

A Beginner's Guide to
**Collecting
Lichens**
in Queensland

Queensland Mycological Society

Text and images have been reproduced with permission from:

Prance, M. & Fechner, N. (2017). *Collecting and preserving fungi specimens, a manual*. 2nd edition. Department of Science, Information Technology and Innovation, Brisbane.

Rogers, R.W. (2022). *Keys to the Lichens of Subtropical Australia*. Draft Copy.

Text has been collated and edited by Vanessa Ryan.

Additional text and images by Vanessa Ryan unless otherwise noted.

Thanks to Rod Rogers, Nigel Fechner, Paul Forster, John Neldner and Ailsa Holland for their assistance with producing this document.

March 2023

Version 1.2

Use of copyrighted material without permission of the owner has been accessed through Section 40(1) of the Australian Copyright Act 1968 – Fair dealing for purpose of research or study. <https://www.legislation.gov.au/Details/C2019C00042>

The copyright in this publication is licensed under a Creative Commons Attribution 3.0 Australia (CC BY) licence.



Under this licence you are free, without having to seek permission from the authors, to use this publication in accordance with the licence terms.

You must keep intact the copyright notice and attribute the State of Queensland, Department of Science, Information Technology and Innovation as part of the source of the publication.

For more information on this licence visit:

<http://creativecommons.org/licenses/by/3.0/au/deed.en>

Table of Contents

What is a lichen?	1
Lichen morphology	1
Reproduction	2
Where lichens live	3
Why collect lichens?	4
Before you collect	6
Permits and permission	6
Safety first	6
Safe travel procedures	7
What you will need in your collecting kit	7
How to collect a lichen	7
Step 1 – Find your lichen	8
Step 2 – Assign a field number	8
Step 3 – Photography	9
Step 4 – Collecting the specimen	10
Detaching	10
How much to take	11
Other tips	11
Step 5 – Field notes	11
Foray sheet or collecting book	12
Step 6 – Clean up	13
At home or in the lab	14
Specimen labels/specimen sheets	14
Photography	15
Lichen identification	16
Drying collections	16
Storing collections	16
Submitting your specimens	17
How to submit a collection	17
What happens to my specimens after they are submitted?	18
On arrival	19
Freezing	19
Processing	19
Databasing	19
Boxing	20
Incorporation	20
The Queensland Herbarium lichen collections	21
A final word	21

What is a lichen?

A lichen is a long-lasting close association of multiple organisms, having a fungus (the mycobiont) and a green alga or a cyanobacterium (the photobiont) as the main components of its body (the thallus). The photobiont, which makes its food by photosynthesis, provides the energy source for the entire lichen in the form of carbohydrates. The fungus, with its absorptive and protective structures, provides a secure habitat.

Some lichens have both green algae and cyanobacteria as their photobiont. In this case the cyanobacteria are usually housed in special structures called cephalodia. Some of the cyanobacterial photobionts can fix nitrogen. This means that the photobiont provides not only the carbohydrate for the lichen, but nitrogenous compounds too.

Recently the role of single-celled yeasts in the lichen symbiosis has attracted attention. It is thought that the yeasts produce chemicals which help the lichen ward off predators, repel microbes and screen out radiation.

The name of a lichen is that of its main fungal component. The photobiont and yeasts have their own names. Almost all lichens (98%) have a fungal component from the class Ascomycota and about 40% of all Ascomycota are lichenized.

Lichen morphology

Lichens come in many shapes, sizes and colours, however, some of the main forms are:

Crustose

As their name suggests, the thalli of these lichens are thin crusts that are flat and are tightly attached to their substratum, so much so that they cannot be removed from it. Many are ringed by differently coloured fungal hyphae (the prothallus).



Squamulose

The thalli of these lichens are small and scale-like, often overlapping, and are attached to their substratum by their lower surface or at one edge. Image: *Cladonia* sp.



Photographer: Heino Lepp
© 2012 Australian National Botanic Gardens and Australian National Herbarium, Canberra. All Rights Reserved.
<https://www.anbg.gov.au/lichen/photos-captions/cladonia-f-270.html>

Foliose

These “leafy” lichens have leaf-like lobes. They form thalli with distinct upper and lower surfaces and usually the two surfaces are different colours. Reproductive structures are most often on the upper surface of the lobes, but some foliose lichens have them on the lower.

Image: *Parmotrema tinctorum*



Fruticose

Often described as “shrubby”, fruticose lichens are attached to their substrate at a single point and have tendrils that may be ribbon-like or round in cross-section with no distinguishable upper or lower surfaces. They are often found dangling from or sitting upright in tree branches.

Image: *Usnea inermis*



Reproduction

The conditions that permit the formation of a new lichen thallus appear to be highly specific. The fungal component of the lichen may produce spores in structures called apothecia. Lirellae and perithecia are similar spore producing structures.

