
- Administer neuropsychological evaluations to assess various aspects of cognitive function (memory, attention/executive function, information processing/motor speed, and visuospatial processing) in Gulf War veterans, complete data entry, and analyze results
- Familiarity with neuropsychological tests including: CPT3 (continuous performance test 3rd ed.), COWAT (FAS) word association test, Finger tapping test, Grooved pegboard test, Block design, Trail-making, CVLT-II (verbal learning test), TOMM (to assess malingering), POMS2 (profile of mood states, 2nd ed.), etc…
- Provide administrative support via tasks such as researching literature and writing grant project narratives and Institutional Review Board consent forms
- Provided research and administrative support to the Research Advisory Committee on Gulf War Veterans' Illnesses, chartered by Congress to advise the Secretary of Veterans Affairs (VA) regarding research on the unexplained illnesses affecting Gulf War veterans (May – Oct 1).

- Duties included identifying and reviewing health research studies and articles, preparing research reports and recommendations, coordinating and facilitating Committee meetings, and communicating with veterans while supporting VA missions

July 2015 – May 2015 **Research Assistant, Neurology Dept., Biogen**
Advisors: **Dr. Marion Wittmann, Dr. Brandon Farley**
Research Areas: Assay optimization to assess clinical onset of disease in amyotrophic lateral sclerosis (ALS) transgenic mouse and demyelination in the optic pathway of rats after injection of a neurotoxic/gliotoxic compound
Techniques: EEG/EMG recordings, compound muscle action potential (CMAP) recordings, visual evoked potentials, behavioral measurements (rotarod, grip strength), data analysis

- Performed *in vivo* electrophysiological studies in support of Biogen's Neurology Discovery Department objectives: mainly included development of assay to measure compound muscle action potentials (CMAP) in mouse model of Amyotrophic Lateral Sclerosis (ALS), assay optimization of demyelination in the optic pathway of rats, and analysis of "spindles" of EEGs in SK2 fibril-injected mice
- Contributed to study design, independently conducted EMG recordings of CMAPs in the $SOD1^{G93A}$ transgenic mouse model of ALS, and analyzed results for decrement in CMAP which reflects motor unit loss in ALS mice
- Assessed clinical disease onset in mice by tracking weight
- Acquired EEG and visual evoked potentials (VEP) from rats and analyzed the response's latency delay and amplitude decrease from demyelination of fibers in optic pathway as a result of injection of a neurotoxic/gliotoxic compound
- Assisted in surgery to implant recording acquisition tethers and LEDs above rats' eyes, and in stereotaxic injections of Ethidium Bromide/LPC as model of demyelination to mimic optic neuritis, common in Multiple Sclerois (MS)
- Dosed over forty mice intraperitoneally weekly with anti-Tau antibody
- Soldered to prepare telemetry devices for implantation and to create wires and cables used in recordings

May 2013 – May 2014 **Research Assistant, Neurobiology Dept., Harvard Medical School**
Advisors: **Dr. John Maunsell, Dr. Mark Histed**
Research Areas: Visual and auditory perception, neural coding
Techniques: Optogenetics in mice, stereotaxic surgery, *in vivo* electrophysiology, single-unit neural recording, operant conditioning, data analysis using MATLAB

- Deciphered general principles of cortical function in primary visual cortex (V1) of behaving mice; genetically, optically, and electrophysiologically manipulated and recorded neurons during behavior
- Responsible for changing the variables and monitoring the behavioral performance of nine mice; trained according to behavioral task paradigm

