



Figure 1. Lee, Fungarium Collections Manager, opens the tour by introducing a selection of specimens.

# Stepping into the World's Largest Fungarium

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**Context:** The Fungarium at Royal Botanic Gardens, Kew (hereon referred to as Kew), as you'll appreciate as fellow mycologists, is a place I've wanted to visit for some time, and this desire was regularly fuelled when I saw online snippets of information and/or photos of the treasures it contained. The chance of my visiting was low: I live in Scotland (north of Edinburgh) some distance from London, and the Fungarium is not usually open for visits (although researchers can request a visit via the Kew website).

In autumn 2025, by sheer chance, three events occurred simultaneously that enabled me to visit:

1. A family gathering was planned for September 2025 in southern England
2. I was to attend the British Mycological Society (BMS) autumn meeting at Kew
3. The Fungarium was offering a tour to attendees of the BMS meeting

So, after years of waiting, I had a chance to step into the Fungarium, and it was not going to disappoint.

## **What is the Fungarium?**

The Fungarium is underground, beneath the Jodrell Laboratory at Kew. It is the largest fungarium in the world with approximately 1.3 million dried specimens and is one of the oldest, founded during the reign of Queen Victoria. Its foundation came as a result of a donation in 1879 of 30,000 specimens from Miles J. Berkeley (including 6,000 type specimens).

## **Key highlights**

How do I explain to you (the FUNGI reader) how wonderful the visit was? My visit is best explained as two halves; the introductory talk followed by a chance to explore the shelves.

To cover everything I saw along with photos, would probably require an entire edition of FUNGI magazine, so I'm going to focus on my key highlights.



Figure 2. “Beverly,” the tarantula-infecting ascomycete *Cordyceps caloceroides*, with two long ascomata grown from the host; an intact, uninfected tarantula is shown alongside for comparison.

### Introductory talk

Lee Davies (Fungarium Manager) gave a very enthusiastic and engaging opening talk on the history of the Fungarium, followed by how the Fungarium operates, as well as a selection of fungal specimens. As he spoke, Rosie Woods (Fungarium Curator) with perfect timing brought over a steady stream of specimens to make their appearance (Fig. 1).

### Beverly the tarantula-loving *Cordyceps caloceroides*

Beverly consists, not of a perfect 8-legged tarantula, but instead the pale-colored, dried-out arachnid-loving fungus *Cordyceps caloceroides* which formed within the exoskeleton, molded to the internal form. From this, two long ascomata had grown out from the corpse for the purpose of releasing spores. The result was that the storage box held by Lee was quite long to accommodate this impressive fungus. For comparison, next to Beverly was an intact, dead but uninfected tarantula (Fig. 2).

### *Golfballia ambusta*

The first *Golfballia* arrived at Kew in 1952 from Lancashire, England followed a decade later by another from East Africa, accompanied by collection details (e.g. “habitat; short green grass soon after fire, in wet savannah”). At a glance, and to the untrained eye, these fungi were surely gasteroid, not unlike a *Bovista* or dumpy *Lycoperdon* (Fig. 3). Lee explained that after a closer examination at the time, they were recognised not as anything mycological, rather as burnt golf balls.

After the arrival of the East African collection the Head of Mycology at the time, Dr. R.W.G Dennis, decided to make the most of a rather unique opportunity and published a paper. In “A remarkable new genus of phalloids in Lancashire and East



Figure 3. Type material of *Golfballia ambusta*—burnt golf balls formally described as a new species by R.W.G. Dennis in 1962.

Africa,” he described them as “small, hard but elastic, spheres enjoyed by the Caledonians in certain tribal rites.” Since that publication, *Golfballia* has been “collected” twice more from the UK by mischievous mycologists!

For those FUNGI readers living in North America, could this be an opportunity to see if *Golfballia* has a wider distribution than just that of Europe and Africa?

