

João Pedro Valente de Oliveira Coelho | Curriculum Vitae

DPhil candidate, University of Oxford

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Current research interests: geospatial palaeontology, paleoecology, machine learning applications to bioanthropology, geometric morphometrics, hominin origins, evolution of bipedalism

Education and Training

- 2017-2023** **DPhil in Evolutionary Anthropology** – University of Oxford (United Kingdom)
Project: Automated geospatial search for hominin ancestors in Mozambique: a computer vision and machine learning approach
Supervisors: Prof. Robert L. Anemone (The University of North Carolina at Greensboro) and Dr. Susana Carvalho (University of Oxford)
- 2013-2015** **Master's Degree in Human Evolution and Biology** – Universidade de Coimbra (Portugal)
Dissertation: Unwarping Heated Bones: A Quantitative Analysis of Heat-induced Skeletal Deformations Using 3D Geometric Morphometrics
Supervisors: Dr. David Gonçalves and Prof. Eugénia Cunha (Universidade de Coimbra)
- 2012-2013** **Erasmus programme** – Háskóli Íslands (Iceland)
- 2010-2013** **Graduation in Anthropology** – Universidade de Coimbra (Portugal)

Honours and Awards

- 2020/21** **The Boise Trust Fund Research Award** – Department of Zoology, University of Oxford
2020 **Best Poster Prize** - Primate Society of Great Britain - Winter meeting 2020
2018 **The Boise Trust Fund Research Award** – Department of Zoology, University of Oxford
2017 **The Boise Trust Fund Research Award** – Department of Zoology, University of Oxford
2017-2021 **PhD Scholarship SFRH/BD/122306/2016** – *Fundação para a Ciência e a Tecnologia*, Portugal
2014 **Finalist: "Best Business Plan" for Osteomics** – *Arrisca C* 2014, Universidade de Coimbra
2013-2014 **Grant recipient for a biotech startup** – *Passaporte para o Empreendedorismo*, IAPMEI
2013 **Finalist: "Best Business Idea" for Osteomics** – *Arrisca C* 2013, Universidade de Coimbra
2012-2013 **Scholarship: LLP/Erasmus Programme** – Háskóli Íslands (University of Iceland)

Publications

- d'Oliveira Coelho J**, Anemone RL, Bobe R, Carvalho S (Submitted to Science Advances). Combined fossil and molecular data suggest Pan-Homo divergence over 8 Million Years ago.
- Curate F, Navega D, Cunha E, **d'Oliveira Coelho J**. 2022. DXAGE 2.0 — adult age at death estimation using bone loss in the proximal femur and the second metacarpal. *International Journal of Legal Medicine*. DOI:10.1007/s00414-022-02840-y
- Bobe R, **d'Oliveira Coelho J**, Carvalho S, Leakey M. 2022. Early Hominins and Paleoecology of the Koobi Fora Formation, Lake Turkana Basin, Kenya. In: Reynolds, SC, Bobe, R. (Eds.), *African Paleoecology and Human Evolution*. Cambridge University Press, Cambridge: 311–331. DOI:10.1017/9781139696470.026
- Bobe R, Aldeias V, Alemseged Z, Archer W, Aumaître G, Bamford MK, Biro D, Bourlès DL, Braun DR, Capelli C, **d'Oliveira Coelho J**, Habermann JM, Head JJ, Keddadouche K, Kupczik K, Lebatard A-E, Lüdecke T, Macôa A, Martínez FI, Mathe J, Mendes C, Paulo LM, Pinto M, Püschel TA, Regala FT, Sier M, Ferreira da Silva MJ, Stalmans M, Carvalho S. 2021. The First Miocene Fossils from Coastal Woodlands in the Southern East African Rift. Available at SSRN: <http://dx.doi.org/10.2139/ssrn.3941489>
- d'Oliveira Coelho J**, Anemone RL, Carvalho S. 2021. Unsupervised learning of satellite images for enhancing fossil site discovery at Gorongosa, Mozambique. *PeerJ* 9:e11573 DOI 10.7717/peerj.11573

