

The top half of the image shows several fossil specimens, likely plant remains, embedded in a light-colored rock matrix. The fossils are dark brown or black and show various leaf and stem structures. They are arranged on a bright yellow background.

## CHAPTER 8

# starting a new herbarium

*Do what you can,  
with what you have,  
where you are.*

*—Theodore Roosevelt*

When starting a new herbarium, it is useful to know what infrastructure, equipment, and supplies would be adequate for your needs. In this chapter, we provide guidelines for setting up and managing a new herbarium.

## Purpose

The main purpose of a herbarium is ongoing taxonomic research. This research relies on a collection of preserved plants—the herbarium—that is built up over a long period. There are many different activities associated with building up and maintaining a herbarium collection.

## Collecting, preserving and storing specimens

Collected specimens should be of a high quality and meticulously preserved. A standardised storing system should be used to ensure that specimens are easily retrievable. The arrangement of specimens could be based on a simple alphabetical system, or on a more complex system based on taxonomic relationships. A high standard of label information is also essential.

## Identification

Identification is based on taxonomic relationships. It is the matching of unnamed plants with named specimens in the collections, based on similarities between the specimens.

## Nomenclature

When naming plants, the focus is on maintaining nomenclatural standards. Names of specimens should be kept in line with any revisions done. A type collection must be maintained and exchanges of specimens with other institutions must be standard practice.

## Comprehensive collection

The aim is to work towards a fully representative collection, representing the diversity and distribution of the region's vegetation. This implies undertaking collecting trips to under-collected areas and ensuring that all taxa in the region are represented.

## Determining basic needs

Once the purpose of the herbarium is clear, an inventory of basic needs can be compiled. This would include the estimated size of the herbarium, staffing, cupboard and working space, and equipment required such as microscopes, plant presses, freezers, microwave ovens, and good quality card of a standard size for mounting. The system for the arrangement of specimens should be decided from the start as this could affect the layout of the herbarium. (For more information on filing systems, see "Filing specimens").

## Registering in *Index herbariorum*

The *Index herbariorum* (Holmgren *et al.* 1990) is a world-wide register of herbaria that provides concise information about a large number of herbaria. The staff of the New York Botanical Gardens maintains this useful publication. To be registered in *Index herbariorum*, a unique acronym (for example, GAB for the National Herbarium of Botswana, Gaborone) is needed, as well as information about the size, collections, staff, contact person, and address.

## Infrastructure and functional areas

The building housing a new herbarium should be given careful thought before work commences. Work areas, storage space, and offices should be incorporated in the layout. In this section, we also discuss cupboards, lighting, ventilation, and many other aspects of an efficient herbarium.

## W A R N I N G

### BEWARE OF FIRE

Do not use open flames.  
Do not leave heaters on unattended.

## Buildings

Buildings should preferably be custom-built and designed with the staff complement, as well as the size and layout of cupboards in mind. The layout should take into consideration whether or not the ancillary collections will be housed separately.

It is important that buildings are water and dust proof, and that pests can be controlled easily. A form of fire protection should be in place in every herbarium; this can be an automatic or manual system. Fire is potentially the most devastating disaster for a herbarium; care should be taken to follow international standards for fire protection. Be aware of possible flooding dangers, as this can also ruin the collection.

## P

Good housekeeping will keep fire hazards to a minimum—ensure electrical wiring is well maintained.

## I

For more information on fire protection standards, contact your local fire brigade, Health and Safety organisation, or visit [www.nosa.co.za](http://www.nosa.co.za).

## T

## Working areas, storage space, and offices

Ideally, members of the herbarium staff should have their offices outside the main herbarium to allow for minimum disturbance.

There should be enough work surfaces inside the herbarium for researchers and other workers to spread out specimens when working with them.

A packaging area may be required for sending and receiving specimens, books, and so on. This area is best kept separate and suitably equipped with a large working surface, easy access to wrapping materials, and a scale.

A mounting area should also be kept separate from the main collections to reduce insect contamination and to consolidate mounting activities and equipment.

Storage space would depend on the quantity of supplies that are kept, but should be suitably shelved and maintained for optimum efficiency.



Specimens stacked in different types of cupboards—wooden (above) and metal (below).

## Cupboards

Specimens are stacked on top of each other and stored in shelved cupboards. The cupboards are shelved with pigeon-holes that are a little wider than the standard mounting board, and deep enough to hold a moderate pile of specimens—not too many, otherwise the lower specimens could be damaged by the weight. Over the years, cupboards have had different designs; all cupboards should, however, comply with the following standards:

- Cupboards should ideally have shelves approximately 150 mm apart, with close-fitting doors to provide protection from insects and dust.
- Metal cupboards should have doors with magnetic sealing strips around the edges for the same reason.
- Wooden cupboards may not provide the same protection against insects, but in humid climates they are not subject to condensation to the same degree.
- In a fire, unless they catch alight, wooden cupboards may offer better protection to specimens, since metal may overheat and singe the contents.

## Lighting

Studying herbarium specimens with microscopes and hand lenses requires good lighting. In sunny countries, large windows may leave plant specimens exposed and vulnerable to direct sunlight. To avoid damage to plant specimens, use of artificial or indirect light is preferable. In colder climates, however, most use is made of natural lighting, for example, the herbarium of the Royal Botanic Garden in Edinburgh (RBGE, Scotland, UK) is large and has windows on the one side and a light shaft in the centre. This makes the best of natural lighting, thereby reducing the amount of artificial light needed.

## Ventilation

In some climates, atmosphere control by air conditioners and humidifiers is essential in a herbarium. Such control does, however, create an artificial working atmosphere for staff and is expensive to install and maintain. The decision to control the atmosphere should therefore be made with great care, taking into account the fumigation method used and compatibility with the fire protection system. In addition, ventilation should comply with Health & Safety standards.

## Telecommunications

Telephones offer an effective way of communication, for example, faxing, as well as access to the Internet and e-mail through computers. Careful planning is needed to ensure that the telephone points are placed in practical positions. Computers have

become indispensable in modern herbaria as they are used in many aspects of herbarium work. They may have to be placed near a telephone jack if a modem is required for electronic communication.

### Library

A library or access to a library is essential for herbarium staff. Although electronic literature searches are made easy through technology that is becoming more freely available, all herbaria should have at least the standard reference works. It is also important to keep all possible Floras for the region, and the most recent botanical works relevant to the area, or local families. (For more information on books, see “Recommended herbarium literature”.)

### Laboratory

It is convenient to have laboratory facilities in the herbarium for researchers. Depending on the researchers’ needs, laboratories can be relatively simple or very well equipped. In all cases, it is useful to have basic facilities available: a workbench, scale, fume cabinet, glassware, and necessary chemicals. Other research facilities can be created (for example, for cytological work); these are often driven by individual preferences and the nature of the research.

The use of open flames and corrosive chemicals, such as acids, necessitate a fire protection system and a cold-water shower facility in case of an emergency. For the health and safety of staff, there must be a special storage cupboard or room for chemicals. Flammable substances, such as alcohol, should be stored away from the main building. It is also a good idea to have a first aid kit.



Specimens being dried in plant dryers.

### Reception

A reception area for visitors is convenient. Some herbaria also have special working areas for visitors to control their access to the collections.

Specimen reception is separated from other herbarium collections to reduce insect contamination. Strict hygiene regulations should be followed and no new accessions should be allowed into the main collection, unless first decontaminated. It is best to have two separated spaces for working with incoming specimens: one for contaminated material (for example, specimens donated from other herbaria, or specimens being unpacked and sorted for drying after a field trip); the other for decontaminated plants, such as those being sorted for identification or mounting. For more information on insect contamination, see “Herbarium Pests”.

### Equipment and supplies

As far as possible all herbaria that keep their specimens as archival records, should avoid using material of a temporary nature, such as sticky tape, masking tape, magic tape, plastic packaging tape, and self-adhesive labels. It is best to use only archival materials, such as methylcellulose adhesive, archival ink pens, and acid-free paper.

### Decontamination equipment

All new accessions and any insect-contaminated material need to be decontaminated. A freezer is the most essential piece of equipment; microwave ovens are very useful as well. Chemical methods used to be popular, but because of the potential health hazard, are not used much today. For more information on decontamination, see “Herbarium Pests”.

### Plant dryers

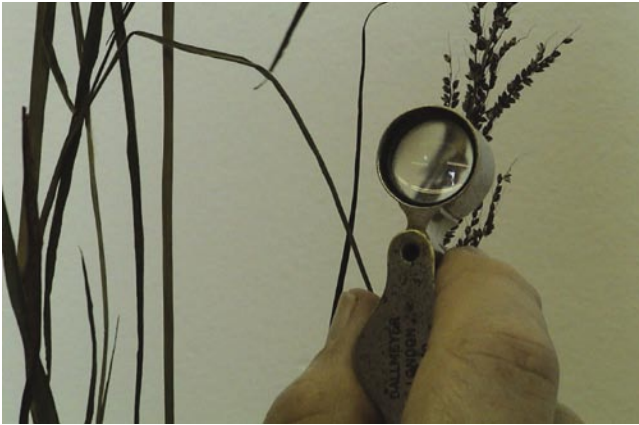
When choosing a plant dryer, take into account the number of specimens likely to be dried at one time. Many different kinds are available, ranging from a wooden box with a grid over a light bulb, to a walk-in oven; some advanced dryers even press and dry at the same time.