The spores need to fall and grow where there are the appropriate free-living algal cells or cyanobacteria with which to form an association. Survival of young thalli to the stage where identifiable tissues start to develop is most likely low as growth rates are slow. It may take several years for a new thallus to reach the size of a pinhead.

Apothecia

Austroparmelina pseudorelicina



Cladonia sp.



Lirellae

Graphis sp.



Perithecia *

Strigula subtilissima



* Photographer: Heino Lepp © 2012 Australian National Botanic Gardens and Australian National Herbarium, Canberra. All Rights Reserved. <https://www.anbg.gov.au/lichen/photos-captions/strigula-subtilissimaf-336.html>

Vegetative reproduction by special clonal structures (soredia and isidia) that are easily detached from the lichen's thallus might seem an easier and faster way to propagate, but many lichenized fungal species do not produce these structures and must rely on their spores.

Soredia

Lepra subventosa var. *subventosa*



Isidia

Parmotrema tinctorum



Where lichens live

Lichens have a very long fossil record and are very widespread. They have been found on every continent – from dry deserts to wet jungles, and from both polar regions to the equator. There are also fresh water and marine lichens. It has been estimated that 6-8% of Earth's land surface is covered by lichens.

Experiments have shown that lichens can even survive exposure to the vacuum and intense radiation of space. Not just for a few minutes, or hours, or even days, but up to one and a half years!

So far, world-wide, about 20,000 species have been formally described and given names. 3,000 of those are found in Australia.

The larger lichens – particularly the shrubby and leafy lichens – can be visually striking. They live on tree trunks and branches, on rocks and on soil.

Smaller crustose and other tiny thalli are more common but less obvious to the unpractised eye. These may be found living on almost any surface that persists for long enough – not only on soil, rock or bark, but also on leaves (foliicolous) and even other lichens! (lichenicolous)

Lichens also can grow on tortoise shells, bones, brick, concrete, tile, glass, metal, painted surfaces, leather and plastic.

The close mutuality of the organisms in a lichen thallus may confer great stress tolerance on the lichen as a whole, but the delicate balance between them also makes lichens very susceptible to damage.

Lichens are usually extremely slow growing and very long lived. You should keep this in mind as it is easy to destroy a decade of growth by walking carelessly on a lichen.

Foliicolous lichens

Porina epiphylla



Marine lichens

Caloplaca spp.



Why collect lichens?

There are many species of lichen yet to be discovered, and the role of lichens in ecosystem function is as yet only basically understood. High quality collections of specimens and data are needed as materials for research to improve our understanding of this important group of organisms. Without good collections, researchers cannot describe new species or study their relationships and evolution, or accurately document biological diversity.

Herbarium collections and associated data provide:

- reference material for accurate identification.
- basic biological material for taxonomists and other researchers to study.

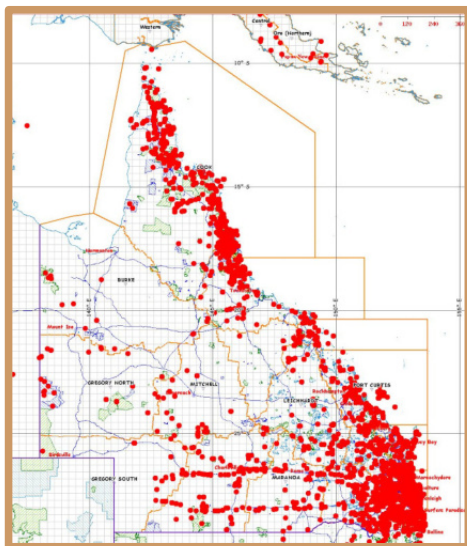
- the core material upon which application of scientific names is based (Type specimens).
- a permanent record for a species at a particular time and location.
- reliable distribution maps and habitat information.
- vouchers for scientific research, including taxonomic, ecological and biochemical analyses and DNA sequences.
- information for production of lichen inventories for your local area.
- information for monitoring changes in composition and behaviour over time.
- data for monitoring programs which document the introduction and spread of invasive alien species.

New genetic techniques have increased the need for well-annotated and correctly identified specimens (the lichenologist's role) to be stored in herbaria, and collected in sufficient quantities to allow limited destructive sampling. These specimens need to be properly processed and stored so that the DNA is preserved for future study.

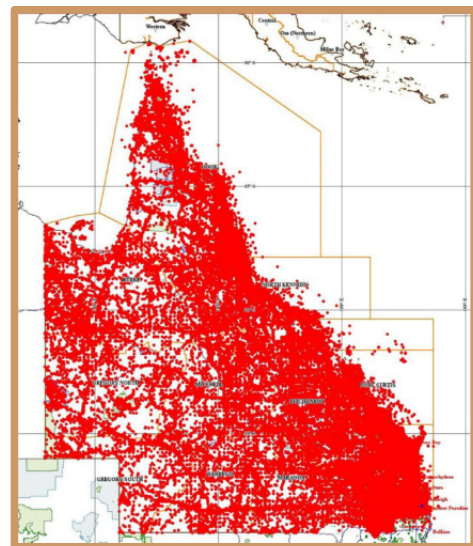
In Queensland, most areas of the state are still poorly collected compared with vascular plants and a significant proportion of the specimens you collect will probably represent new discoveries or new records. Citizen scientists and amateur lichenologists play an important role in finding and collecting lichen, and ultimately documenting Queensland's lichen flora.