- Assembled optical windows for implantation, performed craniotomy/head post implant surgeries, took pictures of the window post-surgery with AxioVisionLE (Rel. 4.8) and edited images in ImageJ
- Acquired fluorescent images of brain slices using Olympus VS120 Slide Scanner (image used as Figure Panel in *J. Neurosci* publication)
- Conducted intrinsic signal mapping of retinotopy in V1 and analyzed results
- Assisted in single-unit recordings of V1 in awake mice
- Designed custom 3D-printed parts for experimentation rigs using AutoCAD program Autodesk Inventor
- Searched Jax database for proper mouse strains, created new probes and cross strains using Transnetyx, acquired genetic samples from mice to send to Transnetyx for automated genotyping, and analyzed results
- Performed miscellaneous tasks including weaning pups, tracking weights, implementing new cage card numbering system for mouse inventory, creating plots in MATLAB, aliquoting virus/enzyme, maintaining inventory of sterile materials

Dec. 2011 – May 2013 **Undergraduate research volunteer, Psychology Dept.**
Northeastern University
Advisors: **Dr. Richard Melloni, Jr., Dr. Thomas Morrison**
Research Areas: Anabolic-androgenic steroids (AAS), offensive aggression, affective behaviors (e.g. anxiety), actions of arginine vasopressin and dopamine in lateral anterior hypothalamus
Techniques: Rodent behavioral tests (elevated plus maze, resident-intruder paradigm, black/white box) and scoring, stereotaxic surgery, cardiac perfusions, brain extractions, tissue cross-sectioning with microtome, slide mounting and coverslipping, immunohistochemistry

- Examined how use of anabolic-androgenic steroids (AAS) during adolescence facilitates offensive aggression in Syrian hamsters through alterations to dopaminergic neural system in anterior hypothalamus
- Injected rodents daily with AAS or sesame oil for three-week dosing regimen
- Performed surgery to implant cannulas into specific brain regions of hamsters
- Conducted behavior tests (EPM, dark box, resident-intruder), analyzed results, and completed data entry with behavioral scoring, test scores, video transfers, and data backup
- Performed cardiac perfusions, brain extractions, and sliced 35 μm coronal cross-sections of cortex using microtome for histological stains
- Applied immunohistochemistry techniques on sliced tissues; completed slide mounting, coverslipping, and slide analyses

Grants and Fellowships

2018-2019	National Institute of Environmental Health Sciences Pre-doctoral Training Grant (5T32ES007322-17); Principal Investigator: Andrea Baccarelli
2017-2018	National Institute of Environmental Health Sciences Pre-doctoral Training Grant (2T32ES007322-16); Principal Investigator: Andrea Baccarelli
2016-2017	National Institute of Environmental Health Sciences Pre-doctoral Training Grant (4T32ES007322-15); Principal Investigator: Joseph H. Graziano

Awards and Honors

Northeastern University

2015 Huntington 100 Award – *recognizes one hundred students selected for their impressive achievements and impact both on campus and around the world*

2015 Sears B. Condit Award – *recognizes the one hundred graduating students with the highest quality GPAs in the class*

2015 Provost Undergraduate Research and Creative Endeavors Award – *offers financial and academic support to Northeastern students seeking to conduct original projects of their own design*

2014 President's Award – *awarded to the top ten students in the class; note that NU's total undergraduate enrollment is nearly 14,000 students*

2014 Behavioral Neuroscience Department Travel Award

2011-2015 Dean's Scholarship, Dean's List

Publications

Yarychkivska, O., Shahabudhin, Z., **Comfort, N.**, Boulard, M., Bestor, T.H. BAH domains and a histone-like motif regulate *DNMT1* in vivo. 2018. *J. Biol. Chem.,* 293(50): 19466-19475. doi: 10.1074/jbc.RA118.004612.

McCampbell A., Cole T., Wegener A.J., Tomassy G.S., Setnicka A., Farley B.J., Schoch K.M., Hoye M.L., Shabsovich M., Sun L., Luo Y., Zhang M., Thankamony S., Salzman D.W., Cudkowicz M., Graham D.L., Bennett C.F., Kordasiewicz H.B., Swayze E.E., Miller T.M., **Comfort N.**, Wang B., Amacker J. Antisense oligonucleotides extend survival and reverse decrement in muscle response in ALS models. 2018. *J Clin Invest.* 1;128(8): 3558-3567. doi: 10.1172/JCI99081.