### Magnifying instruments

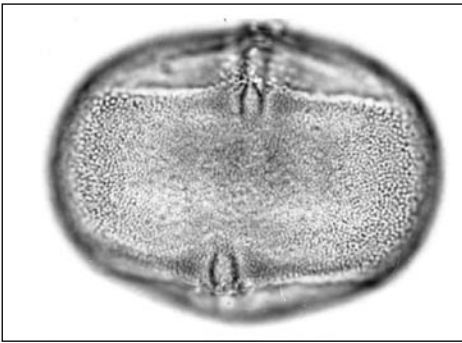
Most identification keys make use of characters that need high magnification; therefore, magnifying instruments are essential in a herbarium.

- **Hand lenses** (8–10x) are very useful for observing characters on specimens in the field, as well as in the herbarium.
- **Stereomicroscopes** have magnifications higher than 20x and are used to observe micro-characters on specimens.

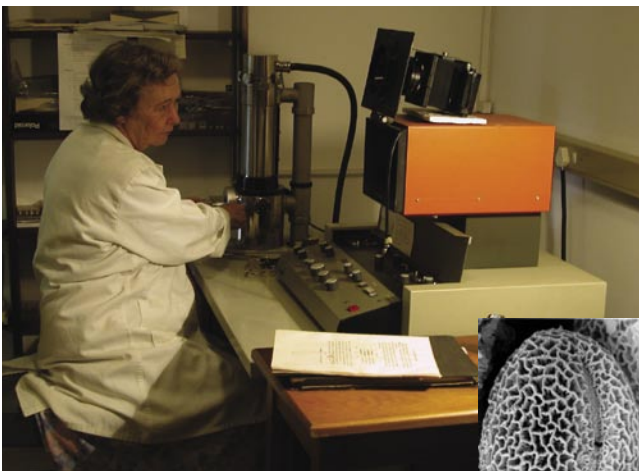




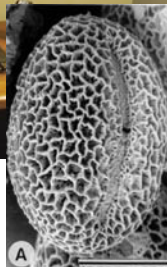
Hand lens being used to magnify grass spikelets.



Pollen grains viewed through a light microscope.



▲ Scanning electron microscope.  
► A pollen grain viewed through this instrument.



- **Transmission microscopes** are often needed to observe special characters such as cell structure in water plants and bryophytes. Preparations on microscope slides are required.
- **Microscope attachments**, that is, a camera and drawing tube, are invaluable (in the illustration of research papers) to herbaria active in research.
- **Electron microscopes**, transmission and scanning, are used for specialist research.

## Maps

Maps are essential for research and fieldwork. They are used for pinpointing localities, based on specimen label information and for supplying accurate locality data when new specimens are collected. Locality information, in turn, is used to establish the distribution range of a species.

Maps can be stored flat, folded, rolled, or hanging in special cabinets or drawers.

Preserve older and historic maps; they are often of great help when you are trying to find localities written on old specimens. This could, for example, be necessary when you are planning a field trip to collect a rare species, of which the only record is an old specimen with a locality name that is no longer in use. For more information, see "Maps".

## Camera

A camera is useful for botanical photography, both in the field and in the herbarium, as well as for recording incidents in the history of your herbarium.

The best camera to get is a single-lens reflex (SLR) camera, preferably one with optional auto focus. An additional lens for macrophotography, for taking close-up images of flowers, for example, is also very useful.

Digital cameras are becoming more affordable and popular and are very useful for photographing people, plants, and landscapes in the field, since one can immediately see the result and delete unwanted images. Special adapters are available for using a digital camera with a microscope. Digital cameras, however, have some disadvantages:

- There are capital expenses related to downloading or reproducing the images (for example, software and printer); however, one saves on film, processing, and printing costs.
- The quality of the image produced by an affordable digital camera is inferior to that produced by an SLR camera, but this may change as advanced technology becomes increas-

ingly affordable.

- Macro-photography is not of a high standard, unless you buy an expensive model.

### Other equipment

A herbarium also needs the usual office equipment, such as a photocopier, fax machine, telephone, and stationery. In addition, specialised equipment is necessary for collecting, mounting, preserving, and studying specimens. These are discussed in more detail in the other chapters of this book.

- **Plant collecting equipment.** See "Collecting Plants".
- **Mounting equipment.** See "Mounting Specimens".
- **Containers for spirit collection.** Plastic containers of different sizes to collect and store material in spirits. See "Spirit collection".
- **Packaging equipment.** For posting specimens or books: boxes, brown paper, packaging tape, string. See "Handling requests for loans".
- **Dissecting equipment.** See "Identifying specimens".

### Herbarium services

A herbarium can offer a wide range of services, both to scientists and other professionals, and the public.

#### Information service

A herbarium is the most likely place to contact if members of the public want to make an enquiry regarding the name of a plant. An information service can be introduced to respond to enquiries from the public, to make botanical information more accessible, and to improve public relations.

A herbarium staff member should be able to answer enquiries relating to plant identity and plant names (common names, synonyms, and so on). It is useful to keep the following books in a place accessible from the telephone:

- A book on common names, such as that by Smith (1966) for South Africa, or Cole (1995) for Botswana.
- A book on names of plants, such as *The plant book* by Mabberley (1997), which has a worldwide coverage.
- Also helpful is a reference on poisonous plants, such as that by Watt & Breyer-Brandwijk (1962).

It is essential to deal with enquiries in a friendly and efficient manner. However, many questions directed at herbarium staff members are about subjects for which they are not necessarily equipped, for example, queries about plant diseases, horticulture, and even solutions to crossword puzzle questions! Unless the staff member knows the answer to the query, it may be best

to refer the enquirer to someone with the relevant knowledge. A list of useful telephone numbers next to the telephone makes referrals easier. If you are unable to refer the caller, tell them that the query is outside the scope of the knowledge of a taxonomist, or the function of that particular herbarium.

### Visitors

Visitors to herbaria are generally welcomed as they ensure contact with other institutions and can contribute positively to curatorial care. Some herbaria are open to visitors, either on a daily basis or by appointment. Visitors who have an interest in herbaria include

- Researchers
- Casual visitors
- Consultants
- Commercial business people

Some herbaria keep a visitors' book for recording visitors' information, their research interests, and reasons for the visit. The book provides a useful list of contacts for future communication, as well as a record of the use of the herbarium.

Herbaria often prescribe regulations for visitors on, for example, handling specimens, dealing with name changes, selecting loans, and so on. Visitors should always be informed about herbarium practices and should work under supervision.

### Plant identifications

Researchers, members of the public, and people with specific interests such as vets, herbicide companies, and consultants doing vegetation surveys, may all approach the herbarium to have plants identified. Although identification is a basic essential service provided by herbaria, a fee may be charged to cover the costs of processing and time involved. This fee may be waived if the person is not in a hurry for names and donates good quality specimens to the herbarium. Clients who need plants identified urgently are often charged a higher fee. If a herbarium has the capacity and chooses to provide an identification service, it is advisable to have a policy stipulating the conditions and charges for providing the service.

#### TIP

Keep the telephone numbers of doctors and poison information centres next to the phone. Ask callers to supply a sample of the plant material for correct identification.



A herbarium staff member identifying plants.

### Loans

It is a generally accepted practice for a herbarium to lend specimens to another herbarium for use by qualified researchers, studying particular taxonomic groups or problems. Loans make it possible to

- Assemble a greater, more varied amount of material of a group than is possessed by any one herbarium, thus providing a better basis for revisions and monographs.
- Compare specimens directly with types and other authentic material.
- Have specimens annotated by the monographer or specialist.

Loans are usually made between institutions rather than from institutions to individuals, and arrangements should be made through the correct channels. All correspondence should be addressed to the curator of the museum or herbarium. Conditions of loans should be included with the correspondence.

For detailed information, see “Loans”.

### Environmental Impact Assessments

Staff members of herbaria may be approached to take part in Environmental Impact Assessments (EIAs). Taxonomists may be very useful to an EIA team, because they are competent in naming plant species and may therefore assist with compiling species lists for vegetation surveys. A herbarium worker is, however, not likely to be qualified to do full EIAs and should be wary of getting too involved in large projects requiring specialist ecological knowledge. If asked to participate in an EIA, a herbarium worker should make it quite clear what skills are offered. A tax-

onomist may assist in some or all of the following ways:

- Collecting voucher specimens from the area under study.
- Identifying these specimens and providing the names.
- Consulting the herbarium collection and compiling a list of species historically found in the area under investigation.
- Studying the literature to determine the rarity and extent of distribution of the species.
- Highlighting the occurrence of rare or endangered species that are found during the collecting trip, or while consulting herbarium records or literature.
- Assessing whether development would be harmful to the distribution of rare species.
- Providing recommendations on the conservation of rare species.

