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, with the goal of solving real-world problems.

Academic education and employment:

08/2021-present	**SNSF Early Postdoc Mobility Fellow – Independent Postdoctoral Researcher** Martin Lab – University of Edinburgh, UK Project: The evolution and maintenance of wing-pattern supergenes in *Danaus* butterflies
02/2021-07/2021	**Postdoctoral Research Associate** Martin Lab – University of Edinburgh, UK
10/2016-12/2020	**PhD** – Pass with honours - *insigni cum laude* University of Bern, Switzerland Title: The genetic basis of adaptation and speciation in the Swiss Alpine whitefish radiation Project supervisors: Prof. Ole Seehausen & Dr. Philine G. D. Feulner
10/2015-10/2016	**MRes Tropical Forest Ecology** – Pass with Distinction Imperial College London, UK Thesis: Endophytic fungal, not bacterial, communities differ between sympatric palm species Project supervisor: 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** – 1st Class Honours Imperial College London, UK Thesis: Resolving the phylogeny of the sharks using 20 transcriptomes Project supervisor: Prof. Vincent Savolainen

Publications:

I have **9 publications (7/9 as first author)** accepted for publication in internationally recognised peer reviewed journals with a total of **130 citations and an h-index of 6**.
* = joint first authorship

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: proficient in R and Bash, experience with Python and using Git.
- Genome assembly and annotation, genome-wide association studies, and population genetic analysis of large datasets, all using high performance scientific computing clusters.
- Molecular lab: extensive molecular lab experience including sequencing library preparation and high molecular weight DNA extraction for genome sequencing and assembly.
- Wet lab: Aquarium experience breeding and rearing salmonid larvae.
- Fieldwork experience: biodiversity studies and species-specific collections in multiple habitats across Australia, Malaysia, and South Africa.
- Herbarium specimen preparation and organization.

Grants, prizes, and awards:

- SNSF Postdoc Mobility fellowship (18 months - to start 2023) **– CHF 78,000/£68,700**
- SNSF Early Postdoc Mobility fellowship (18 months) **– CHF 73,150/£64,500**
- Best student talk at PopGroup53 01/2020 – **1st Place - CHF 316/£250**
- Best student poster at PopGroup51 01/2018 **– 2nd Place - CHF 190/£150**
- Best conference poster at Biology20 02/2020 – **2nd Place - CHF 150/£120**

Teaching Experience:

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. 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 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 advising her on the most suitable approaches to carry out the mitochondrial genome assembly, annotation, and subsequent analyses of the mitochondrial genome.

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: molecularecologist.com.

Contributions to conferences and seminars (as presenting author):

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

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

22. 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.

References (available upon request):

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