

# Balancing discovery and education in natural history collections

Alfonsina Arriaga Jiménez<sup>1,2</sup>, Simon Fearn<sup>1</sup>

<sup>1</sup> Queen Victoria Museum and Art Gallery, 2 Wellington Street, Launceston, TAS, 7250 Australia

<sup>2</sup> School of Science and Technology, University of New England, Trevenna road, Armidale, NSW, 2350 Australia

Corresponding author: Alfonsina Arriaga Jiménez ([alfonsina.arriagajimenez@launceston.tas.gov.au](mailto:alfonsina.arriagajimenez@launceston.tas.gov.au))

## Abstract

At the Queen Victoria Museum and Art Gallery (QVMAG), we recognize the importance of natural history collections as tools for scientific discovery and public education. Historically, the QVMAG entomological collection was modest. However, the recent growth of the collection, driven by dedicated staff, fieldwork, and donations, has allowed for significant expansion, including the development of an outreach collection aimed at engaging the public. These outreach specimens are essential for educational initiatives but require careful management to ensure their durability in public-facing roles. The “BUGS” STEAM gallery will showcase these specimens, integrating them into interactive displays and educational programs designed to inspire curiosity about insects and arthropods. We discuss the challenges of maintaining a dedicated outreach collection, including curatorial practices, conservation, and balancing the needs of scientific research with community engagement. We propose that outreach collections be viewed as distinct entities, supported by collaboration between curatorial and educational teams to ensure both scientific integrity and long-term sustainability.

**Key words:** Collection management, museum education, public engagement, scientific outreach



This article is part of:

**Entomological Outreach Collections and Community Engagement**

Edited by Victor Gonzalez,  
Jennifer C. Girón Duque

Academic editor:

Jennifer C. Girón Duque

Received: 22 January 2025

Accepted: 17 February 2025

Published: 12 March 2025

**Citation:** Arriaga Jiménez A, Fearn S (2025) Balancing discovery and education in natural history collections. *Natural History Collections and Museomics* 2: 1–8. <https://doi.org/10.3897/nhcm.2.147409>

Copyright: ©

Alfonsina Arriaga Jiménez & Simon Fearn.

This is an open access article distributed under terms of the Creative Commons Attribution

License ([Attribution 4.0 International – CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)).

## Introduction

Insects are the most diverse and abundant terrestrial animal group (Stork 2018), and they are generally well represented in natural history collections. They contribute to critical ecosystem services such as pollination, decomposition, and nutrient cycling, while also presenting challenges as pests and disease vectors (Losey and Vaughan 2006; Klein et al. 2007; Culliney 2014; Sharma et al. 2017). Understanding and addressing the numerous roles insects play requires well-developed scientific knowledge, supported by collections that provide historical and contemporary data for monitoring populations and assessing environmental changes (Luke et al. 2023).

Natural history collections serve as repositories of biological diversity, offering invaluable resources for both scientific discovery and public education (Rouchon 2021). At the Queen Victoria Museum and Art Gallery (QVMAG), as well as at other institutions worldwide, we see our collections as much more than static drawers of specimens. They are dynamic, essential



tools for understanding the past, navigating the present, and planning for the future. Beyond their scientific value, natural history museums serve as hubs for interdisciplinary research and educational advancement. Through extensive exhibits, public programming, and community engagement, they offer a place-based window into the integration of diverse scientific disciplines (Bakker et al. 2020). These collections not only document biodiversity across different scales but also serve as vital reference points for scientists and the public exploring the natural world and population trends (Shaffer et al. 1998).

Museum biological collections include specimens with important core data, such as locality, collection parameters, environmental variables, and even DNA, enabling cutting-edge research in areas like environmental monitoring, infectious disease studies, and tracking phenotypic changes over time (Suarez and Tsutsui 2004; Grandcolas 2021). At QVMAG, our core entomological collection documents Australian and Tasmanian biodiversity, supporting taxonomic and ecological studies, conservation planning, and climate change assessments. By combining meticulous curation with modern tools such as digitization and data-sharing platforms (e.g., Atlas of Living Australia, Belbin et al. 2021), we ensure these resources remain globally accessible and preserved for generations to come.

## History of the entomology collection at QVMAG

Historically, the QVMAG natural history collections focused primarily on vertebrates, reflecting the research priorities and collection efforts of previous Senior Curators. This emphasis left invertebrates, particularly insects, relatively overlooked (QVMAG 2018). Unlike larger state institutions on mainland Australia, which benefited from significant donations of private entomological collections, QVMAG had not, until recently, received any major contributions of this kind. As a regional museum with a strong focus on northern Tasmania and a smaller population base, QVMAG lacked the same influx of extensive private collections. This limitation, combined with constrained resources and sporadic collecting efforts, resulted in an entomology collection that was relatively modest in both taxonomic depth and geographic coverage.

