Royal Botanic Gardens

Kew

Economic Botany Collection

Introduction for Staff, Volunteers, and Interns

Date – 28/01/2022

Version – 1.0

1. Introduction to The Economic Botany Collection

1.1 Points of contact

Erin Messenger: Collections Manager **Email**: e.messenger@kew.org **Telephone**: 020 8332 (5064)	**Mark Nesbitt:** Senior Research Leader **Email:** M.nesbitt@kew.org **Telephone:** 020 8332 (5386)

1.2 History of the collection

The Economic Botany Collection (EBC) was founded in 1847 by Sir William Hooker, Kew's first Director. The Collection is a record of useful plants and contains over 100,000 botanical raw materials and artefacts made from plants. Today's Collection is intrinsically linked to the history of Kew and reflects its changing policies, interests and geographical priorities.

Initially, the EBC was used to educate manufacturers about the new and varied raw materials available worldwide, and their uses. Today the collection is used for community engagement, scientific and biocultural research, as well as being used as a reference collection. It is an active collection, which means we are continually adding new objects and specimens on a regular basis.

The whole collection has been on display at different museums around the grounds at Kew. The first Museum of Economic Botany opened to the public in September 1847 and was housed in what is now the School of Horticulture. To house the expanding Collection, Museum No.1 was then built and opened to the public in 1857. The Timber Museum (No. 3) and Wood Museum (No. 4) were also opened in the Orangery around this time. These museums were later closed to the public and all specimens moved to the Banks Building in the 1980s.

Kew's EBC is the oldest and most comprehensive collection of its kind in the world. Collectors and donors to the EBC include individuals, institutions, commercial companies, governments, world fairs and expeditions. The age of material in the EBC ranges from 4000 B.C to present day.

2. Health and Safety

Any incidents or near misses must be reported to the Collections Manager as soon as possible. These will then be logged onto a central system. The First Aid kit can be found in the kitchen and will be highlighted during your induction tour.

2.1 Building health and safety

There is a strict no eating or drinking rule in the collection store. Areas where it is permitted to eat and drink will be highlighted to you during your induction tour.

All interns, volunteers, new staff and researchers will be fully briefed by the Collections Manager on procedures for moving the compactor units. These must be locked into position before entering an aisle when multiple people are working in the collection and the compactor units are half opened, and when working in the heavier wood aisles (W4).

In the event of a fire the nearest fire alarm is in the left-hand corner of the store from the point you first enter. There are three fire extinguishers located around the collections store. DO NOT attempt to put any fire out yourself unless you have received Kew training.

On hearing an alarm everyone must leave the building as quickly and safely as possible, following signs to the nearest emergency exit, which will be highlighted to you during your induction. Do not stop to collect bags or coats. Close windows and doors on your way out, but only if safe to do so. Proceed directly to the designated assembly point – The Nash Conservatory. In the event you are unable to reach The Nash Conservatory, make your way to the alternative assembly point – Herbarium Car Park. Both will be shown to you during your induction. Remain there, until told by the person in charge of the assembly point that it is safe to return to the building, or that you must move to another location. This will either be the Collections Manager of the EBC or Commercial Events Manager from the Events team. The fire escapes are detailed in the floor plan on page 16.

2.2 Collection health and safety

This section highlights the key areas to be aware of when working with the collection. Please be aware, however, this is not a comprehensive list, and you may come across hazards which are not in this document. If at any time you are unsure, please contact the Collections Manager.

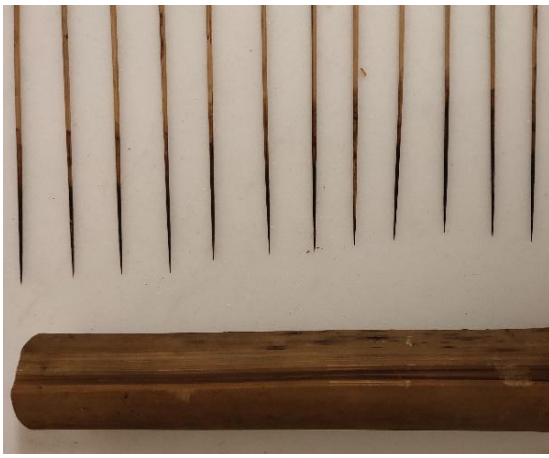
Pesticides

Before the development of environmental controls and Integrated Pest Management (IPM) museums commonly relied on pesticides to prevent pest infestation and damage. There are no documented uses of Kew using pesticides on the Economic Botany Collection, however items from other museums or collectors may have been treated before they arrived at Kew. Without scientific analysis it is not possible to determine what pesticides, if any, have been used on the collection. When working with parts of the collection you know have not been treated with pesticides, please bear in mind that it may have been contaminated through storage in proximity to objects which have been treated with pesticides. Most pesticides leave no residue, however in rare cases arsenic can sometimes be seen on the surface of a specimen as a white powdery substance. Arsenic has not yet been seen on EBC collections.