Comfort, N., Re, D.B. Sex-specific neurotoxic effects of organophosphate pesticides across the life course. 2017. *Curr Environ Health Rep*, 4(4): 392-404.

Qiang, L., Rao, A.N., Mostoslavsky, G., James, M.F., **Comfort, N.**, Sullivan, K., Baas, P.W. Reprogramming cells from Gulf War veterans into neurons to study Gulf War Illness. 2017. *Neurology*, 88(20): 1968-1975.

Acknowledgements:
Histed, M.H. and Maunsell, J.H.R. Cortical neural populations can guide behavior by integrating inputs linearly, independent of synchrony. 2014. *Proc Natl Acad Sci U.S.A.*, 111(1): E178-E187.

Glickfeld, L., Histed, M.H., Maunsell, J.H.R. Mouse primary visual cortex is used to detect both orientation and contrast changes. 2013. *J. Neurosci*, 33(50): 19416-19422.

Link to Bibliography:
https://www.ncbi.nlm.nih.gov/myncbi/1v5L4VkrjtH55/bibliography/public/

Abstracts

2019 **Nicole Comfort,** Cara Smith, Steven Chillrud, Qiang Yang, Andrea Baccarelli, Darby Jack. *Extracellular Vesicles in Saliva as Biomarkers of Exposure and Effect:*

A feasibility pilot in the context of the New York City Biking and Breathing Study. 31st Annual Conference of the International Society for Environmental Epidemiology (ISEE).

2018 **Nicole Comfort,** Wanda Phipatanakul, Andrea Baccarelli. *Saliva extracellular vesicle (EV) microRNA and asthma severity in urban school children.* Academic Pediatric Association (APA) Environmental Health Scholars Retreat. Providence, RI. Abstract accepted for October 2018 APA conference.

2017 Teresa Obis, Meredith Loth, Agnese Ramirez, Samantha Merwin, Beatriz Blanco, Sara Guariglia, Vesna Ilievski, Silvia Tamanini, **Nicole Comfort**, Yanelli Nunez, Marfred E. Munoz Umanes, Mary Gamble, Vernice Jackson-Lewis, Shingo Kariya, Stefania Corti, Tomas Guilarte, and Diane B. Re. *PK11195, a ligand of the translocator protein 18KDa, improves grip strength, motor performance, and muscle innervation at early but not late disease stages in the amyotrophic lateral sclerosis mutant superoxide dismutase 1 mouse model.* Program No. 670.10. 2017 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014. Online.

2015 Brandon J. Farley, **Nicole T. Comfort**, Jessica L. Goodman, Anne M. Kuszpit, Tracy Cole, Holly Kordasiewicz, Eric Swayze, Alexander McCampbell, and Marion Wittmann. *Antisense oligonucleotide treatment protects against neuromuscular denervation in the SOD1 G93A mouse model of ALS as evaluated by a pre-symptomatic electrophysiological measure.* Program No. 69.18. 2015 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2015. Online.

2014 M. H. Histed, **N. T. Comfort**, R. T. Ohman, A. R. Perillo, J. H. R. Maunsell. *Linear integration for perceptual behavior in mouse primary auditory and visual cortex.* Program No. 530.05. 2014 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014. Online.

Conference and Seminar Presentations

2019 Poster presentation, *Extracellular Vesicles in Saliva as Biomarkers of Exposure and Effect: A feasibility pilot in the context of the New York City Biking and Breathing Study.* 31st Annual Conference of the International Society for Environmental Epidemiology (ISEE), Utrecht, Netherlands

2019 Lecture, *Novel Extracellular Vesicle and Molecular Biomarkers of Environmental Exposure and Disease Progression in ALS.* National ALS Registry Annual Meeting.

