

Rishi De-Kayne, PhD | Evolutionary Biologist

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I am an evolutionary biologist using computational genomics to study the genetic basis of traits and evolutionary processes, including adaptation and speciation.

Academic Education and Employment:

04/2023-present	Postdoctoral Researcher Joanna Kelley Lab – University of California Santa Cruz, USA <u>Project:</u> Convergent adaptation to extreme environments in Poeciliid fishes.
02/2021-03/2023	SNSF Early Postdoc Mobility Fellow – Independent Postdoctoral Researcher Simon Martin Lab – University of Edinburgh, UK <u>Project:</u> The evolution and maintenance of wing-pattern supergenes in <i>Danaus</i> butterflies
10/2016-12/2020	PhD – Pass with honours - <i>insigni cum laude</i> University of Bern, Switzerland <u>Title:</u> The genetic basis of adaptation and speciation in the Swiss Alpine whitefish radiation <u>Project supervisors:</u> Prof. Ole Seehausen & Dr. Philine G. D. Feulner
10/2015-10/2016	MRes Tropical Forest Ecology – Pass with Distinction Imperial College London, UK <u>Thesis:</u> Endophytic fungal, not bacterial, communities differ between sympatric palm species <u>Project supervisor:</u> Prof. Vincent Savolainen
08/2015-09/2015	Field Technician Savolainen Lab – Imperial College London/Lord Howe Island
07/2014-09/2014	Undergraduate Research Opportunity Placement Student Bidartondo Lab – Kew Gardens
10/2012-10/2015	BSc Biology – 1 st Class Honours Imperial College London, UK <u>Thesis:</u> Resolving the phylogeny of the sharks using 20 transcriptomes <u>Project supervisor:</u> Prof. Vincent Savolainen

Publications:

I have **10 publications (7 as first author)** in internationally recognised peer reviewed journals with a total of **182 citations and an h-index of 8**. I currently have 4 papers in preparation, 1 in review, and 1 in press.

* = joint first authorship

11. **Rishi De-Kayne**, Rowan Schley, Julia MI Barth, Luke C Campillo, Catalina Chaparro-Pedraza et al. The role of ecology in adaptive radiation. Cold Spring Harbor Perspectives – Speciation – in press

10. José Cerca, Darko D Cotoras, Vanessa C Bieker, **Rishi De-Kayne**, Pablo Vargas, et al. (2023) Evolutionary genomics of oceanic island radiations. Trends in Ecology & Evolution <https://doi.org/10.1016/j.tree.2023.02.003>
9. **R De-Kayne**, OM Selz, D Marques, D Frei, O Seehausen, PGD Feulner (2022) Genomic architecture of adaptive radiation and hybridization in Alpine whitefish. Nature Communications 13:4479
8. K-W Kim*, **R De-Kayne***, IJ Gordon, KS Omufwoko, DJ Martins, SH Martin (2022) Stepwise evolution of a butterfly supergene via duplication and inversion. Philosophical Transactions of the Royal Society B 377:20210207
7. D Frei, **R De-Kayne**, OM Selz, O Seehausen, PGD Feulner (2022) Genomic variation from an extinct species is retained in the extant radiation following speciation reversal. Nature Ecology and Evolution 6:461-468
6. KS Singh*, **R De-Kayne***, KS Omufwoko, R ffrench-Constant, C Bass, D Martins, SH Martin (2022) Genome assembly of *Danaus chrysippus* and comparison with the Monarch. *Danaus plexippus*. G3: Genes, Genomes, Genetics 12:jkab449
5. **R De-Kayne***, D Frei*, R Greenway, SL Mendes, C Retel, PGD Feulner (2021) The future of next generation sequencing datasets: technological shifts provide opportunities but pose challenges for reproducibility and reusability. Molecular Ecology Resources 21:653–660
4. **R De-Kayne**, S Zoller, PGD Feulner (2020) A de novo chromosome-level genome assembly of *Coregonus* sp. “Balchen”: one representative of the Swiss Alpine whitefish radiation. Molecular Ecology Resources 20:1093–1109
3. **R De-Kayne**, PGD Feulner (2018) A European whitefish linkage map and its implications for understanding genome-wide synteny between salmonids following whole genome duplication. G3: Genes, Genomes, Genetics 8:3745-3755
2. OG Osborne*, **R De-Kayne***, MI Bidartondo, I Hutton, WJ Baker, CGN Turnbull, V Savolainen (2017) Arbuscular Mycorrhizal fungi promote coexistence and niche divergence of sympatric palm species on a remote oceanic island. New Phytologist 217:1254-1266
1. PGD Feulner, **R De-Kayne** (2017) Genome evolution, structural rearrangements and speciation. Journal of Evolutionary Biology 30:1488-1490