When working with the collection nitrile gloves must always be worn. Refrain from touching your face or mouth when handling objects and specimens to further reduce the risk of pesticides. Always wash your hands after working with EBC specimens. (For further information please refer to section 5.3.)

Poisons

Poisons within the collection are found as raw specimens, as slides, within pharmaceutical jars, or applied to weapons used for warfare, hunting and fishing. These include poisoned spears, arrows and darts. The poison is usually smeared on the tips in the form of a sticky resin. The most common poisons found in the collection are curare and *Strophanthus*. Curare is primarily made from a plant called *Chondrodendron tomentosum*. In the collection it can be found stored in vessels or containers such as gourds and baskets, as well as applied to darts and arrows from South and Central America. *Strophanthus* (often mixed with *Strychnos*) is often found applied to arrows from Africa, but also as raw specimens, such as seeds, fruits and roots.



Plant based poisons are considered more stable than those derived from animals, and as a result their toxicity can remain active for decades. **Best practice is to presume that all poisons have remained as active as the day they were made.**

Poisons specimens work most effectively when introduced directly into the blood stream. There are however other means of exposure which include ingestion, inadvertent hand-face contact, inhalation, entry into the eye, all of which can cause illness or death.

When working with poisons in the collection there is a strict NO LONE WORKING policy. Staff will take steps to avoid exposure via cuts or wounds, ingestion, inadvertent hand-face contact, inhalation, entry into the eye, and contact with the skin. This will be achieved with the use of the correct PPE. This includes laboratory coats, nitrile gloves with armored glove insiders, a FFP2 face mask, and closed toe shoes. Any workspaces or equipment used during handling must be cleaned or disposed of once work is complete.

- If exposure occurs via the bloodstream, notify the Collections Manager and immediately ask Constabulary to call Emergency Services.
- If exposure occurs via ingestion, inadvertent hand-face contact, inhalation, entry into the eye, contact the Collections Manager, carefully monitor any symptoms and be prepared to ask Constabulary to call Emergency Services.

Poisonous seeds

A number of seeds and fruits have poisonous interiors, including castor oil (*Ricinus communis*) and jequirity bean or rosary pea (*Abrus precatorius*). When intact these seeds are perfectly harmless, once broken the toxic interior can potentially be ingested or inhaled.

When working with abrus seed specimens or objects with abrus seeds attached, ensure you have taken time to assess them from safe distance for any breakages or large cracks. Broken seeds must be stored in sealed zip-lock bags. If they are found loose, leave boxed and consult the Collections Manager before further work. If in good condition, adhere to handling standards detailed in section 5.1. We recommend wearing an FFP2 face mask for handling.

Controlled drugs

Kew adheres to the Misuse of Drugs Regulations 2001, which requires controlled drugs to be stored in a separate locked storage space. If you believe you have found a substance deemed to be a controlled drug (e.g. opium resin, cannabis resin, coca leaves, khat), please notify the Collections Manager immediately. Tools related to drug use, e.g. opium pipes, and opium poppy capsules, do not have any special requirements and are stored within the main collection.

Mould

This is the common name to describe a variety of growths found on the surface of objects which is caused by fungi. These organisms can be found on the surface of any organic material. While the surface growth can be brushed off, the spores will remain and if given warm, damp conditions will re-grow. There are many different strains of mould, some mildly irritating, other's toxic. Most susceptible are people with respiratory problems, asthma or other allergies. Prolonged exposure to germinating moulds in enclosed areas can damage the lungs, mucous membranes, eyes, stomach and skin.

If you find objects with mould on the surface, do not try and brush it off, as it will spread its spores onto yourself and the surrounding collection. Report it to the Collections Manager immediately.

Liquid objects

When working with liquids in the collection, lids and stoppers should not be removed from containers of any spirits, oils or any other liquid. In the event of liquid spillage cover the whole area with absorptive crystals (white tub which can be found in the curation bay and will be pointed out during the induction tour) and contact the Collections Manager immediately.

Heavy objects

There are parts of the collection which are difficult to work with due to their size and weight. Key areas of the collection to be mindful of are the large woods (W4 & W5), and to a lesser extent large bottles and boxes (B5). Please ensure you read and become familiar with section 5.2 (handling heavy objects), before you work with any of the heavier objects and specimens in the collection. In the event of an injury notify the Collections Manager.

Sharps

Sharp objects in the collection include but is not restricted to microscope slides, damaged glass jars and palm leaves. When working with such collections assess objects for breakages or sharp edges before handling. If you do cut yourself, notify the Collections Manager and clean the area thoroughly to avoid chance of infection. For minor cuts, plasters are held in the curation office.

Working from heights

Working from heights will be required as the rolling racking and stationary shelving reach 2.7 meters in height. There are two step ladders in the collection. Training is required before use. Do not use the step stools. When retrieving large or bulky objects from higher shelves always ask for assistance, in order to reduce the risk to yourself and the collection.

