Jeffrey James Lynch, PhD

Forensic Anthropologist · Data Scientist · Research Software Engineer

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Forensic anthropologist and data scientist at the Defense POW/MIA Accounting Agency (DPAA) laboratory since 2015. Alongside skeletal casework, I build the laboratory's analytical software from end to end: the statistical methods, the web and desktop applications, the reference database and the deployment. I have 14 publications on computational methods for sorting commingled human remains, and my open-source tools include OsteoSort, SID, OS3D and QA3D.

EXPERIENCE

Forensic Biological Anthropologist (Data Science) 2015–Present

Defense POW/MIA Accounting Agency (DPAA), Department of Defense, Offutt AFB, Nebraska

Full-time, 40 hours per week. Employed through an Oak Ridge Institute for Science and Education fellowship (2015–2018), SNA International (2018–2025) and the Defense POW/MIA Accounting Agency (2025–Present).

Forensic casework

- Analyze human remains for the medico-legal identification of U.S. service members, integrating osteology, anatomy, anthropometry and statistics.
- Distinguish human from non-human remains, estimate biological profiles (age, sex, ancestry and stature), and analyze perimortem and antemortem trauma, taphonomy and the conservation of remains.
- Write forensic anthropology reports, disinterment memorandums and biological comparison reports as a senior-level anthropologist.
- Review colleagues' forensic reports for scientific accuracy before they go to laboratory leadership, and contribute to quality assurance testing for ISO/IEC 17025 accreditation.
- Develop DNA sampling strategies, and analyze trace evidence and material evidence from historical items.

Data science and software

- Design, build and maintain the laboratory's analytical applications, including OsteoSort, SID, OS3D and QA3D, working mainly in Julia, R, Python, C++ and JavaScript.
- Designed and built ARDS, the PostgreSQL reference database behind those applications.
- Oversee Atlas (formerly LabNet), the laboratory's internal analysis platform, now hosted on the National Research Platform: help set its direction and requirements, review its code and test it as an end user.
- Administer the laboratory's GitHub organization and mentor its developers on osteology.
- Clean, standardize and analyze unstructured, semi-structured and structured datasets.
- Lead research to improve forensic methods.
- Carry out domestic and international data collection trips and act as liaison for research collaborations between institutions.

Bioarchaeologist 2013

D and D Osteological Services, USA

Full-time, 40 hours per week.

- Excavated human remains, mapped burials and developed biological profiles from historical cemeteries as part of a cultural resource management team.
- Worked around heavy equipment on active construction sites.

Earlier technical roles

Help Desk Technician, College of Health & Social Sciences, San Francisco State University 2011–2013

Supported faculty, staff and students in computer labs and offices, and built, deployed and managed the computer labs.

IT Specialist and Network Administrator, PC Service Center 2009–2011

Network and server administration, database management, data migration, and scripting in Bash and Perl for business and home clients.

SOFTWARE AND DATA SYSTEMS

The analytical tools are free software under the GPL v3 or AGPL v3 license. Project pages and live apps are at osteocoder.com.

OsteoSort · Osteometric sorting 2015–Present

Julia web app · AGPL v3 · os.osteocoder.com

Compares skeletal measurements against reference populations to help reassociate commingled remains. Tests pair-matching, articulation and regression for a single pair of bones or a whole case file.

SID · Stature identification 2024–Present

Julia web app · AGPL v3 · sid.osteocoder.com

Estimates living stature from skeletal measurements, with prediction intervals, and tests whether a known stature is consistent with a bone.

OS3D · Osteometric sorting 3D 2025–Present

Desktop app (Electron, Julia, Three.js) · GPL v3 · release pending

Pair-matches left and right bones by their 3D shape. Loads PLY models, places landmarks and compares pairs, including fragments, using multithreaded ICP registration.

QA3D · Quality assurance 3D 2019–Present

Desktop app (Electron, Julia, Three.js) · GPL v3 · release pending

Checks the accuracy of 3D scanners for research and laboratory accreditation. Registers a scan to a reference surface and reports error, dimensional and flatness metrics.

ARDS · Authoritative Reference Data Set 2025–Present

PostgreSQL

The central reference database of skeletal measurements behind OsteoSort and SID, so that statistical models are standardized across applications. Role: designed the schema and built the database.

Atlas · Forensic Analysis Systems platform 2025–Present

Django, Next.js, Kubernetes on NRP

DPAA's internal platform that brings the laboratory's analytical applications, ARDS reference data and administrative tools into one workspace. Formerly called LabNet, it runs on the National Research Platform (NRP). Role: oversee the project and help set its direction and requirements; review the code and test the platform as an end user.

AxisVault · Imaging data archive 2026–Present

Python web app, Docker, PostgreSQL · in development

Laboratory archive and catalog for imaging data: micro-CT, radiographs, CT, 3D scans and histology.

Archaeo3D · Excavation visualizer 2026–Present

JavaScript web app (Three.js)

Shows archaeological excavation data in 3D.