Personal Skills:

- Programming in R, Bash, and Python
- Version control using Git/GitHub
- Use of high-performance scientific computing clusters
- Genome assembly and annotation, genome-wide association studies, and population genetic analysis of large datasets
- Extensive molecular lab experience including sequencing library preparation and high molecular weight DNA extraction for genome sequencing and assembly
- Aquarium experience breeding and rearing fish larvae
- Fieldwork experience carrying out biodiversity studies and species-specific collections in multiple habitats across Australia, Malaysia, and South Africa

- Herbarium specimen preparation and organization

Grants, Prizes, and Awards:

- SDBE Young Investigator Travel Award 05/2023 – **\$3,500**
- SNSF Postdoc Mobility fellowship (18 months) – **CHF 78,000/\$78,170**
- SNSF Early Postdoc Mobility fellowship (18 months) – **CHF 73,150/\$73,310**
- Best student talk at PopGroup53 01/2020 – **1st Place - £250/\$280**
- Best conference poster at Biology20 02/2020 – **2nd Place - CHF 150/\$150**

Teaching Experience:

UC Santa Cruz - Undergraduate Genomics Training 05/2023

This course offered an extra-curricular comprehensive introduction to bioinformatics for BSc students, covering key concepts in bioinformatics and a typical bioinformatics project workflow from start to end. My contributions to this course included two teaching sessions spanning general bash scripting, read trimming, and read mapping.

OH-KNOW Bioinformatics Workshop 09/2021

I co-organised this four-day online workshop aimed at teaching the latest k-mer based tools for bioinformatics using high-performance computing platforms. The course was attended by 61 participants spanning 10 different time zones. On top of organising the logistics of the workshop I designed, wrote, and taught a ‘bash refresher’ course introducing participants to bash scripting for bioinformatics and the programming basics required for working on a computer cluster and assisted with all subsequent teaching topics.

University of Bern – Practical in Aquatic Ecology and Evolution 03-05/2018, 03-05/2019, and 04/2021

In this course, students designed their own practical investigation to study the ecology and evolution of fish in Swiss lakes. In both 2018 and 2019 these projects revolved around scale and fossil bones excavated from sediment cores collected from various Swiss lakes. I assisted during all stages of the practical and wrote and presented an ‘introduction to scientific writing’ guide to help the students through the writing process. I then graded student reports at the end of the practical. In 2021 I was invited to give a guest lecture on scientific writing.

University of Bern – Introduction to R for Beginners 09/2019

In this five-day course, second- and third-year BSc students received an introduction to R covering basic syntax, an outline of different data types, linear modelling, writing functions, and carrying out descriptive statistics in R. I assisted with the teaching of the course, helped students work through the R programming exercises throughout the course, and provided them with feedback on their code. I also graded the final homework exercises from the course.

Student mentorship:

Co-supervision of Frances Swift – University of Edinburgh MSc Evolutionary Genetics Student 12/2022-05/2023

In this project, Frances aimed to use high-quality Lepidoptera reference genome assemblies from the genome consortium DTOL to determine patterns of genetic diversity across this clade using both

SNPs and structural variation (indels). My supervision spanned all stages of the project including early project planning and developing the goals of the project through to the analysis and write up.