For this work a fee may be negotiated; it should cover all direct costs, as well as time spent on the project.

### Herbarium management

Without active, hard-working, dedicated staff to record, research, and communicate the wealth of information contained in a herbarium, the collections are worthless.

The energy and enthusiasm of staff should be directed by management to reach specified outcomes.

### Staff management

Staff are the biggest asset to any herbarium. Many opportunities for staff to develop their knowledge and skills exist in any herbarium. Managers and staff must continually explore ways of creating challenges for staff to grow.

### Herbarium staff

**Managers** ensure that the herbarium functions effectively. The most senior manager of a herbarium can be a director, curator, or keeper.

**Researchers** generally research the flora covered by the herbarium. Their research is usually restricted to a small number of families, although they are also responsible for the quality of scientific curation. Researchers are often involved in larger collaborative projects.

**Technicians** are generally involved in the day-to-day activities of the herbarium, such as plant identifications and scientific curation. They are generally responsible for a large range of families. After retirement, many researchers continue their research and can contribute substantially in this way.



**Supporting staff** hold a wide range of positions. They can be dedicated to a specific position, or fulfil a variety of tasks including mounting, packaging, filing, preparing genus covers, and loan administration. They are often approached to help with specific tasks or to clear backlogs.

### Financial management

Every herbarium has a budget, however small. Budgets are drawn up annually and should be managed to cover priority spending without over-spending. It is useful to have an itemised, yet flexible, budget to guide annual spending. Since priorities change continuously, a budget should be able to accommodate emergencies. ▲



Taxonomists on a plant collecting expedition press plants at their base camp.



# APPENDIX I: HERBARIUM SUPPLIES

## Local suppliers

The Pretoria National Herbarium (PRE) offers a non-profit herbarium supply service to smaller herbaria. PRE stocks most herbarium supplies, which are bought in bulk; some items are custom-made for the herbarium.

**The following items are available to individuals and institutions:**

- Plant presses (including straps)
- Single straps
- Drying paper (190 gsm, 450 x 280mm)
- Flimsies (unprinted newspaper, 550 x 420 mm)
- Genus covers (230 gsm, 570 x 430 mm)
- Species covers (230 gsm, 570 x 430 mm)
- Eltoro mounting boards (240 gsm, 270 x 420 mm)
- Acid-free mounting boards (300 gsm, 240 x 420 mm)
- Corrugated cardboard (280 x 450 mm)
- Field label notebooks
- Plastic zip bags (80 x 120 mm)
- Plastic zip bags (100 x 110 mm)
- White gummed paper (50 mm wide)
- Tarcroft paper
- Seed envelopes: small (45x 45 mm); medium (65 x 65 mm); large (90 x 90 mm)
- Raffia tails
- Boxes: size A (430 x 300 x 80 mm); size B (430 x 300 x 155 mm); size C (430 x 300 x 230 mm)
- Cardboard sheets (box inlets) (470 x 270 x 295 mm)
- Brown paper bags: sizes 35, 20, 12, 8, 4, 1

**You can request a current price list by writing to**

Herbarium Supplies  
National Herbarium Pretoria  
Private Bag X101  
Pretoria  
0001  
South Africa

## International suppliers

Herbarium Supply Company  
3483 Edison Way  
Menlo Park  
CA 94025  
USA

University Products  
517 Main Street  
PO Box 101  
Holyoke  
MA 01041-0101  
USA



# APPENDIX II: FIELD LABEL

Collector: .....		No.: .....		Date: .....				
Provisional name: .....								
Region:		Grid:		Alt: ft/m				
GPS	° ' S	° ' E						
Locality								
Biome	Forest	Fynbos	Grassland	Nama Karoo	Savanna	Succulent karoo	Thicket	
Vegetation type								
Habitat	mountain peak	mountain slope	hilltop	hill slope	ridge	cliff face	ravine/kloof/gorge	
	talus/scree	plateau	valley	floodplain	waterfall	river/stream bank	river/stream	
	dry streambed	donga/gulley/ditch	pan	depression	marsh	swamp	wetland	
	seepage	dune (desert)	dune (coastal)	estuary	littoral	lagoon	sea	
	lake	dam	pond	plain	other:			
Substrate	soil	stony soil	rocky soil	gravel	bare rock	in water	termite mound	
	bark	leaf	leaf litter	roots	other:			
Moisture regime	well-drained	seasonally waterlogged	free standing water	tidal	mist/fog			
	moist/damp	permanently waterlogged	running water	other:				
Soil type	gravel	sand	loam	black turf	humus	clay	salt/brack	baserock
Lithology	sandstone	shale	granite	quartzite	calcrete	dolomite	dolerite	
Exposure	shade	partial shade	full sun	Slope	none	gentle		
Aspect	N	S	W	E	NE	NW	SE	SW
							moderate	steep
Biotic effect	abandoned land	cultivated land	pasture	recently burned	garden	roadside		
	plantation	grazed	disturbed	none seen	other:			
Life form	tree	shrub	dwarf shrub	herb	graminoid	geophyte	epiphyte	
	climber	parasite	succulent	hydrophyte	bryophyte	lichen	scrambler	
	saprophyte	lithophyte	other:					
Plant features (underground parts, bark, leaves, flowers, fruit, seeds, aroma)								
Flowers:	present	absent	Fruit:	present	absent	Plant height:	m	
Notes (local abundance, phenology, pollinators, herbivory, economic & ethnobotanical factors, voucher specimen)								
Voucher:	photo	ecology	cytology	anatomy	seed	spirit		
Plant name: .....								
.....								
Genspec: ..... / ..... Det.: ..... Date: ..... No. of labels: .....								

# references and further reading



- ABOOBAKER, H. & NICHOLAS, A. 1999. How to collect field samples for DNA analysis. *SABONET News* 4(3): 214.
- BENTHAM, G. & HOOKER, J.D. 1862–1883. *Genera Plantarum*, 3 vols. London.
- BRIDSON, D. & FORMAN, L. 1992. *The herbarium handbook*. Royal Botanic Gardens, Kew, London.
- BRUMMITT, R.K. & POWELL, C.E. 1992. *Authors of plant names*. Royal Botanic Gardens, Kew.
- BRUMMITT, R.K. 1992. *Vascular plant families and genera*. Royal Botanic Gardens, Kew.
- BURGOYNE, P.M. & SMITH, G.F. 1999. Preparing useful herbarium specimens of succulents and other plants with fleshy parts. *Aloe* 35: 102–103.
- CLAYTON, W.D. & RENVOIZE, S.A. 1986. Genera graminum—grasses of the world. *Kew Bulletin Additional Series* XIII.
- COLE, D.T. 1995. *Setswana—animals and plants*. The Botswana Society, Gaborone.
- DE DALLA TORRE, C.G. & HARMS, H. 1900–1907. *Genera Siphonogamarum*. Leipzig.
- ENGLER, H.G.A. & PRANTL, K.A.E. 1887–1915. *Die Natürlichen Pflanzenfamilien*, ed. 1. Leipzig.
- FARR, E.R., LEUSSINK, J.A. & STAFLEU, F.A. 1978. *Index nominum genericorum*, and supplements 1986, Vol. 1–111 Bohn, Scheltema & Holkema, Utrecht, dr. W. Junk b.v. Publishers, The Hague.
- FISH, L. 1999. Preparing herbarium specimens. *Strelitzia* 7. National Botanical Institute, Pretoria.
- FISH, L. & STEYN, H. 2001. Benefits of data capturing in herbaria. *SABONET News* 6(1): 19–21.
- FOSBERG, F.R. & SACHET, M. 1965. Manual for tropical herbaria. *Regnum Vegetabile* 39. Utrecht, Netherlands.
- FRODIN, D.G. 1984. *Guide to the standard floras of the world*. Cambridge University Press.
- GERMISHUIZEN, G. & MEYER, N.L. (eds). 2003. Plants of southern Africa: an annotated checklist. *Strelitzia* 14. National Botanical Institute, Pretoria.
- HALL, A.V. 1988. Pest Control in Herbaria. *Taxon* 37: 885–907.
- HALL, D.W. 1981. Microwave: a new way to control herbarium insects. *Taxon* 30: 818–819.
- HOLMGREN, P.K., HOLMGREN, N.H. & BARLETT, L.C. 1990. *Index herbariorum Part 1*. New York Botanical Gardens, Bronx, New York.
- GREUTER, W., MCNEILL, J., BARRIE, F.R., BURDET, H.-M., DE MOULIN, V., FILGUERAS, T.S., NICOLSON, D.H., SILVA, P.C., SKOG, J.E., TREHANE, P., TURLAND, N.J. & HAWKSWORTH, D.L. (eds). 2000. *International Code of Botanical Nomenclature (Saint Louis Code)*. Koeltz Scientific Books, Königstein, Germany.
- JACKSON, N.D. 1928. *A glossary of botanic terms*. 4<sup>th</sup> ed. Duckworth, London.
- LAWRENCE, G.H.M. 1951. *Taxonomy of vascular plants*. Macmillan, New York.
- LEISTNER, O.A. (ed.). 2000. Seed plants of southern Africa: families and genera. *Strelitzia* 10. National Botanical Institute, Pretoria.
- LEISTNER, O.A. (ed.). 2004. Seed plants of south Tropical Africa: families and genera. *South African Botanical Diversity Network Report* No. 26. SABONET, Pretoria.
- MABBERLEY, D.J. 1997. *The plant book*. 2<sup>nd</sup> ed. Cambridge University Press.
- PRENTICE, C.A. & ARNOLD, T.H. 1998. PRECIS specimen database user guide. *South African Botanical Diversity Network Report* No. 3. SABONET, Pretoria.
- RADFORD A.E. 1986. *Fundamentals of plant systematics*. Harper & Row, New York.
- RETIEF, E. & NICHOLAS, A. 1988. The cigarette beetle *Lasioderma serricorne* (F.) (Coleoptera: Anobiidae): a serious herbarium pest. *Bothalia* 18: 97–99.
- RETIEF, E., NICHOLAS, A. & BAIJNATH, H. 1995. The psocid *Liposcelis bostrychophilus* Badonnel (Psocoptera: Liposcelidae): an occasional herbarium pest. *Bothalia* 25: 247–253.
- SMITH, C.A. 1966. Common names of South African plants. *Botanical Survey Memoir* 35.
- SMITH, G.F. & WILLIS, C.K. 1999. Index herbariorum: southern African supplement. 2<sup>nd</sup> ed. *South African Botanical Diversity Network Report* No. 8. SABONET, Pretoria.
- SMITH, G.F., WILLIS, C.K. & MÖSSMER, M. 1999. Southern African herbarium needs assessment. *Southern African Botanical Diversity Network Report* No. 6. SABONET, Pretoria.
- STAFLEU, P.A. & COWAN, R.S. 1976–1988. *Taxonomic literature*. 2<sup>nd</sup> ed. Bohn, Scheltema & Holkema, Utrecht (Vol. 1), others: B, S & H, Utrecht/Antwerpen, Koeltz Scientific Books, Königstein 1992–2000.
- STEARN, W.T. 1983. *Botanical Latin*. 4<sup>th</sup> ed. Timber Press, Portland, Oregon.
- VAN ROOY, J. 1998. Introduction to bryology in southern Africa.