- Curate F, **d'Oliveira Coelho J**, Silva AM. 2021. CalcTalus: an online decision support system for the estimation of sex with the calcaneus and talus. *Archaeological and Anthropological Sciences*. 13:74.
- d'Oliveira Coelho J**, Curate F, Navega D. 2020. Chapter 5.1 - Osteomics: Decision support systems for forensic anthropologists. In: Obertová, Z., Stewart, A., Cattaneo, C. (Eds.), *Statistics and Probability in Forensic Anthropology*. Academic Press: 259–273.
- Rodrigues H, Ramos R, Fagundes L, Galego O, Navega D, **d'Oliveira Coelho J**, Alves FC, Cunha E. 2020. Mastoid, middle ear and inner ear analysis in CT scan – a possible contribution for the identification of remains. *Medicine, Science and the Law*, 60:102–111.
- d'Oliveira Coelho J**, Curate F. 2019. CADOES: An interactive machine-learning approach for sex estimation with the pelvis. *Forensic Science International*, 302:109873.
- Ammer S, **d'Oliveira Coelho J**, Cunha E. 2019. Outline Shape Analysis on the Trochlear Constriction and Olecranon Fossa of the Humerus: Insights for Sex Estimation and a New Computational Tool. *Journal of Forensic Sciences*, 64(6):1788–1795.
- Vilas-Boas D, Wasterlain SN, **d'Oliveira Coelho J**, Navega D, Gonçalves D. 2019. SPINNE: An app for human vertebral height estimation based on artificial neural networks. *Forensic Science International*, 298:121–130.
- Ferreira MT, Coelho C, **d'Oliveira Coelho J**, Navega D, Wasterlain SN. 2018. New data about sex and age-at-death based on the postcranial skeleton of the enslaved adult Africans found at Lagos, Portugal (15th-17th centuries). *Cadernos do GEEvH*, 7(1):7–16.
- Silva A, Tomé T, Cunha C, **d'Oliveira Coelho J**, Valera A, Filipe V, Scott GR. 2018. Unilateral absence of mandibular condyle in a Bronze Age male skeleton from Portugal. *International Journal of Paleopathology*, 22: 168–172.
- Scott GR, Pilloud M, Navega D, **d'Oliveira Coelho J**, Cunha E, Irish J. 2018. rASUDAS: A New Web-Based Application for Estimating Ancestry from Tooth Morphology. *Forensic Anthropology*, 1:18–31.
- Gonçalves D, **d'Oliveira Coelho J**, Amarante A, Makhoul C, Oliveira-Santos I, Navega D, Cunha E. 2018. Dead weight: Validation of mass regression equations on experimentally burned skeletal remains to assess skeleton completeness. *Science & Justice*, 58:2–6.
- Navega D, **d'Oliveira Coelho J**, Cunha E, Curate F. 2018. DXAGE: A New Method for Age at Death Estimation Based on Femoral Bone Mineral Density and Artificial Neural Networks. *Journal of Forensic Sciences*, 63(2): 497–503.
- Gonçalves D, **d'Oliveira Coelho J**, Acosta MA, Coelho C, Curate F, Ferreira MT, Gouveia M, Makhoul C, Pinto D, Oliveira-Santos I, Vassalo AR, Navega D, Cunha E. 2016. One for all and all for one: Linear regression from the mass of individual bones to assess human skeletal mass completeness: Linear Regression of Human Skeletal Mass. *American Journal of Physical Anthropology*, 160:427–432.
- Curate F, **d'Oliveira Coelho J**, Gonçalves D, Coelho C, Ferreira MT, Navega D, Cunha E. 2016. A method for sex estimation using the proximal femur. *Forensic Science International* 266:579.e1–7.