### *Penicillium notatum* (syn. *P. chrysogenum*) currently *P. rubens*

*Penicillium notatum* is an older synonym yet it’s used here because under this name, this fungus became one of the

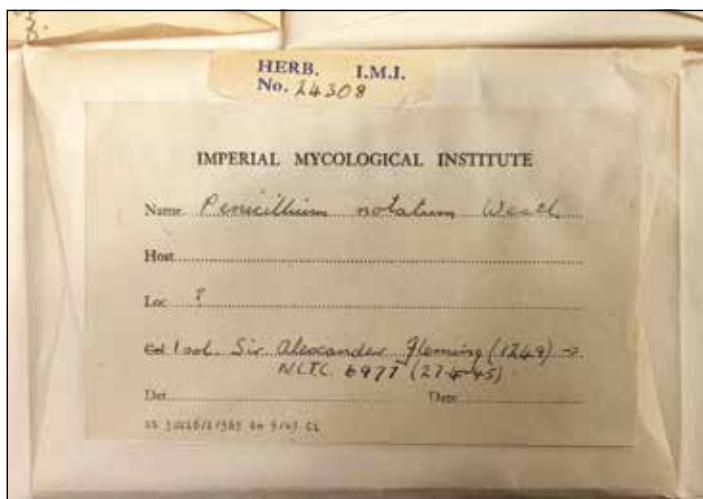


Figure 4. International Mycological Institute (IMI) envelope containing a preserved sample grown from Alexander Fleming's original *Penicillium notatum* (now *P. rubens*) culture.

greatest medical breakthroughs of all time and Lee refreshed us of Alexander Fleming's discovery of the antibiotic penicillin. To accompany the explanation, Lee brought out a neat little envelope once belonging to the International Mycological Institute (IMI) and within was a preserved sample grown from the original culture of Fleming's *Penicillium notatum*. A small unassuming packet and specimen (Fig. 4).

### The green boxes

One of the most striking features on entering the Fungarium are the unmistakable green boxes, an immense number arranged on a moveable shelving system (Fig. 5). Lee demonstrated how each box contained fungi from a single genus, with each species within that genus having its own folder. Within the folder would be a large piece of card to which were attached the preserved fungi. It was clear that



Figure 5. Archival green boxes at Kew Gardens, each safeguarding a single fungal genus—an ordered library of global biodiversity preserved for future mycological study.

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each species had been collected more than once by different mycologists. How those specimens were attached to the card in some cases gave an indication of how long ago they were collected. Those from earlier dates seemed to be stuck or taped directly onto card, with collection notes written around them whereas those collected later were placed into paper packets with notes on the exterior, then attached to card.

I looked more closely at the information held on two cards; it became an incredible history of mycology. Names such as Berkeley, Ravenel, Klotzsch, Cooke, Fuckel, Saccardo, and Broome accompanied by dates of 1832, 1847, 1869, 1884, etc. A selection of the greatest mycologists, from a bygone era.

### Exploring the shelves

After the talk, I had the opportunity to explore a small display area, and then with the company of both Rosie and Lee, through shelves of green boxes. Here are some of my standout fungi:

#### *Cyttaria darwinii* (Darwin's Golf Ball)

Could this specimen be as famous as the *Penicillium* sample? The HMS Beagle sailed around South America from 1831 to 1836, carrying a young Charles Darwin. Whilst visiting Tierra del Fuego, Charles collected a globular, orange-colored fungus growing on southern beech trees (*Nothofagus* sp.) and to preserve the specimens, he dropped them into port. Once



Figure 6. Type material of *Cyttaria darwinii* (Darwin's Golf Ball), collected by Charles Darwin in Tierra del Fuego in 1832 during the HMS Beagle voyage.

back in the UK the fungi were passed to Miles Berkeley, who subsequently named them in honor of Charles. These alcohol treated specimens (Fig. 6), the type for the genus, were on display, inches from my peering eyes.