- Plantlife* 18: 19–21.
- VAN WYK, H.L.G. 1971. *A dictionary of plant names*. A. Ascher & Company, Vaals-Amsterdam.
- WATSON, L. & DALLWITZ, M.J. 1994. *The grass genera of the world*. CAB International, Wallingford.
- WATT, J.M. & BREYER-BRANDWIJK, M.G. 1962. *Medicinal and poisonous plants of southern and eastern Africa*. 2<sup>nd</sup> ed. E & S Liv-

- ingstone Ltd., Edinburgh.
- WILLIAMS, S.L. & CATO, P.S. 1995. Interaction of research, management and conservation for serving the long-term interests of natural history collections. *Collection Forum* 11(1): 16–27.
- WILLIS, J.C. 1973. *A dictionary of flowering plants & ferns*. 8<sup>th</sup> ed. Cambridge University Press.



All photographs by Rolf Burkhardt © 2003 SABONET, except where otherwise noted.

- i, 44, 72. Plant specimen
- ii, 9. Gathering plant material (J. Burrows)
- v. *Mondia whitei* (NBI)
- vi, 21. *Astridia citrina* (NBI)
- vii. *Ferraria schaeferi* (G. Owen-Smith)
- viii, 70. *Moraea aristata* (NBI)
- ix, 83, 84, 85. *Juttadinteria deserticola* (G. Williamson)
- x, 38, 60. *Conophytum* sp. (NBI)
- x. Collections, Nyika expedition (C. Willis)
- 1, 3. *Frithia pulchra* (P. Burgoyne)
- 2. Inside a herbarium
- 4. Pressing plant material in the field (C. Willis)
- 5. *Erythrina lysistemon* (Lyn Fish)
- 6. Plant specimen
- 7. Wooden specimen
- 8. Fossils stored in metal cupboards
- 10. Ancient specimen
- 11. Vehicle equipment
- 12, 13. Collecting equipment
- 14. Gathering plant material, Pressing in the field, *Adiantum reniforme* in press (C. Willis)
- 15. Map
- 16. GPS, Plant press
- 17. Field press
- 18. Bryophyte and lichen specimens and covers
- 19, 30. Bulbs (Lyn Fish)
- 20. Plant press and d-rings
- 20. Flimsies folded (S. Turck)
- 21. Ventilators
- 21. Plant press (S. Turck)
- 22. Characteristics of a good specimen
- 23. Graminoid (G. Condy)

- 24. Bulb sliced (Lyn Fish)
- 24. Bulbous specimen (G. Condy)
- 25. Pressing a succulent flower
- 26. Bulky specimen (G. Condy)
- 26. Preserved specimens in bottles
- 27. *Nymphaea* specimen (G. Condy)
- 28. Specimen of cycad
- 29. Submerged aquatic plants, Aquatic specimen (J.E. Victor)
- 30. Pressing in the field (C. Willis)
- 31. Mounted specimen
- 33. Different envelopes
- 34, 35. Materials and equipment for mounting
- 36. Specimen sewn to the board
- 37. Pattern for envelope (S. Turck)
- 38. Storing bryophytes and lichens
- 39, 75. Wooden cupboard
- 40. Genus cover, mounting sheet, species cover
- 42. Type cover
- 44, 75. Metal cupboard
- 45. Researcher doing plant identification
- 61. Insect damage (NBI)
- 62. Insect damage
- 62. *Lasioderma serricone* (S.M. Perold & E. Retief)
- 63. Lasioderma trap
- 64. Fume cabinet, DDT specimen
- 65. Specimens preserved in bottles
- 69. Hand lenses, Dissecting microscope
- 71. *Bauhinia natalensis* (NBI)
- 73. Fossils stored in cupboard
- 76. Plant dryers
- 77. Pollen grains (J.E. Victor)
- 77. Hand lens, Scanning electron microscope
- 79. Staff member identifying plants (C. Willis)
- 80. Taxonomists on collecting expedition (C. Willis)
- 81. Open plant press

**A**

abbreviations of author names, 66  
 absorbent paper; used for padding, 23  
 abundance, 18  
 academic herbaria, 3  
 Acanthaceae, 24  
 accession numbers, 43  
 acronyms, 74  
 adhesives. *See* glue  
 African herbaria, 2  
 air-drying, 30  
 air conditioning, 75  
 aliens, 44, 48  
 Aloe leaves, 23  
 alphabetical  
   arrangement, 43  
   lists, 44  
 altitude, 18  
 amateur botanists, 10  
 ammonia, 69  
 ancillary collections, 6  
 angiosperms, 6  
 anti-emetics, 14  
 anti-spasmodics, 14  
 antihistamines, 14  
 antiseptic solutions, 14  
 aquatic plants, 28  
 archival materials, 76  
 ArcView, 45  
 arrangement. *See* mounting  
 Asclepiadoideae flowers, 7, 23  
 aspect, 18  
 author names, 66

**B**

backups, 48  
 bandages, 14  
 barium fluorosilicate, 64  
 bending  
   specimens, 23  
 bending specimens, 21  
 binomials, 66  
 biodiversity, 48  
 boards. *See* mounting  
 booklice, 62  
 books  
   interlibrary loans, 70  
   recommended, 70  
   reference, 78

**boxes**

  drop front, 6  
   for bulky specimens, 6  
   for envelopes, 38  
   for fragile fungi, 7  
   for seeds and fruit, 6  
   for tropical herbaria, 6  
   hardboard, 6  
   mailing, 49, 78  
   suppliers of, 81  
 box inlets. *See* cardboard  
 breaking specimens, 21  
 bryophytes  
   collecting, 17  
   drying, 30  
   mounting, 7, 38  
   storing, 7, 17, 38  
   substrate, 18  
   washing, 38  
 buildings, 74  
 bulbs  
   basal parts, 16  
   collecting, 16  
   pressing, 23  
 bulky specimens  
   mounting, 33  
   pressing, 20, 23  
   storing, 6  
 bulrushes, 36  
 burns, 15

