Dr Christopher D. Dean

Postdoctoral Research Fellow
Department of Earth Sciences
University College London, London, UK

Email: christopherdaviddean@gmail.com | **ORCID:** 0000-0001-6471-6903 | **GitHub:** ChristopherDavidDean

Research summary

Palaeobiologist examining the influence of data incompleteness on perceptions of the geological past by integrating interdisciplinary tools and sources of information, such as occupancy modelling, Earth system modelling, and fossil occurrence datasets.

Fossil record bias | **Macroecology and biodiversity** | **R programming** | **Data Quality**

Education

PhD in Palaeobiology (2013–2018)
Imperial College London, London, UK
Research advisors: Prof. Peter A. Allison & Prof. Gary Hampson Thesis title:

MSci in Geology (2009–2013)
Imperial College London, London, UK
Research advisor: Prof. Philip D. Mannion Thesis title:

Employment

Postdoctoral Research Fellow in Palaeobiology (2022–current)\ Department of Earth Sciences, University College London, London, UK\ - Royal Society funded position assessing the relative roles of climate and human impacts on Cenozoic tetrapod biodiversity. - Research examining how occupancy modelling can be applied to deep-time and Holocene occurrence data, in aid of conservation palaeobiology.

Collections Move Team Leader (2021–2022)\ Natural History Museum, London, UK\ - Managing a team of curatorial assistants to complete key tasks for the NHM@Harwell programme, including data collection, maintenance, cleansing and the curation, digitisation and packaging of museum specimens. - Responsible for the development, management and direction of Sectional Documentation workstream and weight data pilot. Co-developed and refined data collection strategies and workflows for various project phases. - Increased skills in project and people management, stakeholder communication and negotiation, and delivering projects to tight deadlines.

Curatorial Assistant (2020–2021)\ Natural History Museum, London, UK\ - Leading the Sectional Documentation project, working as part of the team collecting volumetric and collections specific data for the NHM@Harwell project. - Specific tasks include liaising between departments and key stakeholders to deliver reports and data analysis; data collection, maintenance and refinement of the Earth Sciences dataset; developing workflows and project design for pilots. - Increased skills in data management, curatorial practises, registration of specimens and general collections management.

Postdoctoral Research Fellow (2019–2020)\ Department of Geography, Earth and Environmental Sciences, University of Birmingham, Birmingham, UK\ - In charge of creation, development and implementation of personal research project for duration of contract, focused on applying Occupancy Modelling to the fossil record as part of ERC grant TERRA. - Research examined how the occupancy and detection of North American dinosaur fauna vary through the late Cretaceous, to better constrain understanding of diversity dynamics prior to the K/Pg mass extinction.

Scientific Associate (2018–2019)\ Natural History Museum, London, UK\ - Voluntary project working on the stratigraphy, taxonomy and anatomy of Iguanodont material held within the museum collections. - Involved anatomical description of fossil vertebrate material, registration of specimens and assisting with collection curation.

Undergraduate Office Administrator (2018–2019)\ Earth Science and Engineering Department, Imperial College London, London, UK\ - Acted as general administrative support to the Earth Science and Engineering department as well as Scientific Communications Assistant. - Role included liaising between academic and support staff to ensure smooth running of undergraduate affairs, as well as acting as the forward face of the department for student queries. - Specific tasks included curation of department geological collections, organisation of undergraduate interviews, creation of posters highlighting research within the department, assistance with timetabling/module organisation/exam planning.

Geologist (Paid Internship) (2015–2015)\ Getech, Leeds, UK\ - Worked as part of palaeography team to produce palaeobathymetric maps of the Cretaceous Western Interior Seaway for selected timeslices. - Developed QC system for interpreting paleobathymetry, which was adopted into Getech's mapping pipeline. - Finalised maps were incorporated into Getech globe product palaeogeography and utilised for sensitivity testing of seaway wide anoxia and carbon sequestration.

