Nikolas P. Johnston

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RESEARCH TRAJECTORY

I am an experienced insect systematist, with strengths in genomics, bioinformatics and integrative taxonomy. I have active collaborations in protein phylogenetics and insect microbiome and genomics. My future research will encompass projects in genomics, forensics and antimicrobial discovery

CURRENT POSITION

Lecturer in Bioinformatics and Molecular Biology 2024–present
School of Chemistry and Molecular Bioscience,
University of Wollongong, NSW, Australia

EDUCATION

University of Wollongong Wollongong, Australia
PhD, Phylogenomics, Systematics, Taxonomy 2016–2020
- Thesis title: Integrative systematics of Australian Miltogramminae (Diptera: Sarcophagidae)

University of Wollongong
BMed. Biotechnology (Adv.) (Honours 1st class) Wollongong, Australia
- Thesis title: Characterisation of molecular heat stress responses in *Ceratodon purpureus* (Hedw.) Brid. 2012–2015

RESEARCH TRAINING AND EXPERIENCE

Research Fellow 2022–2023
University of Technology Sydney, NSW, Australia
- Developed a mitochondrial genome exctraction and sequencing pipeline to harness trace DNA from centuries old museum material.
- Redefined the systematics of blowflies in Australia discovering over 40 new species using molecular tools and morphology

Assistant Professor (Adjunct) 2021
Department of Ecology and Biogeography, Nicolaus Copernicus University, Toruń, Poland
- Utilised bioinformatics to extract and annotate Diptera mitogenomes from genome skimming data, then utilised this data to conduct an integrative systematic analysis of the European cluster flies (Pollenidae).
- Performed population genomic analyses of Middle Eastern flesh flies using restriction site associated data.

Senior Research Associate 2020
University of Technology, Sydney, NSW, Australia
- Created a revised morphological system for the Australian Blowflies and described a new species.
- Performed molecular diagnostic techniques to identify insects
- Assisted in the curating and identifying insect material from forensic case work
- Supervised and trained research students

Phylogenomic bioinformatics training 2020
North Carolina State University, NC, U.S.A
- Developed and used bioinformatic analysis pipelines for genomic analysis. This included using High Perfomance computing clusters to complete phylogenomic analysis of genomic datasets

Genomes and biodiversity research and development workshop 2019
Australian academy of Science, NSW, Australia
- Developed skills in phylogenomic analysis, population genomics and genome wide association studies

Anchored phylogenomics training 2018

North Carolina State University, NC, U.S.A
- Performed genomic library preparation, sequencing and data analysis

Forensic Entomology Technician 2016–2019
University of Wollongong, NSW, Australia
- Contributed to insect sample processing, specimen Identification, DNA extraction and analysis and insect rearing in a breeding facility

Research residency – Integrative systematics of Flesh Flies 2017 Jul–Oct
Natural History Museum of Denmark, Denmark
- Developed skills in Diptera taxonomy and working with natural history collections. Created a new taxonomic system for the Australian flesh flies. Developed methods SEM imagery of flesh fly genitalia

2016

4th National Postgraduate Training Workshop in Systematics
University of Adelaide, SA, Australia
- Completed training in Phylogenetics including skills in species delimitation, DNA extraction, sequencing and phylogenetic analysis

2015–2016

Research Assistant – Plant Biochemistry
University of Wollongong, NSW, Australia.
- Conducted extraction and analysis of natural products from Antarctic mosses.

TEACHING EXPERIENCE

Teaching philosophy

I am passionate about teaching biology and strive to use my expertise in insects to inspire students to be inquisitive about their natural environments and the complex interconnected systems that enable these environments to exist. I am enthusiastic about the capabilities of big-data and molecular techniques to enhance biological research and strive to develop these skills in my students. I am dedicated to improving my teaching practices, I actively encourage my students to undertake voluntary evaluations of my teaching to provide me with feedback I can utilise to develop my teaching abilities and subject design.

Associate Lecturer, School of Chemistry and Molecular Bioscience, University of Wollongong 2020-2022
Course design, lecture delivery and lab supervision for second- and third-year university subjects covering core topics in: evolutionary biology, bioinformatics, genetics and biodiversity. Specific experience in remote delivery of biology lectures and practicals, teaching practical skills in entomology and genetic analysis, development of grant writing and scientific communication workshops for Honours candidates.

RESEARCH STUDENTS SUPERVISED

Honours student: *Developed student's skills in phylogenetic analysis of Velvet worms* 2017
Honours student: *Trained student in the identification of carrion associated insects* 2018
PhD student: *Worked with the student to develop molecular diagnostic tools for forensically important insects* 2019-2021
PhD student: *Instructed and developed the students bioinformatic skills for the purposes of exploring phylogenetic relationships between protein families and protein homology.* 2022-current

RELATED PROFESSIONAL EXPERIENCE

National Institute of Forensic Science: Technical Advisory Group (entomology) 2022–current
- Expert forensic entomologist for the NSW jurisdiction
- Forensic advisory group to the police, working to develop standard operating procedures nationally and improve the methodologies used by forensic entomology practitioners

