

Discovering new plant and fungi species

June 22 2022, by Dr Joanne Birch and Melanie Simpson



Algal specimen in the Charles Morrison algal scrapbook. Credit: University of Melbourne Herbarium

There is so much we still don't know about native species in Australia and New Zealand. Best estimates suggest that we have [yet to discover and name some 70% of the life](#) living around us.

The picture for plant life is probably the most complete—we think we've

found and described 90% of vascular plants (e.g. flowering plants, gymnosperms and ferns)—but even that implies there are perhaps several thousand [plant species](#) still to find.

But when it comes to fungi, we've described less than a quarter of the estimated 100,000 [species](#) out there.

Gaining a fuller understanding of native plant and fungi [biodiversity](#) is hugely important. Our native plants and fungi are a vital resource, [including for food, medicines and material products](#). This biodiversity is essential for:

- ensuring food security through sustainable agriculture
- developing new medicines
- managing pathogens of economically important species like crops
- and maintaining ecosystems that support other species.

But the challenge isn't just about discovering new species, naming and describing them. It's also about ensuring [data](#) for these species—like what habitats they occupy or what climatic conditions they grow in—are freely available, so that the public, researchers and policy makers can harness what we know about them.

And it is here that citizen scientists are making a difference.

Australian herbaria, which are natural history collections of plants and fungi, like the University of Melbourne's Herbarium, collectively hold over eight million specimens of [vascular plants](#), green and red algae, mosses and fungi.

The collection data associated with these specimens—which records where and when the samples were collected and who collected them

amongst other details—is key biodiversity data that is made publicly available through the online repository [Australasian Virtual Herbarium](#).

This data can be used for use in research, teaching, biodiversity monitoring, biosecurity and many other applications.

To date, only a fraction of the specimens in these collections have been fully digitized—including databasing, geo-referencing, and digital imaging—which is essential for making this data sharable and reusable. It's a huge undertaking—and citizen scientists are crucial.

Citizen science initiatives are engaging diverse local communities in documenting local biodiversity and curating collection-based biodiversity data. Their involvement harnesses local expertise, creates a global network of contributors to digitization efforts and advances public understanding of biodiversity science.

For example, every semester at the University of Melbourne Herbarium, including throughout the COVID-19 pandemic lockdowns, a team of undergraduate and graduate student volunteers commit time on a weekly basis to work on curation.



Field work, like in the Alpine vegetation in the Victorian Alps, is an important part of the effort to fully understand the biodiversity of our plants and fungi.
Credit: Dr Joanne Birch

These students receive training in how herbarium specimens are prepared, conserved, digitized and used in scientific research as well as on the current protocols for biodiversity data management.

Many of the student volunteers go on to complete post-graduate study, others take on curation roles in herbaria or museums, or pursue interests in data management or bioinformatics.

While discovering and developing their research-associated interests and skills, they make a significant contribution to the curation of our collection.

In many ways citizen scientists are the modern equivalents to the "amateur botanists" of the early 20th century, to whom modern botany is heavily indebted. One such Australian "amateur" was the "school teacher botanist" Herbert Bennett Williamson, who, on retiring, served as the keeper of the University of Melbourne Herbarium between 1929 and 1931.

Throughout his professional teaching career (1875–1925), H.B. Williamson traveled across Victoria, observing the native flora, describing many species and collecting more than 6,000 specimens gifted to national and international herbaria—which are now accessed by researchers globally.

In Australia, [iNaturalist](#) is a popular platform where citizen scientists contribute to biodiversity data, with [upwards of 27,000 users](#). The scope of iNaturalist initiatives varies immensely, from local or species specific initiatives—like the FungiSight which focuses on Australasian fungi—to global initiatives, like the [Great Southern Bioblitz 2021](#) that's engaged with more than 6,000 people.

These community science initiatives provide data at spatial and temporal scales not possible from individual or small teams of collectors.

Curated, research-grade data from these repositories provides a rich source of observational data, documenting where species are found and what ecosystems they are part of.

They also provide valuable opportunities for citizen scientists to observe and connect with local biodiversity and the data generated is increasingly

integrated into ecological, systematic and conservation-focused research.

Alongside [large-scale digitization initiatives](#), museums and herbaria also often engage citizen scientists to transcribe labels from historical collections, many of which are handwritten, to convert them into a digital format.

The digitization of specimen data enables fascinating and enduring links to be drawn—connecting plant collectors, the specimens that they collected and the [scientific research](#) based on those specimens.

As a testament to the enduring value of these resources, [herbarium specimens](#) collected by H.B. Williamson between 1882 and 1931 were integrated into research and cited in five publications in 2022, according to records captured in the online repository [Bionomia](#).

Across the country, the valuable assets in our natural history collections are being studied and curated by scientists, curators and [citizen scientists](#). These efforts are ensuring the specimens at the heart of this significant research infrastructure are well curated and available for research and discovery in perpetuity.

Provided by University of Melbourne

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