Conference Papers

- Scott GR, Navega D, **d'Oliveira Coelho J**, Vlemincq-Mendieta T, Kenessey D, Pilloud MA. 2022. Tooth morphology and population affinity: testing rASUDAS2 on modern African and European-derived samples. *American Journal of Biological Anthropology* 177(S73):164–165.
- Dorans ER, **d'Oliveira Coelho J**, Anemone RL, Bobe R, Carvalho S, Forrest F, Braun DR. 2020. Using remote sensing and machine learning to reconstruct paleoenvironmental features in the Koobi Fora Formation. *American Journal of Physical Anthropology*, 171:73–74.
- d'Oliveira Coelho J**, Anemone RL, Carvalho S. 2020. Filling Gaps in Primate Evolution: Machine Learning Approaches for Automated Fossil Site Discovery in Gorongosa, Mozambique. *Folia Primatologica*:251–252.
- Andrade B, Dias P, Santos BS, Coelho C, **d'Oliveira Coelho J**, Navega D, Ferreira MT, Wasterlain S. Morphological analysis of 3D skull models for ancestry estimation. 2018. *22nd International Conference Information Visualisation (IV)* 2018 Jul 10 (IEEE):567–573. DOI: 10.1109/IV.2018.00104.
- Makhoul C, Amarante A, **d'Oliveira Coelho J**, Navega D, Almeida M, Parker SF, Ferreira MT, Viegas DX, Marques M, de Carvalho LB, Gonçalves D, Cunha E. 2017. Experimental burning and real fire scenarios: Are they comparable in terms of chemical anthropology? *La Revue de Médecine Légale*, 8(4): 187.
- Andrade B, Dias P, Coelho C, **d'Oliveira Coelho J**, Navega D, Wasterlain SN, Ferreira MT, Santos BS. 2016. Towards automatic non-metric traits analysis on 3D models of skulls. *23rd Portuguese Meeting on Computer Graphics and Interaction (EPCGI)*:1–7. DOI: 10.1109/EPCGI.2016.7851196

Work Experience

- 2016-2017** Co-founder, webmaster and R instructor | **JEST - Junior Enterprise for Science and Tech**
- data modelling and visualization for life and health sciences
 - workshops and conferences on programming languages (R and Python) and data science
 - web developer and designer – jest.pt
- 2015-** Researcher | **Centre for Functional Ecology**, Coimbra (Portugal)
- collaborator at the Forensic Anthropology and Paleobiology group – cfe.uc.pt
 - statistical shape analysis (geometric morphometrics) of osteological material
 - webmaster and webdesigner at Laboratory of Forensic Anthropology – lfa.uc.pt
 - 3D scanning expert and curator of the CEIXI 3D Crania Collection (see sketchfab.com/lfa)
 - public communication and workshops, science communication
- 2013-** Co-founder, software developer, designer | **Osteomics** (startup venture)
- developed dozens of web-apps for biological and forensic anthropologists that allow to estimate age at death, sex, stature and biogeographic origin (see osteomics.com)
 - acquired experience with osteology, photogrammetry, 3D scanning and printing, machine learning, and business skills

Paleontological Fieldwork (29 weeks)

- 2022 (6 weeks)** Gorongosa, Mozambique – Co-directed a paleontological excavation + Instructor of the Evolution module at the Master's in Conservation Biology + Lab work (taxonomy).
- 2021 (9 weeks)** Gorongosa, Mozambique – Collected data on a primatology (bipedalism) and a taphonomy (predation to fossilization) project as a member of PaleoPrimate Project Gorongosa.
- 2019 (4 weeks)** Gorongosa, Mozambique – Instructor at the Oxford-Gorongosa Paleo-Primate Field School (University of Oxford); PhD researcher at Gorongosa National Park.
- 2019 (6 weeks)** East Turkana, Kenya – Graduate Assistant at the Koobi Fora Field School (George Washington University); member of the Paleoecology research group at Koobi Fora.
- 2018 (4 weeks)** Gorongosa, Mozambique – Instructor at the Oxford-Gorongosa Paleo-Primate Field School (University of Oxford); PhD researcher at Gorongosa National Park.