3. Security

Always keep the door to the collections store locked when not in use, except for brief exits. Turn off the main lights when not in use, leaving the entrance light on when locked and unalarmed. External researchers should be accompanied by Kew staff when locating objects. Please do not give the security code for the alarm system out to anyone. Return keys to their home after use.

4. Storage

4.1 Storage Areas

The Economic Botany Collection stores are divided by type and size. Please refer to the floorplan on page 15 for locations of each area. The different areas are as follows:

Bottles, boxes etc.

Approximately 60,000 objects and specimens, split into four different categories depending on their size.

B1: This represents the majority of the objects and specimens in the collection and is found within the roller racking.

B3: This section can also be found in the roller racking. It is for slightly larger, often vertical, objects, such as basketry and walking sticks, and is primarily stored on open shelving.

B4: These objects cannot fit on the roller racking and require larger shelving.

B5: This area houses the largest objects in the collection, including artefacts such as barkcloth clothing. It is not stored in family order. See this document for shelf locations:

T:\CEB\EB Collections\EBC Store\ STORAGE LOCATIONS OF out of sequence EBC ITEMS in B3 B4 B5.xlsx




Woods

This area comprises of approximately 40,000 wood specimens, split into four different categories depending on size.

W1: These are the smallest wood specimens, approximately 5 cm in size. They are all stored in a cabinet at the far end of the roller racking.

W2: These are wood samples around 15-25cms in size and are predominantly rectangular in shape.

W3: 25cms+ which can still fit into the shelving on the roller racking.

W4: Large pieces of wood which can be stored on the roller racking.

W5: Extra-large woods which cannot fit on normal racking, these can be found at the end of the store.

W1 W2 W3 W4 W5

Other

Traditional Chinese Medicine (TCM): The centre of the roller racking.

A1-A3: Archaeological Specimens: Approximately 700 objects and specimens. These can be found at either end of B1 in the roller racking.

Fossils: Beginning of B1 in the roller racking.

Drift Seeds: Beginning of B1 in the roller racking.

M1/999.00 – these unidentified specimens are stored, more or less in catalogue number order, in compactor unit 00

Miscellaneous pharmaceutical material, including Maton collection and uncatalogued animal materia medica from the Royal Pharmaceutical Society.

Essential oils: Cabinet on the right-hand side as you enter the collection.

Hanbury Herbarium Cabinet on the right-hand side as you enter the collection.

Uncatalogued woods: Beginning of B1 in the roller racking.

Uncatalogued Imperial Institute fibres: After the TCM collection in the roller racking.

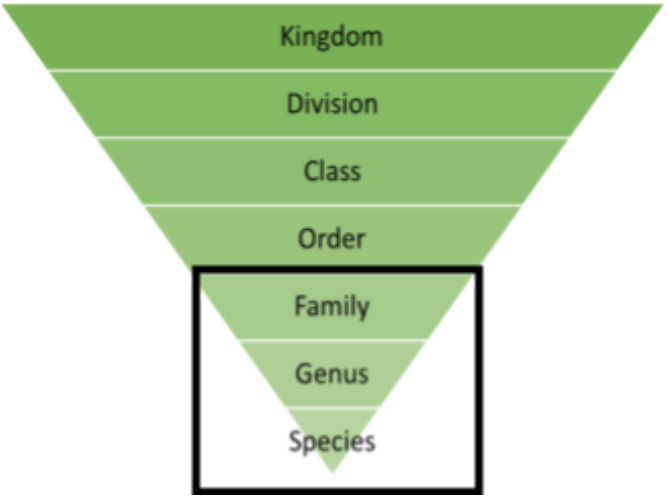
S1: Spirits: Approximately 1000 liquid objects and specimens which can be found at the far end of B1. Note that the 1920 samples of plant material stored in spirit have been transferred to the Herbarium Spirit Collection (but can only be found via the EBC catalogue). A conversion chart for EBC numbers to Spirit Collection numbers is available at:

T:\CEB\EB Collections\EBC Store\Spirit collection

4.2 Taxonomic Location system

Within the different storage areas highlighted in 4.1, the Economic Botany Collection is stored taxonomically by family in the Bentham & Hooker system. This is out of step with the rest of Kew's collections, which use the Angiosperm Phylogeny Group (APG) system. The numerical value given to a plant family from the Bentham & Hooker system can be found on laminated sheets at the end of each aisle of roller racking. It can also be found on each object label. If you are unsure what numerical value an object you are looking for has, please refer to the database.

Within the Bentham & Hooker numerical family system the collection is organised alphabetically at both genus and species level, for example at a genus level in family 84.01 Rubiaceae, *Rubia* comes before *Rudgea*. Within species *Rubia cordifolia* comes before *Rubia munjista*. When a species is unknown it is given the title of sp. or spp.; these are stored at the end of a genus.