Locations of where collections have been made

Lichens



Vascular Plants



People with an interest in lichens are encouraged by the Queensland Herbarium to submit good quality collections accompanied by useful field notes, descriptions and photographs. Submitted specimens are assessed according to the amount and condition of material and the quality of associated notes and photographs.

Remember, only quality specimens that meet herbarium standards are accepted, so it is especially important to take the time and effort to follow this guide when collecting specimens in the field.

The purpose of this guide is to assist amateur lichenologists and others to make useful collections of lichens that meet herbarium standards and therefore contribute to the overall knowledge of our flora.

Before you collect

Permits and permission

In Queensland, native lichens are protected under the Nature Conservation Act 1992 (as protected flora). A permit to take protected flora is required on crown land such as a National Park. Application forms for Scientific Research and Educational Purposes Permits are available here:

<https://www.qld.gov.au/environment/parks/permits/science-education>

These permits have stringent conditions, including notifying the local ranger of your intended visit. The permit also requires records to be kept of your collections, specimens to be submitted to the Queensland Herbarium, and an annual report is to be sent to the relevant department. Permit information should be included with specimens, and the permit number added to labels.

Note that additional permits are required for collecting in State Forests or other areas managed by the Queensland National Parks and Wildlife Service. For more information, contact:

parkaccess@des.qld.gov.au

A permit is also required to collect on City and Regional Council owned lands such as parks and reserves. For collecting on private property, written permission is required from the owner.

The Queensland Mycological Society Inc. (QMS) holds a number of permits and members who wish to collect specimens need to speak to the permits holder.

Safety first

It is advisable to take personal protective equipment and safety items such as hat, long-sleeved shirt, long trousers, sturdy shoes, gloves, sunscreen, insect repellent, first aid kit, water and food.

There is little to no risk of being poisoned by handling lichens. However, tasting is strongly discouraged and skin or respiratory allergies/reactions may occur, caused either by touching the lichen itself or by bacteria or other organisms on the lichen. Washing hands after handling lichens is strongly recommended.

Ticks can be a problem in many areas. Deet sprays or electronic tick deterrent devices have proven to be effective deterrents. Be alert for snakes, leeches, spiders and insects. First aid training for the treatment of bites and stings is recommended.

Safe travel procedures

Always let someone know where you will be working and when you expect to return. For prolonged journeys, details of your intended route and destination, a call-in schedule and expected time of return should be left with someone, preferably the relevant land managers, who can raise help if necessary.

Check prevailing conditions and take note of any track closures or other site specific warnings.

Travel with someone and discuss safety issues and procedures before you leave.

Be sure that the vehicle is suitable for the job and functioning properly prior to leaving.

All safety equipment such as first aid kits, phones and recovery gear should also be checked prior to leaving.

What you will need in your collecting kit

Camera	PVC glue
Ruler for providing scale in photos	Tissue paper
Numbered tags*	Paper bags (brown lunch bags are perfect)
Strong, sharp knife	Newspaper
Carpenter's chisel	Pens and/or pencils
High quality cold-chisel	Foray sheet on a clipboard/a collecting book*
Hammer / Geological hammer	GPS unit and/or maps/smart phone
Protective eye-covering	
Secateurs	
Small saw	

* These will be explained later.

How to collect a lichen

A distinguished botanist once took Australian lichenologist Rod Rogers aside and said (in a heavy German accent):

“Mister Rottchess, there are already enough bad plant collections in der velt. You need not to add any more.”

He was right. Miserable scraps of inadequate material that are poorly documented are frustrating and time wasting. A collection with an adequate amount of material that shows what the lichen is actually like and where it came from is a pleasure to work with.

That said, collecting lichens is a relatively straightforward process.

Step 1 – Find your lichen

This is the easiest part of the process.

Remember, the idea of collecting is to try to get a representation of the lichens growing in a particular area. This means that you should try to collect as wide a variety as possible, including what you might think are common species.

In some environments (e.g. tropical savannas that are regularly burnt) lichens are relatively uncommon. You will need to focus your search in places such as high tree branches that are above the reach of most fires, or on trees that don't annually shed their bark. In arid environments, look on the more sheltered southern side of tree trunks, or in areas that are shaded.

Step 2 – Assign a field number

Each collection is given a unique number for identification and tracking purposes. This is called the field number.