Co-supervision of Sam Mitchell – University of Edinburgh MSc Evolutionary Genetics Student

05-08/2022

This genomics project focussed on understanding the consequences of a strong population bottleneck population using whole-genome sequences collected for African monarch butterflies on the remote island of St. Helena. My supervision spanned all stages of the project from project planning to practical bioinformatics advice and mentorship throughout the analysis stages.

Co-supervision of Michelé Leemann – University of Bern MSc Bioinformatics Student

07-09/2021
This short project aimed to use existing sequencing data for Alpine whitefish to assemble and annotate the Alpine whitefish mitochondrial genome. My supervision involved setting up Michelé to work on the computer cluster and discussing suitable approaches to carry out the mitochondrial genome assembly, annotation, and subsequent analyses of the mitochondrial genome with her.

Co-supervision of Romano Josi – University of Bern BSc Summer Research Student

06-07/2017
This research project used diagnostic microsatellites to determine the pedigree of lab-reared whitefish larvae and test for the presence of gynogenetic haploid individuals. My supervision involved training Romano in molecular lab techniques including DNA extraction, PCR, and microsatellite sequencing and analysis.

Outreach and science communication:

I founded and manage the PhDetails Blog: phdetails.blogspot.com - featuring interviews with biology PhD students from around the world to promote the diversity of students in biology. Over 100 PhD students have been featured to date. I also write broader interest articles on the PhDetails blog and have contributed to The Molecular Ecologist Blog: molecular ecologist.com.

Contributions to conferences and seminars (as presenting author):

27. Evolutionary dynamics of a modular supergene in the African monarch butterfly (*Danaus chrysippus*). SMBE 2023, Italy, 07/2023 - **Oral Presentation**

26. The genomic basis of adaptation and speciation in the Alpine whitefish radiation. *Betancur FishLab Group Seminar*, University of Oklahoma, USA 09/2022 - **Invited Seminar**

25. Adaptation across scales – from supergenes to adaptive radiations. *MVZ Seminar*, UC Berkeley, USA 05/2022 - **Invited Seminar**

24. Stepwise supergene evolution in a butterfly: multiple duplications preceded multiple inversions. *Bay Area Population Genomics meeting XIX*, Stanford University, USA 04/2022 - **Oral Presentation**

23. Adaptation across scales – from supergenes to adaptive radiations. *CPB Seminar*, UC Davis, USA 03/2022 - **Invited Seminar**

22. The genomic basis of adaptation and speciation in the Alpine whitefish radiation. *Next Generation Genomics MSc Course*, University of Edinburgh, UK 02/2022 - **Guest Lecture**