Within species, objects are stored by the numerical value of their individual catalogue number, except when varied packaging forms mean this arrangement is not efficient.

Tools related to a specific plant production or use can be found at the beginning of a family. For example, opium pipes can be found at the beginning of 10.00 Papaveraceae.

When an object is comprised of several botanical components, the primary material will guide where it is stored and how it is catalogued.

4.3 Exceptions to the taxonomic location system

Although the above system encompasses the majority of the collection, there are some sub-sections/divisions which are stored differently. These have their own location system, which can be found on the T drive (ADD T DRIVE LOCATIONS). Below is a list of the collections included:

- Cinchona
- Tea
- Chinese Medicine
- Walking sticks – in family order, but divided into Howell sticks (north side) and general sticks (south side)

4.4 Lost specimens

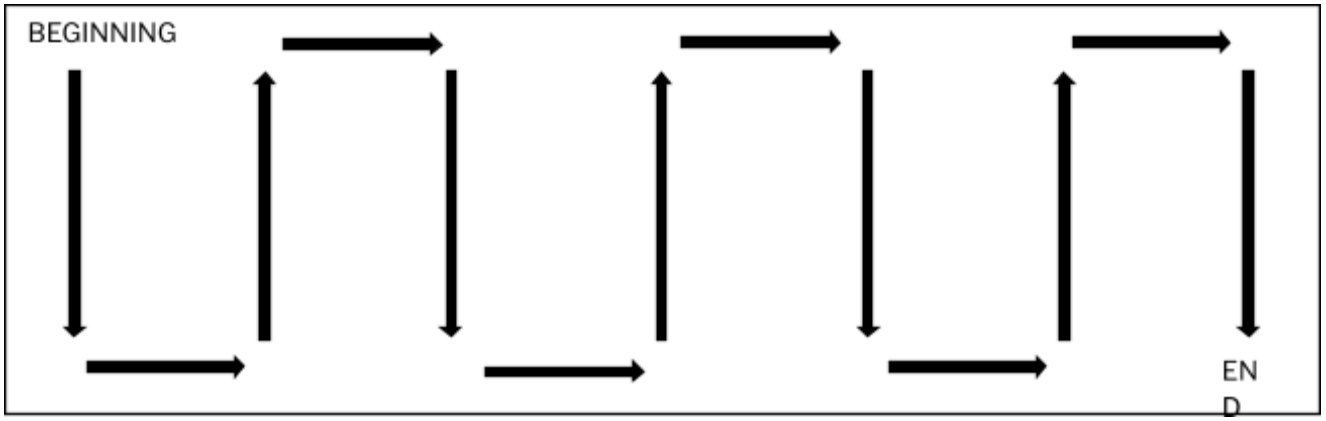
If a specimen cannot be found, follow these steps

- Check the shelf immediately below and above
- Ask a colleague to double-check (this often works)
- Check trolleys and tables
- Check with Collection manager to see if on loan/in conservation
- If only classified to family (e.g. tool), check end of family (NB should be at beginning)
- If identified to sp. or spp., check it is not filed as if a species name starting with s (sp./spp. should be at the end of the genus)
- If B4, check B1; if A1, check B1
- If B5, check location list at 4.1

- If S1/Spirit Collection, check list at 4.1 to see if transferred to Herbarium
- Palms labelled Palm Herbarium are in palm room in main Herbarium building.
- Wood specimens may be with Pete Gasson, Wood Anatomy laboratory.

4.5 Shelf storage

When removing and/or returning an object to a shelf it is important that it is returned to the correct location. Always check that items with similar names are shelved alongside. The B1 shelf storage follows a precise system, as detailed below. As you can see, it runs in a zig zag (or out and back?) formation beginning in the back-left hand corner of the shelf and ending in the front right-hand corner. Objects should be stored in chronological order, according to their accession number. It is not always possible to follow this method however, as in some cases it is not an efficient use of space. In these scenarios a degree of common sense is needed, one must try and find a balance between space efficiency and being able to easily locate an object.



It is possible to stack boxes on the roller racking shelving. The base of the highest box however MUST NOT be higher than the front of the shelf, as boxes do move slightly when using the roller racking and there is a chance of it falling if it is stored higher than the front of the shelf.

4.6 Storage types

Acid Free Box

Most of B1, B4 and B5 is stored in boxes. They provide the most protection to solid objects and specimens and allow us to stack objects on a shelf for the most efficient use of space. Object labels which contain the object name, location, family, genus and species are applied/ to the lid.

Glass Jars

Glass jars are used to store liquid specimens and loose material such as tea and powder. The older jars often have cork stoppers and vary greatly in shape and size. EBC labels are tied around the jar neck with string. The newer jars have a plastic seal and the labels are stuck to the side, with the same information as above.

Glass stoppers can be removed by light tapping with wood while the jar is rotated several times.

