

# Evonne McArthur, PhD

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## EDUCATION

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Anticipated May 2023	<b>Vanderbilt University School of Medicine</b> <i>M.D.</i>	Nashville, TN
	▪ USMLE Step 1: 258, 92nd percentile · USMLE Step 2 CK: 266, 91st percentile	
May 2022	<b>Vanderbilt University</b> <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’	
2021 - 2022	<b>University of California, San Francisco</b> <i>Visiting Scholar, Bakar Computational Health Sciences Institute (BCHSI)</i>	San Francisco, CA
May 2015	<b>University of North Carolina at Chapel Hill</b> <i>B.S. with Highest Distinction</i>	Chapel Hill, NC
	▪ GPA: 3.95 · Minors: Computer Science & Chemistry · Honors Carolina member	
2013	<b>School for International Training, Study Abroad</b>	New Delhi, India
	▪ Program: India – Health and Human Rights	
May 2011	<b>William G. Enloe Magnet High School</b>	Raleigh, NC
	▪ International Baccalaureate (IB) Diploma	

## HONORS

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2021 - 2022	<b>Second-place senior human genetics graduate student talk of the academic year (\$1500 award)</b>
2021	<b>Predoctoral semifinalist, Charles J. Epstein trainee award, American Society for Human Genetics (ASHG)</b>
	▪ Awarded for excellence in human genetics research (\$750 award)
2020 - 2021	<b>Second-place senior human genetics graduate student talk of the academic year (\$1000 award)</b>
2019 - 2020	<b>First-place human genetics graduate student talk of the academic year (\$2000 award)</b>
2016 - Pres.	<b>Canby Robinson Society Scholarship</b>
	▪ Full-tuition 4-year merit scholarship to Vanderbilt University School of Medicine
2013	<b>Order of the Grail-Valkyries Inductee</b>
	▪ Recognized for outstanding character and significant contribution to the intellectual climate at UNC
2013	<b>Phi Beta Kappa Inductee</b>

- 2013      **Phillips Ambassador Scholarship Awardee**  
▪ Selected to represent UNC as an ambassador to Asia (New Delhi, India) (\$5000 award)

## GRANTS

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- 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

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- 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 methodology for more sensitive CNV calling for use in pharmacogenomic association studies
- 2013            **Public and global health, School for International Training · All India Institute for Medical Science (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

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- 2019 - 2020    **Careers in Medicine Clinical Informatics Interest Group**  
*Co-Chair*  
▪ 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

	<b>Women in Training (WIT) MSTP Committee</b>
2019 - 2020	<i>Co-Chair</i>
	<ul style="list-style-type: none"> <li>▪ Co-founded, co-chaired, and member of an MSTP committee organized to support women physician-scientist trainees via community, service, and advocacy programming</li> </ul>
	<b>Mini-MSTP</b> (day-long scientific engagement program for local middle schoolers)
2019, 2021	<i>Volunteer</i>
	<b>MSTP Admissions Subcommittee</b>
2019 - Pres.	<i>Interviewer</i>
	<b>Medical Scientist Training Program (MSTP) Website Committee</b>
2018 - Pres.	<i>Member</i>
	<ul style="list-style-type: none"> <li>▪ Created Vanderbilt MSTP's website to recruit new students and increase collaboration and resource-sharing among current students</li> </ul>
	<b>MSTP Student Advisory Council</b>
2018 - 2020	<i>Class representative</i>
	<b>Vanderbilt School of Medicine Student Technology Committee</b>
2018 - 2019	<i>Chair</i>
2016 - Pres.	<i>Member</i>
	<ul style="list-style-type: none"> <li>▪ An official liaison between medical students, administration, and IT leaders regarding all technologies related to Vanderbilt School of Medicine</li> <li>▪ Helped transition EHRs (to Epic) and trained all medical students for competency in effective medical record use</li> <li>▪ Organized multiple programming workshops and community-wide technology talks with invited speakers</li> </ul>
	<b>Pre-medical and pre-MD/PhD student mentorship</b>
2016 - Pres.	<i>Mentor</i>
	<ul style="list-style-type: none"> <li>▪ Mentor to one UCSF Biological and Medical Informatics graduate student (advised rotation project)</li> <li>▪ Mentor to two Vanderbilt MD/PhD students for scientific presentation skills</li> <li>▪ Mentor to 14 undergraduate students through Student National Medical Association (SNMA) (1), Vanderbilt's Scientific Immersion &amp; 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"> <li>▪ Maggie Benson – current first-year MD/PhD student at Kansas University</li> <li>▪ Anirban Chakraborty - current postbaccalaureate at NIH NCI and 2022 MD/PhD applicant</li> <li>▪ Carly Stewart – current Vanderbilt University senior and 2022 MD/PhD applicant</li> </ul> </li> </ul>
	<b>Shade Tree Clinic</b> (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