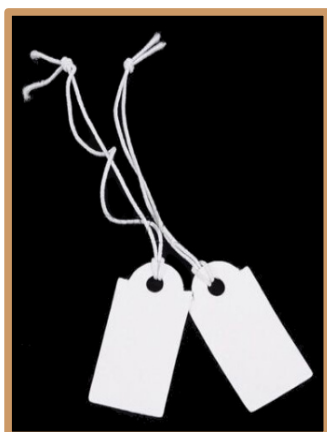
A tag with the corresponding number written on it is assigned to each collection and stays with that collection.

It is a very good idea to write the field number, the date the collection was made and the collector's name on the paper bag that will be used for holding the specimen. This makes it easy to keep track of the collection.

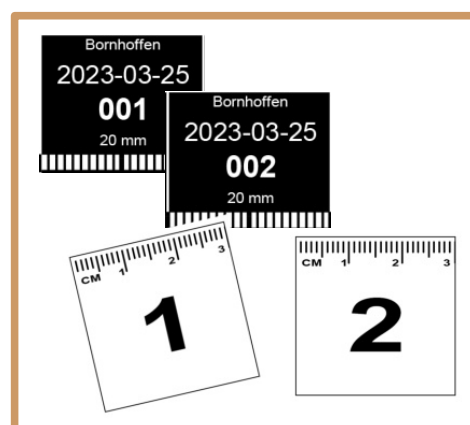
Some collectors start anew each foray with the number “one” for the first collection of that foray, while others continue their numbering sequence from foray to foray so that they have a running total for all their collections. Both methods are correct, it's just a matter of preference.

Traditionally, small jeweller's tags were used for the numbered tag. If using jeweller's tags, write the field numbers on them clearly with a dark (2B or darker) pencil. Ink or felt pens can run if they get wet.

Jeweller's Tags



Printed Tags



With the advent of home computers and printers, some collectors now design and print their own numbered tags. Pre-numbered tags with a 3 cm scale can be downloaded from the QMS's website:

https://qldfungi.org.au/wp-content/uploads/2013/03/numbered_tags_01-40.pdf

Step 3 – Photography

Photographs of your specimens aren't a mandatory part of lichen collecting as lichens don't change their appearance or structure upon drying. However, these days with digital cameras and cameras in mobile phones, they are quick and easy to do and having a visual record to support the written record is becoming a preferred option. Good quality photos can supply useful information.

What to take:

1. A photo of the habitat that includes the location of your specimen.
2. An initial photo with the specimen in situ, including its numbered tag and a ruler or something to show scale.
3. Finally, a couple of photos with the tag and any distractions removed, but try to maintain a natural look to the location. This is for the "glossy magazine" shot. It isn't necessary, but it is surprising how useful it can be.



Do **NOT** shift the specimen to a different substrate, e.g. from soil onto a log. Even though this may give a better photo, it will convey misleading information.

Try a couple of different angles, taken at different distances from the lichen.

Make sure the photographs include any distinguishing or interesting features, such as:

- Any reproductive structures.
- For leafy lichens, a photo of the lobe underside and edges is useful.
- Creatures that might be living on the lichen.

Step 4 – Collecting the specimen

Detaching

Detaching the lichen can be a problem.

If you are lucky, a strong knife will allow you to neatly separate a leafy or shrubby lichen from its substratum – especially if it is on bark. On rock is a bit more difficult, but with loosely attached lichens a knife will work.

Closely attached leafy lichens and all crustose or squamulose lichens must be collected with their substratum. On bark this is usually not a problem as a patch of bark including the desired lichen can be sliced away with a strong knife. If the lichen is on wood, then more care is needed, and a carpenter's chisel and a hammer is useful. Secateurs can help with cutting twigs, as will a small saw for thicker branches.

Lichens closely adhering to rock are more difficult again. A high quality cold-chisel and hammer are needed, together with some determination. Chipping off the piece of rock you want can be frustrating as good specimens often vanish in a shower of fragments. Protective eye-covering is important.

Lichens growing on soil are a special problem as the soil-lichen system can be very fragile. The best approach is to take specimens with care and wrap them in tissue. Sitting the specimen in a shallow layer of PVA glue (craft glues are fine) – while making sure only the soil is infiltrated – can stabilise fragile soils.

Lichens on leaves are easy to collect – take the leaf and press it in a paper bag.

If you haven't done so already by this time, don't forget to write the specimen's field number, the date and your name on the paper bag. Some collectors also like to write the numbers of the respective photos on the bag.

If the specimen is wet when you collect it, carefully wrap it in paper towels before putting it into its paper bag.

Crisply fold over the top few centimetres of the bag to prevent the contents from accidentally spilling out.

How much to take

The amount of material to collect depends on the lichen. The idea is to collect material that is representative of the whole lichen. If it is a small lichen, then it might be the entire lichen. If it is a very large lichen, you may not need to collect all of it. Multiple samples taken from across the entire lichen that together represent the whole lichen will do.