One major consequence of these historical factors is the absence of surplus specimens that could be designated specifically for education and outreach. In contrast, larger institutions like Museums Victoria have been able to allocate extensive material for such purposes. For example, Museums Victoria designated approximately 20,000 pinned insect specimens, which had limited associated data, to be used in a long-term public education display (Ken Walker 2024, pers. comm.). This illustrates differing resources between collections and highlights the challenges regional museums have in managing research, conservation, and public education at the same time.

The turning point for QVMAG came in 2013 when Natural Sciences staff with expertise and a strong interest in arthropods – particularly insects and spiders – were employed. The curator, collection officer, and an honorary researcher began addressing significant gaps in the invertebrate collection, focusing on northern Tasmania. Recognizing the urgent need for a comprehensive



reference collection to study climate change and its impacts on biodiversity, we initiated targeted fieldwork in under-sampled regions of Tasmania and accepted a remarkable donation of more than 16,000 pinned specimens—primarily butterflies—from the nationally significant Trevor Lambkin–Ian Knight private collection (Maynard and Fearn 2021).

Over the past decade, our collection has grown exponentially, approximately 140,000 insects and spiders have been added through fieldwork and donations, with nearly 40,000 now registered and available through the Online Zoological Collections of Australian Museums (**OZCAM**) and Atlas of Living Australia (**ALA**) websites.

### Developing and maintaining our outreach collection

In 2018, the Natural Science team took a closer look at the limited numbers of historical specimens with little scientific value (e.g., lacking precise locality data) and repurposed them into an education and outreach collection (Fig. 1). This new collection, housed in a dedicated cabinet within the Natural Science collection, has become an invaluable resource for our Learning and Engagement team, supporting hands-on activities that connect the public with nature. This collection remains under the careful oversight of our Natural Sciences team.

However, creating an outreach collection from existing scientific collections remains a challenge. Registered specimens, vital for scientific research, are too valuable and fragile for public engagement. Additionally, many local Tasmanian species, while fascinating, lack the vibrant appearance and size needed to capture public imagination. Without a broader array of visually striking species from mainland Australia or beyond, it is sometimes difficult to fully engage audiences.

Purpose-built outreach collections bridge the gap between scientific research and community engagement (Bakker et al. 2020) and are assembled for a completely different purpose: to inspire, engage, and educate the public; museums provide everyday opportunities to enhance scientific knowledge and motivation while making science more relevant (Martin et al. 2016). These collections play an important role in exhibitions, interactive displays, and educational initiatives, such as National Science Week (QVMAG 2024; Fig. 2). While they do not hold the same scientific value or adhere to rigorous research standards, they are excellent tools for sparking curiosity and inspiring public interest. They are particularly effective in engaging audiences, especially children, in discussions about evolution, biodiversity, and the vital role of insects in ecosystems. However, maintaining these specimens in public-facing roles requires ongoing care to prevent damage from frequent handling, light exposure, and humidity fluctuations.

To address these challenges, we recognize the need for a dedicated outreach collection that is thoughtfully curated and properly maintained. Establishing such a collection requires planning and collaboration between collection officers, curators and educators, as well sufficient resources to ensure its long-term sustainability. This includes securing durable specimens, implementing conservation-friendly display methods, and developing guidelines for responsible handling.



Figure 1. Examples of outreach collection drawers. Image credit: Queen Victoria Museum and Art Gallery, Tasmania.



**Figure 2.** Children observing insects during National Science Week 2024. Image credit: Queen Victoria Museum and Art Gallery, Tasmania.

## BUGS

QVMAG's upcoming STEAM (Science, Technology, Engineering, Arts, and Mathematics) gallery, "BUGS," represents an exciting opportunity to showcase some specimens from our outreach collection. With "BUGS," we aim to engage audiences, particularly children, through a multidisciplinary framework that includes interactive displays, creative activities, and immersive experiences about the fascinating world of insects and arthropods.

The gallery will feature a wide range of information about insects and arthropods, with an emphasis on Tasmanian species. This will allow the public to gain a closer look at the biodiversity found in their own backyards and in the bush. Through different themes and activities, visitors will learn about the remarkable abilities and importance of these arthropods and insects. The outreach collections will enable children and the general public to examine specimens up close, without compromising the integrity of our core scientific collection. "BUGS" will also serve as a starting point for ongoing outreach efforts. By integrating the gallery with school programs and community events, we aim to extend its impact beyond the museum, inspiring young minds to explore science and biodiversity in their everyday lives.