#### *Psilocybe cyanescens* (Blue-leg Brownie)

Although very well known today, its official discovery occurred when Elsie Wakefield, who went on to become the first female Head of Mycology, at Kew, collected specimens found growing in the grounds of Kew. Although described in 1946, the type specimen was one she had collected earlier. The original but empty packet is on display next to Darwin's *Cyttaria*. Empty because in the UK, as in many countries,



Figure 7. *Onygena equina* (Horn Stalkball) fruiting on the horns stilled attached to the sheep skull on which it was collected.

*Psilocybe* is a "controlled substance," the actual specimens are securely locked away from public reach.

#### *Onygena equina* (Horn Stalkball)

This specimen was high on my list of "must-see," not because *Onygena* is rare (it's a resident on a pile of sheep horns in my garden) rather, along with *Cyttaria*, it provides an iconic image of the Fungarium. The specimen collected and on display (Fig. 7), came along with the whole skull adorned with its two curling horns and right next to the *Cyttaria* display.

#### *Hemileia vastatrix* (Coffee Rust)

I am fascinated by rust fungi and arguably one of the most well-known (perhaps infamous) is this one. During the 1860s and 70s, Ceylon (as it was referred to then) went from being one of the largest growers and exporters of coffee to one of almost complete failure (and as a result the farmers switched to tea production) because of the devastating impact of *Hemileia vastatrix* on coffee plants causing premature leaf drop and reduced fruit setting.

Having spotted the box for *H. vastatrix*, Lee revealed the contents: the type specimen (dated 1869) along with detailed drawings, which at the height of this rust's impact was referred to as "Devastating Emily." In front of me was a specimen of "Devastating Emily" collected just prior to the collapse of the Ceylonese coffee industry (Fig. 8).

#### *Mycena juniperina* (Juniper Bonnet)

The team at the Fungarium welcomes additions to the collection, be they rare, unusual, or common; they all add to the ever-growing pool of knowledge. My first specimen's

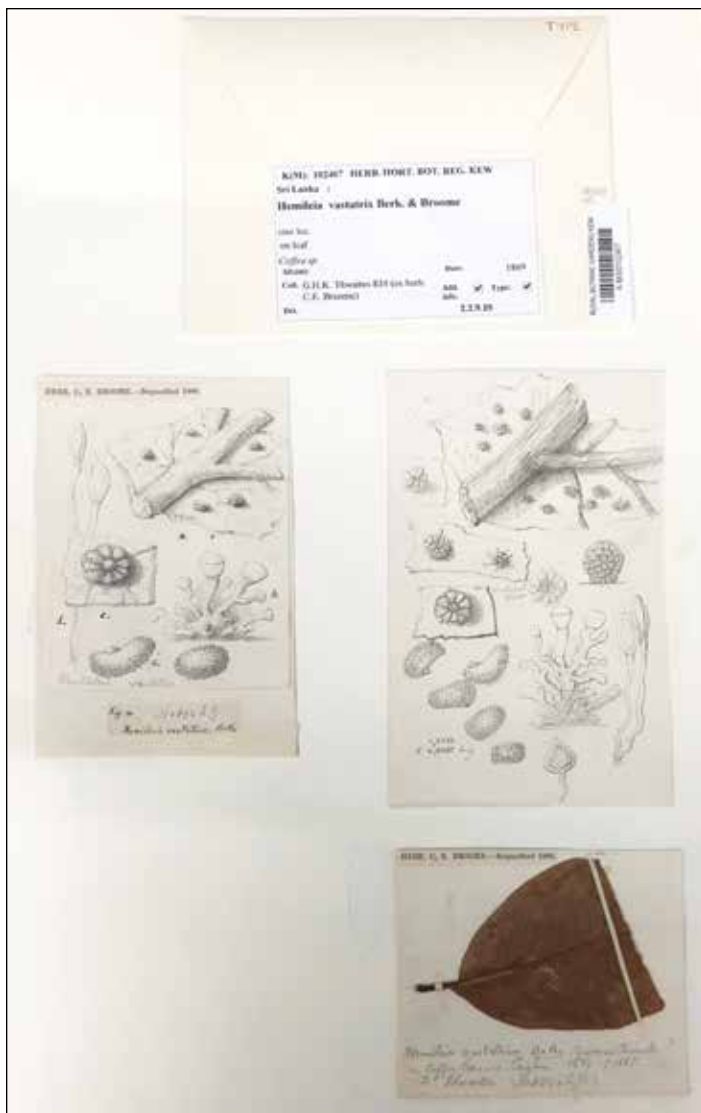


Figure 8. Type specimen of *Hemileia vastatrix* (Coffee Rust), dated 1869, with the original detailed drawings made at the height of the rust's impact on the Ceylonese coffee industry.