Graduate Teaching Assistant (2012–2018)\ Department of Earth Science and Engineering, Imperial College London, London, UK\

Publications

Peer-reviewed publications

1. Jones, L. A., Gearty, W., Allen, B. J., Eichenseer, K., **Dean, C. D.,**, Galván, S., Kouvari, M., Godoy, P. L., Nicholl, C., Buffan, L., Dillon, E. M., Flannery-Sutherland, J. T., Chiarenza, A. A. 2023. palaeoverse: A community-driven R package to support palaeobiological analysis. *Methods in Ecology and Evolution* 14 (9), 2205–2215. DOI:**10.1111/2041-210X.14099**.
2. Collins, D. S., Avdis, A., Wells, M. H., **Dean, C. D.**, Mitchell, A. J., Allison, P. A., Johnson, H. D., Hampson, G. J., Hill, J., Piggott, M. D., 2021, Prediction of shoreline–shelf depositional process regimes guided by palaeotidal modelling. *Earth Science Reviews*, 223, 103827.
3. Maidment, S. C. R., **Dean, C. D.**, Mansergh, R. I., Butler, R. J. 2021. Deep-time Biodiversity Patterns and the Dinosaurian Fossil Record of the Late Cretaceous Western Interior, North America. *Proceedings of the Royal Society B: Biological Sciences*, 288: 20210692.
4. Jones, L. A., **Dean, C. D.**, Mannion, P. D., Farnsworth, A., Allison, P. A., 2021. Spatial sampling heterogeneity limits the detectability of deep time latitudinal biodiversity gradients. *Proceedings of the Royal Society B* 288 (1945), 20202762. DOI:**10.1098/rspb.2020.2762**.
5. **Dean, C. D.**, Chiarenza, A. A., Susannah C. R. Maidment 2020. Formation binning: a new method for increased temporal resolution in regional studies, applied to the Late Cretaceous dinosaur fossil record of North America. *Palaeontology*, 63(6), 881–901.

6. **Dean, C. D.**, Collins, D. S., van Cappelle, M., Avdis, A. Hampson, H. J., 2019. Regional-scale paleobathymetry controlled location, but not magnitude, of tidal dynamics in the Late Cretaceous Western Interior Seaway, USA. *Geology*. 47, 1083–1087.
7. **Dean, C. D.**, Allison, P.A., Hampson, G. J., Hill, J., 2019. Aragonite bias exhibits systematic spatial variation in the Late Cretaceous Western Interior Seaway, North America. *Paleobiology*. 45(4), 571–579.
8. **Dean, C. D.**, Mannion, P. D., Butler, R. J., 2016. Preservational bias controls the fossil record of pterosaurs. *Palaeontology*. 59(2), 225–24.
9. **Dean, C. D.**, Sutton, M. D., Siveter, D. J., & Siveter, D. J., 2015. A novel respiratory architecture in the Silurian mollusc Acaenoplax. *Palaeontology*, 58(5), 839–847.

Pre-prints, In Press and In Review publications

1. **Dean, C. D.**, Chiarenza, A. A., Doser, J. W., Farnsworth, A., Jones, L. A., Lyster, S. J., Outhwaite, C. L., Valdes, P. J., Butler, R. J., Mannion, P. D. 2024. Occupancy modelling reveals sampling heterogeneity shapes interpretations of the end-Cretaceous dinosaur fossil record. In review at *Current Biology*.
2. **Dean, C. D.**, Thompson, J. R. 2024. Museum 'dark data' illuminates the biogeographic and evolutionary history of fossil groups. In review at *Nature Ecology & Evolution*.
3. Thompson, J. R., **Dean, C. D.**, Ford, M., Ewin, T. A. M. 2024. Taphonomic controls on a multi-element skeleton. In press at *Palaeontology*. Preprint DOI: **10.31223/X5GQ5W**
4. Jones, L. A., **Dean, C. D.**, Gearty, W., Allen, B. 2024. rmacrostrat: An R package for accessing and retrieving data from the Macrostrat geological database. In press at *Geosphere*. Preprint DOI: **10.31223/X5XX37**
5. Dunne, E. M., Chattopadhyay, D., **Dean, C. D.**, Dillon, E. M., Godoy, P. L., Smith, J. A., Raya, N. B. 2024. Data equity in paleobiology: Progress, challenges, and future outlook. In press at *Paleobiology*.
6. Hatfield, J. H., Davis, K. E., Allen, B. J., Carroll, T., **Dean, C. D.**, Deng, S., Gordon, J. D., Guillerme, T., Hansford, J. P., Cuthill, J. F. H., Mannion, P. D., Payne, A. R. D., Martins, I. S., Shipley, A., Thomas, C. D., Thompson, J. B., Woods, L. 2024. The greatest extinction event in 66 million years? In review at *Nature Reviews Biodiversity*. Preprint DOI: **10.32942/X2C035**

Published software

1. **palaeoverse**: A community-driven R package to support data preparation and exploration for palaeobiological analyses.