Scientific Conferences

- Bobe R, **d'Oliveira Coelho J**, Carvalho S. Biogeographic approaches to understanding the origin and dispersal of the earliest hominins. *Oreopithecus150*, Florence, Italy, 2022 (Podium).
- Carvalho S, Bobe R, **d'Oliveira Coelho J**, and Paleo-Primate Project. The first Miocene fossil sites of the southern end of the East African Rift: summary of key findings. *Oreopithecus150*, Florence, Italy, 2022 (Poster).
- Scott GR, Navega D, **d'Oliveira Coelho J**, Vlemincq-Mendieta T, Kenessey D, Pilloud MA. Tooth morphology and population affinity: testing rASUDAS2 on modern African and European-derived samples. *91st Annual Meeting of the American Association of Biological Anthropologists*, Denver, Colorado, USA, 2022 (Poster).
- Curate F, Navega D, Cunha E, **d'Oliveira Coelho J**. DXAGE 2.0 – An update on adult age at death estimation using bone loss. *19^o Congresso Nacional de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2021 (Poster).
- Scott GR, Navega D, **d'Oliveira Coelho J**. The Evolution of rASUDAS and Its Application to Bioarchaeological Problems. *Centro de Investigação em Antropologia e Saúde BioSocial Talks*, 2021 (Online Seminar).
- d'Oliveira Coelho J**, Bobe R, Carvalho S. Using fossil evidence to improve our understanding of divergence estimates for the Panini and Hominini lineages. *Primate Society of Great Britain - Winter meeting*, Online, 2020 (Poster).
- Dorans ER, **d'Oliveira Coelho J**, Anemone RL, Bobe R, Carvalho S, Forrest F, Braun DR. Using remote sensing and machine learning to reconstruct paleoenvironmental features in the Koobi Fora Formation. *The 89th Annual Meeting of the American Association of Physical Anthropologists*, Los Angeles, USA, 2020 (Poster).
- d'Oliveira Coelho J**, Anemone RL, Carvalho S. Filling gaps in primate evolution: machine learning approaches for automated fossil site discovery in Gorongosa, Mozambique. *European Federation for Primatology & the Primate Society of Great Britain Winter meeting*, Oxford, United Kingdom, 2019 (Podium).
- d'Oliveira Coelho J**, Braun DR, Bobe R, Anemone RL, Carvalho S. A MaxEnt approach to estimate the likelihood of finding new fossil sites in Lake Turkana, Kenya, using satellite images. *9th Annual European Society for the study of Human Evolution meeting*, Liège, Belgium, 2019 (Poster).