The most important thing to remember is to make sure you collect any distinguishing features, such as attachment points, margins and reproductive structures.

Other tips

Collecting crusts from rocks can be difficult and hard work. A tip is to try to find a loose piece of the rock that might already have broken off, or an existing crack or protuberance to work from. **Don't forget to wear your protective eyewear!**

Keep twigs, cuts of branches, and bits of rock to a manageable size (palm-sized) that will fit easily into a brown paper lunch bag.

Sometimes, especially with crusts, there might be a large number of different lichens growing together on the substrate and it is difficult, if not impossible, to collect them as individual specimens. As tempting as it might be to collect the whole branch or rock, please don't. Collect pieces of it that have only three or four lichens on each of them.

Please don't take excessive material. The gaps you leave when you take a collection may well still be there in fifty years. Remember, lichens establish with great difficulty and grow slowly.

Keeping that in mind, when collecting on lands such as National Parks and Reserves, please avoid making collections that will leave a scar on the surface of the substratum that would be visible by the public from tracks and pathways. When leaving paths, always tread carefully to cause minimum damage. It is also best to be discrete in your collecting. While attracting attention from the public may produce fruitful educational conversations, it may also cause confrontation or require unnecessary justification.

And finally, and it can not be said enough, do NOT put your collections into plastic bags. If the specimen is too big to fit in a paper bag, a newspaper folded up will do.

Step 5 – Field notes

Having good written records are just as important as the lichen specimen itself.

Collections that are not fully documented have limited value. Your specimens will likely be used for research by future lichenologists, so they will need to have notes submitted with them that contain all the necessary information.

Important – Do not be tempted to wait until you get home to do all your paperwork: take down as many notes as you can at the site of the collection!

Foray sheet or collecting book

A foray sheet is a structured sheet which is a summary of a particular foray. It contains brief notes for each collection as it is made, and assists with keeping track of collection numbering and what has been found during the process of collecting. It is especially useful if more than one person is doing the collecting. A blank example of a foray sheet is given at the end of this guide.

Some collectors like to use a collecting book – a notebook that is easy to carry out in the field.

These notes are also referred to later when processing the collections.

The key pieces of information to record are:

Location	Place name – town or suburb, street address, park or reserve, named land form (e.g. mountain or river), walking track – preferably described in relation to roads, road intersections or distances from the nearest named place. For example “Silver Plains Station Homestead, south of Stewart River and 28.5 km by road north of Running Creek Station, north east of Musgrave”. Vague locality descriptions such as Black Mountain (which one?), a large national park (e.g. Bunya Mountains NP) or a very long road are not sufficiently detailed by themselves. Aim to record enough information to allow a person to be able to find the site of your collection to within at least 50 m using your notes alone. If you cannot provide GPS latitude and longitude, these notes should have sufficient detail to allow the site to be located using a mapping program such as Google Earth.
Date of collection	The date the collection was made.
Collector(s)	Surname and initials of the collector(s).
Permit number	The permit number if collecting under a permit. If you have written permission from a land owner, write the name of the land owner and date of the document.
Field number	This is the number that was assigned to the specimen and is on the numbered tag.
Spotter	Initials of the person who found the collection. (Optional)
Name/Description	If the lichen is easily identified (e.g. an <i>Usnea</i> species) write the name. If not, write a brief description such as “crustose, white, black apothecia”.
Substrate	Details about what the lichen is growing on should definitely be included. E.g. Stone (granite), wood (burned tree stump), bark (fallen branch), soil (sandy).

Associated Organism	Record the plant it is growing on (e.g. <i>Callitris endlicheri</i>)
Habitat	The habitat and type of vegetation (e.g. open woodland, with <i>Callitris</i> and <i>Eucalyptus</i> sp.) If possible, also record the aspect and geology/soil type.
G.P.S.*	A number of collections may be made in a small area and the G.P.S. location noted only the once. If there is a significant change to the next collecting area (e.g. you have moved a good distance further along a track) another G.P.S. location should be noted.
Frequency	Give an indication of how common or uncommon the lichen appears to be.
Notes	Anything else that might be of significance. Some collectors include the numbers of their specimens' photos.

*** More about G.P.S.**

- The G.P.S. location can be obtained in a number of different ways. Some cameras have the ability to embed the G.P.S. location of where a photograph was taken into the photo's metadata. Free G.P.S. apps are available for mobile phones. A third method is to use Google Maps. Bring up the desired location in it and right click on the required place. The co-ordinates are shown at the top of the pop-up box.
- It is essential that you state which geodetic datum format your device is using. Google Maps uses the WSG84 format.
- If possible, please include the altitude in metres above sea level.
- Also, if possible, please record the level of accuracy in metres.
- The Queensland Herbarium prefers you to use Degrees, Minutes, Seconds as your G.P.S. format. For example: 27°28'31.2"S 152°58'32.5"E The preferred geodetic datum options are GDA94 (best), WGS84, AGD84 and AGD66.