Taxonomy Australia 2020–current
- Expert taxonomist (Flesh flies, Blow Flies)
- Part of several working groups to establishing the Australian taxonomy and biosystematics decadal plan

Workshop organiser and presenter 2018

- "Forensic Entomology – How science helps us solves crime" Workshop for school students (Years 6-10) 2017–2019
- "Insect conservation and Biodiversity in the Illawarra" workshops 2017–2019
- "Science and Schooners" community lecture series 2014–2016

GRANTS AND AWARDS

External:

Australian Biological Resources Survey: National Taxonomy Postdoctoral Research Fellowship – $300,000 2022–2025

University Global Partnership Network (UGPN) Research Collaboration fund: Travel sponsorship for phylogenomic training at North Carolina State University – $10,000 2019–2020

Australian Biological Resources Survey: Integrative systematics of Australian Flesh Flies –$35,000 2015–2019

Internal:

Molecular Horizons collaboration grant: Extracting new antimicrobial compounds from blowflies – $10,000 2024–2025

Molecular Horizons small equipment grant: Developing internal protocols for Minion genome sequencing – $5,000 2024–2025

Science, Medicine and Health interdisciplinary grant: Evolutionary genomics of non-model organisms – $20,000 2024–2025

University of Wollongong, Centre for Sustainable Ecosystem Solutions Grant: Next generation sequencing analysis of Australian flesh flies – $1,350 2018

PROFESSIONAL MEMBERSHIPS

Australian Entomology Society
Entomological Society of America
Entomological Society of New Zealand
Society of Australian Systematic Biologists
Taxonomy Australia
North American Dipterists society

PUBLICATIONS

First author:

Johnston, N.P., Pape, T., Piwczyński, M., Wallman, J.F., Wiegmann, B.M., Cassel, B.K. et al. (2024) Anchored phylogenomics and revised classification of the Miltogramminae (Diptera: Sarcophagidae). Systematic Entomology, 49(1), 138–155.

Johnston, N.P., Piwczyński, M., Trzeciak, P., Walczak, K. & Szpila, K. (2023) Integration of mitogenomic and morphological data disentangles the systematics of *Pollenia* and establishes a revised phylogenetic hypothesis for the Polleniidae. *Systematic Entomology* 48 (2), 296 – 395

Johnston, N.P., Wallman, J.F. (2021) A new species of carrion-breeding "golden blowfly" from south-eastern Australia (Diptera: Calliphoridae). *Transactions of the Royal Society of South Australia* 145, 143–151

Johnston, N.P., Wallman, J.F., Szpila, K., Pape, T. (2021) Integrative taxonomy reveals remarkable diversity in Australian *Protomiltogramma* (Sarcophagidae: Miltogramminae). *ZooTaxa* 5043, 1–104

Johnston, N.P., Wallman, J.F., Szpila, K., Pape, T. (2020) Integrated revision of Australian *Metopia* describes a new Australian endemic and challenges generic definition (Sarcophagidae: Miltogramminae). *Insect Systematics and Diversity.* 4 (6), 5; 1–13

Johnston, N.P., Wallman, J.F., Dowton, M., Szpila, K., Pape, T. (2020) Integrated taxonomic revision of the Australian *Amobia* (Sarcophagidae: Miltogramminae) finds new species and tackles old problems. *European Journal of Taxonomy.* 722(1), 75–96

Johnston, N.P., Wallman, J.F., Szpila, K., Pape, T. (2020) An enigma no more: an integrated taxonomic revision of *Aenigmetopia* Malloch reveals novel phylogenetic placement and multiple new species (Sarcophagidae: Miltogramminae). *Invertebrate Systematics* 34 (5), 519–534

Johnston, N.P., Wallman, J.F., Pape, T., Whitmore, D. (2020) *Macronychia* (Diptera: Sarcophagidae) goes cosmopolitan: description and molecular delineation of the first Australasian species. *Austral Entomology* 59 (2), 292–301

Johnston, N.P., Wallman, J.F. & Pape, T. (2019) First record of Miltogramminae from New Caledonia: a new species of *Protomiltogramma* (Diptera: Sarcophagidae). *Zootaxa*. 4612, 595–599

Other:

Fitschen, L. J., Newing, T. P., **Johnston, N. P.,** Bell, C. E., & Tolun, G. (2024). Half a century after their discovery: Structural insights into exonuclease and annealase proteins catalyzing recombineering. *Engineering Microbiology*, *4*(1).

Piwczyński, M., Granton, L., Trzeciak, P., Carlos Brito, J., Oana Popa, M., Daba Dinka, M., **Johnston, N**. P., & Boratyński, Z. (2023). Unraveling phylogenetic relationships and species boundaries in the arid adapted Gerbillus rodents (Muridae: Gerbillinae) by RAD-seq data. *Molecular Phylogenetics and Evolution*, 107913.

Mata, L., Hahs, A. K., Palma, E., Backstrom, A., **Johnston, N.**, *et al.* (2023). Large positive ecological changes of small urban greening actions. *Ecological Solutions and Evidence*, 4, e12259.

