

## Two new fungi species uncovered in Australian Herbarium after DNA breakthrough



Figure 1 - *Peziza austroechinospora*



Figure 2 – *Peziza meridionalis*

Scientists at Royal Botanic Gardens Victoria, Australia have described two new species of fungi, *Peziza austroechinospora* and *Peziza meridionalis* with the assistance of DNA sequencing — highlighting how modern science is revealing vast, hidden biodiversity beneath our feet.

The discovery was made by researchers working with collections held at the National Herbarium of Victoria, which is home to 1.6 million irreplaceable plant, algae and fungi specimens, and where the specimens had previously been classified under the broader genus *Peziza*. Genetic sequencing refined that classification, confirming the existence of two distinct species found across southern Australia.

Dr Camille Truong, Research Scientist (Mycology) at Royal Botanic Gardens Victoria, said the finding demonstrates the power of natural history collections linked to DNA technologies to accelerate species discovery.

Despite their critical role in ecosystems, fungi remain one of the most under-described groups of organisms on Earth. Scientists estimate that only about 155,000 of the planet's 2–3 million fungal species — around five per cent — have been formally described. In Australia it is estimated that there are at least five times more fungal species than plant species, yet only a fraction of those species have been formally described and assessed for conservation purposes.

“Many fungi are invisible to the human eye and a handful of soil can contain hundreds of species of fungi. DNA sequencing, together with scientific observation, is increasing the rate of new discoveries in general and led to the discovery of this new species,” she said.

“Identifying and naming fungi is essential if we are to conserve them,” Dr Truong said. “Fungi are nature’s great recyclers. They underpin healthy soils and forests,

help plants absorb water and nutrients through underground networks, and provide food and medicines that humans rely on.”

Specimen donations also played a crucial role in the discovery. One of the key specimens was collected in Tasmania in 2004 by Mycologists the late David Ratkowsky and Genevieve Gates and later donated to the National Herbarium of Victoria.

“Donations to the Herbarium by citizens and scientists dramatically expand the quality, quantity and geographic range of specimens available for research,” Dr Truong said. “We are deeply grateful to Genevieve Gates and David Ratkowsky for their contribution to this discovery.”

The species is often found on old fire sites and charred wood and is often brown in appearance in the shape of a cup.

She said that Genevieve and David’s collections, combined with others from Western Australia and Victoria dating back to the 1960’s and 70’s, formed a clade – a group of organisms believed to comprise all the evolutionary descendants of a common ancestor – separate to the cosmopolitan species *Peziza echinospora*.

Dr Truong and colleagues investigated the specimens using light microscopy and Scanning Electron Microscopy (SEM) and compared them to the morphology of similar species.

“We found that the ascospores of the specimens in the separate clade were larger, more ellipsoid shaped and with slightly different ornamentation than those of *Peziza echinospora*, and other known species of *Peziza*.”

Gates and Ratkowsky’s specimen were selected as the holotype for the new species. A holotype is a single type specimen upon which the description and name of a new species is based.

“We selected their specimen over others because it was an ample collection with a photograph and field notes,” she said.

*Peziza meridionalis*, while similar in appearance, is found on soil in eucalypt forests and woodlands, is not associated with post-fire environments. Its spores (the dispersal units in fungi, like seeds in plants) have smooth cell walls, as opposed to the bumpy spores of *Peziza echinospora*. DNA sequencing confirmed that this species was distinct from other smooth spored species, *Peziza vesiculosa* and *Peziza varia*.

Luke Vaughan, Research Assistant (Taxonomic Mycology) at Royal Botanic Gardens Victoria suspended the cells of dried specimens in liquid to extract pure DNA for analysis, by breaking the cells and precipitating away the unwanted parts of the cells such as proteins and polysaccharides.

The research was supported by a grant from the Australian Biological Research Study (ABRS) and is part of Luke Vaughan’s (RBGV) Master of BioSciences

research, supervised by Dr Camille Truong (RBGV) and Dr Joanne Birch (University of Melbourne).

Dr Truong and colleagues described *Peziza austroechinospora* along with *Peziza meridionalis*, in the new paper entitled “*Exploring the diversity of Peziza echinospora (Ascomycota, Pezizomycota) and related species in Australia, with descriptions of the new species P. austroechinospora and P. meridionalis.*”

Link to paper:

<https://www.tandfonline.com/doi/full/10.1080/00275514.2026.2616180#d1e660>

Last year, Dr Truong also co-authored a paper about ‘Dark taxa’, species known only from DNA sequences that have yet to be named, entitled “*The biogeography and conservation of Earth’s ‘dark’ ectomycorrhizal fungi*”. Link to paper:

<https://www.sciencedirect.com/science/article/pii/S0960982225004269>

### **Images and video:**

<https://www.dropbox.com/scl/fo/6mvr48c97m2kwt5mwt3f8/AKIPBS3Sg9v4KBIGMjw46VE?rlkey=h89nvcg55dinlkzf8pxaa3kjj&st=sgijiv3z&dl=0>

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