

STANDARD OPERATING PROCEDURES
FOR
COLLECTING PLANT SPECIMENS
AND
CURATING THE PARK HERBARIUM

WRANGELL-ST. ELIAS NATIONAL
PARK AND PRESERVE

Prepared By:

Kathleen A. Teare
Kathleen A. Teare
Biological Technician

11/2/84
Date

Recommended By:

W. Brad Cella
W. Brad Cella
Resource Management Specialist

11/2/84
Date

William F. Paleck
William F. Paleck, Chief Ranger

11/2/84
Date

Approved By:

Charles A. Budge
Charles A. Budge
Superintendent

11/2/84
Date

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Introduction

These standard operating procedures were developed to establish practices consistent with maintaining specimen collection and curatorial procedures through time and changes in staff at Wrangell-St. Elias National Park and Preserve. This herbarium will be set up and maintained as a Study Collection. This type of collection is appropriate for large parks which have a natural history theme, as defined in the Natural History Collections Policy and Care Recommendations.

The ultimate goal for the park herbarium is a collection which will represent the plant life that occurs in the park with authoritatively and fully identified catalogued specimens. Justification for such a collection is that sound research, accurate interpretation and wise management depend on a quality collection. The collection should aim at taxonomic completeness as well as thoroughness in aspects of ecological, biological and geological significance.

The collection will have the following primary functions:

1. Reference inventory of the park's flora.
2. Baseline inventory.
3. Research.
4. Monitoring of natural resources.
5. Depository for voucher specimens collected during research projects conducted in the park.

To best serve these purposes, the specimens need to be fully identified and individually catalogued.

PART I: COLLECTION AND FIELD PREPARATION OF SPECIMENS

Herbarium specimens are permanent records of a species or flora. The future value and use of any specimen is largely dependent on the care with which the collector selects, collects and prepares specimens. The following directions and suggestions on specimen preparation and field records are intended to assist collectors in preparing high quality herbarium specimens accompanied by adequate field notes.

Collecting Objectives and Planning

1. The objective is to collect and document as many different species within the park as possible. Care must be taken to not overlook either plants that are inconspicuous or those which are difficult to collect or identify. Attempt to collect thoroughly in each habitat.
2. The collecting objectives will vary with projects. These objectives should be outlined accordingly.
3. Collect duplicate specimens. Duplicates provide sufficient material for dissection, verification and exchange.

Collecting Equipment

1. Plant press. A press typically consists of two hardwood frames, with each frame made to the following specifications:

4 wood strips 1 x $\frac{1}{4}$ x 18"
5 wood strips 1 x $\frac{1}{4}$ x 12"

The five short strips should be spaced equally on the four longer strips, which are also equally spaced. Glue and nail the strips or rivet securely at the intersection. The completed frame should be 12 x 18 inches.

A frame can also be constructed of 3/8" plywood boards cut to 12' x 18". Figure 1.

2. Corrugates. Corrugated cardboard, 12 x 18", double faced, and cut with the corrugations running crosswise (not lengthwise).
3. Blotters (optional). Lightweight builder's felt or heavy blotting paper can be cut to 12 x 18" pieces.