Open Shelf Storage in polythene bags

Open shelf storage is only used when objects cannot fit into containers such as boxes and jars. It should only be used as a last resort, as it offers little to protect to the object or specimen.

4.7 How to pack an object

As mentioned above, most objects/artefacts/specimens will be stored in acid free boxes . In order to ensure objects are packed safely, follow this short step by step guide:

1. Create a mushroom out of acid free paper. Create the mushroom by rolling the edges of the tissue paper sheet inwards to create mushroom cap of the approximate size/shape of the object to be stored, but slightly larger. Make sure the rolled edges are tucked UNDER the object to avoid any possible abrasion of the surface.

2. Place the object within the acid free paper ‘mushroom cap’ or ‘poof’ and continue to manipulate the paper to match the shape of the object.

3. Place the object in the box and surround it with acid free paper pillows. These can be created by scrunching the paper in a similar fashion as the mushroom, however this time fully fold the paper in on itself to create a circular pillow shape. Once again, don’t scrunch too hard, so as to leave plenty of air inside.

4. Once finished the box should look like this. The acid free paper creates a protective barrier and ensures the object does not rattled about. It is important not to cover the object with anything (including acid free paper), so the object can be clearly seen when opening the box.

5. Working with the collection

5.1 Object handling

Correct handling is essential for the preservation of museum collections, it reduces the risk of unnecessary and avoidable breakages, as well as conservation costs. Fortunately, much of handling objects comes down to common sense, but here are some key guidelines:

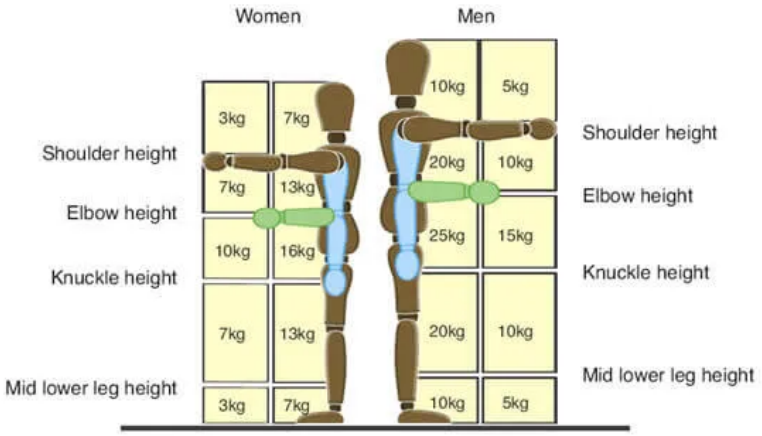
- Before picking up an object, take time to assess it for structural weak points, such as breakages, cracks, narrow or thin sections.
- This can sometimes be difficult when removing objects from tight boxes and is why objects should never be covered with acid free tissue, as highlighted in section 4.4.
- Do not assume that because an object looks robust, it is. Where appropriate, look inside objects to see if they contain anything that will affect their centre of gravity, weight, or which could move around and get damaged.
- If you are unsure of the structural integrity of an object, it is advisable to carry out a test lift to assess the weight distribution of the object, and to ensure that all parts of it are attached and stable.
- Never lift objects by a projecting section such as a handle, rim or lid, in order to prevent unnecessary stress.
- Always use two hands when handling an object. It is good practice to have one hand underneath the object and the other cradling it, keeping it close to your body. This helps keep the weight of the object centred.
- Open boxes and handle objects above a table or trolley, not above the floor. the object has further to fall!
- When moving an object pre-plan your route, ensuring there are no obstacles or closed doors along the route. Never drag an object across a surface.
- Make use of trolleys, trays and boxes when moving across open spaces.
- Never carry more than one object at a time, if you require to move multiple objects, use a trolley.
- If an object is fragile, make use of acid free tissue and plastazote to minimise the effect of vibration whilst in transit and provide sufficient support whilst stationary.
- To reduce the amount of object movement, make use of the pull-out workstations at the end of each aisle in the roller racking.
- When moving large flexible objects, such as plant specimens in B5, place a rigid support below, to reduce the risk of bowing and prevent unneeded damages.

5.2 Handling heavy objects

Manual lifting and handling of heavy objects carries a risk of personal injury. In order to reduce this risk, please adhere to the following guidance:

- Take time to assess whatever you are lifting and have a pre-planned route of where it needs to go.

- If lifting an object as part of a team, make sure everyone knows the pre-planned route and everyone communicates precisely and clearly.
- Wherever possible make use of the equipment available in the stores, such as trolleys and sliders.
- Do not try and carry/lift anything that you are not 100% comfortable with.
- Lift with a straight back, ensuring your legs take the weight of the load and not your arms or back.
- Use plastazote as padded blocks to rest larger objects on, to make lifting easier in the future.
- The below image provides guidance on what is deemed to be an acceptable weight to be lifted by a man or woman. If your object exceeds these limits, ask for assistance from another member of the department.