journey to the Fungarium, was posted not many years ago, and having been responsible for the start I was keen to see the final resting place of my specimen.

The species concerned was *Mycena juniperina*, collected during the annual, week-long Scottish foray from rather an unusual location, the MOD Tain Air Weapons Range in northeast Scotland. This site is not accessible to the public however the foray group had been given access for just one day, a rare opportunity to search an area of undisturbed habitat in which common juniper (*Juniperus communis*) grew in good number. We hadn't anticipated seeing this *Mycena*, as it is very rarely recorded, yet as soon as we started looking within the juniper, *M. juniperina* was everywhere. Not being sure how many, if any specimens of this fungus could be in the Fungarium I collected and sent some off (Fig. 9).

### *Tilletia caries* (Stinking Bunt)

I have a fondness for rusts and smuts, and this smut was on my Fungarium list to see as I am unlikely to see it in the wild. The agricultural industry considered *Tilletia caries* undesirable; it infected the seed of grain crops such as wheat, and the smell



Figure 9. *Mycena juniperina* (Juniper Bonnet) collected on common juniper (*Juniperus communis*) during the Scottish Joint Foray to the MOD Tain Air Weapons Range, and accessioned into the Fungarium collection.

(fishy) rather than the smutty appearance was what made the grain unsaleable. As it was easily and successfully prevented with a fungicidal seed coating prior to planting *T. caries* now appears to be extinct in the UK. (I read somewhere that the fishy odor/taste that permeated the flour could be overcome, and the flour used for food so long as another ingredient with

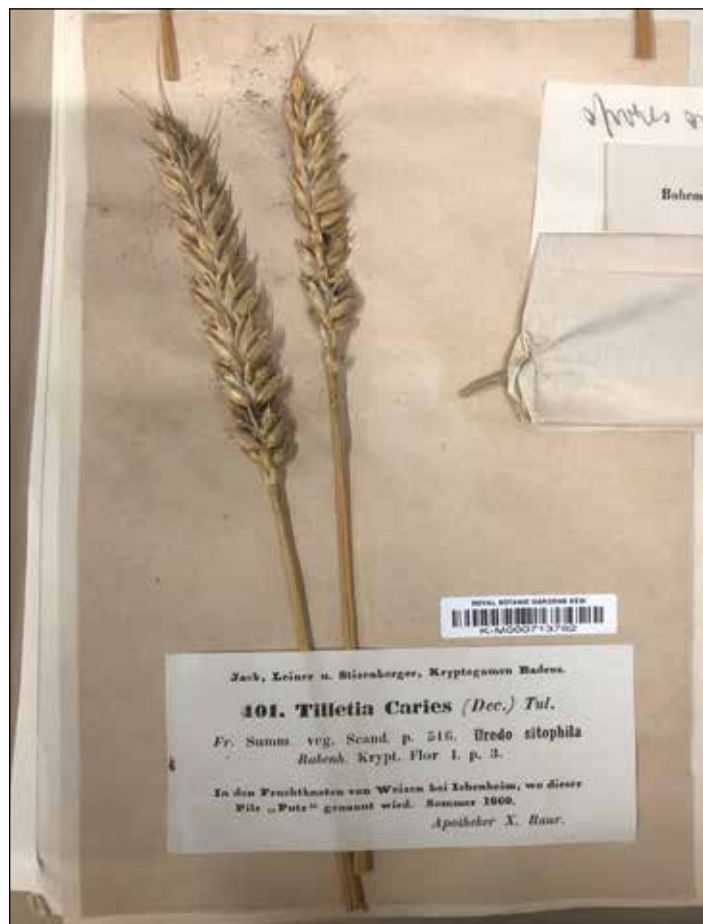


Figure 10. *Tilletia caries* (Stinking Bunt) packet showing loose teliospores, with a collection date of 1860.

an even stronger smell and flavor was incorporated into the recipe, hence the inclusion of ginger in gingerbread.)

