

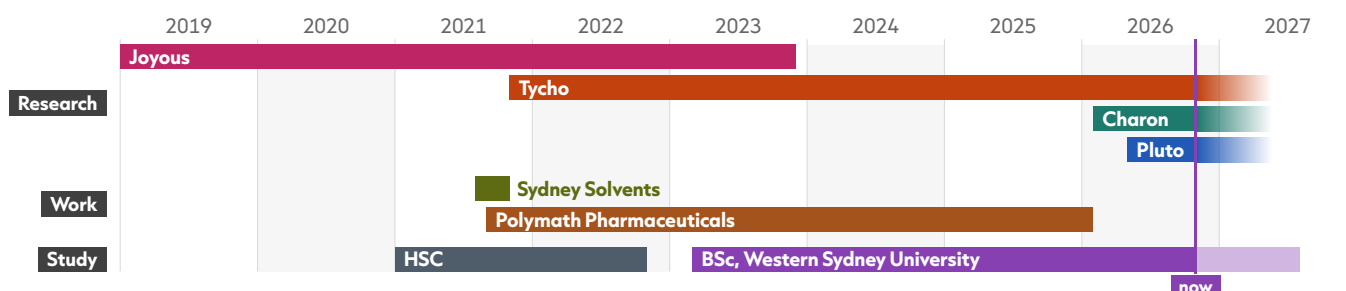
Nicholas Eshun-Wilson

Chemistry undergraduate, Western Sydney University
Radiotrophic fungi, radiation measurement, field 3D survey

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Building an independent research program on the microbiology of the former British nuclear test sites at Maralinga and Emu Field, focused on melanised, radiation-tolerant fungi, alongside a BSc in Chemistry with a minor in Infectious Disease and Pharmacology. I design the field kit and data pipelines the work needs: off-grid sampling, shielding and dose planning, GNSS-logged gamma spectrometry, UAV photogrammetry and Gaussian splatting, and self-hosted research data infrastructure. Seeking Honours and research placements in environmental radioactivity and radiochemistry.



Research	3D reconstruction	Radiation mapping	UAV survey	Low-cost instrumentation	History
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2026 → now Project Charon: mapping the British nuclear test sites

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- Historical record of the British tests at Maralinga, Emu Field and the Monte Bello Islands: a schema-validated timeline dataset (63 elements) with all twelve major detonations dated to the day, the minor trial series, site markers and the cleanups and inquiries.
- Instrumentation: a Raspberry Pi logger fusing two RadiaCode gamma spectrometers with high-accuracy GNSS (in build), feeding a real-time SLAM 3D model with voxel estimates of radioactive sources.
- Designing a near-real-time reconstruction pipeline on feed-forward 3D models (DVL, VGGT, Pi3, MapAnything) for two modes: live UAV capture (target under 10 s per update) and unordered survey sets of 1,000+ images.
- Tahmoor quarry survey: 1,680 images processed in ArcGIS Drone2Map and exported to COLMAP for Gaussian splat training; *terrapi*, a Rust tool (about 3,800 lines) converting BlocksExchange XML to COLMAP, nerfstudio and Bundler formats.
- Radiation safety and logistics for specimen transport: cast-bismuth shielding design, point-kernel dose estimates, cabin dose-rate maps, and off-grid field power (EcoFlow Delta 3 Plus with solar panels).
- ENVL2007 case study, *Radiotrophs and Where to Find Them* (June 2026): Gaussian splatting and low-cost robots carrying dosimeters for mapping contaminated ground.

Research	Metagenomics	Melanin	Radioprotection	Photomicrography	Science policy
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2026 → now Project Pluto: microbes as nuclear threats and tools

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- Metagenomic study design: 16S amplicon sequencing with random-forest classification (after MacGregor et al., 2024), weighing field sequencing on an Oxford Nanopore MinION against WSU's NGS Facility and the Ramaciotti Centre.
- Lab methods: DNA extraction (DNeasy PowerSoil Pro, ZymoBIOMICS) with a 1600CPS centrifuge and bead beater that run on Charon's field power; Nikon Eclipse Si and Archimedes Em1 microscopy, with macro and photomicrography on an OM TG-7 and Nikon Z5II.
- A radiotolerant atlas: published growth thresholds and doses for radiotrophic organisms, set against measured contamination at Maralinga and Emu Field.
- Policy brief, *Microbes as Threats and Tools for Australian Nuclear Infrastructure* (2026): microbial corrosion of reactors and spacecraft, and three uses for extremophile pigments: radioresistant materials, biosensing and bioremediation, and radioprophylactics.

Research	Flow chemistry	OpenSCAD	LLMs	Automation
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2021 → now Project Tycho: 3D-printed reactors and LLM-driven design

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- Parametric 3D-printed microreactors modelled in OpenSCAD.
- Aim: language models that read synthesis literature and emit reactor CAD, with experimental results fed back into the design.
- Presented at the Deep Network presentation night (September 2025), first presented in November 2021.

Research	Organic synthesis	Antimicrobials		
2019 → 2023	Project Joyous: β -nitrostyrene chemistry		nicholaseshunwilson.com/joyous	
■ Antimicrobial activity of β -nitrostyrenes, and synthetic routes to endogenous neurotransmitters.				
Experience	Laboratory supply	Independent projects		
2021 → 2026	Polymath Pharmaceuticals: founder		Sole trader, Sydney	
■ Laboratory chemical supply website, run with James Rowland Payne, and the umbrella for independent commercial projects. Sole-trader ABN held 2021 to 2026.				
Experience	Market research	Product testing		
2021	Sydney Solvents Pty Ltd: research assistant		Sydney	
■ Market research, product-related experiments and liaison with industrial suppliers.				
Education	Chemistry major	Infectious Disease and Pharmacology minor		
2023 → 2027	Bachelor of Science, Western Sydney University		Expected August 2027	
■ Units include Analytical Microbiology; Environmental Assessment and Analysis (EART2001); ENVL2007 (Gaussian splatting case study, NSW air quality assessment); Science of the Anthropocene (EART3006).				
Education	Chemistry	Biology	Investigating Science	
2021 → 2022	Higher School Certificate, Bradfield Senior College			St Leonards, NSW
Methods				
Lab	Aseptic technique, optical microscopy and photomicrography, organic synthesis, chemical handling and safety			
Field	Off-grid sampling logistics, solar-powered field equipment, specimen storage and transport			
Radiation	Gamma spectrometry (RadiaCode), bismuth shielding design, point-kernel dose estimates			
Survey	UAV and ground photogrammetry, ArcGIS Pro and Drone2Map, COLMAP and GLOMAP, Gaussian splatting (Brush, Spirula Studio, InstantSplat), 360° capture			
Computing	R, Rust, Python, SQL, PowerShell; Typst and CeTZ for documents and figures; Zotero			
Systems	Self-hosted research stack: Syncthing, Zotero WebDAV, Traccar GNSS on PostgreSQL, Cloudflare Tunnel, WireGuard			
Other work				
Glass	Glass from lunar regolith simulant (IFLRS-75, Interstellar Innovation) and bismuth borosilicate glass for shielding: small-scale melts, early stage.			
Air quality	Project Aeolus: an R pipeline on the NSW air quality API, with PM _{2.5} and PM ₁₀ exceedance heatmaps and limit-referenced charts.			
Outputs				
Site	nicholaseshunwilson.com: project pages, one-page briefs and the current CV			
Data	Raw and processed data from Charon and Pluto on request, with access-controlled downloads at data.nicholaseshunwilson.com			
Referees	Available on request			