5.3 Personal Protective Equipment (PPE)

Nitrile gloves

Correct hand wear is key when working with museum collections. They are used not only to protect the objects but also yourself. As highlighted in 2.2, parts of the collection may have been treated with pesticides or may have mould spores present. Wearing gloves reduce the risk of skin contact with these potential hazards. On the other hand, the skin secretes oils and metabolic wastes, including various salts and urea. These can react aggressively with some materials causing irreversible damage.

Cotton gloves, whilst a viable option for some collections, are usually not appropriate for the Economic Botany Collection. Cotton fibres can get caught on brittle or fragile parts of objects, causing them to break off. They are also highly absorbent and can potentially absorb harmful substances from the collection onto your hands.

Boxes of nitrile gloves can be found in the curation office and should be used when handling the collection. Always change gloves when they get dirty, ensuring that dirt is not transferred from one object to another.

Armoured gloves

Armoured gloves MUST ALWAYS be worn under nitrile gloves when working with poison arrows and darts, in order to reduce the risk of piercing your skin.

Lab coat

Lab coats are available when working with the collections. It is advisable that they are worn when working with particularly dirty/grimy objects so to keep them from damaging or staining your clothing.

Face masks

When working with parts of the collection which are particularly dusty or you believe to contain mould spores, it is advisable to wear protective face masks. This will greatly reduce the risk of inhaling anything harmful. If unsure whether your work requires wearing a face mask, please discuss with the Collections Manager before you begin.

6. Conservation

Conservation supports a museum's primary purpose to ensure the longevity of its collections, so that they are available for future generations. The most effective form of conservation is preventative, much of which involves common sense, good housekeeping and communication. The following methods are used in conjunction with sections 4.4, 5.1 and 5.2 to conserve the Economic Botany Collection.

6.1 Integrated Pest Management (IPM)

IPM is a proactive preventive approach that allows us to monitor the numbers of both harmful and harmless insects in the collection, whilst also reducing the number of pests within the store. There are a number of traps placed strategically throughout the store, if you come across a trap please do not move it. If you find a trap which appears to have a high level of insects on it, particularly if they are of a single species, please bring it to the attention of the Collections Manager.

If you notice insect damage or frass in a specimen, please bring it to the attention of the Collection Manager. It will be frozen, just in case pest activity is recent.

6.2 Freezing & quarantine

If an object or specimen has been away from the storeroom for longer than a few days, on its return it must undergo a period of freezing or quarantine. This is to kill off any potential pests that may have become attached during its time away from the store. Objects and specimens which have been taken from the collection to work on in the curatorial room for a few hours can be placed straight back where it came from, as the likelihood of them becoming infested in that time is very low.

The majority of the Economic Botany Collection can be frozen, however there are some materials which cannot be frozen. These are as follows:

- Objects coated in lacquer
- Objects that have any sort of paint on them
- Liquid specimens
- Objects and specimens stored in glass containers

The quarantine room and freezer are located to the left of the storeroom entrance, please refer to the floor plan on page 15. The objects which are to be frozen should be sealed in bags of heavy plastic and placed in the freezer for approximately one week. When objects are removed from the freezer, they are given some time to acclimatise to the temperature of the room before opening the bag, to reduce the risk of condensation forming on the object.

In general, boxed or bagged items should be frozen before use in the Herbarium. Jars and fragile materials (e.g. lacquer) need not be frozen in this instance.

6.3 Environment monitoring

Due to the nature of the collection (biological), the EBC is highly susceptible to changes in temperature and humidity. Continuous fluctuations can cause shrinkage and expansion that over time can cause damage to objects. High humidity levels (over 60%) can cause mould, whilst high temperatures (16°C and over) create a perfect environment for pests to breed. We use Hanwell monitors to observe the environmental conditions of the store, which are checked daily.

A monitor is handily placed by the curation bay. If you notice relative humidity over 60% or temperature over 18°C please alert the Collection Manager.

6.4 Conservation book

The conservation book is stored in a drawer of the desk at the front of the storeroom. If you feel like an object needs urgent conservation treatment, please raise it with the Collections Manager. It will then be added to the conservation book, to be treated when the opportunity arises.