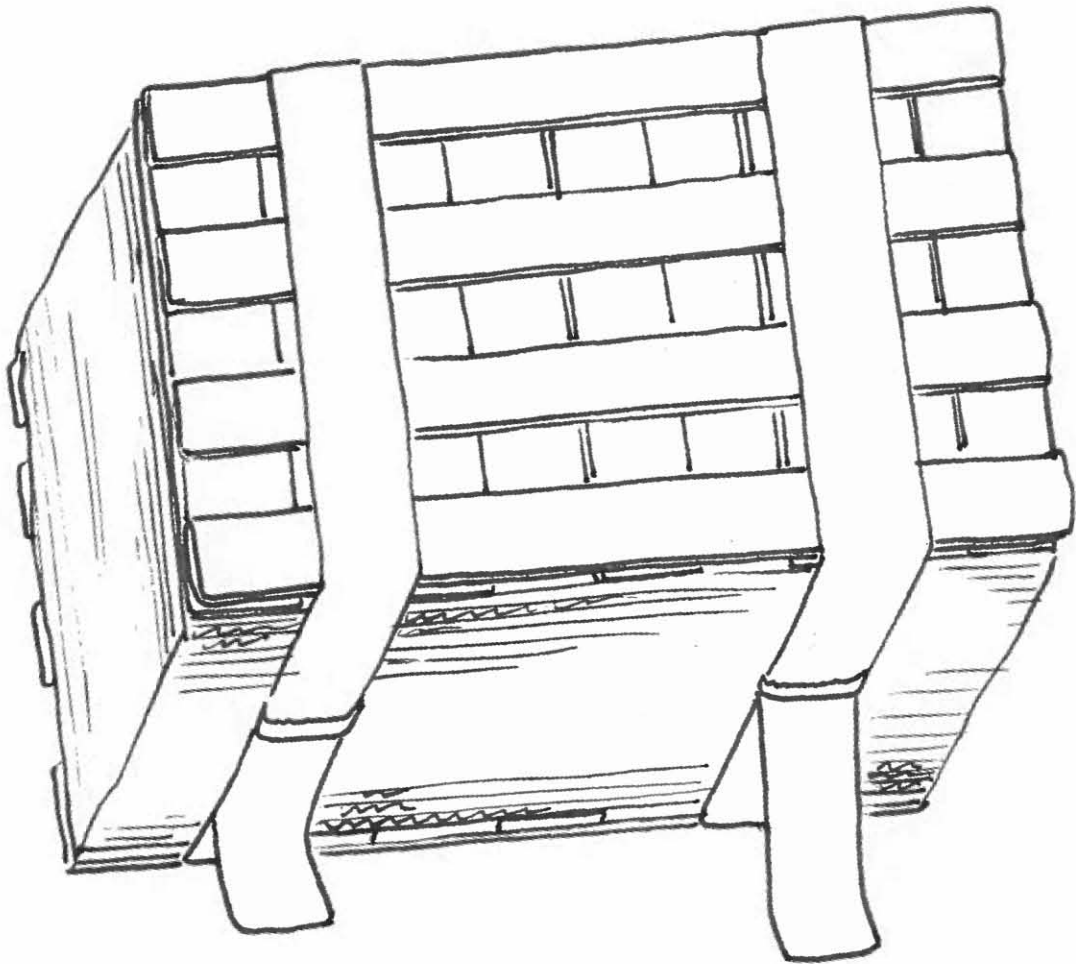


FIGURE 1. PLANT PRESS

4. Newspaper. Folded newspaper is already the approximate size and useable as is. Pieces should be about 22 x 16" and folded to 11 x 16".

5. Press Straps. A pair of strong webbing straps, about 6' long and 1" wide with a buckle on one end.

6. Plastic bags. Plastic bags of various sizes are used to store freshly collected plants in the field until they can be pressed. They are handy to carry, lightweight and prevent the material from drying out. All materials should be labeled to avoid confusion when the specimens are pressed. Avoid exposing samples in plastic bags to the sun.

7. Paper bags. Small paper bags are used for collecting specimens of mosses and lichens.

8. Digging tool and clippers. A hand pick, geologist's pick, heavy sheath knife or trowel and a sharp knife or pruning shears are excellent for field use. Mark tools with a bright color to help locate if misplaced.

9. Tags (optional). Waterproof string tags or adhesive tags are useful for labeling plants which are not pressed immediately following collection.

10. Handlens. For field observation and identification, a small 10x lens is desirable.

11. Labels. Field labels should be filled out and placed in the newssheet with the specimen.

12. Field notebook. A pocket size book which will not disintegrate when wet (Rite-in-the-rain) and pencil or waterproof pen are necessary items. Some prefer to keep two books--one for the field and another which remains in a safe place and into which field notes are copied. Field notebooks should be permanent.

13. Cardboard storage boxes. Merril boxes or other cardboard containers may be purchased flat and make excellent storage for dried specimens.

14. Maps. Topographic and geologic maps are often very useful in locating and identifying where a particular species was collected.

15. Camera (optional). Photographs are of considerable value.

Selection of Material

Specific guidelines have been set for collecting quality plant specimens. A little extra time and effort to collect proper specimens in the field will yield an accurate identification and a more valuable collection. Inadequate collections of plant materials are useless and an expensive waste of field time and transportation. During the course of field work, "unknown" plants will be collected for identification at a later date. To facilitate proper identification and to allow for possible inclusion in the herbarium collection, please adhere to the following recommendations in the collection of all specimens.