**C**

cameras, 77  
 carcinogens, 26  
 cardboard  
   corrugated, 20  
   for mounting, 32  
   ventilators, 20  
 cardiac-pulmonary resuscitation, 15  
 Carnoy's fluid, 26  
 carpological collections, 6  
 changing drying paper; 20, 30  
 checklists  
   of collecting equipment, 12, 13  
   of emergency supplies, 14  
   plant, 68  
   of vehicle equipment, 14  
 cheesecloth, 28  
 chemicals

  hazardous, 26  
   storing, 76  
 cigarette beetles, 62  
*cited as* labels, 72  
*cited* labels, 42  
 CITES, 14  
 classification  
   defined, 66  
   systems, 43, 66  
 cockroaches, 62  
 collecting  
   bryophytes, 17  
   consent, 14  
   defined, 8  
   equipment, 12, 13  
   etiquette, 8  
   floristic, 10  
   fungi, 28  
   good specimens, 16  
   guidelines, 16  
   landowners, 14  
   lichens  
     permits. *See* permits  
   plastic bag method, 17  
   rare plants, 17  
   representative parts, 16  
   research, 10  
   shrubs, 16  
   specialised, 10  
   trees, 16  
   trips, 45  
   types of  
     vehicle equipment, 14  
   weeds, 16  
 collections  
   ancillary, 6  
   carpological, 6  
   enlarging, 8  
   expanding, 8  
   historic, 3  
   improving, 8  
   main, 6  
   old, 3  
   special, 3  
   types of, 8  
 collection dates, 18, 47  
 collectors  
   amateur, 10  
   herbarium staff, 10

information, 47  
 names, 18  
 numbers, 18, 33  
 parataxonomists, 10  
 professionals, 10  
 register, 18  
 students, 10  
 colour  
   coding, 40  
   flower, 18  
   fruit, 18  
   plant, 7  
 common names, 18, 18, 78  
 comparison, 68  
 computerisation, 45, 47  
   advantages of, 45  
   backups, 48  
   quality control, 46  
   specimens, 47  
 computers  
   e-mail, 75  
   maintenance, 48  
   upgrading, 48  
   uses, 45  
 cones, 6  
*conf.* labels, 42, 69  
 consent, landowners, 14  
 conservation, 47, 48, 79  
 cooking bags, 36  
 coordinates, 15  
 Copenhagen mixture, 26  
 corms, pressing, 23  
 correcting fluid, 43  
 corrugated cardboard, 20  
 covers  
   genus, 40  
   species, 40  
   type, 40  
 CPR, 15  
 cross-referencing  
   carpological specimens, 6  
   hybrids, 44  
   labels used for, 42  
   photographic negatives, 7  
   separated specimens, 60  
   slides, 8  
   wood specimens, 7  
 cultivated plants, 6, 44  
 cupboards, 7, 75  
   bryophyte storage, 38  
   for fossils, 7  
   metal, 75  
   wooden, 75  
 cupboard lists, 43  
 curation  
   physical, 40  
   scientific, 66  
 cutting

fleshy plants, 23  
 specimens, 21, 23  
 succulents, 23  
 cycads  
   collecting, 16  
   pressing leaves, 21  
   storing cones, 6  
 Cyperaceae, pressing, 23  
 cytological fixatives, 26

## D

Dalla Torre & Harms, 43  
 damage  
   bryophytes, 17  
   bulky specimens, 20, 23  
   correcting fluids, 43  
   envelopes, 33  
   flowers, 23, 28  
   glue, 32, 33  
   handling, 32  
   insect, 60, 62  
   in flimsies, 30  
   in transit, 49, 59  
   light, 75  
   loans, 49, 59  
   preventing, 41  
   repairing, 60  
   soil, 38  
   spines, 33  
   when collecting, 17  
 databases, 45  
 data input, 47  
 data output, 48  
 dates  
   advantages of recording, 18  
   collection, 18, 47  
 decontamination  
   equipment, 76  
   loans, 49  
   new accessions, 76  
 defragmenting computers, 48  
 dehydration, preventing, 15  
 delicate  
   aquatic plants, 30  
   bryophytes, 17, 38  
   flowers, 12, 23, 24, 28, 69  
   inflorescences, 36  
   organs, 20  
   specimens, 17, 32, 33  
   structures, 7  
 denatured alcohol, 23, 26  
 deposits, 8  
 descriptions, 68  
 descriptive notes, 18  
 desiccants, 63  
*det.* labels, 42, 69  
 diagnoses, 68  
 diameter of trees, 18

diarrhoea, 14  
 dichlorvos, 63  
 digital cameras, 77  
 dissected material, 33  
 distribution, 45, 47  
   maps, 45, 48  
 donations, 8  
 drawings, vouchers for, 18  
 drying, 30  
   bryophytes, 30  
   changing paper, 30  
   details lost during, 18  
   fungi, 30  
   guidelines, 30  
   paper, 20  
   speeding up, 28  
   temperature, 30  
   testing specimens, 30  
 duplicates, 8, 18  
   collecting, 16  
   requirements, 60  
   sorting, 8

## E

e-mail, 75  
*e descr.*, 69  
*e num.* label, 72  
 effective publication, 66  
 EIAs, 79  
 electron microscopes, 77  
 emergency supplies, 14  
 Engler, 43  
 enquiries, dealing with, 78  
 envelopes, 33  
   bryophytes, 7  
   filing, 38  
   folding, 33, 38  
   for old labels, 38, 60  
   from A4 paper, 38  
   glueing, 33  
   labelling, 38  
   loose parts, 32  
   making, 33, 38  
   mounting, 33  
   paper for, 32  
   seeds, 23  
   suppliers of, 81  
 environmental impact assessments, 79  
 equipment  
   collecting, 12, 13  
   mounting, 32  
   office, 78  
   safety, 26  
   vehicle, 14  
 escapes, garden, 44  
 ethanol, 26  
 etiquette, collecting, 8  
 ex, in author name, 66



*ex descr.*, 69  
*ex herb.* label, 42  
*ex num.* label, 72  
 exchanges, 8  
 exchange policies, 8  
 exotics, 44  
 expanding collections, 8

## F

FAA, 26  
 family names, 66  
 faxing, 75  
 ferns  
   basal parts, 16  
   collecting, 16  
   fronds, 16  
   glueing, 33  
   mounting, 33  
   pressing, 21  
 field  
   guides, 68  
   labels, 18  
   notebook, 18  
   press, 17  
   trips, 8  
 filing  
   envelopes, 38  
   loans, 59  
   specimens, 43, 74  
 financial management, 80  
 fire, 74, 75  
 fire protection system, 76  
 first aid, 14, 15, 76  
 fish moths, 62, 64  
 fixatives, 7, 26  
 fleshy plants  
   preserving, 7  
   pressing, 23  
 flimsies  
   folding, 20  
   leaves sticking to, 28, 30  
   paper for, 20  
   using, 20  
 floating method, 28  
 flooding, 74  
 floras, 68  
 floristic collecting, 10  
 floristic regions, 43  
 flowers  
   Acanthaceae, 24  
   aquatic plants, 28  
   arranging when pressing, 21  
   Asclepiadoideae, 23  
   closing times, 18  
   fragile, 24  
   gummed cards, 24  
   Iridaceae, 24

Mesembryanthemaceae, 23, 24  
   opening times, 18  
   pressing, 24  
   Stapelieae, 23  
 flower colour, 18  
 foam, for padding, 23  
 folders. *See* covers  
 formaldehyde, 26  
 formalin, 26  
 fossils, storing, 7  
 freezers, 76  
 freezing  
   decontamination by, 62  
   specimens after drying, 62  
   specimens while pressing, 23, 28  
 fruits, 6  
 fruit colour, 18  
 fumigation, 63, 75  
 functions of herbaria, 2  
 fungi  
   collecting, 28  
   drying, 30  
   insect damage, 7  
   pathogenic, 28  
   rusts, 28  
   storing, 7, 28  
   substrate, 18

## G

gazetteer, 48  
 generic names, 66  
 genus covers, 40  
 geographical information systems, 46  
 geographic regions, 43  
 geology, 18  
 georeferencing, 46  
 gifts, 8  
 GIS, 46  
 glacial acetic acid, 26  
 Global Positioning System. *See* GPS  
 glue, 32, 33  
   applying, 33  
   methylcellulose, 32, 33  
   PVA, 32  
   water-soluble, 33  
   white, 32  
   wood, 32, 33  
 glueing  
   labels, 38  
   specimens, 33  
 glycerol, 26  
 GPS, 12, 15, 18, 47  
 graminoids, pressing, 23  
 grasses  
   collecting, 16  
   pressing, 23  
 guidelines

bryophytes, 38  
 collecting, 16  
 drying, 30  
 glueing specimens  
 handling specimens  
 labels, 43  
 microwaving, 62  
 new herbaria, 74  
 permits, 14  
 remounting, 60  
 samples, 59  
 gummed  
   cards, 24  
   paper, 24, 32, 36  
 gum Arabic, 24  
 gymnosperms, 6

## H

habit, 7  
 habitat, 18, 47  
   photographs of, 7  
 handling specimens  
 hand lenses, 68, 76  
 hardware, upgrading, 48  
 hazardous chemicals, 26, 64  
 height, 18  
 herbarium  
   acronyms, 74  
   buildings, 74  
   defined, 2  
   equipment, 76  
   labels, 32  
   layout, 74  
   management, 79  
   needs of new, 74  
   pests. *See* pests  
   purpose of, 74  
   staff, 10, 79  
   stamp, 32  
 herbarium services  
   enquiries, 78  
   environmental impact assessments, 79  
   identifications, 78  
   information, 78  
   loans, 79  
   visitors, 78  
 histological fixatives, 26  
 historical  
   collections, 3  
   specimens, 7  
 holotypes, 68  
 host plants, 18  
 humidifiers, 75  
 humidity  
   control, 63, 75  
   effect on drying, 30  
 humid climates, cupboards for  
 hybrids, 44