Butterworth, N.J., Wallman, J.F., **Johnston, N.P**. *et al.* (2023). The blowfly *Chrysomya latifrons* inhabits fragmented rainforests, but shows no population structure. *Oecologia* (2023).

Newing, T. P., Brewster, J. L., Fitschen, L. J., Bouwer, J. C., **Johnston, N. P.,** Yu, H., & Tolun, G. (2022). Redβ177 annealase structure reveals details of oligomerization and λ Red-mediated homologous DNA recombination. *Nature Communications 2022 13:1*, *13*(1), 1–14.

Szpila, K., **Johnston, N. P.,** Akbarzadeh, K., Richet, R., & Tofilski, A. (2022). Wing measurements are a possible tool for the identification of European forensically important Sarcophagidae. *Forensic Science International*, *340*, 111451.

Polidori, C., Piwczynski, M., Ronchetti, F., **Johnston, N.P.,** Szpila K. (2022) Host-trailing satellite flight behaviour is associated with greater investment in peripheral visual sensory system in miltogrammine flies. *Scientific Reports* 12, 2773.

Szpila, K., Piwczyński, M., Glinkowski, W., Lutz, L., Akbarzadeh, K., Baz, A., **Johnston, N.P.,** Grzywacz, A., (2022) First molecular phylogeny and species delimitation of West Palaearctic *Pollenia* (Diptera: Polleniidae), *Zoological Journal of the Linnean Society*, zlac035

Grzywacz, A., Jarmusz, M., Walczak, K., Skowronek, R., **Johnston, N.P.,** Szpila, K. (2021) DNA Barcoding Identifies Unknown Females and Larvae of *Fannia* R.-D. (Diptera: Fanniidae) from Carrion Succession Experiment and Case Report. *Insects* 12, 381.

Szpila, K., Walczak, K., **Johnston, N.P.,** Pape, T., Wallman, J.F. (2021) First instar larvae of endemic Australian Miltogramminae (Diptera: Sarcophagidae). *Scientific Reports* 11, 2687.

Butterworth, N.J., Byrne, P.G., **Johnston, N.P.,** Keller, P.A., Drijfhout, F.P., Wallman, J.F. (2020). The evolution of sexually dimorphic cuticular hydrocarbons in blowflies (Diptera: Calliphoridae). *Journal of Evolutionary Biology* 2020 (33), 1468–1486.

Book chapters:

Johnston, N. P., Krosch, M. N., Archer, M. S., & Wallman, J. F. (2024). Entomology. *Reference Module in Social Sciences*. https://doi.org/10.1016/B978-0-443-21441-7.00078-9

Krosch, M. N., **Johnston, N. P.,** Archer, M., & Wallman, J. F. (2023). Forensic Entomology. *Forensic and Legal Medicine*, 977–984. https://doi.org/10.1201/9781003138754-106

Stadler, F., **Johnston, N. P.**, Butterworth, N. J., & Wallman, J. F. (2022). 13. Fly Colony Establishment, Quality Control and Improvement. *A Complete Guide to Maggot Therapy*, 257–288.

SEMINARS AND CONFERENCE PRESENTATIONS

Embracing not avoiding generative AI to enhance scientific writing education.
(2024). University of Wollongong, Science, Medicine and Health, Learning and Teaching Forum.

Advances in Calliphoridae phylogenomics unravel Australian blowfly systematics.
(2024). Australian Entomology Society National Conference. Hobart, Tasmania, Australia

Extraordinary insights into the evolutionary relationships of the blowflies (Diptera: Calliphoridae).
(2024). Invited presentation. 10th Dresden meeting on Insect Phylogeny. Dresden, Germany

Retrospective review of forensic entomology casework in eastern Australia
(2024). Invited presentation. National Institute of Forensics Medical Sciences Special Advisory Group workshop. Perth, Western Australia, Australia

Automated mitogenome extraction from low-coverage genome skimming data facilitates integrative systematic revision of *Pollenia* and a revised phylogenetic hypothesis for the Polleniidae
(2023). Phylogenomics symposium. 10th international Congress of Dipterology. Reno, Nevada

When *Calliphora* are not *Calliphora*: Advances in Calliphoridae phylogenomics provide unprecedented insights into Australian blowfly systematics
(2023). Calyptrate Evolution symposium. 10th International Congress of Dipterology. Reno, Nevada

Species identification methods for urban pest management
(2022). Invited presentation, Future of Urban Pest Control conference. Sydney, Australia

Revised systematics of Australian flies using integrative techniques
(2022). Invited seminar, National Research Collections Australia. CSIRO, Canberra, Australia

Integral integration – a combined morphological and molecular approach delineates cryptic species and evolutionary relationships in Australian Miltogramminae (Sarcophagidae)
(2018). Calyptrate Evolution symposium. 9th International Congress of Dipterology. Windhoek, Namibia

Integrative systematics of Australian Miltogramminae
(2018). UOW postgraduate conference. Kioloa, Australia – Awarded Highly commended Progress Seminar

The phylogenetics of parasitism: revising Australian flesh flies
(2016). UOW postgraduate conference. Kioloa, Australia– Awarded Best Initial Seminar