CRAN: **https://cran.r-project.org/web/packages/palaeoverse/**. GitHub: **https://github.com/palaeoverse/palaeoverse**.

1. **rmacrostrat:** An R package to fetch geologic data from the Macrostrat database.

CRAN: **https://cran.r-project.org/web/packages/rmacrostrat/**. GitHub: **https://github.com/palaeoverse/rmacrostrat**.

Academic awards and grants

rmacrostrat R package development workshop (2024)\ Scientific Exchange grant from the Swiss National Science Fund, Switzerland\ Role: co-applicant, value: 5800 CHF

R for Palaeobiologists: Workshop and Hackathon (2023)\ Meeting support grant from The Paleontological Society, USA\ Role: co-applicant, value: 1000 USD

R for Palaeobiologists: Workshop and Hackathon (2022)\ Grant-in-Aid from The Palaeontological Association, UK\ Role: co-applicant, value: 2000 GBP

PalaeoParty! (2021)\ Outreach and Education grant from The Paleontological Society, USA\ Role: applicant, value: 1673 USD

Green Man Festival Outreach Stall (2019)\ Engagement Grant from The Palaeontological Association, UK\ Role: applicant, value: 2537 GBP

Palaeontological Association Travel Grant\ Grant for invited talk at EGU from The Palaeontological Association, UK\ Role: recipient, value: 500 GBP

Invited presentations

Computational Palaeobiology Mini-Symposium (2024)\ Department of Biosystems Science and Engineering, ETH Zürich, Basel, Switzerland\ Oral: Mind the uncertainty: Global Plate Model choice impacts deep-time palaeobiological studies\

Standon Calling Music Festival (2022)\ Agile Rabbit Talks, UK\ Oral: Do dinosaur fossils lie?

Science Communication Workshop (2022)\ Department of Earth Science and Engineering, Imperial College London, UK\ Oral: Three principles to guide your science communication

MAPAS Lab Seminar (2021)\ University of Vigo, Spain\ Oral: How does temporal bias influence the vertebrate fossil record?

TaphCon 2020 Keynote Talk (2020)\ Online conference\ Oral: Unknown unknowns & known no-nos; an exploration of preservational biases and how to reduce their impact on the known fossil record

School of Geoscience Seminar (2020)\ University of Edinburgh, UK\ Oral: How does temporal bias influence the vertebrate fossil record?

Birmingham Earth Sciences Seminar (2020)\ University of Birmingham, UK\ Oral: Resolving spatial and temporal biases in the fossil record

EGU General Assembly (2018)\ Vienna, Austria\ Oral: Are the molluscs really missing? Modelling the spatial impacts of aragonite bias

Conference presentations

12th North American Paleontological Convention (2024) Ann Arbor, Michigan, USA\ Oral: Occupancy modelling reveals sampling biases drive the observed end–Cretaceous dinosaur decline\ Poster: palaeoverse: A community-driven R package to support palaeobiological analyses\ Poster: rmacrostrat: An R package for retrieving data from the Macrostrat geological database

200 Years of Dinosaurs: New Perspectives on an Ancient World (2024)\ Natural History Museum, London, UK\ Oral: Occupancy modelling reveals detection probability drives the perceived late Cretaceous dinosaur record\

Conservation Paleobiology Network: Annual Meeting 2023 (2023)\ Gainesville, Florida, USA\ Poster: Detecting Genuine Versus Pseudo–Absence in The Fossil Record: Applications of Occupancy Modelling For Conservation Palaeobiology

Geological Society of America: Annual Meeting 2022 (2022)\ Denver, Colorado, USA\ Poster: Taphonomic controls on the Palaeozoic echinoid fossi record

Symposium of Vertebrate Palaeontology and Comparative Anatomy 2022 (2022)\ London, UK\ Oral: Occupancy modelling of dinosaurs indicates no decline of dinosaurs in the late Cretaceous of North America

The Palaeontological Association: Annual Meeting 2019 (2019)\ Valencia, Spain\ Oral: Poor spatial sampling coverage obscures our understanding of the latitudinal biodiversity gradient in deep time Poster: Occupancy modelling of dinosaurs within the Late Cretaceous of North America

1st Palaeontological Virtual Congress (2018)\ Presentation: Binning by formation: a new method for increase temporal resolution in regional studies