1. Select a plant representative of the population or collect several showing the range of variation in the population. Don't choose a plant just because it best fits the press.
2. Select vigorous specimens while avoiding damaged plants.
3. Choose specimens to illustrate all of the parts of the plant, if at all possible. Collect material in flowering and/or fruiting condition, as the reproductive parts are necessary for identification purposes.
4. If available, include additional detached flowers and fruits to your collection to avoid dissection of the specimen proper.
5. Roots, bulbs, tubers and other underground parts should be carefully excavated and the dirt removed with care.
6. If the plant is not too large, press the whole plant. If the plants are very small, press several specimens for complete herbarium sheets.
7. Large plants, such as trees and shrubs, should be represented by carefully selected branches showing different types of foliage, flowers and fruits, including catkins or cones.
8. Collect enough material for two complete specimens--if it is available, but do not collect an entire small population. One specimen will be for the park herbarium and one will be sent away for identification or verification.

Field Notebook

Plant specimens have scientific value only if they are accompanied by accurate information. It is recommended practice to carry a field notebook for data on the collected specimens. Your notebook will be a record of your sequential collections numbers and accompanying information as you collect your specimens. (Figure 2.)

Specimen Labels

The collection data in the field notebook must be transferred to field labels which will accompany the specimen in its news-sheet. Fill the label out completely and legibly. This information now becomes permanently associated with the specimen. The vegetation specialist will use the data to type the permanent label for the herbarium sheet. Labels may be completed in the field or at camp, but must be completed by the time they are deposited at the Operations Center. (Figure 2.)

Data to Accompany Specimens

Include the following information in your notebook and on the specimen label. The starred items are minimum data needed. The other items are optional, but useful.

- 1.**Location. Describe where the specimen was collected. Be precise enough that the area from which the plant was secured can be easily located on a topographic map. Township, Range and Section, or UTM units and direction and miles from a prominent landmark (road, river, town, or mountain) should be recorded. Include elevation. If a field plot was done at the collection site, note the plot number and project.
- 2.**Habitat. Describe the local condition under which the plant grew, such as "growing in wet soil at the edge of a creek in an alter thicket," or "on SW facing talus slope". Include information on soil type, moisture conditions, slope, exposure, associated species, plant community, etc.
- 3.**Date. The day, month and year should be given. Spell out the name of the month, rather than using a number to avoid possible confusion.
- 4.**Collector. Use your full name.
- 5.**Collection number. Enter your collection number on the label corresponding to your field notes concerning the specimen. These numbers should run consecutively through the collector's lifetime or annually, e.g. 317 or 84-317. Each species collected at a given place and time should be given its own collection number. Duplicate specimens share the same collection number.

14 July 1984

Alaska WRST

South side of Jack Lake, 2 miles south
of Nabesna Road

T9N, R11E, S35, SW $\frac{1}{4}$

Black spruce forest, wet ground

371 Carex
6" tall

372 Vaccinium vitus-idea

373 Vaccinium uliginosum

374
(grass with rhizomes
perennial)

Field Label

NATIONAL PARK SERVICE		NPS FORM 10-512 (JUNE 1982)	Park Code <u>WRST</u>
Technical Name <u>Vaccinium uliginosum</u>		Collection <u>No.</u>	<u>373</u>
Common Name <u>Dwarf Blueberry</u>		Acc.No. _____	
Locality <u>S side of Jack Lake, 2</u>		Elevation <u>3180 ft</u>	
<u>mi. S of Nabesna Road. T9N, R11E, S35, SW$\frac{1}{4}$</u>			
Habitat <u>Black spruce forest, wet ground.</u>			
<u>Pink flowers.</u>			
Collected By <u>John L. Jacobsen</u> <u>Susan A. Smith</u>		Date <u>6 Aug 1984</u>	
HERBARIUM COLLECTION			

6. Habit. Record those features that may aid in identification, but which will not be evident from the pressed specimen. These may include the plant height, the type of branching, the type and depth of the root system, the color and odor of the flowers, or whether the plant is an annual or a perennial.

7. Special information. This may include almost anything of particular interest to the collector. Some things that have been noted on labels are relative abundance, field variation, soil type, insect visitors, ecological formation, economic importance, native uses, etc. If you have collected an unusual or abnormal plant for any special reason, clearly state the situation.

8. Identification. Include the scientific name on the label after identification.

Field Collecting Techniques

A plant press may be taken into the field and specimens pressed as collected, or specimens may be brought back in plastic bags and pressed upon return to camp. If plastic bags are used, put material from one collection (one species and one location only) in each bag. Specimen bags should be kept as cool as possible and out of the sun. Each collection should be numbered and labelled as collected to avoid confusion when pressing later in camp.