Step 6 – Clean up

The final step is to clean all tools and implements you have used on your foray.

Methylated spirits or 70% ethanol (if you have access) is recommended.

Include your boots (and camera tripod if you used one) in your clean-up routine. This ensures safety as well as reducing cross contamination of specimens.

Always remember to wash your hands after handling specimens.

At home or in the lab

Specimen labels/specimen sheets

The foray sheet or the notes you wrote in your collection book are a summary of that particular foray. Some collectors keep these as master records of their forays.

A specimen label or sheet deals only with a single collection and it is submitted to the herbarium with the lichen specimen in the collection's bag.

A **specimen label** contains nearly all the information you noted down in the field on the foray sheet (and is copied from the foray sheet) about a particular collection, with a few differences:

1. Instead of writing the field number, you record a **collection reference number** that is a unique identifier for that collection.

It is a good idea to also note this collection reference number on the front of the collection's paper bag.

Collectors who use the sequential method for creating field numbers often just use their initials and the field number for their collection reference number. E.g. PL 0999

Another method is to include the date, the field number, and your initials. By writing the date in reverse, any computer file (such as digital photos) with this unique number as the start of its name will list the files by date and in order of collection. E.g. 23032501MP

A third, similar but more complicated method, is to have a location code, the date, field number and your initials. E.g. BHFN23032501VR This lists any files by location, date, and collection.

Finally, the QMS uses their own format for group forays. E.g.: QMS230325001 or QMSBornhoffen230325001

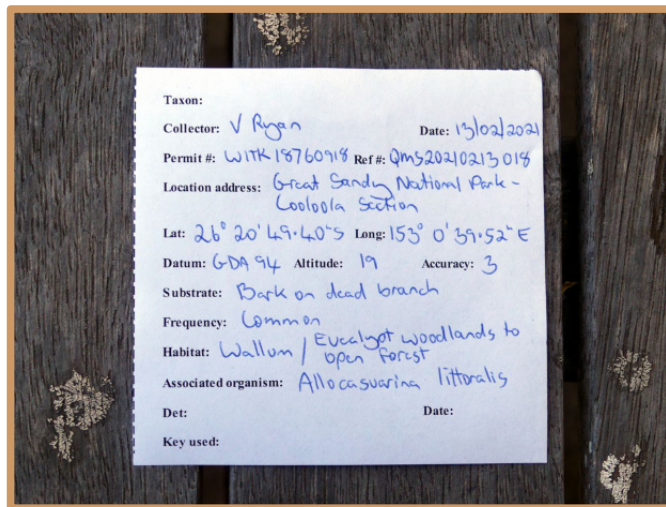
Some more information that may be included on a specimen label is:

1. A name for the specimen – identification to genus is sufficient.
2. The name of whoever identified it.
3. When it was identified.
4. Which key was used to identify it.
5. Voucher Details: If the collections are for the purposes of a particular project, research proposal, ongoing survey, etc., it is worthwhile recording this data on the label. E.g. "This specimen is part of the Bornhoffen Lichen Project, 2023."

A page with six blank specimen labels is available to download from the QMS website:

https://qldfungi.org.au/wp-content/uploads/2013/03/specimen_label.pdf

An example of a specimen label



A **specimen sheet** includes the same information as a specimen label, but it also includes some extra information, such as the lichen's form, structures it may possess and the results of any chemical testing that was performed during the identification process. An example of a blank specimen sheet is given at the end of this guide.

Photography

It is easier to take close up or detail shots at home or in the laboratory where environmental factors, such as lighting, can be controlled.

Diagnostic photos (e.g. close ups of the thallus, lobes or apothecia) and of microscopic features (e.g. spores and asci) included in the collection are very helpful.

You will need to download your photos onto your computer for sorting and preparation for submission to the herbarium.

Please minimise the number of photographs you submit. Only good quality images will be accepted – out of focus, blurred or poorly exposed images will be rejected.

The size of printed photographs should be 10 x 15 cm.

To be useful to the herbarium, submitted digital photo files will also require meaningful names that allow them to be readily matched with the specimens.

A good method is to use the collection's reference number, followed by a numerical sequence or descriptive word. E.g.:

- 230325MP01001
- 230325MP01_habitat
- 230325MP01_underside
- 230325MP01_spores

Lichen identification

Identification of lichens has the reputation of being very difficult. This is true, it can be a challenge even to professional lichenologists!

Lichen identification works on both visible (morphological and anatomical) characters and on invisible chemical characters. Lichens are small and many of the characters are barely visible to the naked eye. Identification, even to genus, requires great patience, considerable skill, a good microscope and access to specialist chemicals (some are very poisonous).