EyePath · Light bar for EMDR therapy 2026–Present

JavaScript desktop app · AGPL v3 · github.com/jjlynch2/EyePath

A free light bar for EMDR therapists, built outside my forensic work.

CoRA · Commingled Remains Analytics 2016–Present

coracore.org

Data steward and API developer for integrating advanced analytical methods with the database.

Earlier tools: Centroid Banding (2019), an R package that extracts centroid bands from 3D models for shape matching; Measurement Standardization (2016), a universal numbering system for skeletal measurements; and Forensic Anthropology Tools (2019), a searchable index of computational tools for forensic anthropology.

PUBLICATIONS

Maijanen H, **Lynch J**, Junno J, Niinimäki J (2024). Sex estimation from humeral and femoral head diameters using CT-scans of living Finns. *Legal Medicine* 69:102341.

Fancourt HSM, **Lynch JJ**, Byrd JE, Stephan CN (2021). Next-generation osteometric sorting: Using 3D shape, elliptical Fourier analysis, and Hausdorff distance to optimize osteological pair-matching. *Journal of Forensic Sciences* 66(3):821–836.

Brown CB, **Lynch JJ** (2019). Using Biological Profile Data to Inform a DNA Sequencing Strategy. *Forensic Anthropology* 2(2):121–128.

Stephan CN, Caple JM, Atkins JG, **Lynch JJ**, Meikle B, Fisk W (2019). Skeletal Evidence of Sharp-Force Disarticulation and Tissue Flensing in 54 Cases Exhibiting Approximately 4200 Bone Strike Injuries. In: Ross AH, Cunha E, editors. *Dismemberments: Perspectives in Forensic Anthropology and Legal Medicine*. Elsevier. p. 133–154.

Lynch JJ, Maijanen H, Prescher A (2019). Analysis of Three Commonly Used Tibia Length Measurement Techniques. *Journal of Forensic Sciences* 64(1):181–185.

Warnke-Sommer J, **Lynch JJ**, Pawaskar SS, Damann FE (2019). Z-Transform Method for Pairwise Osteometric Pair-matching. *Journal of Forensic Sciences* 64(1):23–33.

Lynch JJ, Brown C, Palmiotto A, Maijanen H, Damann F (2019). Reanalysis of the Trotter Tibia Quandary and its Continued Effect on Stature Estimation of Past-Conflict Service Members. *Journal of Forensic Sciences* 64(1):171–174.

Lynch JJ, Stephan C (2018). Computational Tools in Forensic Anthropology: The Value for Open Source Licensing as a Standard. *Forensic Anthropology* 1(4):228–243.

Lynch JJ (2018). An Automated Two-dimensional Pairwise Form Registration Method for Pair-matching of Fragmented Skeletal Remains. *Journal of Forensic Sciences* 63(6):1790–1795.

Lynch JJ (2018). An Automated Two-dimensional Form Registration Method for Osteological Pair-matching. *Journal of Forensic Sciences* 63(4):1236–1242.

Lynch JJ (2018). The Automation of Regression Modeling in Osteometric Sorting: An Ordination Approach. *Journal of Forensic Sciences* 63(3):798–804.

Lynch JJ (2018). An Analysis on the Choice of Alpha Level in the Osteometric Pair-matching of the Os Coxa, Scapula, and Clavicle. *Journal of Forensic Sciences* 63(3):793–797.

Lynch JJ, Byrd J, LeGarde CB (2018). The Power of Exclusion using Automated Osteometric Sorting: Pair-matching. *Journal of Forensic Sciences* 63(2):371–380.

Lynch JJ, Cross P, Heaton V (2017). Sexual Dimorphism of the First Rib: A Comparative Approach using Metric and Geometric Morphometric Analyses. *Journal of Forensic Sciences* 62(5):1251–1258.

PRESENTATIONS

Jerković I, **Lynch JJ**, LeGarde CB, Whitmore K, Damann FE, Bašić Ž (2027, accepted). A Computational Seating and Ranking of Vertebral Pairs: Re-Associating Commingled Remains With the Anthropologist in the Loop. Oral presentation A108, 79th Annual Scientific Conference of the American Academy of Forensic Sciences, Orlando, Florida.

Palamenghi A, Pawaskar S, Mazzarelli D, Biehler-Gomez L, Gibelli D, Damann F, **Lynch J**, De Angelis D, Jantz RL, Cattaneo C (2023). Humanitarian Forensic Anthropology in Italy: a case of commingled remains from the largest mass disaster of the migrant crisis in the Mediterranean Sea. 20th anniversary meeting of the Forensic Anthropology Society of Europe, Marseille, France.

Lynch JJ (2018). OsteoSort and Introduction to R. Workshop presentations in Data Standards, Archiving, and Analytics in Forensic Anthropology, 70th Annual Scientific Meeting of the American Academy of Forensic Sciences.

Brown C, **Lynch JJ** (2018). Using Biological Data to Inform a DNA Sequencing Strategy. Poster presentation, 70th Annual Scientific Meeting of the American Academy of Forensic Sciences.