- Gabriel B, Makhoul C, **d'Oliveira Coelho J**, de Carvalho LB, Cunha E. Thermally induced changes: influence of duration of heat exposure on colorimetry, morphometry and chemometrics. *FASE – Forensic Anthropology Society of Europe Advanced Course in Forensic Anthropology and One-Day Symposium 2019*, Brussels, Belgium, 2019 (Poster).
- d'Oliveira Coelho J**, Anemone RL, Bobe R, Carvalho S. Let the computers do the surveying: applying support vector machines on spectral data to identify new fossiliferous deposits in Koobi Fora, Kenya. *Paleoanthropology Society 2019 Meeting*, Albuquerque, USA, 2019 (Poster).
- d'Oliveira Coelho J**, Anemone RL, Carvalho S. Standing out in a crowd of trees: spectral outliers as predictors of fossiliferous outcrops in modern forests. *Unravelling Human Origins 2019*, York, United Kingdom, 2019 (Podium).
- d'Oliveira Coelho J**, Anemone RL, Carvalho S. Fossil sites as landscape outliers: the potential of the dbSCAN clustering algorithm for detecting fossiliferous outcrops in forests. *16th Conference of the Gesellschaft für Primatologie*, Göttingen, Germany, 2019 (Poster).
- d'Oliveira Coelho J**, Anemone RL, Carvalho S. Finding the needle in a haystack: automating spectral remote searching for hominin fossil sites in Gorongosa, Mozambique. In: *Proceedings of the European Society for the Study of Human Evolution*. 56. Faro, Portugal, 2018 (Poster).
- d'Oliveira Coelho J**, Anemone RL, Carvalho S. Why bother surveying? How automated search of fossil sites in Africa can help fill gaps in hominoid evolution. *Abstracts of the 27th International Primatological Society Congress*. Event–714. Nairobi, Kenya, 2018 (Podium).
- Ammer S, **d'Oliveira Coelho J**. Estimating Sex with Outline Shape Analysis of the Trochlear Constriction and the Olecranon Fossa. *American Academy of Forensic Sciences 70th Annual Scientific Meeting*, Seattle, USA, 2018 (Podium).
- d'Oliveira Coelho J**, Ammer S. Sex estimation based on outline shape analysis of the posterior distal humerus, *MORPH 2017 - A Conference on the Archaeological Applications of Morphometrics*, Aarhus, Denmark, 2017 (Podium).
- Ferreira MT, Coelho C, Rufino AI, Navega D, **d'Oliveira Coelho J**, Wasterlain SN. Os Escravos do Valle da Gafaria: recuperar a identidade através dos ossos, *Dia Internacional dos Museus*, Viseu, Portugal, 2017 (Podium).
- Rodrigues H, Fagundes L, Ramos R, Galego O, **d'Oliveira Coelho J**, Navega D, Caseiro-Alves F, Cunha E. Análise da mastóide, ouvido médio e ouvido interno em tomografia axial computarizada (TAC) - Possível contribuição para a identificação de cadáveres, *16º Congresso de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2017 (Podium).
- Navega D, **d'Oliveira Coelho J**, Cunha E, Curate F. Estimativa da idade à morte com base na densidade mineral óssea do fémur proximal: uma abordagem com redes neuronais artificiais, *III Conferência do Instituto Nacional de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2016 (Poster).
- Rufino AI, **d'Oliveira Coelho J**, Navega D. A coleção PAVd'09 (Lagos): futuro e novas perspetivas. *V Jornadas Portuguesas de Paleopatologia*, Coimbra, Portugal, 2016 (Podium).
- Coelho C, **d'Oliveira Coelho J**, Navega D, Andrade B, Dias P, Santos BS, Wasterlain SN, Ferreira MT. CraMs: uma ferramenta informática para a análise antropológica do crânio, *III Conferência do Instituto Nacional de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2016 (Poster).
- Navega D, **d'Oliveira Coelho J**, Cunha E, Curate F. Estimativa da idade à morte com base na densidade mineral óssea do fémur proximal: uma abordagem com redes neuronais artificiais, *III Conferência do Instituto Nacional de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2016 (Poster).
- Ferreira MT, Coelho C, Rufino AI, **d'Oliveira Coelho J**, Navega D, Wasterlain SN. Os Escravos do Valle da Gafaria: novos dados e novas questões, *A História e a Memória dos Escravos Africanos*, Lagos, Portugal, 2016 (Podium).
- Navega D, Coelho C, **d'Oliveira Coelho J**, Vicente R, Ferreira MT, Wu J, Cunha E. AnceTrees: uma nova ferramenta para a avaliação da ancestralidade em Antropologia forense, *I Congresso da Associação Portuguesa de Ciências Forenses*, Porto, Portugal, 2016 (Podium).
- Gonçalves D, **d'Oliveira Coelho J**, Makhoul C, Navega D, Cunha E. MassReg: An application to predict the skeleton mass of adult individuals in incomplete or poorly preserved assemblages of human remains, *XXI Jornadas Mediterrâneas de Medicina Legal*, Badajoz, Spain, 2016 (Podium).
- Scott GR, Navega D, **d'Oliveira Coelho J**, Cunha E, Irish JD. rASUDAS: A New Method for Estimating Ancestry from Tooth Crown and Root Morphology, *The 85th Annual Meeting of the American Association of Physical Anthropologists*, Atlanta, USA, 2016 (Podium).
- d'Oliveira Coelho J**, Gonçalves D, Makhoul C, Oliveira-Santos I, Navega D, Coelho C, Curate F, Ferreira MT, Cunha E. Retrodeformação morfológica em ossos queimados para estimar a forma prévia e condições de queima, *II Conferência do Instituto Nacional de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2015 (Podium).

Navega D, **d'Oliveira Coelho J**, Coelho C, Vicente R, Ferreira MT, Curate F, Cunha E. Teste do método Diagnose Sexuelle Probabilistique (DSP) numa amostra da Coleção De Esqueletos Identificados do Século XXI, *II Conferência do Instituto Nacional de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2015 (Poster).