The curation of outreach drawers is ongoing, with conservation challenges such as light exposure and humidity fluctuations being addressed through newly designed display cases. To display specimens in BUGS, we have invested in Avelon VEL (Vertical Electric Lift; Show Works 2024) showcases, which will offer the environmental control needed to preserve them in optimal condition for long-term exhibitions. While the exhibition will feature outreach specimens collected specifically for this purpose, these cases also ensure their longevity.



Furthermore, the showcases provide flexibility, allowing us to present shorter-term exhibitions using collection specimens as well.

While developing “BUGS”, we recognized the need to expand our outreach collection with specimens that are not only visually striking, those “shiny” or particularly “interesting” specimens that captivate attention, but also familiar species that the public can encounter in their gardens or while exploring the bush. To achieve this, we organized targeted fieldwork specifically aimed at collecting specimens for this exhibition. With plans for the exhibition to tour in the future, we want to include real, preserved specimens, to enrich the experience, giving visitors a tangible connection to our work and the incredible biodiversity we study. However, we also acknowledge the challenges of preserving these specimens, as they are susceptible to degradation from movement, light exposure, and the demands of being displayed and handled by educators. This stresses the importance of maintaining a dedicated outreach collection, designed with unique curatorial, management, and conservation practices to ensure these specimens remain both engaging and intact for years to come.

## Discussion and future considerations

Outreach collections are invaluable for bridging the gap between scientific institutions and the public. They enable QVMAG to showcase the wonders of Tasmania’s biodiversity while inspiring future generations of scientists and naturalists. However, effective management of these collections requires recognizing their unique needs. They must be treated as distinct entities, supported by dedicated resources, and never sourced from the core scientific collection to avoid compromising its integrity. By maintaining this balance, QVMAG can continue to stand as a symbol of scientific excellence and community engagement, ensuring its collections remain relevant, respected, and accessible to all.

To support and ensure the long-term success of this initiative at QVMAG, a well-structured collaboration between the Learning and Engagement and Natural Sciences teams will be essential. While Natural Sciences will continue to provide expertise in curation and preservation, Learning and Engagement staff could take a more active role in managing outreach specimens, integrating them effectively into educational programs. This approach would require careful planning to balance responsibilities and resources, ensuring that outreach efforts expand without diverting focus from research and fieldwork. Establishing clear protocols and guidelines for responsible specimen handling will also be crucial as Learning and Engagement becomes more involved, maintaining best practices while enhancing accessibility.

Strengthening this partnership will allow both teams to refine curation, conservation, and engagement strategies, ensuring that outreach collections remain a valuable bridge between scientific research and public education. Although the primary goal is education, engagement, and outreach, the new guidelines will strengthen the collaboration between teams, allowing us to refine curation, conservation, and engagement strategies while ensuring that outreach collections continue to serve as a vital link between scientific research and public education.



## Acknowledgements

The authors would like to thank the amazing Learning and Engagement team, and everyone involved in the BUGS gallery for their valuable input and discussions, which helped shape the outreach collection for a range of purposes. We also acknowledge the reviewers and editors for their feedback and suggestions, which have helped improve this paper.

## Additional information

### Conflict of interest

The authors have declared that no competing interests exist.

### Ethical statement

No ethical statement was reported.

### Funding

No funding was reported.

### Author contributions

Conceptualization: AAJ. Data curation: SF, AAJ. Investigation: AAJ. Methodology: AAJ. Writing – original draft: AAJ, SF. Writing – review and editing: SF, AAJ.

### Author ORCIDs

Alfonsina Arriaga Jiménez  <https://orcid.org/0000-0002-1242-7496>

### Data availability

All of the data that support the findings of this study are available in the main text.