- I**
- ICBN, 66
  - identification, 68
    - by matching, 70
    - characters for, 16
    - defined, 66
    - fees for, 78
    - microscopes, 68
    - service, 78
    - using keys, 69
    - using maps, 48
  - illustrations, 7
    - as types, 68
  - IMS, 26
  - in*, in author name, 68
  - Index herbariorum*, 74
  - indexes, 43
  - industrial methylated spirits, 26
  - infestations. *See* pests
  - inflorescences, strapping, 36
  - information
    - recording, 18
    - service, 78
    - storing, 40
  - insecticides, 63
  - insects, 30, 38, 62
  - insect damage
    - on fungi, 7
    - treating, 60
  - interfacing, 28
  - interlibrary loans, 70
  - International Code of Botanical Nomenclature, 66
  - international herbaria, 3
  - Internet, 75
  - invaders, 48
  - IPNI website, 66
  - Iridaceae flowers, 24
  - isotypes, 68
- K**
- Kew mixture, 26
  - keys
    - for identification, 68
    - in floras, 68
    - using, 69
  - killing specimens, 23
- L**
- labels
    - basic information, 18
    - bryophytes, 38
    - cited*, 42
    - cited as*, 72
    - conf.*, 42, 69
    - creating, 43
    - cross-references, 42
    - det.*, 42, 69
    - faded, 60
    - field, 18, 42
    - for illustrations, 7
    - fragile, 60
    - information on, 18
    - main, 33, 42
    - mounting, 36
    - multiple sheets, 32
    - new, 36
    - nomenclature, 42
    - old, 60
    - original, 42
    - paper for, 43
    - position, 36
    - printing, 43
    - quoted*, 42
    - remounting, 60
    - replacing, 60
    - self-adhesive, 43
    - switched, 44
    - types of, 42
    - using PRECIS for, 46
    - voucher specimen, 42
    - writing on, 41
  - laboratory, 76
  - large specimens
    - mounting, 33
    - storing, 6
  - laser printers, 43
  - Lasioderma*, 62
    - traps, 62
  - latex, 18
  - Latin, diagnoses, 68
  - latitude, 15
  - lattice frames, 20
  - lauryl pentachlorophenolate, 64
  - layout of herbarium, 74
  - leaves
    - Aloe*, 23
    - aquatic plants, 28
    - arranging when pressing, 21
    - sticking to flimsies, 28
    - venation, 28
  - lectotypes, 68
  - legitimate names, 66
  - libraries, 70, 76
  - lichens. *See* bryophytes
  - life form, 18
  - lighting, 75
  - light conditions, 18
  - Liposcelis*, 62
  - lists
    - alphabetical, 44
    - computer-generated, 45, 48
    - cupboard, 44
    - loan, 59
    - Red Data, 47
    - species, 45
  - literature
    - recommended, 70
    - storing, 40
  - living plants, 62
  - loans
    - advantages of, 79
    - decontaminating, 49
    - handling, 59
    - interlibrary, 70
    - loan sheet, 49
    - packing, 49
    - re-filing, 59
    - requesting, 49
    - requests, 49
    - returning, 59
    - selecting specimens, 49
    - storing, 59
  - locality
    - advantages of recording, 18
    - computerising, 47
    - defined, 18
    - for GIS use, 46
    - names, 48
    - using GPS, 15
  - local herbaria, 3
  - longitude, 15
  - loose parts, 33
  - LPCR, 64
  - lumpers, 72
- M**
- macrofungi
    - drying, 28
    - storing, 7
  - macrophotography, 77
  - maintenance, computer, 48
  - main collection, 6
  - management, 79
  - MAPPIT, 45, 46, 47
  - maps
    - benefits of, 48
    - coordinates, 15
    - historic, 77
    - old, 77
    - quarter-degree grids, 15
    - reading, 15
    - reference lines, 15
    - scale, 18
    - software, 47
    - storing, 77
  - matches, 15
  - matching, 68, 70
  - materials, archival, 76
  - mercuric chloride, 64
  - mercury, 64
  - Mesembryanthemaceae flowers, 23
  - methylated spirits, 23, 26
  - methylcellulose. *See* glue

methyl bromide, 63  
 microscopes  
   attachments, 77  
   cameras, 77  
   dissecting, 68  
   electron, 77  
   for identification, 68  
   slides. See slides  
   stage colour, 68  
   stereo, 77  
   transmission, 77  
 microwave ovens, 76  
 microwaving  
   effects of, 62  
   specimens for decontamination, 62  
   succulent specimens, 23  
 modems, 76  
 moisture regime, 18  
 monographs, 68  
 mothballs, 64  
 mounting  
   aims of, 32  
   area, 75  
   arranging the specimen, 32  
   boards, 32  
   bryophytes, 7, 38  
   cardboard, 32  
   envelopes, 33  
   equipment, 32  
   illustrations, 7  
   labels, 36  
   lichens, 7, 38  
   materials, 32  
   photographs, 7  
   procedures, 32  
   sequence, 32  
 mushrooms. See fungi

## N

names, correct, 66  
 naphthalene, 64  
 national herbaria, 3  
 naturalised species, 44  
 nature reserves. See permits  
 nausea, 14  
 negatives, 8  
 neotypes, 68  
 nomenclature, 66, 74  
 northern hemisphere herbaria  
 notes, storing, 40  
*Nymphaea* flowers, 28

## O

offices  
   equipment, 78  
   for herbarium staff, 75  
 orientation, 16  
 outliers, 48

output, 48  
 oven bags, 36

## P

packaging area, 75  
 packing  
   loans, 49  
   presses, 21  
 padding, when pressing, 23  
 paintings, vouchers for, 18  
 palm fronds, 6  
 paper  
   absorbent, 23  
   changing, 30  
   for labels, 43  
   gummed, 24, 32, 36  
   self-adhesive, 32  
   tissue, 38  
   towels, 32  
   wax. See wax paper  
 parasitic host plants, 18  
 parataxonomists, 10  
 paste. See glue  
 permits  
   CITES, 14  
   collecting, 8  
   conditions, 8  
   guidelines, 14  
   nature reserves, 14  
   obtaining, 14  
   phytosanitary, 14  
   special, 14  
 pests, 62, 76  
   fish moths, 64  
   fumigation, 63  
   insecticides, 63  
   preventing, 62, 63  
   treating, 63  
 petrol, 23  
 photocopies of specimens, 7  
 photographic slides, 7  
 photographs  
   filing, 7  
   labelling, 7  
   of specimens, 7  
   vouchers for, 18  
 photography, 77  
 physical curation, 40  
 pigeonholes, 75  
 plant  
   collecting. See collecting  
   colours, 7  
   dryers, 76  
   height, 18  
   press. See press  
   size, 18  
   specimen, 6  
   uses, 18  
 plastic bags, 44  
 Poaceae, pressing, 23  
 poisoned specimens, 64  
 poisonous plants, 78  
 poisons, 26, 64  
 policy  
   donations, 8  
   identification, 78  
   loans, 49, 79  
   removing samples, 59  
   space-saving, 8  
 poly(vinyl acetate). See glue  
 polyester  
*Potamogeton*, pressing, 28, 30  
 potplants, 62  
 Prantl, 43  
 pre-printed field labels, 18  
 PRECIS, 46  
   labels, 46  
 preservatives, 7, 26  
 presses  
   components of, 20  
   field, 17  
   packing, 21  
   temporary, 17  
 pressing  
   aims of, 20  
   aquatic plants, 28  
   bending specimens, 23  
   bryophytes, 17  
   bulbs, 23  
   corms, 23  
   cutting specimens, 23  
   fleshy plants, 23  
   freezing specimens  
   fungi, 28  
   graminoids, 23  
   gummed card method, 24  
   killing specimens before, 23  
   large leaves, 28  
   lichens  
   microwaving specimens  
   problems, 28  
   re-pressing, 32  
   small plants, 28  
   special methods, 23  
   spiny plants, 24  
   standard methods, 21  
   succulents, 23  
   tall specimens, 23  
   thick parts, 23  
   underground organs, 23  
 private herbaria, 3  
 professionals, 10  
 programmes  
   computer, 45  
   mapping, 45, 47  
   upgrading, 48



protective measures, 26  
 psocid booklice, 62  
 pteridophytes, 6  
 publications, taxonomic, 68  
 public relations, 78  
 purpose of herbarium, 74  
 PVA. *See* glue  
 pyrethrin, 64

## Q

quality control, 46  
 quarter-degree grids, 15, 18, 45, 47  
 Quick Guide, 45, 70  
*quoted* labels, 42