2018 Lecture, *Indoor Air Pollution, Salivary Extracellular Vesicles, & Asthma Exacerbations in Children with Asthma: A School-Based Study.* Academic Pediatric Association Environmental Health Scholars Retreat, Brown University, Providence, RI

2018 Poster presentation, *Saliva extracellular vesicle microRNA and asthma severity in urban school children.* Student Research Diversity Day, Columbia University, NY

2015 Poster presentation, *Antisense oligonucleotide treatment protects against neuromuscular denervation in the SOD1 G93A mouse model of ALS as evaluated*

by a pre-symptomatic electrophysiological measure. 45th Annual Society for Neuroscience Meeting, Chicago, IL

2015 Poster presentation, *Cortical neural populations can guide behavior by integrating inputs linearly, independent of synchrony.* RISE: Research, Innovation, and Scholarship Expo, Northeastern University

2014 Poster presentation, *Linear integration for perceptual behavior in mouse primary auditory and visual cortex.* 44th Annual Society for Neuroscience Meeting, Washington, D.C.

2014 Poster presentation, *Linear integration for perceptual behavior in mouse primary auditory and visual cortex.* Honors Evening Poster Session, Northeastern University, Boston, MA

Teaching Experience

Specific courses

2020 **Teaching Assistant** for graduate course "Toxicokinetics."

2018, 2019 **Teaching Assistant** for graduate course titled "Fundamental Toxicology for Public Health-Related Disciplines." Developed and taught a lecture, developed quizzes and assignments, provided supplemental reading, graded assignments, held office hours.

2019 **Teaching Assistant** for graduate course "Laboratory Methods in Environmental Health Sciences."

Other teaching activities

2020 **Workshop facilitator** for Columbia's "PI Crash Course" Boot Camp, teaching the fundamental leadership and management skills to health and research professionals needed for success in running a lab

2020 Completed the "Course Design Seminar," an intensive, evidence-based teaching development program offered by the Center for Teaching and Learning at Columbia University. Program details are available at https://ctl.columbia.edu/graduate-instructors/programs-for-graduate-students/seminars-institutes-for-graduate-students/course-design-seminar/.

2019 **Workshop facilitator** for Columbia's NIH Grant Writing Boot Camp, a 2-day hands-on workshop to help participants powerfully frame their grant proposal so that it generates enthusiasm in reviewers.

2018 – 2019 Scientist-in-Residence participant, NYAS: *Pairs scientists with public school teachers to develop inquiry-based research projects for the classroom. Our 10th grade project looked at the effects of different carbon dioxide concentrations on various measures of plant growth. By building partnerships between teachers and scientists, this innovative program not only provides students the opportunity to engage in authentic, hands-on research, it also gives teachers the critical support they need to bring scientific inquiry to life in the classroom.*

2018 - Columbia University Teaching Development Program (TDP), Advanced Track. *The TDP allows doctoral students to cultivate, document, and articulate their teaching development across the arc of their graduate school career. By completing the advanced track, the participant will exhibit competencies such as being able to articulate and reflect on their own inquiry-based development as a teacher, present evidence of sustained teaching development, and demonstrate organized, engaging, and distinctive communication practices that extend into future professional settings.*

2018 **Workshop facilitator** for Columbia's Mendelian Randomization Boot Camp, a two-day intensive combination of seminars and hands-on analytical sessions to provide an overview of the concepts, techniques, packages, data sources, and data analysis methods needed to conduct Mendelian Randomization studies. Provide coding assistance to workshop participants.

2018 Completed the "Evidence-Based Teaching in Science & Engineering Seminar," an intensive, 4-week, STEM-focused teaching development program offered by the Columbia University Center for Teaching and Learning (CTL). Program details are available at http://ctl.columbia.edu/etse/.

2014 – 2015 Volunteer teacher for NEPTUN (NorthEastern Program for Teaching by Undergraduates) *Splash* weekends at Northeastern University. *Splash* is an immersive day held annually where high school students sign up for introductory topics that interest them that are developed and offered by undergraduates.

