Karen A. Cranston

Independent Contractor
Research software development
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I am a computational biologist who is passionate about building computational infrastructure and communities to facilitate the adoption and practice of more efficient, reproducible science. My role in complex software projects has been as developer, architect, manager, and community engager.

Skill summary

Technical: extensive experience with python (web applications, libraries, scripting); experience with database (SQL) design / Implementation, API design / implementation, user interface design, Ansible deployment, Kubernetes, Jupyter notebooks / JupyterHub; previous experience with C / C++, Perl

Outreach / education: teaching interactive data science / programming workshops, developing course material, coordinating training programs, and evidence-based instructor training; teaching technical and analytical skills to researchers; organization of hackathons for building tools and communities

Management: project and financial management of scientific research grants, supervising technical staff across multiple projects, agile software development, board member overseeing open source / open science organizations

Research: phylogenetic methods, including gene tree inference, visualization, supertrees; statistical genetics, particularly Bayesian Markov Chain Monte Carlo

Education

PhD (2007) Statistical Genetics. Department of Medical Genetics, University of Alberta, Edmonton, AB, Canada.

B.Sc., Honours, First Class (1996), Genetics. University of Manitoba, Winnipeg, MB, Canada

Employment

Independent contractor
2018-present
Development of open source software / infrastructure to support academic research and teaching.
Current clients:

- Open Tree of Life (https://github.com/opentreeoflife) - python development (web application in Pyramids + PostgreSQL, scripting) and Ansible deployment

- Earth Lab, University of Colorado (https://github.com/earthlab) - support of data science instruction, including software for autograding in Jupyter notebooks, admin for JupyterHub on Kubernetes

Technical Advisor, Bioinformatics
2017-2018, Agriculture and Agri-food Canada, Ottawa, ON
Project manager and technical advisor in biological informatics group, leading development of software for biological specimen collection digitization and management.

Research Scientist
2015-2017, Department of Biology, Duke University, Durham, NC
Lead PI of Open Tree of Life (http://opentreeoflife.org) project that summarizes published phylogenetic trees into a synthetic tree of life; designing and writing software for storing, accessing and analyzing phylogeny data; leading hackathons and workshops; managing overall project, including software development.

Training Coordinator and Bioinformatics Project Manager
2010-2015, National Evolutionary Synthesis Center (NESCent), Durham, NC.
Management of informatics support for a broad range of evolutionary science projects; coordination of training programs in informatics and analytical skills for scientists; community building in open-source biodiversity and evolutionary informatics through hackathons and Google Summer of Code.

Postdoctoral Research Associate
2009-2010, Biodiversity Synthesis Center, The Field Museum, Chicago, IL
Interactive visualization of taxonomies and large phylogenies with Encylopedia of Life and iPlant Collaborative; summarizing large-scale gene tree incongruence across genomes

Postdoctoral Research Associate
2007-2009, Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ
PhyLoTA broswer, summarizing phylogenetic signal in GenBank; phylogenomic analyses of wild and domesticated rice species

Laboratory technician
1997-2002, Cangene Corporation, Winnipeg, MB.

Maintenance of cell cultures; design and implementation of protein chemistry assays; analytical method validation.

Technical writer 1996-1997, Integrated Engineering Software, Winnipeg, Canada, 1996-1997 Technical documentation and online help systems for engineering simulation software.

Publications

I have 19 peer-reviewed scientific papers, and 6 commentaries / preprints (noted with *). Only papers from 2013-present shown below. Full list at http://kcranston.github.io/research/.

Phylogenetic methods

McTavish, E. J., Drew, B. T., Redelings, B., & Cranston, K. A. (2017). How and Why to Build a Unified Tree of Life. BioEssays, 39(11). https://doi.org/10.1002/bies.201700114

Rees, J., & Cranston, K. (2017). Automated assembly of a reference taxonomy for phylogenetic data synthesis. Biodiversity Data Journal, 5, e12581. https://doi.org/10.3897/BDJ.5.e12581

Hinchliff, C. E., et al., (2015). Synthesis of phylogeny and taxonomy into a comprehensive tree of life. Proceedings of the National Academy of Sciences, 112(41), 12764-12769. http://dx.doi.org/10.1073/pnas.1423041112.

Software and databases

McTavish, E. J., et al., (2015). Phylesystem: a git-based data store for community curated phylogenetic estimates. Bioinformatics, btv276. http://dx.doi.org/10.1093/bioinformatics/btv276

Ksepka, D.T., et al., (2015) The Fossil Calibration Database, A New Resource for Divergence Dating. *Systematic Biology*. http://dx.doi.org/10.1093/sysbio/syv025

Stoltzfus, A., et al., (2013). Phylotastic! Making tree-of-life knowledge accessible, reusable and convenient. *BMC bioinformatics*, 14(1), 158. http://dx.doi.org/10.1186/1471-2105-14-158

Open science, Collaboration, and Education

Stoltzfus, A., Rosenberg, M., Lapp, H., Budd, A., Cranston, K., Pontelli, E., ... & Vos, R. A. (2017). Community and Code: Nine Lessons from Nine NESCent Hackathons. F1000Research, 6. http://dx.doi.org/10.12688/f1000research.11429.1