Progressive Palaeontology: Annual Meeting 2017 (2017)\ Leicester, UK\ Oral: No Missing Molluscs? Investigating Spatial Aragonite Bias in Epicontinental Seas

Geological Society of America: Annual Meeting 2016 (2016)\ Denver, Colorado, USA\ Oral: Spatial Aragonite Bias in the Western Interior Seaway

Society for Vertebrate Paleontology: Annual Meeting 2014 (2014)\ Berlin, Germany\ Oral: The completeness of the fossil record of pterosaurs: implications for their diversity and evolution through the Mesozoic

Outreach, Public Engagement and Media

Imperial College Science Communication Workshop (2023)\ Developed, organised and ran a one day workshop introducing fourth year geology students to the basics of science communication, including talks from a variety of science communicators.

Standon Calling Festival Talk (2022)\ Invited talk on fossil record bias and dinosaurs at Standon Calling festival as part of the â€˜Agile Rabbitâ€™ science talks lineup.

Imperial College Science Communication seminar (2022)\ Invited talk on how to communicate science to a general audience.

PalaeoParty! Livestream/Podcast (2020-2023)\ Co-creator/host of PalaeoParty!, an interactive, bi-weekly podcast streamed live on Twitch. Each season consists of six episodes.

BBC Royal Institute Christmas Lectures (2020)\ Invited guest on the 1st 2020 Royal Institute Christmas Science Lecture (Engine Earth), discussing bias in the fossil record through playing a battleship inspired game with a remote child audience.

Iâ€™m a Scientist, Get Me Out of Here! (2020)\ Took part in 3 weeks of online live chats with primary and secondary school students discussing research and answering questions.

Dino Nerds for Black Lives Livestream (2020)\ Guest on a palaeontology themed charity livestream raising funds for BLM affiliated charities.

Fossil Fact or Fiction? Stall, Green Man Festival (2019)\ Designed, organised and implemented outreach event at Green Man festival (Brecon Beacons, Wales) following successful grant funding. Led a team of seven other scientists discussing fossil record bias with visitors of all ages. Received upwards of 1500 visitors over the course of the weekend.

Ardingly Dinosaur Dig (2014-2016)\ Helper at citizen science dinosaur dig site. Included outreach events and assistance with public digs aimed at adults and children.

Soho Radio (2015)\ Invited guest discussing science news and personal research.

CBBC Newsround (2014)\ Appeared on CBBC program â€˜Newsroundâ€™ talking about the Ardingly Dinosaur Dig.

Fieldwork experience

El Qoseir, Egypt (2023)\ Modern and fossil (Last Interglacial) coral reef data collection via line-intercept transects

Professional development

Teaching and pastoral care

R for Paleobiologists: Getting Started with the palaeoverse R Package (2024)\ 12th North American Paleontological Convention, Ann Arbor, Michigan, USA Organised and ran a workshop on using R in Palaeobiology

R for Palaeobiologists: Workshop and Hackathon (2023)\ University College London, UK
Organised and ran a workshop on using R in Palaeobiology

Graduate Teaching Assistant (2016–2021)
Imperial College London, London, UK

- Palaeobiology I
- Palaeobiology II
- Dorset (UK) geology field course
- Almería (Spain) geology field course

Professional service and outreach

Palaeontological Association meeting (2017)
Imperial College London, London, UK
Co-organised and ran the annual meeting of the Palaeontological Association

Peer-review experience

Reviewed manuscripts for the following journals:

Nature Ecology and Evolution\ Nature Communications\ Biology Letters\ Palaeontology\ Paleobiology\ Papers in Palaeontology\ The Journal of Human Evolution\ The Anatomical Record\ Palaeontological Research\ Historical Biology\ Acta Palaeontological Polonica

Skills

R programming\ Advanced proficiency in data analysis, data visualization, writing functions and developing packages

Geocomputation\
Proficient in spatial analysis and the use of R spatial packages (e.g. raster, terra, sf, sp)

Lab. work\ Acetic acid laboratoy preparation of microvertebrate specimens High resolution tomograp

Karate\ First degree black belt for Renshinkan Karate (Shorinjiru style)

Memberships

Member of the Palaeontological Association (2017–present)\ Member of the Paleontological Society (2023–present)\ Member of the Conservation Paleobiology Network (2019–present)\

Referee details available upon request.