Like all fields of studies, lichenology has its own language that, once learned, makes the task easier.

A lichen does not require identification before submission to a herbarium. It is far better to hand over a good collection that is unidentified than one that might have been misidentified.

Drying collections

Lichens are extremely delicate and should only be air-dried in their paper bag.

The best method is to peg the bag onto a clothes line (or ailer) that is positioned in a dry, warm place with a good air flow. Leave it there until both the lichen and any substrate it may be attached to is thoroughly dry.

Do NOT dry lichens on food dehydrators, in drying cabinets or by using any other artificial drying or heating process.



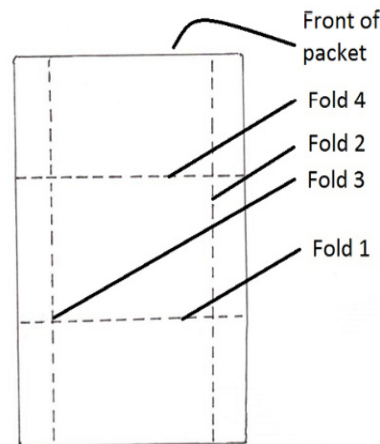
Storing collections

Lichen collections can be kept stored loosely in their paper bags indefinitely. Because the lichen's colour is the consequence of stable pigments external to the cells, the colours last. Lichen structures are tough and maintain their form when air-dried.

The traditional method of storing collections is to place the specimen in a seed envelope. The envelope is then put inside a sheet of A4 paper, folded to make a packet. The A4 paper must be of good quality and not recycled if it is to last.

Fold the lines in order and always fold up and over, but do not unfold anything.

Write on the front of the packet the same information that would be on a specimen label before placing the specimen inside the packet.



Folding an A4 page as a lichen packet.

Submitting your specimens

How to submit a collection

Dried specimens may be submitted in person during office hours, or sent in the mail. If posting, make sure to pack the dried specimens into a box with bubble wrap, foam or fresh crumpled newspaper to protect the specimens. Address the package to:

The Mycologist
Queensland Herbarium
Brisbane Botanic Gardens, Mt Coot-tha
Mt Coot-tha Road
TOOWONG Q 4066

Please:

- Ensure all the components of your collection are together: specimen, notes, drawings and/or photographs.
- Ensure that all the necessary collecting information is included in your notes: collector's name, collection date, collection number, genus and species if known, additional collectors, location of collecting, G.P.S. coordinates, substrate, habitat and any description notes.
- Always ensure that the collection number attached to your specimen is the same as attached to your notes, and that any photographs and other items are also clearly linked by the collection number.

-
- Your notes must be presented as hard-copy printed or legibly written. If you wish to submit your information electronically in a spreadsheet, or via a phone application, please contact the herbarium first.
 - The size of printed photographs should be 10 x 15 cm. Prior arrangements with the herbarium must be made before submitting electronic images.
 - You will need to include with your photographs an indication of the copyright permissions you wish to allow the herbarium. For example, some collectors are happy for the herbarium to use their images internally, but not to use them in publications or sale items. Others are happy for any use so long as they are acknowledged as the source.
 - If you have used archival quality (acid free) paper for your notes and photographs, please indicate this clearly.
 - As storage space in the herbarium is limited, bulky paperwork is discouraged.
 - An assessment will be made on your specimen's suitability for incorporation. Don't be discouraged if in the initial stages of your collecting that some of your specimens are discarded. Please ask for feedback if you are unsure as to why.
 - If you wish to submit fresh material, please make prior arrangements so that a trained staff member can assist you.

What happens to my specimens after they are submitted?

Please Note:

- The Queensland Herbarium does not offer an identification service for lichens.
- If you are submitting specimens publicly, by mail or by the front counter, you will receive notification of receipt and a mail number for tracking, but don't expect a speedy reply. It may take months or years for your specimens to be examined.
- There may be a backlog of specimens awaiting processing. If there is some reason for haste – e.g. an upcoming publication – please advise staff at the point of submission.
- Herbaria do not send back your specimens. If you intend to keep a reference collection at home, you will need to submit a duplicate specimen to the Herbarium which has the same collecting details as the original specimen.
- Remember, all collections made in protected areas under a QMS permit MUST be submitted to the Queensland Herbarium.

On arrival

When your specimens arrive at the herbarium they are first checked to ensure they have been dried and then they are placed together into a bag with a date of arrival slip. If further drying of your specimens is not required, the bag then goes into the freezer.

Freezing

Herbarium specimens are vulnerable to attack by insects, particularly beetles and psocids (paper lice). To ensure insects are not introduced to the herbarium's collection, all paper, plant and fungal material entering the building must first be treated by freezing. The Queensland Herbarium freezes new specimens for at least two weeks at -25°C to kill all insects and insect eggs.

Processing

After your specimens have undergone freezing, they are stored awaiting examination and identification by the curator(s).