Wilson, G., et al., (2017). Good Enough Practices in Scientific Computing. PLoS Comput Biol 13(6): e1005510 https://doi.org/10.1371/journal.pcbi.1005510

Katz, D.S. et al., (2016). Report on the Second Workshop on Sustainable Software for Science: Practice and Experiences (WSSSPE2). Journal of Open Research Software. 4(1), p.e7. http://doi.org/10.5334/jors.85

Teal, T. K., et al., (2015) Data Carpentry: Workshops to Increase Data Literacy for Researchers. *International Journal of Digital Curation*. 10(1):135-143. http://dx.doi.org/10.2218/ijdc.v10i1.351

Cranston, K. A., et al., (2014) Best Practices for Data Sharing in Phylogenetic Research. *PLOS Currents Tree of Life*. Jun 19. Edition 1.
http://dx.doi.org/10.1371/currents.tol.bf01eff4a6b60ca4825c69293dc59645

* Katz, D. S., et al., (2014). Second Workshop on on Sustainable Software for Science: Practice and Experiences (WSSSPE2): Submission, Peer-Review and Sorting Process, and Results. arXiv preprint http://arxiv.org/abs/1411.3464.

* Vision, T., & Cranston, K. A. (2014) Open data for evolutionary synthesis: an introduction to the NESCent collection. Nature Scientific Data. http://dx.doi.org/10.1038/sdata.2014.30

* Cranston, K. A., et al., (2014): Simple rules for sharing phylogenetic data. figshare. http://dx.doi.org/10.6084/m9.figshare.997763

Rodrigo, A., et al., (2013). Science incubators: synthesis centers and their role in the research ecosystem. PloS biology, 11(1), e1001468. http://dx.doi.org/10.1371/journal.pbio.1001468

* Rees, J. A., et al., (2013): Response to GBIF request for consultation on data licenses. figshare. http://dx.doi.org/10.6084/m9.figshare.799766

* Cranston, K. A., et al., (2013): A grassroots approach to software sustainability. figshare. http://dx.doi.org/10.6084/m9.figshare.790739

Education and outreach

- NESCent Academy: coordinated series of hands-on summer workshops in Evolutionary Biology and Informatics, 2010-2014.
- Software / Data Carpentry: Executive Council Chair since 2018; instructor certification in 2013; Instructor Training certification in 2017; co-lead development of reproducible science curriculum
- Phylogenetics workshops: taught phylogenetic methods and software in workshops at Wuhan Institute of Virology, Fudan University, Kenyan Medical Research Centre, The Field Museum, and Bodega Bay Marine Laboratory
- Hackathons: co-organized four hackathons on evolutionary informatics through NESCent and Open Tree of Life; see https://informatics.nescent.org/wiki/Main_Page

Professional activities

- Governance chair, Code of Conduct Committee, The Carpentries (https://carpentries.org), 2020-present
- Chair, Executive Council: The Carpentries (https://carpentries.org), 2018-2019
- Board of Directors: Open Bioinformatics Foundation (https://open-bio.org/), 2015-2018
- Data Carpentry founding board member (http://datacarpentry.org), 2014-2017

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- Co-organizer: Reproducible science hackathon (https://github.com/Reproducible-Science-Curriculum/Reproducible-Science-Hackathon-Dec-08-2014), 2014
- Organization administrator for NESCent Google Summer of Code participation, 2011-2013
- Program committee, Workshop on Sustainable Software for Science: Practice and Experiences (WSSSPE), http://wssspe.researchcomputing.org.uk, 2014 and 2016
- Panelist, First Workshop on Sustainable Software for Science: Practice and Experiences (WSSSPE), http://wssspe.researchcomputing.org.uk, 2013
- Society of Systematic Biology council, 2012-2014
- Systematic Biology Editorial Board, 2011-present
- Leadership team, Informatics for Evolutionary Biology (iEvoBio, http://ievobio.org) conference, 2013-2016
- Leadership team, Hackathons, Interoperability and Phylogenetics (HIP) NESCent working group, 2011-2015
- Board of Directors: Phyloinformatics Research Foundation, 2010-2015
- Team lead, iPlant Tree Of Life working group on Tree Visualization, 2009-2012
- Co-organizer: Phyloinformatics VoCamp for development of an ontology for evolutionary biology, November 2009, Montpellier, France
- Invited participant: National Evolutionary Synthesis Center (NESCent) Hackathon on Evolutionary Database Interoperability, March 2009, Durham, NC, USA
- Invited participant: iPlant Collaborative (http://iplantcollaborative.org) Grand Challenge Workshop on Assembling the Tree of Life to Enable the Plant Sciences, November 2009, Biosphere 2, Oracle, AZ
- Journal referee for: Systematic Biology, Trends Ecology and Evolution, PeerJ, Nucleic Acids Research, Journal of Open Research Software, PLOS Computational Biology, Molecular Biology and Evolution. See Publons reviewer profile for recent activity.
- National Science Foundation panelist, 2011 - 2014