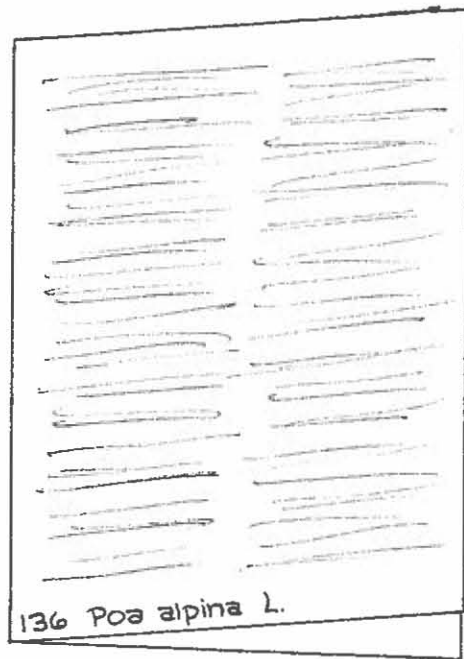
Give each plant a collection number. These should be in consecutive order by each collector. This number corresponds to that used on the field notebook and label.

Number the newssheet in which the specimen is pressed in the lower left hand corner, with the newssheet fold on the left and opening on the right (as a book is opened). This newssheet will remain with the specimen from the collecting through the identification process and, in some cases, it will be stored with it. (Figure 3)

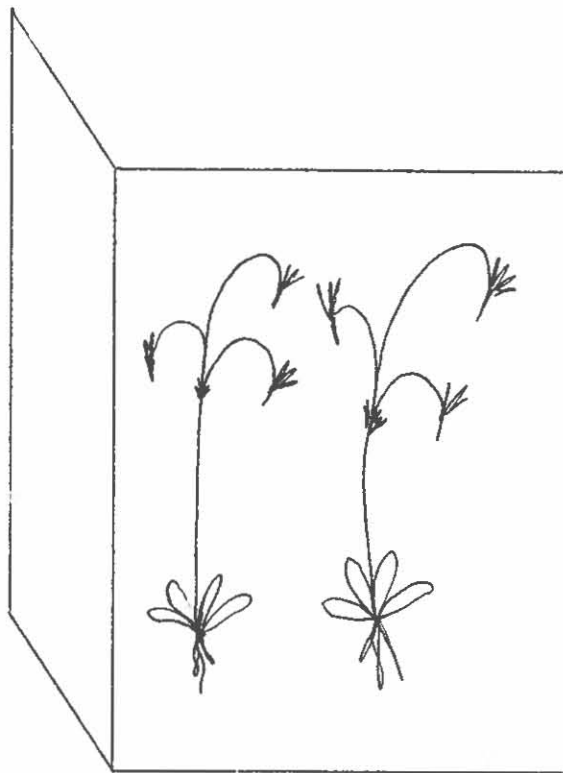
Place the plant in the open half of a folded piece of newspaper. Arrange the plant as naturally as possible and spread out the inflorescence so that the floral parts are well displayed. Avoid excessive overlapping of parts. See that leaves are not unnecessarily crumpled or folded, and try to show both upper and lower surfaces. If the specimen is too long for the sheet, bend or break it into a V or N figure, avoiding excessive bending. If necessary, thin the specimen by cutting away some leaves or branches. Larger thick parts, such as tubers, bulbs, basal parts of stems, etc. may have to be split in half lengthwise and spread out.

The press should be built up by starting with one of the press frames on the bottom. If the frame is made of strips, turn it so that the long strips are on the outside, to prevent pulling the press apart and to insure uniform pressure when the press is strapped. Lay a corrugated cardboard over the frame, then the numbered, folded newssheet in which the plant specimen is spread, then another corrugate. Repeat this sequence until all the specimens are arranged. Top the pile with the second press frame, and very tightly strap it together.

If blotters are used in the pressing process, the following is recommended. If you are collecting succulent, aquatic or wet (rainy day) specimens, blotters can be useful to absorb the excess moisture and aid in drying. Use the blotters between the corrugates and the newssheets, stacking the press as follows: corrugate, blotter, newssheet with specimen, blotter, corrugate, etc. The blotters must be changed or removed within



Label newsheet with collection number and species name (if known).



Placement of specimens on newsheet.

FIGURE 3

12-24 hours. At this changing, rearrange the specimen if it is needed. For exceptional results, the blotters should be changed at least three times during the first 48 hours or use them for the first 12-24 hour period to absorb the excess moisture and then remove them, separating the specimens by corrugates. Blotters may be dried in the sun.

It is recommended that blotters be used only in pressing wetter specimens.