## R

raffia, 36  
 range of variation, 16  
 ranks, 66  
 rare plants, 17  
 rats, 62  
 re-glueing, 60  
 re-pressing, 32  
 re-strapping, 60  
 reading maps, 15  
 rearranging specimens, 23, 32  
 reception area, 76  
 recording label information, 18  
 Red Data Lists, 47, 48  
 reference lines, 15  
 regional herbaria, 3  
 rehydration  
   of specimens, 32, 69  
   powder, 15  
 remounting, 16  
 removing  
   leaves or flowers, 23  
   samples, 59  
 repairing, 60  
 representative parts, 16  
 research, 3  
   collecting for, 10  
   herbaria, 3  
   photographs from, 7  
 researchers, 79  
 respirators, 26  
 Restionaceae, pressing, 23  
 returning loans, 59  
 revisions, 68  
   evaluating, 72  
   incorporating, 72  
 roles of herbaria, 2  
 roots, 21  
 rusts, 28

## S

safety equipment, 26  
 samples, removing, 59

sandbags, 32, 33  
 scanning specimens, 7  
 scientific curation, 66  
 sedges  
   collecting, 16  
   pressing, 23  
 seeds, 6, 23, 33  
 seed banks  
   vouchers for, 18  
 self-adhesive paper, 32  
 services, herbarium. *See* herbarium services  
 shelves, 75  
 showers, 26  
 silica aero gel, 64  
 silica gel, 7, 13, 63  
 slides, storing, 7, 8  
 SLR cameras, 77  
 small plants, pressing, 28  
 smell, 18  
 snakebite, 15  
 software. *See* programmes  
 soil, 21, 32, 38  
 soil type, 18  
 southern African herbaria, 2  
 southern hemisphere herbaria, 2  
 spacers, 20  
 specialised collections, 3  
 special permits, 14  
 species  
   covers, 40  
   lists, 48  
   names, 66  
 specific epithets, 66  
 specimens  
   arranging in cupboards, 44  
   arranging when mounting, 32  
   arranging when pressing, 21  
   bending, 21  
   breaking, 21  
   bulky, 6, 23  
   carrying, 41  
   cutting, 21, 23  
   difficult, 23  
   drying. *See* drying  
   duplicate. *See* duplicates  
   filing, 43, 44  
   good, 16  
   handling  
     historical, 7  
     hybrid, 44  
   killing, 23  
   labelling, 42  
   large, 21, 23  
   mounting. *See* mounting  
   ordering, 44  
   padding, 23  
   poisoned, 64  
   pressing. *See* pressing

re-pressing, 32  
 rearranging, 23, 32  
 rehydrating, 32  
 remounting, 60  
 removing samples from, 59  
 reorganising, 72  
 repairing, 60  
 samples, 59  
 size, 16  
 splitting, 23  
 stacking, 41  
 storing, 40  
 undescribed, 44  
 unmanageable, 23  
 wood, 6  
 spiny plants  
   mounting, 33  
   pressing, 24  
 spirit collection, 7  
 splints, 14  
 splitters, 72  
 splitting specimens, 23  
 spore prints, 7  
 staff, 79  
 stamps, 32  
 standard pressing methods, 21  
 Stapelieae flowers, 23, 26  
 stereo microscopes, 76  
 stickiness, 18  
 stitching, 36  
 storage space, 75  
 storing  
   bryophytes, 17, 38  
   bulky specimens, 6  
   chemicals, 76  
   fossils, 7  
   fruit, 6  
   fungi, 7, 28  
   large specimens, 6  
   lichens, 38  
   macrofungi, 7  
   maps, 77  
   seeds, 6  
   wood, 7  
 strapping  
   inflorescences, 36  
   re-strapping, 60  
   specimens, 36  
 straps, for presses, 20  
 students, 10  
 subdivisions, 43  
 submerged plants, 28  
 substrate, 18  
 succulents, pressing, 23  
 sunlight, 75  
 support services, 3  
 synonyms, 44  
 syntypes, 68

systematic arrangement, 43

## T

tags, 18  
     mounting, 33  
 tall specimens, pressing, 23  
 taste, 18  
 taxonomy, 66  
 teaching herbaria, 3  
 technicians, 79  
 telephones, 75  
 temperature for drying, 30  
 thick parts, 23  
 thorns, 24, 33  
 thread, 36  
 threatened taxa, 48  
 Tipp-Ex, 43  
 tips  
     adhesives, 32  
     bryophytes, 38  
     carcinogens, 26  
     CPR, 15  
     difficult specimens, 23  
     emergencies, 15  
     endings, of taxon names, 66  
     field press, 17  
     filing specimens, 44  
     first aid, 15  
     freezing, 28  
     fumigation, 63  
     genus covers, 40  
     glues, 32  
     guidelines, 41  
     handling specimens, 41  
     hand lenses, 69  
     hazardous chemicals, 26  
     identification, 70  
     ink, 43  
     insects, 38  
     instructions for visitors, 41  
     keys, 69, 72  
     labels, 43  
     labels, switched, 44

lichens, 38  
 lists, 44  
 loans  
 matches, 15  
 microscopes, 69  
 plastic bags, 17, 44, 64  
 poisoned specimens, 64  
 polyester film  
 preservatives  
 printers, 43  
 Quick Guide, 70  
 re-pressing, 32  
 rearranging, 32  
 rearranging specimens, 23  
 rehydration, 32  
 revisions, 72  
 snakebite, 15  
 species covers, 40  
 speeding up drying, 28  
 tile, 69  
 type specimens, 68  
*Typha* inflorescences, 36  
 unmanageable specimens, 23  
 vehicles, 11  
 waterproofing matches, 15  
 zip-closure bags, 44  
 TISAB, 70  
 tissue paper, 38  
 topotypes, 68  
 transmission microscopes, 77  
 transporting plants, 14  
 tubers, pressing, 23  
 type covers, 40  
 type specimens, 7, 16, 40, 44, 48, 68  
     defined, 68  
*Typha* inflorescences, 36

## U

underground organs, pressing, 23  
 upgrading computers, 48  
 usage, plant, 18

## V

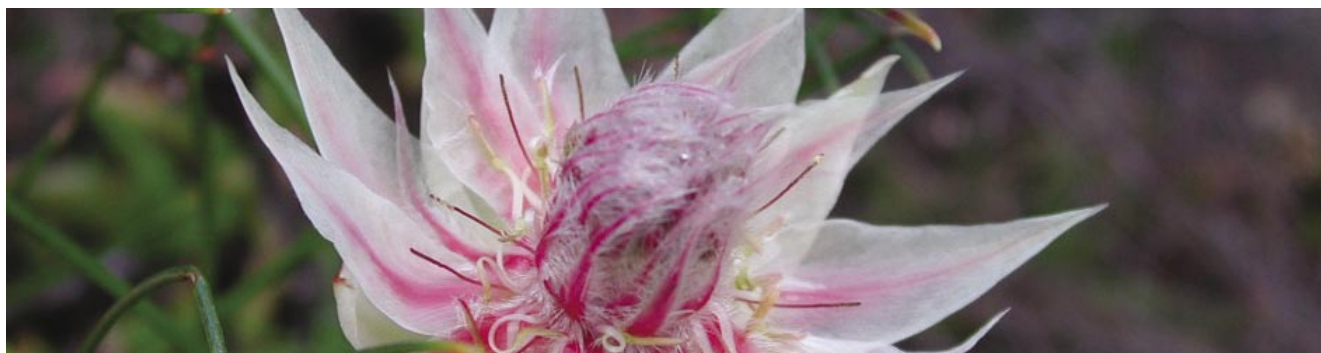
valid publication, 66, 68  
 vegetation type, 18  
 vehicle equipment, 14  
 venation, 28  
 ventilation, 75  
 ventilators  
     cardboard, 20  
     changing while drying, 30  
 vinegar, 23  
 visitors, 78  
     book, 78  
     handling specimens, 41  
     reception, 76  
     rules for, 78  
 voucher specimens  
     defined, 6  
     deposits of, 8  
     EIAs, 79  
     for research projects, 10  
     labels, 42  
     label information, 18  
     photographs, 7  
     seed, 6  
     specialised collections, 3  
     wood specimens, 7

## W

water purifying tablets, 15  
 wax paper, 24, 28, 32, 33  
 weeds, 48  
     collecting, 16  
 weights, 32  
 white glue. See glue  
 window cleaner, 69  
 wood, 6  
 wood glue. See glue  
 work surfaces, 75

## X

xylarium, 6  
 Xyridaceae, pressing, 23



## About SABONET

This publication is a product of the Southern African Botanical Diversity Network (SABONET), a programme aimed at strengthening the level of botanical expertise, expanding and improving herbarium and botanic garden collections, and fostering closer collaborative links among botanists in the southern African subcontinent.

The main objective of SABONET is to develop a strong core of professional botanists, taxonomists, horticulturists, and plant diversity specialists within the ten countries of southern Africa (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe). This core group will be competent to inventory, monitor, evaluate, and conserve the botanical diversity of the region in the face of specific development challenges, and to respond to the technical and scientific needs of the Convention on Biological Diversity.

To enhance the human resource capacity and infrastructure available in the region, SABONET offers training courses, workshops, and collaborative expeditions in under-collected areas. The programme produces a newsletter, *SABONET News*, and a series of occasional publications, the Southern African Botanical Diversity Network Report Series, of which this publication is part.