2013 – 2015 Interaxon volunteer, presenting neuroscience topics to K-12 public schools in Boston, MA

2012 – 2013 College of Reading and Learning Association certified tutor, Northeastern University Peer Tutoring Program

Invited Peer Reviewer

2020 Environment International

2019 The Journal of Integrative Neuroscience

2018 Neurological Research

2018 Behavioral and Brain Functions

2018 Journal of Pollution Effects & Control

Publons: https://publons.com/researcher/1543846/nicole-comfort/

Invited Speaker

July 2019 Invited presenter, "Novel Extracellular Vesicle and Moleculare Biomarkers of Environmental Exposure and Disease Progression in ALS," Annual Amyotrophic Lateral Sclerosis (ALS) Surveillance Meeting, Department of Health and Human Services Centers for Disease Control and Prevention Agency for Toxic Substances and Disease Registry, Atlanta, GA

Apr. 2019	Invited panel speaker, "Applying to PhD & Doctoral Programs," Columbia University Mailman School of Public Health
2017	Invited panel speaker, "Johns Hopkins University Center for Talented Youth Family Programs Environmental and Public Health Workshop," Columbia University

Workshops and Certifications

Aug. 2019	Single Cell RNA-Seq Analysis Boot Camp participant: This two-day intensive boot camp starts with a fast-paced training session on single cell data collection and basic analysis, then continues with in-depth sessions on advanced methods for phenotyping single cell populations using systems-biology approaches.
Jun. 2019	High-Throughput Sequencing 6-week course, Department of Biostatistics and Bioinformatics of the Duke University School of Medicine. Gained the biological, statistical, computational, and informatics knowledge for implementing a well-designed genomics experiment.
Apr. 2019	Exosomes: Principles, Methods, and Applications. Completed 4-day Bio-Trac® workshop at Montgomery College, MD which balanced theoretical lectures with hands-on introduction to the isolation, quantitation, analysis, and engineering of exosomes.
Jun. 2018	Epigenetics Boot Camp participant: This two-day intensive boot camp integrates the principle concepts of epigenetics and the effects of risk factors on the epigenome as we step through the key components of designing and executing DNA methylation studies.

Professional Organizations and Society Memberships

2019-	International Society for Environmental Epidemiology
2018-	American Association for the Advancement of Science (AAAS)
2018-19	New York Academy of Sciences (NYAS)
2018-	International Society for Extracellular Vesicles
2015-	Nu Rho Psi National Honor Society, Massachusetts Beta Chapter
2015-	Tri Beta Biological Honor Society, Chi Delta Epsilon Chapter
2014-2016	Society for Neuroscience

Leadership, Student Organizations, and Volunteer Activities

2017-	**Doctoral representative,** Environmental Health Science, **Graduate Student Association,** Columbia Mailman School of Public Health
2016 -	Member, Students for Environmental Action, Columbia University Mailman School of Public Health
2015-	**Climate Reality Leader**, received training at twenty-seventh Climate Reality Leadership Corps Training, New Delhi, India

2014-2015	**President**, Nu Rho Psi National Honor Society, Massachusetts Beta Chapter at Northeastern University
2013-2014	Secretary, Nu Rho Psi National Honor Society, Massachusetts Beta Chapter at Northeastern University
2014	**Alternative Spring Break Team Leader**, Northeastern University, Tandana Foundation, Ecuador
2013	Alternative Spring Break Participant, Northeastern University, Rebuilding Together, Oklahoma, U.S.
2012-2015	Behavioral Neuroscience program peer mentor – mentor incoming Behavioral Neuroscience major undergraduates

Related Professional Skills

Mendelian randomization	Exosome isolation	Jupyter
DNA/RNA extractions	Western Blot	Git
DNA methylation analysis	RNA-Seq	*In vivo* rodent handling and survival surgery
R, SAS	Unix/Linux/Bash	
PCR	SDS-PAGE	Nanoparticle Tracking Analysis (ViewSizer 3000)
Cell culture	Antibody staining	

Interests

Activism, international travel, acrylic painting, dogs, gardening, playing classical flute and piano, volunteering