## References

- Bakker FT, Antonelli A, Clarke JA, Cook JA, Edwards SV, Ericson PGP, Fairby S, Ferrand N, Gelang M, Gillespie RG, Irestedt M, Lundin K, Larsson E, Matos-Maraví P, Müller J, von Proschwitz T, Roderick GK, Schliep A, Wahlberg N, Wiedenhoeft J, Källersjö M. (2020) The Global Museum: natural history collections and the future of evolutionary science and public education. *PeerJ* 8: e8225. <https://doi.org/10.7717/peerj.8225>
- Belbin L, Wallis E, Hobern D, Zerger A (2021) The Atlas of Living Australia: History, current state and future directions. *Biodiversity Data Journal* 9: e65023. <https://doi.org/10.3897/BDJ.9.e65023>
- Culliney TW (2014) Crop losses to arthropods. In: *Integrated pest management: pesticide problems*, Vol.3. Springer, Netherlands, 201–225. [https://doi.org/10.1007/978-94-007-7796-5\\_8](https://doi.org/10.1007/978-94-007-7796-5_8)
- Grandcolas P (2021) Natural History Collections: An Ancient Concept in a Present and Future Perspective. *Natural History Collections in the Science of the 21<sup>st</sup> Century: A Sustainable Resource for Open Science*, 13–26. <https://doi.org/10.1002/9781119882237.ch2>
- Klein AM, Vaissière BE, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C, Tscharntke T (2007) Importance of pollinators in changing landscapes for world



- crops. *Proceedings of the Royal Society B: Biological Sciences* 274(1608): 303–313. <https://doi.org/10.1098/rspb.2006.3721>
- Losey JE, Vaughan M (2006) The economic value of ecological services provided by insects. *Bioscience* 56(4): 311–323. [https://doi.org/10.1641/0006-3568\(2006\)56\[311:TEVOES\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2006)56[311:TEVOES]2.0.CO;2)
- Luke SH, Roy HE, Thomas CD, Tilley LA, Ward S, Watt A, Carnaghi M, Jaworski CC, Tercei MPTG, Woodrow C, Aown S, Banfield-Zanin JA, Barnsley SL, Berger I, Brown MJF, Bull JC, Campbell H, Carter RAB, Charalambous M, Cole LJ, Ebejer MJ, Farrow RA, Fartyal RS, Grace M, Highet F, Hill JK, Hood ASC, Kent ES, Krell F-T, Leather SR, Leybourne DJ, Littlewood NA, Lyons A, Matthews G, Mc Namara L, Menéndez R, Merrett P, Mohammed S, Murchie AK, Noble M, Paiva M-R, Pannell MJ, Phon C-K, Port G, Powell C, Rosell S, Sconce F, Shortall CR, Slade EM, Sutherland JP, Weir JC, Williams CD, Zielonka NB, Dicks LV (2023) Grand challenges in entomology: Priorities for action in the coming decades. *Insect Conservation and Diversity* 16(2): 173–189. <https://doi.org/10.1111/icad.12637>
- Martin AJ, Durksen TL, Williamson D, Kiss J, Ginns P (2016) The role of a museum-based science education program in promoting content knowledge and science motivation. *Journal of Research in Science Teaching* 53(9): 1364–1384. <https://doi.org/10.1002/tea.21332>
- Maynard D, Fearn S (2021) A precious gift: the Lambkin-Knight butterfly collection donated to the Queen Victoria Museum and Art Gallery. *The Tasmanian Naturalist* 143: 1–11.
- Queen Victoria Museum and Art Gallery (2018) Significance assessment of the vertebrate skin and skeleton collection (CHG2018/094). Internal Queen Victoria Museum and Art Gallery report: unpublished.
- Queen Victoria Museum and Art Gallery (2024) Annual Report 2023–24.
- Rouchon V (2021) Why Preserve? Natural History Collections in the Science of the 21<sup>st</sup> Century: A Sustainable Resource for Open Science. <https://doi.org/10.1002/9781119882237.ch20>
- Shaffer HB, Fisher RN, Davidson C (1998) The role of natural history collections in documenting species declines. *Trends in Ecology and Evolution* 13(1): 27–30. [https://doi.org/10.1016/S0169-5347\(97\)01177-4](https://doi.org/10.1016/S0169-5347(97)01177-4)
- Sharma S, Kooner R, Arora R (2017) Insect pests and crop losses. In: *Breeding insect resistant crops for sustainable agriculture*. Springer, Singapore, 45–66. [https://doi.org/10.1007/978-981-10-6056-4\\_2](https://doi.org/10.1007/978-981-10-6056-4_2)
- Show Work Avelon VEL Showcase System (2024) Show Work Avelon VEL Showcase System. <https://showworks.com.au/showcases/products/avelon/>
- Stork NE (2018) How many species of insects and other terrestrial arthropods are there on earth? *Annual Review of Entomology* 63(1): 31–45. <https://doi.org/10.1146/annurev-ento-020117-043348>
- Suarez AV, Tsutsui ND (2004) The value of museum collections for research and society. *Bioscience* 54: 66–74. [https://doi.org/10.1641/0006-3568\(2004\)054\[0066:TVOMCF\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2004)054[0066:TVOMCF]2.0.CO;2)