Lynch JJ (2017). OsteoSort. Presentation video, Defense POW/MIA Accounting Agency and Ministry of National Defense Agency for Killed in Action Recovery and Identification Joint Symposium.

EDUCATION

PhD, Forensic Anthropology, University of Queensland, Australia 2017–2021

Thesis: Computerized Methods for De-Commingling Mixed Human Skeletal Assemblages: New Automated Approaches Using Centroid Banding

Advisors: Carl Stephan, PhD, Mike Bennett, PhD, and John Byrd, PhD

Award: UQ Research Training Scholarship

MSc, Forensic Anthropology, with distinction, University of Central Lancashire, UK 2014–2015

Dissertation: Sexual Dimorphism of the First Rib: A Comparative Approach using Metric and Geometric Morphometric Analyses

Advisors: Vivienne Heaton, PhD, and Peter Cross, MSc

BA, Anthropology, magna cum laude, San Francisco State University 2011–2013
Dean's list 2011, 2012 and 2013

AS, Computer Science, with honors, Diablo Valley College 2006–2011
Emphasis: Linux and Unix systems, network and computer security, and C/C++ programming

Certificate of Achievement, Computer Forensics, Los Medanos College 2006–2008
Emphasis: digital evidence acquisition and EnCase digital investigations

TECHNICAL SKILLS

Programming: Julia, R, Python, JavaScript, C, C++, SQL, Bash, Perl, assembly, HTML and CSS

Statistics and scientific computing: R package development for computationally intensive analytics; R/Shiny app development since 2015; Rcpp and RcppParallel for integrating R and C++; JuliaCall and RCall for integrating R and Julia; SPSS; artificial intelligence and machine learning for forensic science and computer vision

Application development: Web apps (Julia HTTP servers, Bootstrap), desktop apps (Electron, Three.js), Docker, and Git and GitHub administration

Data and infrastructure: PostgreSQL, MySQL, MariaDB and QuestDB; Proxmox high-availability cluster deployment and management for scientific computing; more than 20 years of Unix and Linux systems, networking and security, including penetration testing; STARLIMS since 2019; Osteoware, CoRA, data stewardship and database management for osteological collections

Imaging and laboratory: 3D structured light and laser scanning; photogrammetry; skeletal computed tomography and radiography; scanning electron microscopy with energy-dispersive X-ray spectroscopy; histological analysis of skeletal elements; skeletonization, dissection and processing of human cadavers for osteological collections

Field and forensic: Excavation, total station mapping and GIS surveying; crime scene photography and scene processing; latent fingerprint lifting; backpacking, rock climbing and long-distance expedition experience in remote and hazardous wilderness

GRANTS

AAFS Humanitarian and Human Rights Resource Center Grant 2015
A Fully Computerized Method of Osteometric Sorting for Pairwise Comparisons in Large Assemblages. Co-principal investigator with Dr. Carl Stephan and Dr. John Byrd.

TEACHING AND MENTORSHIP

Defense POW/MIA Accounting Agency 2016–Present
Mentor developers on osteometric sorting and general osteological knowledge.

University of Central Lancashire, UK 2015
Teaching assistant for an undergraduate osteology laboratory.

Anthropology Osteology Laboratory, San Francisco State University 2013
Mentored students on osteological cleaning, inventorying and data entry into Osteoware.

PROFESSIONAL DEVELOPMENT

Proxmox VE Deployment and Management, Weehooey Inc. 2025

Proxmox VE Clustering and Shared Storage, Weehooey Inc. 2025

Macromorphoscopic (MMS) Traits: Data Collection and Analysis, AAFS 70th Annual Scientific Meeting 2018

Geometric Morphometrics in R, Transmitting Science, certificate of completion 2017

BAHID CPD Emergency Mortuary workshop 2014
Emergency mortuary simulation and filing Interpol disaster victim identification paperwork.

BAHID CPD Forensic Odontology workshop 2014
Juvenile age estimation and common problems from eruption and root development.

ADDITIONAL ARCHAEOLOGY AND OSTEOLOGY EXPERIENCE

San Emigdio Archaeology Historical Project, Wind Wolves Preserve, USA 2014
Volunteer archaeologist surveying, photographing and mapping artifacts with GPS for a historical archaeology project with the University of Central Lancashire.

Oakington Anglo-Saxon Cemetery Project, UK 2013
Field school through the University of Central Lancashire: excavation of human skeletal remains, osteological analysis, total station mapping and GIS surveying.

Anthropology Osteology Laboratory, San Francisco State University 2012–2013
Intern cleaning, inventorying and analyzing the taphonomy of human skeletal remains from a large historical assemblage, using Osteoware for collection management.

Central Valley Medical Center Project, USA 2012
Volunteer bioarchaeologist excavating human skeletal remains, mapping burials with a total station and creating biological profiles in the field.

ASSOCIATIONS

US Research Software Engineer Association (US-RSE) 2026–Present

American Association of Biological Anthropologists 2018–Present

American Academy of Forensic Sciences 2015–Present

British Association of Human Identification 2015–2016

British Association of Forensic Anthropologists 2015–2016