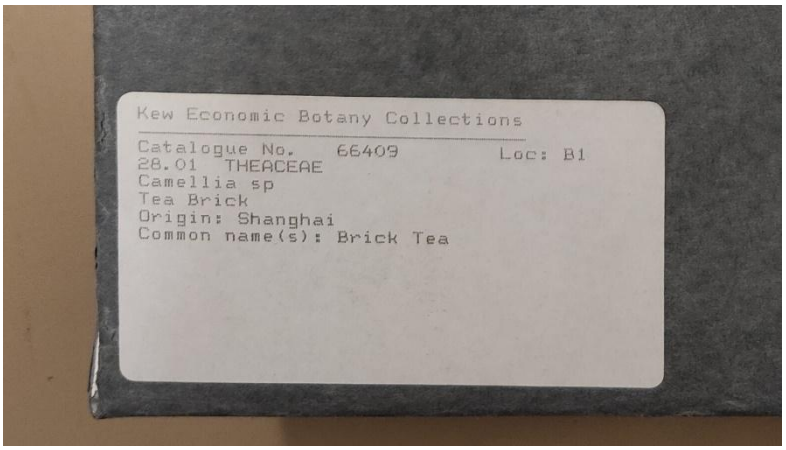
7. Entry book and accession numbers

7.1 Entry Book Numbers

When a batch of objects enters the collection, it is given an entry book number. This number can relate to a single object or thousands, depending on the size of the donation. The entry book number consists of a donation number + a year, for example 25.1902, which would mean the object(s) is the 25th donation to the collection in 1902.

7.2 Accession Numbers

The accession number is the unique identifier given to an object when it is formally added to the collection, which creates a link between the object and its associated information. Accession numbers were added to specimens when they were moved into the Banks Building in the 1980s (more or less 1 -70,000) and have been systematically applied to new accessions since then. The accession number can be found on the label which is physically attached to the object.



When working with the collection, **please ensure that the label is kept with an object at all times**. If an object becomes separated from its label (and accession number) the link between the object and its information is lost. This means we no longer know what the object is, where it is, or how it was acquired, and will have to spend valuable time and resources re-establishing the link between object and information.

Note that 80,000-89,999 is reserved for the Chinese Medicine collection

As a safeguard, most specimens have a stringed treasury tag bearing the catalogue number.

8. Working with ethnographic collections

It is important to be aware that whilst the EBC is a scientific collection it is also a world culture collection. As such, we must respect the objects and the communities from which they originated. In cases where there are cultural restrictions on who can view or handle objects, boxes are clearly marked with instructions on restricted access.

Due to the age of the collection, documentation on objects and specimens will sometimes contain derogatory or offensive language. If you are unsure whether a term is offensive or not, there is a terminology definition document on the T drive: T/CEB/EB Collections/Documentation/Inclusive Terminology Guide & Glossary – Carissa Chew - NLS -1.0.

9. Kew collections

The EBC is just one of many collections housed at Kew. The others are as follows.

9.1 Herbarium

The Herbarium contains dried, pressed plant specimens, representative of global plant diversity, and contains around 95% of vascular plant genera. Stored specimens act as sources of information such as: what the plants physically look like; where they are found; what environmental niche they occupy; which species are threatened by extinction; what morphological and chemical variation occurs; and, when they flower or produce seed. To protect the herbarium specimens, this is a clean site: live or dead plant specimens must not be brought into the building, without prior arrangement and going through the freezer to eliminate potential pests. The location of the collection management team is on the ground floor, to the right of reception. It is occasionally used to freeze oversized EBC specimens. Food and drink must be in sealed containers kept in reception, and only opened and consumed in the tearoom, located on the top floor of the herbarium.

9.2 The Fungarium

The Fungarium houses Kew's reference collection of fungi which includes an estimated 1.25 million dried specimens. This collection is the largest, and one of the oldest and most scientifically important, in the world. There are samples of fungi from all seven continents, spanning the entire fungal tree of life and representing well over half of known global diversity.

9.3 Library Art and Archives

Located on the first floor of the herbarium. This is a clean site, please see the herbarium section (9.1) on rules about using the building. The library collection stores books and journals on taxonomy and systematics of wild plants, including collections of herbaria in microform. As well as specialised horticulture, horticultural history and management, botanic gardens, and garden history, including seed lists from botanic gardens and nursery catalogues from commercial growers. There is also a large collection of maps and travel literature relating to expeditions and to regions of botanical importance.
The art collection comprises of over 200,000 prints and drawings, assembled over the last 200 years and ranging in date from the 18th century to the present day. The Artefacts Collection ranges from botanical medals, scientific equipment and furniture to a travelling chair used by the 18th century naturalist Sir Joseph Banks.
The archives hold personal papers of many botanists, gardeners, and other individuals including Charles Darwin, Joseph Hooker, and Marianne North. There are over seven million sheets of paper in 4,600 archival collections, comprising correspondence, maps, plans, notebooks, records of plants received and sent out from Kew, as well as photograph albums.

9.4 Seed Collection

The Seed Collection at the Millennium Seed Bank (MSB) based at Wakehurst is the most diverse wild plant species genetic resource in the world, with over 2.4 billion seeds representing almost 40,000 different species.

9.5 DNA and Tissue Bank

The DNA and Tissue Bank contains approximately 60,000 samples representing nearly all families (507 families), and over half the genera (around 7,100) of flowering plants. Located in The Jodrell Building laboratories.