I was delighted to finally get to see examples of *T. caries*. You might be wondering if I was tempted to collect a sample of the smutty spores loose within the packet (Fig. 10) and in all honesty, yes. It would have been so easy to moisten a finger and pick up spores surreptitiously ... however with 1860 as the date of collection, and with too great a respect for the Fungarium, I pushed the thought from my mind.

### Unexpected encounter with M.C. Cooke

Whilst Lee and I were looking through further collections of Miles J. Berkeley, we came across donations from one of



Figure 11. Specimen from Mordecai Cubitt Cooke's donations to the Fungarium, accompanied by his characteristic ornate handwriting.

the most important Victorian mycologists: Mordecai Cubitt Cooke. Seeing some of Cooke's specimens should not have been unexpected; but it did come as a nice surprise, especially as they were accompanied with his ornate handwriting (Fig. 11). He was a prolific author of mycological books (although the quality of some of his publications is disputed). He was one of the founders of the Quekett Microscopical club in 1865, and in 1896 helped set up the British Mycological Society, along with Carleton Rea and George Massee amongst others.

### Summary of my visit

The time spent within the Fungarium was wonderful, seeing a selection of amazing fungi collected by such prominent names in the history of mycology and in some cases supported with fascinating stories, however the "icing on the cake" was the supportive and engaging Fungarium team, especially Lee Davies and Rosie Woods; mycological ambassadors par excellence. I came away very much impressed by every aspect of my visit.

### Want to visit?

At the time of writing, the Fungarium only opens on special occasions or to researchers (who can request access via the Kew website). Looking to the future, the Fungarium team are keen to make the collection more accessible and will be trialling open days. If you find yourself in London and are in the vicinity of Kew (which is an incredible place to visit in its own right), check out the Kew website to see if this coincides with an open day at the Fungarium.

### Literature Cited

Dennis, R.W.G. 1962. A remarkable new genus of phalloid in Lancashire and East Africa. *Journal of the Kew Guild* 8 (67): 181–82. ↑

## The Angel's Share Fungus (*Baudoinia compniacensis*)

One of Scotland's more unusual cultural and ecological markers is the presence of the so-called Angel's Share Fungus, *Baudoinia compniacensis*. This black, crustlike mold thrives on ethanol vapors released during the maturation of whisky in oak casks. As whisky ages, a small percentage of alcohol evaporates through the wood—a loss romantically termed the "angel's share." The fungus has adapted to use this airborne ethanol as a carbon source, colonizing surfaces near distilleries and bonded warehouses.

*Baudoinia* forms black, velvety coatings on buildings, trees, fences, and even road signs. In whisky towns such as Dufftown, Islay, and around Speyside, the darkened warehouses and vegetation—tree branches can be draped in the stuff!—are a visible reminder of the industry's presence. While harmless to humans, the fungus can stain property and has occasionally led to disputes between distilleries and local residents over aesthetics and maintenance.

Originally described in the 19th century from brandy warehouses in Cognac, France, the species was later recognized as distinct and given its own genus, *Baudoinia*. Modern studies show that ethanol vapor triggers protective proteins in the fungus, allowing it to thrive in exposed, sunbaked environments where few other organisms can survive. In Scotland, this adaptation has made *Baudoinia* a permanent fixture of the whisky landscape. On a personal note, this fungus was long on my "life list," so I was absolutely thrilled when Cameron DieKonigin offered to take me to collect some in Scotland (where this photo was taken) for the first time. —Britt