When you are collecting away from transportation and choose to carry a press, take only enough corrugates and blotters to separate the papers containing woody specimens from delicate ones. When you return to base camp, insert the corrugates and blotters. At this stage look over the specimens and rearrange crumpled leaves or flowers to their best advantage.

Drying the Specimens

The faster the drying process is carried out, the better the specimens will appear; retaining better color in foliage and flowers and preventing problems with mold and mildew. Plant specimens will be dried in the press.

There are a few methods of drying the plants, choose the method that will work best for you.

1. Blotters. The specimens may be dried by using blotters in pressing the plants. The blotters must be changed daily, as described above, and the process may take 4-6 days.
2. Solar. The easiest method in the field is to put the presses in the sun to dry, bringing them in at night and during the rain.
3. Warm cabin. The preferred methods of drying include using an artificial source of circulating warmed air (90-110°F). If you have a warm cabin as a base camp, the easiest method would be to hang the press from the ceiling above the wood stove suspending it with the corrugates running vertically or place it on a shelf in a high part of the cabin where the hot air rises to facilitate warm air circulating through the press. Depending on the air temperature, this may take 3-4 days. Do not attempt to dry specimens in an oven.
4. Gas stove or lantern. If you are in the field under wet conditions, a field dryer may need to be constructed. A simple drier can be made by setting the presses on a frame (of two chairs or stumps) erected about one to two feet over a gas stove or lantern as a heat source. A canvas "tent" may be

hung over the frame and presses to keep the heat in. Since there is no forced circulation of warmed air in such an arrangement, it is usually advisable to dry without heat for the first 24 hours to prevent steaming and discoloration of the specimens. Then dismantle the press, dry the blotters and corrugates, reassemble the press, and put it over the heat as suggested above. It can be left without further changing of corrugates until the specimens are dry, although the straps should be tightened occasionally.

5. Electric heat. If electricity is available, a portable, fan-equipped electric heater makes a very good drier as it supplies continuous, gentle, circulating warm air through the tubes of the corrugated cardboards. Lay the press on its side on an elevated rack one or two feet above the heater (with the corrugates vertical). Two chairs or stools, set apart, can make an adequate rack. Hang a "tent" over the heat source, presses and frame to keep the warm air in around the presses. If not bulky, plants may take only 1-2 days to dry.

6. Cabinet drier. An ideal drier may be constructed at the operations center using a cabinet for housing. The drier may be constructed from a metal cabinet, plywood or an old refrigerator or freezer. The heat source should be a portable, fan-equipped electric heater. Ventilation holes should be cut near the bottom and top to facilitate air flow. Metal mesh or slates should be used for shelves to place the presses on. (See Appendix A)

When the specimens are dry, very carefully remove them from the press. Stack the specimens and their newsheet folders using corrugates on the bottom and top of the stacks. If necessary, insert a few more corrugates into the stack to keep the folders flat. Tie the stack together with string or rubber bands and label the top corrugate with collection information. This label should include the collector's name(s), dates, general location and project (e.g. herbarium, "unknowns", bison browse, etc.)

How to Collect Mosses and Lichens

Collecting mosses and lichens is extremely simple. Most mosses are easily removed from the substrate that they grow on. If they are growing on soil, they can be easily removed without damage to the moss. A knife may be needed to pry the moss or lichen from its substrate. When collecting lichen, it might be necessary to moisten the thalli before attempting to pry a

specimen from rock or bark. Occasionally you may want to chip off a portion of a rock covered by small crustose type lichens and include this in the bag. Place the specimen into a small paper bag. No pressing is necessary. The moss or lichen will air dry in the paper bag within a day or two if kept in a warm dry place. Do not use plastic bags as these plants are very susceptible to molding.

When collecting, attempt to find fruiting material. In some mosses, sporophytes are necessary for an accurate identification. Other mosses rarely produce sporophytes, so even specimens lacking sporophytes should be collected.

When collecting mosses and lichens, the following data should be recorded directly on the paper bag containing the specimen.

1. Habitat. The substrate (rock, rotten wood, etc.), exposure (sunny, shaded), moisture (wet, submerged, dry), nature of surrounding vegetation (tundra, spruce forest), elevation.
2. Collector's name.
3. Collection number.
4. Locality collected.
5. Date collected.
6. When the specimen is determined, the scientific name can be assigned to it.

Procedures for Deposition of Collected Specimens

The following procedures for deposition of collected specimens should be observed as each crew/collector returns to the Gulkana Operations Center. These procedures have been developed for efficient handling of specimens and presses, and to avoid damage and/or loss of specimens and the accompanying information. Both wet and dry specimens will be arriving at the center and should be handled separately.