9.6 Microscope Slide Collection

The Microscope Slide Collection holds around 150,000 specimens from a diverse range of plant taxa, particularly from seed-producing plants. The slides include leaf surfaces and sections, pollen, wood, roots and chromosomes. Located in The Jodrell Building.

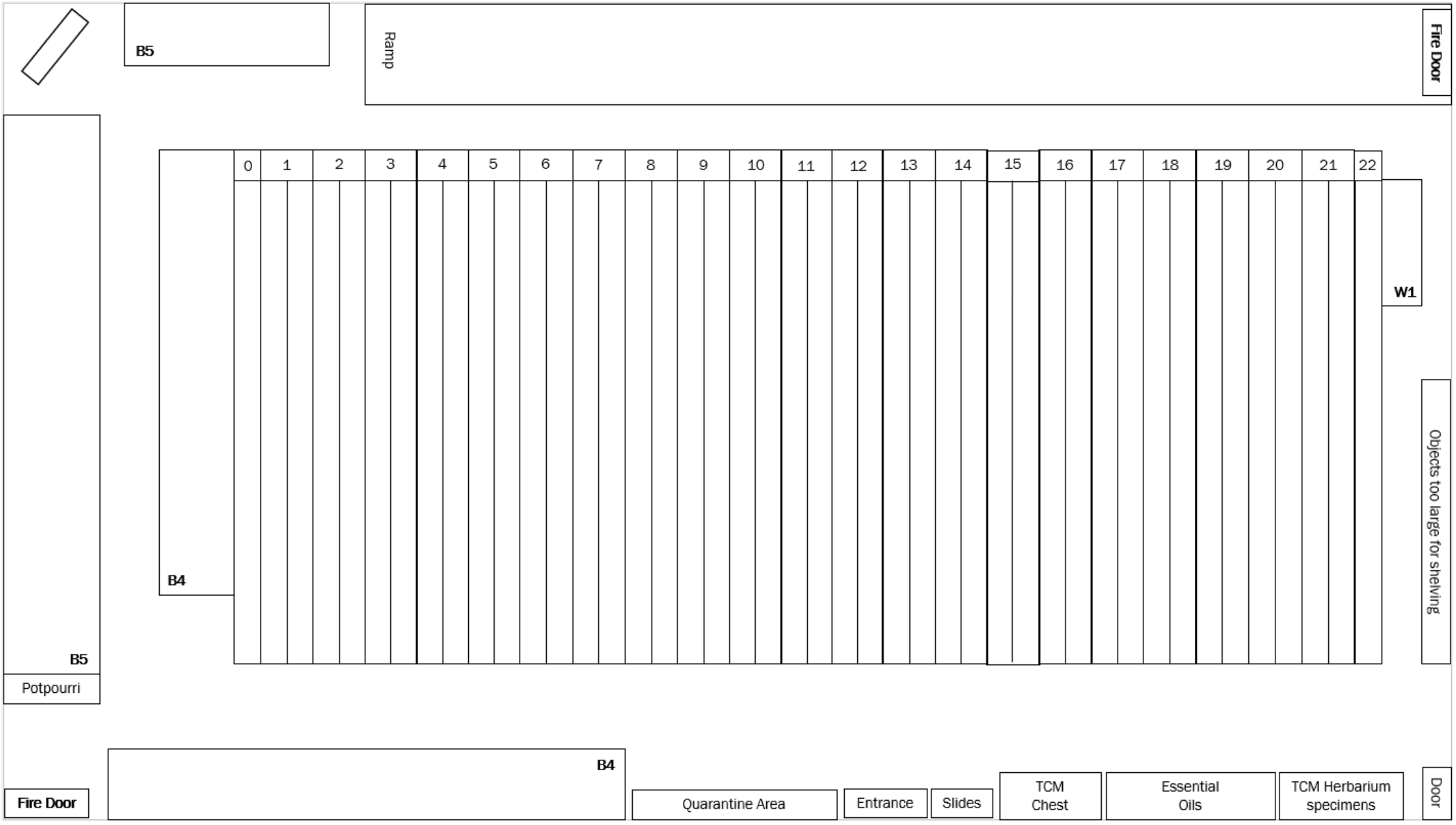
9.7 Spirit Collection

The Spirit Collection is one of the world's largest and most diverse collections which consists of over 76,000 plant specimens preserved in fluid and stored in glass jars. Based in the herbarium. See section 9.1 about attending this site.

10. Further Reading

- **Curating Biocultural Collections: A Handbook** – Jan Salick, Katie Konchar, Mark Nesbitt
- **Mobile Museums: Collections in Circulation** – Felix Driver, Mark Nesbitt, Caroline Cornish
- **Economic Botany Data Collection Standard** – Frances E. M. Cook
- **Fifty Plants That Changed the Course of History** – Bill Laws
- **Collection Trust Spectrum 5.0 Standards** – https://collectionstrust.org.uk/spectrum/spectrum-5/

11.0 Floor Plan of Stores



12.0 Floor Plan of Banks Building