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Feb 2022: Two-part workshop	<b>Manuscript writing for reproducible science in MS word and Latex</b>
	<ul style="list-style-type: none"> <li>▪ <a href="https://github.com/CapraLab/lab-manuscript-template">https://github.com/CapraLab/lab-manuscript-template</a></li> </ul>
Nov 2021: workshop	<b>Introduction to version control in Git</b>
	<ul style="list-style-type: none"> <li>▪ <a href="https://emcarthur.notion.site/Git-Version-Control-a1315177f4fc44c28bf3a54b5f3a3501">https://emcarthur.notion.site/Git-Version-Control-a1315177f4fc44c28bf3a54b5f3a3501</a></li> </ul>

Jun 2021: workshop	<b>Communicating science through interactive apps with Dash and Plotly in python</b>
May 2020: Five-part workshop	<ol style="list-style-type: none"> <li>1. <b>Introduction to computer programming &amp; R</b></li> <li>2. <b>Introduction to data manipulation</b></li> <li>3. <b>Introduction to plotting &amp; regression</b></li> <li>4. <b>Introduction to machine learning</b></li> <li>5. <b>Introduction to single-cell analysis</b> <ul style="list-style-type: none"> <li>▪ <a href="https://medschool.vanderbilt.edu/mstp/2020/05/28/mstp-programming-workshop/">https://medschool.vanderbilt.edu/mstp/2020/05/28/mstp-programming-workshop/</a></li> </ul> </li> </ol>
Aug 2018, 2019: Orientation session	<b>Clerkship student introduction to medical student technology (Epic eStar &amp; VPEN)</b> <ul style="list-style-type: none"> <li>▪ <a href="https://docs.google.com/document/d/1Piqrww0YecoBo4eG_mXmbvaeiNIzGxKxw01qcEmJRDg">https://docs.google.com/document/d/1Piqrww0YecoBo4eG_mXmbvaeiNIzGxKxw01qcEmJRDg</a></li> </ul>
Fall 2015: one-month course module	<b>UNC BIOL 528</b> <ul style="list-style-type: none"> <li>▪ TA, lecturer, and curriculum design for a one-month module in a systems biology course</li> </ul>

## PUBLICATIONS

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### Peer-reviewed journal

1. 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>
2. **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>
3. **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>
4. 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>
5. 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>
6. 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>
7. **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>
8. 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>

9. 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

10. 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.
11. **McArthur E**, Bastarache L, Capra JA. (2022). Linking rare and common disease vocabularies by mapping between the Human Phenotype Ontology and phecodes.
12. **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>
13. Quach WT, Le CH, Clark MG, **McArthur E**, Ancker J, Johnson KB, Gadd CS. (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.
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

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### 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. (Feb 2022). The contribution of the 3D genome to gene regulation, human evolution, and disease. *Dissertation defense*. Vanderbilt & UCSF.
8. (Jan 2022). 3D genome organization constrained human sequence evolution (Seminar talk). *Evolutionary genetics seminar*. UCSF & Gladstone Institutes.

9. (Dec 2021). Reconstructing the 3D genome folding of Neanderthals (Seminar talk). *Genetics interest group seminar*. Vanderbilt [Virtual].
10. INVITED: (Sept 2021). Common-variant dysregulation of Mendelian disease genes contributes to complex disease. *Center for Precision Medicine (Department of Biomedical Informatics)*. Vanderbilt [Virtual].
11. (Jun 2021). Reconstructing the 3D genome folding of Neanderthals (Lightening talk). *MSTP retreat*. Vanderbilt [Virtual].
12. (Mar 2021). Searching for answers to rare medical mysteries in a book with 69,768 pages (Flash talk). *3 Minute Thesis*. Vanderbilt [Virtual].
13. (Feb 2021). Applying deep learning models to infer 3D organization of Neanderthal genomes. *Evolutionary genetics seminar*. UCSF & Gladstone Institutes [Virtual].
14. (Oct 2020). Statistical methods for predicting gene dysregulation to solve cases of rare disease (Chalk talk). *MSTP seminar series*. Vanderbilt [Virtual].
15. (Oct 2020). Identifying gene dysregulation to solve undiagnosed rare disease cases (Seminar talk). *Genetics interest group seminar*. Vanderbilt [Virtual].
16. (Jun 2020). Predicting gene regulation from whole-genome sequencing to solve rare disease cases (Chalk talk). *MSTP retreat*. Vanderbilt [Virtual].
17. (Feb 2020). Predicting gene dysregulation to solve undiagnosed disease cases (Seminar talk). *Genetics interest group seminar*. Vanderbilt.
18. (Mar 2019). Personalized regulatory genomics: ideas and aims (Seminar talk). *Genetics interest group seminar*. Vanderbilt.
19. (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.
20. (Mar 2017). Mutations in Human Accelerated Regions Disrupt Cognition and Social Behavior (Journal club). *MSTP seminar series*. Vanderbilt.

### **Poster presentations**

\* denotes presenter

21. 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.
22. 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.
23. **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.
24. **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.
25. **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.
26. **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.
27. 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.

28. 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.
29. 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)*.

### *Science & medicine writing or applications*

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

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## PROFESSIONAL ORGANIZATIONS

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

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## 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

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## 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: slalom and giant slalom skier 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)