21. The evolution of complex wing-pattern supergenes in *Danaus* butterflies. *Lepinar Seminar Series*, Online 02/22 - **Invited Seminar**
20. Stepwise evolution of a butterfly supergene via duplication and inversion. *55nd Population Genetics Group Meeting (PopGroup55)*, Norwich, UK (online) 01/2022- **Oral presentation**
19. A mixed genetic architecture and gene flow facilitate adaptive radiation. *Understanding 'reproductive isolation'? ESEB satellite symposium*, Online 09/2021 - **Oral presentation**
18. The genomic basis of adaptation and speciation in the Alpine whitefish radiation. *COMgen Seminar Series*, University of Nottingham 02/2021 - **Invited Seminar**
17. Genomic insights into the evolution of the Alpine whitefish radiation. *CIGENE Seminar Series*, Norwegian University of Life Sciences 02/2021 - **Invited Seminar**
16. Dissecting the evolutionary mechanisms driving Alpine whitefish diversification, *54nd Population Genetics Group Meeting (PopGroup54)*, Liverpool, UK (online) 01/2021 - **Oral presentation**
15. From palms to whitefish – understanding the genetic basis of adaptation and speciation. *Eawag Aquatic Ecology & Macroevolution Seminar Series 2020*, Kastanienbaum, Switzerland 04/2020 - **Seminar**
14. Towards understanding adaptation and speciation in the Swiss Alpine whitefish radiation. *Biology20 Conference*, Freiburg, Switzerland 02/2020 – **Poster presentation**
13. Towards understanding adaptation and speciation in the Swiss Alpine whitefish radiation. *53rd Population Genetics Group Meeting (PopGroup53)*. Leicester, UK 01/2020 - **Oral presentation**
12. A de novo chromosome-level genome assembly of *Coregonus steinmanni* – towards understanding adaptation and speciation in the Swiss Alpine whitefish radiation. *4th International Conference on Integrative Salmonid Biology (ICISB2019)*. Edinburgh, UK 11/2019 - **Oral presentation**
11. Genomics of adaptation in the Alpine whitefish radiation - genomic resources to study adaptation and speciation. *2019 Congress of the European Society for Evolutionary Biology (ESEB2019)*. Turku, Finland 08/2019 - **Poster presentation**
10. Assembling the genome of *Coregonus steinmanni* – unlocking the secrets of the Swiss Alpine whitefish radiation. *EAWAG Fish Ecology and Evolution Symposium 2019*. Kastanienbaum, Switzerland 07/2019 - **Oral presentation**
9. Towards the understanding of adaptation and speciation in the Swiss Alpine whitefish radiation. *Biology19 Conference*. Zurich, Switzerland 02/2019 - **Oral presentation**
8. Towards the understanding of adaptation and speciation in the Swiss Alpine whitefish radiation. *52nd Population Genetics Group Meeting (PopGroup52)*. Oxford, UK 01/2019 - **Oral presentation**
7. The Swiss Alpine whitefish radiation – first steps in understanding the genomic basis of adaptation and speciation. *Programming for Evolutionary Biology (PEB) Conference 2018*. Buttermere, UK 09/2018 - **Oral presentation**

6. The Swiss Alpine whitefish radiation – genomic resources to study adaptation and speciation. *2018 Congress of the European Society for Evolutionary Biology (ESEB2018)*. Montpellier, France 08/2018 - **Poster presentation**
5. Producing genomic resources for pre-Alpine whitefish and what they can tell us about genome evolution. *EAWAG Fish Ecology and Evolution Symposium 2018*. Kastanienbaum, Switzerland 06/2018 - **Oral presentation**
4. Constructing a linkage map for Swiss Alpine whitefish. *Biology18 Conference*. Neuchatel, Switzerland 02/2018 - **Poster presentation**
3. Constructing a linkage map for Swiss Alpine whitefish. *51st Population Genetics Group Meeting (PopGroup51)*. Bristol, UK 01/2018 - **Poster presentation**
2. Investigating the genomic basis of adaptation and speciation in the Alpine whitefish radiation. *EAWAG Fish Ecology and Evolution symposium 2017*. Kastanienbaum, Switzerland 06/2017 - **Oral presentation**
1. The genomic basis of adaptation and speciation in the Swiss Alpine whitefish radiation. *Biology17 Conference*. Bern, Switzerland 01/2017 **Poster presentation**

Academic Service:

- Scientific manuscript reviewing for: Molecular Biology and Evolution, Genome Biology and Evolution, G3, Molecular Ecology, Molecular Ecology Resources, Journal of Evolutionary Biology, and Philosophical Transactions of the Royal Society B.
- Scientific grant reviewing for: Great Lakes Fisheries Commission.
- PhD and Postdoc representative (Unteren Mittelbau) on the hiring committee for a new Professor for Theoretical Ecology and Evolution at the University of Bern 2019.
- Postdoc representative and member of the Inclusion, Diversity, Equity, & Action (IDEA) committee at UC Santa Cruz.

References (available upon request):

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