SABONET is co-funded by:

- The United States Agency for International Development (USAID/World Conservation Union—Regional Office for southern Africa (IUCN-ROSA))
- The Global Environment Facility (GEF)/United Nations Development Programme (UNDP)

For more information about our projects in southern Africa contact one of the following addresses:

General enquiries about SABONET  
SABONET Coordinator  
c/o National Botanical Institute  
Private Bag X101  
Pretoria 0001  
South Africa  
Tel: (27) 12 804 3200  
Fax: (27) 12 804 3211/5979  
E-mail: [info@sabonet.org](mailto:info@sabonet.org)  
<http://www.sabonet.org>

ANGOLA  
Luanda Herbarium  
(Prof. Esperança Costa)  
Universidade Agostinho Neto  
Rua Fernando Pessoa No. 103  
Villa Alice  
Caixa Postal 3244  
Tel: (244) 2 336 168  
Fax: (244) 2 336 168  
E-mail: [esperancacosta@yahoo.com](mailto:esperancacosta@yahoo.com)

BOTSWANA  
Botswana National Museum  
National Herbarium  
(Mr Nonofo Mosesane)  
Private Bag 00114  
Gaborone  
Tel: (267) 3973860/3974616  
Fax: (267) 311186/3902797  
E-mail: [nmosesane@gov.bw](mailto:nmosesane@gov.bw)

LESOTHO  
National Environment Secretariat  
(Mr Thulo Qhotsokoane)  
Ministry of Environment  
Private Bag A23

Maseru 100  
Tel: (266) 311 767  
Fax: (266) 310 506/321505  
E-mail: [tghotsokoane@ilesosho.com](mailto:tghotsokoane@ilesosho.com)

MALAWI  
National Herbarium and Botanic Gardens of Malawi  
(Dr Zacharia Magombo)  
P.O. Box 528  
Zomba  
Tel: (265) 525 388/118/145  
Fax: (265) 524164/108  
E-mail: [zlmagombo@hotmail.com](mailto:zlmagombo@hotmail.com)

MOZAMBIQUE  
LMA Herbarium (Ms Samira Izidine)  
Instituto Nacional de Investigação Agronómica  
Caixa Postal 3658  
Mavalane  
Maputo  
Tel: (258) 1 460 255/130/190/097  
Fax: (258) 1 460 074  
E-mail: [sizidine@yahoo.com](mailto:sizidine@yahoo.com)

NAMIBIA  
National Herbarium  
(Dr Gillian Maggs-Kölling)  
National Botanical Research Institute  
Private Bag 13184  
Windhoek  
Tel: (264) 61 202 2020  
Fax: (264) 61 258 153  
E-mail: [gmk@mweb.com.na](mailto:gmk@mweb.com.na)

SOUTH AFRICA  
National Herbarium  
(Prof. Gideon Smith)

National Botanical Institute  
Private Bag X101  
Pretoria 0001  
Tel: (27) 12 804 3200  
Fax: (27) 12 804 3211/5343  
E-mail: [gfs@nbipre.nbi.ac.za](mailto:gfs@nbipre.nbi.ac.za)

SWAZILAND  
National Herbarium  
(Mr Gideon Dlamini)  
Malkerns Agricultural Research Station  
P.O. Box 4  
Malkerns  
Tel: (268) 52 82111/83017/83038  
Fax: (268) 52 83360/83490  
E-mail: [sdnh@africaonline.co.sz](mailto:sdnh@africaonline.co.sz)

ZAMBIA  
Herbarium  
(Dr Patrick Phiri)  
Department of Biological Sciences  
University of Zambia  
P.O. Box 32379  
Lusaka  
Tel: (260) 1 293 158  
Fax: (260) 1 294806/253952  
E-mail: [Pphiri@natsci.unza.zm](mailto:Pphiri@natsci.unza.zm)

ZIMBABWE  
National Herbarium and Botanic Garden  
(Ms Nozipo Nobanda)  
P.O. Box A889  
Avondale  
Harare  
Tel: (263) 4 708 938/744170/745230  
Fax: (263) 4 708 938  
E-mail: [srgh@mweb.co.zw](mailto:srgh@mweb.co.zw)



## Other publications in this series

1. \***Southern African national herbaria: status reports, 1996.** C.K. Willis (ed.). 1997. 59 pp. ISBN 1-874907-36-6.
2. \***Index herbariorum: southern African supplement.** G.F. Smith & C.K. Willis (eds). 1997. 55 pp. ISBN 1-874907-37-4.
3. \***PRECIS Specimen database user guide.** C.A. Prentice & T.H. Arnold. 1998. 130 pp. ISBN 1-874907-39-0.
4. \*†**Inventory, evaluation and monitoring of botanical diversity in southern Africa: a regional capacity and institution building network (SABONET).** B.J. Huntley, E.M. Matos, T.T. Aye, U. Nermark, C.R. Nagendran, J.H. Seyani, M.A.C. da Silva, S. Izidine, G.L. Maggs, C. Mannheimer, R. Kubirske, G.F. Smith, M. Koekemoer, G.M. Dlamini, P.S.M. Phiri, N. Nobanda & C.K. Willis. 1998. 73 pp. ISBN 1-919795-36-7.
5. \***Plant taxonomic and related projects in southern Africa.** T.H. Arnold & M. Mössmer (compilers). 1998. 101 pp. ISBN 1-919795-34-0.
6. \*†**Southern African herbarium needs assessment.** G.F. Smith, C.K. Willis & M. Mössmer. 1999. 88 pp. ISBN 1-919795-45-6.
7. \***A checklist of Namibian plant species.** P. Craven (ed.). 1999. 206 pp. ISBN 1-919795-37-5.
8. \*†**Index herbariorum: southern African supplement.** Second edition. G.F. Smith & C.K. Willis. 1999. 181 pp. ISBN 1-919795-47-2.
9. \***Making your garden come alive! Environmental interpretation in botanical gardens.** M. Honig. 2000. 96 pp. ISBN 1-919795-50-2.
10. †**Plant taxonomic expertise: An inventory for southern Africa.** M. Mössmer & C.K. Willis. 2000. 350 pp. ISBN 1-919795-53-7.
11. \***Southern African botanical gardens needs assessment.** D.J. Botha, C.K. Willis & J.H.S. Winter. 2000. 156 pp. ISBN 1-919795-54-5.
12. \***Action plan for southern African botanical gardens.** C.K. Willis & S. Turner (eds). 2001. 35 pp. ISBN 1-919795-61-8.
13. **Conspectus of southern African Pteridophyta.** J.P. Roux. 2001. 223 pp. ISBN 1-919795-58-8.
14. \***Southern African plant Red Data Lists.** J.S. Golding (ed.). 2002. 256 pp. ISBN 1-919795-64-2.
15. \***Addressing the needs of the users of botanical information.** Y. Steenkamp & G.F. Smith. 2002. 56 pp. ISBN 1-919795-65-0.
16. \***A checklist of Zimbabwean grasses.** C. Chapano. 2002. 28 pp. ISBN 1-919795-66-9.
17. \***A checklist of Lesotho grasses.** K. Kobisi & L.E. Kose. 2002. 28 pp. ISBN 1-919795-68-5.
18. **Trees of Botswana: names and distribution.** M.P. Setshogo & F. Venter. 2003. 160 pp. ISBN 1-919795-69-3.
19. \***Swaziland ferns and fern allies.** J.P. Roux. 2003. 242 pp. ISBN 1-919795-97-9.
20. **Checklist of grasses in Namibia.** E.S. Klaassen & P. Craven. 2003. 130 pp. ISBN 99916-63-16-9.
21. **A checklist of Zimbabwean bryophytes.** P. Manyanga & S.M. Perold. 2004. 22 pp. ISBN 1-919976-02-7.
22. **African Botanic Gardens Congress 'Partnerships and Linkages': proceedings of a congress held at Durban Botanic Gardens, South Africa, 24–29 November 2002. / Congrès des Jardins Botaniques Africains 'Relations et Partenariats': compte rendu d'un congrès tenu dans les Jardins Botaniques de Durban, Afrique du Sud, 24–29 Novembre 2002.** C.K. Willis (ed.). 2004. 96 + 96 pp. ISBN 1-919976-04-3.
23. **Integration of Red Data List concepts into the policy framework in Mozambique: proceedings of a workshop held in Kaya-Kwanga, Maputo, Mozambique, 29–31 August 2001.** S.A. Izidine, I. Nhantumbo & J. Golding (eds). 2004. 19 + 19 pp. ISBN 1-919976-05-1.
24. **A checklist of Botswana grasses.** M. Kabelo & D. Mafokate. 2004. 18 pp. ISBN 1-919976-06-X.

\* Out of print.

† Available in PDF format on the SABONET web site: <http://www.sabonet.org/publications/download.htm>

Most of the books in this series can also be ordered in PDF format on CD. Contact [sabonetpub@nbi.ac.za](mailto:sabonetpub@nbi.ac.za)