The curator(s) will decide which specimens to keep and which to discard based on the criteria already outlined, along with whether or not diagnostic microscopic structures are present – e.g. spores in the asci (these can be seasonal).

For specimens marked for adding into the collection (accessioning), the curator(s) will attempt an identification at least to genus. The specimen information is then databased and the specimen is processed for storage (as explained below).

You may, or may not, get a reply from the curator as to the identification of accessioned specimens (as mentioned above, it may take years). You can, of course, at a later date, check the national databases (AVH or ALA) to find your accessions, or ask the herbarium directly for a list.



Databasing

Your collection will be given a unique AQ number (a database number beginning with AQ – **A**cquisition **Q**uery). This number is automatically created when a specimen's details are entered into the herbarium's database.

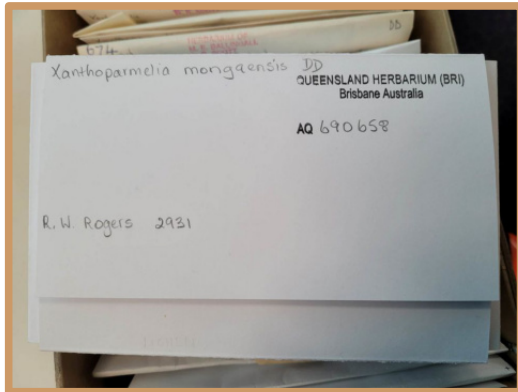
Your notes are transcribed or imported (if they were provided electronically) into the database. An herbarium label with all your specimen's information and its AQ number is generated and printed on archive-quality paper.

Boxing

Your specimen is placed in either an archive quality (acid free) packet or archive quality box (if bulky). Your notes and photographs are also placed with your specimen.



The name of the lichen (if provided), your name, your collection reference number and the AQ number is written on the front of the packet or box.



The herbarium label is also placed inside with your specimen.



Incorporation

Your specimens in their boxes are then sorted by genus and species, and shelved.



If a single collection is too large for a single box, the collection may be split and a portion of the specimens sent to another herbarium as a duplicate – these are only sent if the specimen is named to species. You may nominate which herbaria are to receive their duplicates.

The Queensland Herbarium lichen collections

The Queensland Herbarium (BRI) houses approximately 864,670 specimens of plants, algae and fungi (912,060 if you include liverworts, hornworts and lichens) but only 31,260 (21,600 for Queensland) of these are lichenized fungi.

A census of Queensland flora is published annually:

<https://www.qld.gov.au/environment/plants-animals/plants/herbarium/flora-census>

This list includes named species known to occur in Queensland and those that are known but as yet undescribed. The latter may be recorded as phrase names with a standard format based on the collection e.g. *Buellia* sp. (Burrum Heads N.Stevens 1126).

The Queensland Herbarium collection continues to grow through activities undertaken by staff and research associates, the Queensland Mycological Society (QMS), exchange of specimens with other herbaria, students undertaking research projects, and members of the public.

The specimen label information, including location and habitat, is available online through collective data delivery such as Australia's Virtual Herbarium (AVH) (<http://avh.chah.org.au>) or the Atlas of Living Australia (ALA) (<http://www.ala.org.au>).

A final word

Specimens form an incredibly valuable resource for research and are a temporal and spatial record of biodiversity. Your specimens may eventually be examined by local or international lichenologists working on the taxonomy of a particular group.

Herbaria aren't just about collecting, preserving and conserving specimens, or describing and naming species. They are about making the world a better place through learning what our plants, fungi and lichen do for us. Herbaria, like our very own Queensland Herbarium, are of world wide significance.

But ultimately, they are only as good as the collections they hold. So it's important that we, as collectors, do our best to provide good quality specimens with useful notes.

By doing that, we will be giving the future a priceless legacy.

Foray Sheet Location: _____ Date/s: _____

Date/s:

Collector: _____

Assistant/s: _____

Permit Number: _____

Permit Number: _____

[illegible]

[illegible]

Lichen Name:

Det:

Det Date:

Collector/s:

Permit#:

Collection#:

Coll Date:

Location:

Lat:

Long:

Alt:

Accuracy:

Datum:

Habitat:

Associated Species:

Substrate:

Habit, Frequency and Notes:

Growth Form:

Colour on top:

Colour underneath:

(Flora of British Fungi Colour Identification Chart)

Rhizines? Yes/No Shape:

Reproductive structures?
(Soredia, isidia, apothecium etc.)

Spores:

Key and Steps:

Chemical Tests:

Potassium hydroxide (KOH 10%) K:

Calcium hypochlorite (Bleach) C:

K followed by C KC:

P-phenylenediamine (Beard dye) P:

Iodine (Melzer's) I:

Nitric Acid N:

UV

Other structures:
(Cilia, dactyls, pores etc.)

Other notes: