

Evonne McArthur, PhD

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EDUCATION

Anticipated May 2023	Vanderbilt University School of Medicine <i>M.D.</i>	Nashville, TN
	▪ USMLE Step 1: 258, 92nd percentile · USMLE Step 2 CK: 266, 91st percentile	
May 2022	Vanderbilt University <i>Ph.D. Human Genetics</i>	Nashville, TN
	▪ Advisor: John A. Capra, PhD · Co-advisor: Nancy J. Cox, PhD ▪ Committee: Lea K. Davis, PhD; Douglas Ruderfer, PhD; Alexander Bick, MD, PhD; Emily Hodges, PhD ▪ Dissertation: "The contribution of the 3D genome to gene regulation, human evolution, and disease"	
Jan 2021 – Mar 2022	University of California, San Francisco <i>Visiting Scholar, Bakar Computational Health Sciences Institute (BCHSI)</i>	San Francisco, CA
May 2015	University of North Carolina at Chapel Hill <i>B.S. with Highest Distinction</i>	Chapel Hill, NC
	▪ GPA: 3.95 · Minors: Computer Science & Chemistry · Honors Carolina member	
2013	School for International Training, Study Abroad	New Delhi, India
	▪ Program: India – Health and Human Rights	
May 2011	William G. Enloe Magnet High School	Raleigh, NC
	▪ International Baccalaureate (IB) Diploma	

HONORS

Oct 2022	First-place digital medical education innovation submission
	▪ Awarded at Digital Education (iMED) 2022: Building Skills, Community and the Future of Medical Education
2021 - 2022	Second-place senior human genetics graduate student talk of the academic year (\$1500 award)
2021	Predoctoral semifinalist, Charles J. Epstein trainee award, American Society for Human Genetics (ASHG)
	▪ Awarded for excellence in human genetics research (\$750 award)
2020 - 2021	Second-place senior human genetics graduate student talk of the academic year (\$1000 award)
2019 - 2020	First-place human genetics graduate student talk of the academic year (\$2000 award)
2018 - 2019	Meade Haven Scholarship in Biomedical Sciences
	▪ For demonstrating serious career commitment to research in the biomedical sciences

- 2016 - Pres. **Canby Robinson Society Scholarship**
▪ Full-tuition 4-year merit scholarship to Vanderbilt University School of Medicine
- 2013 **Order of the Grail-Valkyries Inductee**
▪ Recognized for outstanding character and significant contribution to the intellectual climate at UNC
- 2013 **Phi Beta Kappa Inductee**
- 2013 **Phillips Ambassador Scholarship Awardee**
▪ Selected to represent UNC as an ambassador to Asia (New Delhi, India) (\$5000 award)

GRANTS

- 2020 - 2023 **NIH National Research Service Award (NRSA) F30 (F30HG011200)**
▪ **PI:** Evonne McArthur, Vanderbilt Univ · **Funding IC:** NHGRI
▪ **Title:** Quantifying the relationship between 3D genome structure and the genetic architecture of common complex disease
▪ **Sponsor:** John A. Capra, PhD · **Co-sponsor:** Nancy J. Cox, PhD · **Award:** \$112,014

RESEARCH

- 2018 - Pres. **Personalized regulatory genomics, Vanderbilt Genetics Institute**
▪ Graduate student · Advisor: John A. Capra, PhD · Co-advisor: Nancy J. Cox, PhD
▪ Using and building computational tools to explore personalized regulatory genomes, rare unsolved diseases, 3D chromatin structure, and evolution
- 2015 - 2016 **Computational RNA biology, UNC Department of Biology**
▪ Research technician · Advisor: Alain Laederach, PhD · Mentor: Lela Lackey, PhD
▪ Investigated RNA structure and its relationship with human disease through the development of computational tools to detect and classify riboSNitches
- 2014 - 2015 **Pharmacogenomics, UNC Eshelman School of Pharmacy**
▪ Research assistant · Advisor: Federico Innocenti, MD, PhD · Mentor: Eric Seiser, PhD
▪ Investigated and developed a methodology for more sensitive CNV calling for use in pharmacogenomic association studies
- 2013 **Public and global health, School for International Training · All India Institute of Medical Sciences (AIIMS) Bhopal**
▪ Mentors: Azim A. Khan, PhD · Surya Bali, MBBS, MHA, MD
▪ Independent study research project where I conducted personal interviews and used Indian governmental health records to investigate barriers to tuberculosis treatment and diagnosis for Bhopali women
- 2013 **Neuropsychiatric and statistical genetics, University of Chicago, Conte Center for Computational Neuropsychiatric Genomics**
▪ REU participant · Advisor: Nancy J. Cox, PhD · Mentor: Lea K. Davis, PhD
▪ Developed a queryable database that integrates copy-number variant data with exome sequence data to investigate autism spectrum disorder
- 2012 - 2013 **Information science, UNC School of Information and Library Science**
▪ Research assistant · Advisor: Robert Capra, PhD · ResultsSpace Project
▪ Ran participants in a series of experiments and coded responses to investigate the effect of collaborative features on human interaction with search databases

LEADERSHIP & SERVICE

	Careers in Medicine Clinical Informatics Interest Group
2018 - 2019	<i>Co-Founder</i>
2019 - 2020	<i>Co-Chair</i> <ul style="list-style-type: none">▪ Co-founded and co-chaired the nation's first AAMC Careers in Medicine Clinical Informatics interest group at Vanderbilt▪ Organized events to expose students to clinical informatics and biomedical informatics
	Women in Training (WIT) MSTP Committee
2019 - 2020	<i>Co-Chair</i> <ul style="list-style-type: none">▪ Co-founded, co-chaired, and member of an MSTP committee organized to support women physician-scientist trainees via community, service, and advocacy programming
	Mini-MSTP (day-long scientific engagement program for local middle schoolers)
2019, 2021	<i>Volunteer</i>
	MSTP Admissions Committee
2019 - Pres.	<i>Interviewer</i>
	MSTP Website Committee
2018 - Pres.	<i>Member</i> <ul style="list-style-type: none">▪ Created Vanderbilt MSTP's website to recruit new students and increase collaboration and resource-sharing among current students
	MSTP Student Advisory Council
2018 - 2020	<i>Class representative</i>
	Vanderbilt School of Medicine Student Technology Committee
2018 - 2019	<i>Chair</i>
2016 - Pres.	<i>Member</i> <ul style="list-style-type: none">▪ An official liaison between medical students, administration, and IT leaders regarding all technologies related to Vanderbilt School of Medicine▪ Helped transition EHRs (to Epic) and trained all medical students for proficiency in effective medical record use▪ Organized multiple programming workshops and community-wide technology talks with invited speakers
	Pre-medical and pre-MD/PhD student mentorship
2016 - Pres.	<i>Mentor</i> <ul style="list-style-type: none">▪ Mentor to one UCSF Biological and Medical Informatics graduate student (advised rotation project)▪ Mentor to two Vanderbilt MD/PhD students for scientific presentation skills▪ Mentor to 14 undergraduate students through Student National Medical Association (SNMA) (1), Vanderbilt's Scientific Immersion & Mentorship (SIM) program (1), Alpha Epsilon Delta (2), MSTP Summer Research program (3), American Physician Scientists Association (APSA) (4), and through informal contacts (3). Selected mentees include:<ul style="list-style-type: none">▪ Maggie Benson – current first-year MD/PhD student at Kansas University▪ Anirban Chakraborty – current postbaccalaureate at NIH NCI and 2022 MD/PhD applicant▪ Carly Stewart – current Vanderbilt University senior and 2022 MD/PhD applicant
	Shade Tree Clinic (Medical student-run clinic for the uninsured and underserved)
2016 - Pres.	<i>Monthly clinical care provider and peer educator</i>
2018 - 2019	<i>Website master:</i> Managed registrations and donations for the 2019 Shade Tree Trot 5K run with 600+ participants, raising \$17,000+

TEACHING & CURRICULUM DESIGN

Feb 2022: Two-part workshop	Manuscript writing for reproducible science in MS word and Latex <ul style="list-style-type: none">▪ https://github.com/CapraLab/lab-manuscript-template
Nov 2021: workshop	Introduction to version control in Git <ul style="list-style-type: none">▪ https://emcarthur.notion.site/Git-Version-Control-a1315177f4fc44c28bf3a54b5f3a3501
Jun 2021: workshop	Communicating science through interactive apps with Dash and Plotly in python
May 2020: Five-part workshop	<ol style="list-style-type: none">1. Introduction to computer programming & R2. Introduction to data manipulation3. Introduction to plotting & regression4. Introduction to machine learning5. Introduction to single-cell analysis <ul style="list-style-type: none">▪ https://medschool.vanderbilt.edu/mstp/2020/05/28/mstp-programming-workshop/
Aug 2018, 2019: Orientation session	Clerkship student introduction to medical student technology (Epic eStar & VPEN) <ul style="list-style-type: none">▪ https://docs.google.com/document/d/1Piqrww0YecoBo4eG_mXmbvaeiNIzGxKxw01qcEmJRDg
Fall 2015: one-month course module	UNC BIOL 528 <ul style="list-style-type: none">▪ TA, lecturer, and curriculum design for a one-month module in a systems biology course

PUBLICATIONS

Peer-reviewed journal

1. Accepted at JAMIA: Quach WT, Le CH, Clark MG, **McArthur E**, Ancker JS, Gadd CS, Johnson KB. (2022). Engaging the Next Generation of Physician-Informaticians through Early Exposure to the Field: Successes and Challenges Associated with Starting a Novel Clinical Informatics Interest Group.
2. Niarchou M, Gustavson DE, Sathirapongsasuti JF, Anglada-Tort M, Eising E, Bell E, **McArthur E**, Straub P, 23andMeResearchTeam, McAuley JD, Capra JA, Ullén F, Creanza N, Mosing MA, Hinds DA, Davis LK, Jacoby N, Gordon RL. (2022). Genome-wide association study of musical beat synchronization demonstrates high polygenicity. *Nature Human Behaviour* 2022, 1–18.
<https://doi.org/10.1038/s41562-022-01359-x>
3. **McArthur E**, Rinker DC, Capra JA. (2021). Quantifying the contribution of Neanderthal introgression to the heritability of complex traits. *Nature Communications*, 12(1), 2020.06.08.140087.
<https://doi.org/10.1038/s41467-021-24582-y>
4. **McArthur E**, Capra JA. (2021). Topologically associating domain boundaries that are stable across diverse cell types are evolutionarily constrained and enriched for heritability. *American Journal of Human Genetics*, 108(2), 269–283. <https://doi.org/10.1016/j.ajhg.2021.01.001>
5. Rinker DC, Simonti CN, **McArthur E**, Shaw D, Hodges E, Capra JA. (2020). Neanderthal introgression reintroduced functional ancestral alleles lost in Eurasian populations. *Nature Ecology and Evolution*, 4(10), 1332–1341. <https://doi.org/10.1038/s41559-020-1261-z>
6. Patel DA, Gopalakrishnan R, Engelhardt BG, **McArthur E**, Sengsayadeth S, Culos KA, Byrne M, Goodman S, Savani BN, Chinratanalab W, Jagasia M, Mosse, CA, Cornell RF, Kassim AA. (2020). Minimal residual disease negativity and lenalidomide maintenance therapy are associated with superior survival outcomes in multiple myeloma. *Bone Marrow Transplantation*, 55(6), 1137–1146.
<https://doi.org/10.1038/s41409-020-0791-y>

7. Lackey L, Coria A, Woods C, **McArthur E**, Laederach A. (2018). Allele-specific SHAPE-MaP assessment of the effects of somatic variation and protein binding on mRNA structure. *Rna*, 24(4), 513–528. <https://doi.org/10.1261/rna.064469.117>
8. **McArthur E**, Bali S, Khan AA. (2016). Socio-cultural and knowledge-based barriers to tuberculosis diagnosis for women in Bhopal, India. *Indian Journal of Community Medicine*, 41(1), 62–64. <https://doi.org/10.4103/0970-0218.170990>
9. Lackey L, **McArthur E**, Laederach A. (2015). Increased transcript complexity in genes associated with chronic obstructive pulmonary disease. *PLoS ONE*, 10(10). <https://doi.org/10.1371/journal.pone.0140885>
10. Capra R, Chen AT, **McArthur E**, Davis N. (2013). Searcher actions and strategies in asynchronous collaborative search. *Proceedings of the ASIST Annual Meeting*, 50(1). <https://doi.org/10.1002/meet.14505001077>

Preprints & articles in submission

* co-first author

11. In preparation: Gunsalus L*, **McArthur E***, Gjoni K, Kuang S, Pittman M, Gilbertson, EN, Capra, JA, Pollard KS. Comparing chromatin contact maps at scale: methods and insights.
12. In revision at JAMIA Open: **McArthur E**, Bastarache L, Capra JA. (2022). Linking rare and common disease vocabularies by mapping between the Human Phenotype Ontology and phecodes.
13. In review at Science: **McArthur E***, Rinker DC, Gilbertson EN, Fudenberg G, Pittman M, Keough K, Pollard KS, Capra JA. (2022). Reconstructing the 3D genome organization of Neanderthals reveals that chromatin folding shaped phenotypic and sequence divergence. *BioRxiv*, 2022.02.07.479462. <https://doi.org/10.1101/2022.02.07.479462>
14. Strom NI, ... , [Psychiatric Genomics Consortium including **McArthur E**], et al. (2021). Genome-wide association study identifies new locus associated with OCD. *MedRxiv*, 2021.10.13.21261078. <https://doi.org/10.1101/2021.10.13.21261078>

PRESENTATIONS

Oral presentations – International & national conferences

* denotes presenter

1. **McArthur E***, Rinker DC, Gilbertson EN, Fudenberg G, Pittman M, Keough K, Pollard KS, Capra JA. (Apr 2022). Chromatin folding shaped the divergence between modern humans and Neanderthals (Platform talk). *NHGRI Research Training and Career Development Annual Meeting*. Durham, NC.
2. **McArthur E***, Benton ML, Tubbs C, Ruderfer D, Cox NJ, Capra JA. (Oct 2021). Common-variant dysregulation of Mendelian disorder genes contributes to complex disease (Platform talk in session: Expanding genetic approaches and applications in pharmaco- and clinical genomics). *American Society of Human Genetics (ASHG) Meeting*. Virtual.
3. Velazquez-Arcelay, K*, Colbran LL, **McArthur E**, Rinker DC, Capra JA. (Oct 2021). The influence of Neanderthal introgression on human circadian biology (Platform talk in session: Effects of Evolutionary History and Substructure on Modern Populations). *American Society of Human Genetics (ASHG) Meeting*. Virtual.
4. **McArthur E***, Capra JA. (Apr 2021). Quantifying the relationship between 3D genome structure and the genetic architecture of complex traits (Lightning Talk). *NHGRI Research Training and Career Development Annual Meeting*. Virtual.
5. **McArthur E***, Capra, JA. (Oct 2020). Personalized regulatory genomics: Identifying gene dysregulation to solve undiagnosed rare disease cases (Platform talk in Session: Computational approaches for disease diagnosis and variant effect determination). *American Society of Human Genetics (ASHG) Meeting*. Virtual.
6. Capra JA*, **McArthur E**, Rinker DC. (Oct 2020). Quantifying the contribution of Neanderthal Introgression to the heritability of complex traits (Platform talk in session: Effects of Evolutionary History and Substructure on Modern Populations). *American Society of Human Genetics (ASHG) Meeting*. Virtual.

Oral presentations – Institutional conferences & seminars

7. (Jan 2022). 3D genome organization constrained human sequence evolution (Seminar talk). *Evolutionary genetics seminar*. UCSF & Gladstone Institutes.
8. (Dec 2021). Reconstructing the 3D genome folding of Neanderthals (Seminar talk). *Genetics interest group seminar*. Vanderbilt [Virtual].
9. INVITED: (Oct 2021). Testing the relationship between common-variant dysregulation of Mendelian disorder genes and complex disease in the EHR. *Center for Precision Medicine (Department of Biomedical Informatics)*. Vanderbilt [Virtual].
10. (Jun 2021). Reconstructing the 3D genome folding of Neanderthals (Lightening talk). *MSTP retreat*. Vanderbilt [Virtual].
11. (Mar 2021). Searching for answers to rare medical mysteries in a book with 69,768 pages (Flash talk). *3 Minute Thesis*. Vanderbilt [Virtual].
12. (Feb 2021). Applying deep learning models to infer 3D organization of Neanderthal genomes. *Evolutionary genetics seminar*. UCSF & Gladstone Institutes [Virtual].
13. (Oct 2020). Statistical methods for predicting gene dysregulation to solve cases of rare disease (Chalk talk). *MSTP seminar series*. Vanderbilt [Virtual].
14. (Oct 2020). Identifying gene dysregulation to solve undiagnosed rare disease cases (Seminar talk). *Genetics interest group seminar*. Vanderbilt [Virtual].
15. (Feb 2020). Predicting gene dysregulation to solve undiagnosed disease cases (Seminar talk). *Genetics interest group seminar*. Vanderbilt.
16. (Mar 2019). Personalized regulatory genomics: ideas, history, and aims (Seminar talk). *Genetics interest group seminar*. Vanderbilt.
17. (Feb 2019). Polygenic risk scores: what are they and how can we use polygenic risk prediction in clinical care? (Journal club). *MSTP seminar series*. Vanderbilt.