Curate F, Cunha E, Gonçalves D, Coelho C, **d'Oliveira Coelho J**, Ferreira MT, Navega D. Um novo método para a determinação do sexo a partir do Fémur Proximal, *II Conferência do Instituto Nacional de Medicina Legal e Ciências Forenses*, Coimbra, Portugal, 2015 (Poster).

d'Oliveira Coelho J, Navega D, Cunha E. Evaluating the performance of classification algorithms for sex estimation through automated Procrustes configurations of 3D surface scans, *FASE One Day Meeting (Symposium)*, Montepellier, France, 2015 (Poster).

Gonçalves D, **d'Oliveira Coelho J**, Gouveia M, Makhoul C, Oliveira-Santos I, Vassalo AR, Santos AL, Carvalho LB, Cunha E. The Hot topic of burned human skeletal remains: Coimbra's contribution to Forensic Anthropology, *International Symposium on Anthropology and Natural Disasters*, Coimbra, Portugal, 2015 (Poster).

d'Oliveira Coelho J, Navega D, Cunha E. Sex Diagnosis Through Automated 3D Geometric Morphometrics of the Tali Bones, *II Bioanthropological Meeting*, Coimbra, Portugal, 2015 (Poster).

Makhoul C, **d'Oliveira Coelho J**, Gouveia M, Oliveira-Santos I, Vassalo AR, Ferreira MT, Cunha E, Gonçalves D. The Protocol for the Preparation of Burned Identified Skeletons of the CEI/XXI Collection, *II BioAnthropological Meeting*, Coimbra, Portugal, 2015 (Poster).

Professional development

Used massive open online course (MOOC) platforms, to take courses offered by accredited universities and training programs in data science, programming, mathematics, natural history, among others.

Coursera, Inc. | [coursera.org](https://www.coursera.org)

Johns Hopkins University: The Data Scientist's Toolbox (100%); R Programming (100%); Getting and Cleaning Data (100%); Exploratory Data Analysis (100%); Reproducible Research (100%); Regression Models (100%); Practical Machine Learning (100%); Developing Data Products (100%); Mathematical Biostatistics Boot Camp 1 (94%); Mathematical Biostatistics Boot Camp 2 (100%); Bioinformatics: Life Sciences on Your Computer (93.5%); Statistical Analysis of fMRI Data (100%);

Stanford University: Machine Learning (100%); Statistical Learning (100%);

University of Michigan: Model Thinking (98.2%); Programming for Everybody (Python) (100%);

The University of Melbourne: Epigenetic Control of Gene Expression (94.9%);

University of North Carolina: Metadata: Organizing and Discovering Information (99.2%);

University of Alberta: Dino 101: Dinosaur Paleobiology (98.3%);

University of Minnesota: Introduction to Human Behavioral Genetics (98.6%);

Emory University: The Art and Archaeology of Ancient Nubia (99.4%);

Rice University: An Introduction to Interactive Programming in Python (98.3%);

The University of Edinburgh: Astrobiology and the Search for Extraterrestrial Life (97.8%); Introduction to Philosophy (98.2%).

edX, Inc. | [edx.org](https://www.edx.org)

Harvard University: PH525.1x Statistics and R for the Life Sciences (100%); PH525.2x Matrix Algebra and Linear Models (100%); PH525.3x Advanced Statistics for the Life Sciences (97%); PH525.4x Introduction to Bioconductor (94%); AT1x AnatomyX: Musculoskeletal Cases (98%);

MIT – Massachusetts Institute of Technology: MAS.69x Big Data and Social Physics (100%);

The University of Queensland: World101x Anthropology of Current World Issues (98%);

Karolinska Institutet: KiexploRx Explore Statistics with R (90%);

The University of Texas at Austin: UT.7.01x Foundations of Data Analysis (93%);

University of California, Berkeley: Stat_2.3x Introduction to Statistics: Inference (88%).

FutureLearn (The Open University) | [FutureLearn.com](https://www.futurelearn.com)

University of Wollongong: *Homo floresiensis* Uncovered (100%); Bioprinting: 3D Printing Body Parts (100%)

University of Basel: Statistical Shape Modelling (90%)

University of Southampton: Archaeology of Portus (100%)

References: References available upon request.