Poster presentations

* denotes presenter

18. **McArthur E**, Webber CJ. (Sept 2022). Schematify: Developing a web application to visualize medical diagnostic schemas. *Vanderbilt Clinical Informatics Center: InformatiCon 2022*. Nashville, TN.
19. Tubbs C*, Han L, Benton ML, **McArthur E**, Capra JA, Ruderfer DM. (Oct 2021). Copy-Number Variation of CTCF Binding Sites Associates with Diverse Clinical Phenotypes. *American Society of Human Genetics (ASHG) Meeting*. Virtual.
20. Capra JA*, **McArthur E**, Rinker DC, Gilbertson EN, Fudenberg G, Pittman M, Keough K, Pollard KS. (Oct 2021). Reconstructing the 3D chromatin organization of archaic hominins reveals that genome folding shaped human-Neanderthal phenotypic divergence and introgression. *American Society of Human Genetics (ASHG) Meeting*. Virtual.
21. **McArthur E***, Rinker DC, Gilbertson EN, Fudenberg G, Pittman M, Keough K, Pollard KS, Capra JA. (Jul 2021). Reconstructing the 3D chromatin organization of archaic hominins reveals that genome folding shaped human-Neanderthal phenotypic divergence and introgression. *Society for Molecular Biology and Evolution (SMBE) Annual Meeting*. Virtual.
22. **McArthur E***, Capra JA. (Oct 2019). Heritability of common complex traits is enriched at topologically associating domain boundary regions. *American Society of Human Genetics (ASHG) Meeting*. Houston, TX.
23. **McArthur E***, Capra JA. (Jun 2019). Heritability of common complex traits is enriched at topologically associating domain boundary regions. *MSTP Annual Retreat*. Lake Barkley State Resort, KY.
24. **McArthur E***, Capra JA. (Jun 2019). Heritability of common complex traits is enriched at topologically associating domain boundary regions. *Vanderbilt Genetics Institute (VGI) Annual Retreat*. Nashville, TN.

25. Soda T*, **McArthur E**, McGuire P, Crowley J, Hucks D, Davis LK. (May 2019). Identification, validation, and characterization of obsessive disorder case samples in a large US Biobank. *American Psychiatric Association Annual Meeting*. San Francisco, CA.
26. Lackey L*, **McArthur E***, Coria A, Arend K, Moorman N, Laederach A. (Oct 2015). The biological impacts of RiboSNitches: Linking RNA structural changes with molecular phenotypes. *North Carolina Symposium on RNA Biology XI*. Durham, NC.
27. **McArthur E***, Zhang X, Gamazon ER, Sutcliffe JS, Cook EH, Davis LK, Cox NJ. (May 2014). Integration of Copy Number and Exome Sequence Data in a Queryable Database for the Investigation of ASDs. *International Meeting for Autism Research (IMFAR)*. Atlanta, GA.

Science & medicine writing or applications

28. **McArthur E**. (2022) Interactive web application: Medical diagnostic schema graph generator. <http://diagnostic-schema.herokuapp.com/>
29. **McArthur E**. (2021) Behind the paper community science article: Uncovering the legacy of our Neanderthal ancestors. *Nature Portfolio Ecology & Evolution Community*. <https://natureecoevocommunity.nature.com/posts/uncovering-the-legacy-of-our-neanderthal-ancestors>
30. **McArthur E**. (2021) Interactive web application: Visualizing the theoretical evolutionary trajectory of trait-associated Neanderthal-introgressed alleles. <https://neanderthal-heritability.herokuapp.com/>
31. **McArthur E**. (2019) Interactive web application: Personalized chemotherapy calendar. <http://emcarthur.github.io/projects/ChemoCalendar>

PROFESSIONAL ORGANIZATIONS

- 2021 - Pres. Society for Molecular Biology and Evolution (SMBE)
 2018 - Pres. American Society of Human Genetics (ASHG)

SKILLS

Software and Computer Languages:

- Python, R, MATLAB, Perl, Java, AWK, Linux Shell Scripting, MySQL, SQLite, Mathematica, MS Office, HTML, CSS, Git, LaTeX
- Web authoring tools such as Inkscape, Adobe Flash, Illustrator, Photoshop, and Lightroom

Languages

- Introductory conversational Spanish
- Introductory conversational Hindi-Urdu, Proficiency in Devanagari and Nasta'liq Script

INTERESTS

Art

- Photography: Cover of Dick's Sporting Good's Magazine and featured in many other international publications and texts, Created a two-month 30 photo exhibit exploring the diversity of India's life and landscape
- Small business (Etsy shop) owner selling homemade digital art with over 250 sales and \$10,000 revenue

Athletics

- Downhill alpine skier: raced slalom and giant slalom for 2011-2014 UNC Ski Team (US Collegiate Ski Association [UCSCA]) and lifelong ski enthusiast
- 5 half marathons 2019-2021

Crafts

- Computer programming and web application creation
- Other: sourdough bread and pizza making, crochet, basic woodworking (Adirondack chairs, raised garden beds)