1. Dry specimens. Please remove the dry specimens from the presses and carefully stack them. Be sure that each specimen has a completed label accompanying it in the folded newssheet. Put a corrugate on the top and the bottom of the stack. Tie this stack together with string or rubber bands. Label the top corrugate with the following information: Collector's name(s), dates, general location, project name, and any other pertinent information. Then place the bundle(s) of specimens in the proper cabinet in the Operations Center.

2. Wet specimens. If your specimens are damp, they will still need to be thoroughly dried. Remove any blotters from the press. Blotters may also be dried in the drier, separate from the presses. Tighten the straps on the press. Place the presses in the drier, on their sides, with the corrugates vertical. Turn the drier on. The specimens should dry in 2-4 days. After they are dry, treat as dry specimens described above.

PART II: HERBARIUM CURATORIAL PROCEDURES

Purpose

The Herbarium is both a collection of dried plants and an educational tool. Its purpose is a functional one: important for study, documentation and interpretation. It is valuable and subject to deterioration or loss. Collections require continual protection and knowledgeable care.

A collection is useful to the park and the public when the specimens are:

1. Selected purposely.
2. Readily available for study.
3. Well preserved.
4. Accompanied by adequately organized information.
5. Used to their potential in the park program.

The herbarium is a source of information and knowledge for the park staff and its use should be encouraged. Every effort for maximum efficiency in locating material in a collection (information retrieval) should be made without endangering the collection. It is a reference collection, like a library, with special rules for use.

Voucher Specimens

The herbarium will act as a depository for voucher specimens collected during research projects conducted in the park. Researchers that have plant collecting permits are requested to collect and deposit duplicate specimens in the herbarium. Specimens should be properly pressed and dried and submitted unmounted in their newspaper folders with a completed herbarium label.

Herbarium Guide

A printed guide will be available to explain the specimen arrangement, list of families and genera. The guide will also include herbarium policy statements, loan procedures and specimen use.

Operation and Maintenance

A herbarium requires constant attention if materials, specimens, information and facilities are to be available and in proper condition.

The vegetation specialist will be responsible for overseeing the proper operation and maintenance of the collection. Concentrated summer collection activities by park personnel may result in a backlog of specimens to be curated. Proper identification, mounting, label typing, and specimen organization will require a fair amount of time during the fall or winter. Additional duties will include fumigation, repair of specimens, record keeping and correspondence, and ordering supplies and equipment.

The vegetation specialist will also be responsible for deciding when to limit the number of specimens accepted of a particular species. When excessive numbers of duplicates are received they may be loaned to other herbaria or discarded, depending on their value.

Identifying and Authenticating Specimens

Accurate identification of the specimens is crucial to their value in the collection. Little or no use can be made of a specimen in research, management or interpretation until you know what it is. Therefore, identify each specimen as completely and accurately as possible. Everyone eventually reaches the limits of their expertise, so when personal experience, the available floras, and opportunities for comparisons have been exhausted, consider the determination to be still tentative. Have an expert botanist confirm or correct your identification.

The procedure for obtaining verification from the University of Alaska, Fairbanks is still being negotiated.

It is customary for the specialist or the University herbarium to keep all or part of the material sent to them for determination. That is why two specimens of a plant growing in the same colony should be collected, if possible. Press both, mount one for the herbarium, and send the other unmounted to the expert. They will return a record of verification and keep the specimen. Any specimens that are kept by the University should be recorded as being on indefinite loan. Pack the specimens carefully so the specialist receives them in good condition.

Permanent Label

The permanent label is affixed to the mounting sheet with a specimen. It contains the scientific name of the plant and the authority. The additional information must come from the collector's field notebook and field label. Do not abbreviate or use symbols. Specimens are now used throughout the world

and symbols and abbreviations are often difficult to translate. Be specific in giving localities. Give some reference to an easily located landmark. Give Township, Range and Section; latitude and longitude; or UTM units. Minimum data for permanent labels should include date, locality, park, collector and collection number. Labels should be typewritten using a carbon ribbon or written in longhand using india or other permanent ink. The labels should be of 100% rag paper. Figure 4.

Annotation Label

WRANGELL/ST. ELIAS NATIONAL PARK/PRESERVE	
<i>Moehringia lateriflora</i> (L.) Fenzl	
DET. Kathleen A. Teare	DATE 6 Oct 1984

PLANTS OF WRANGELL/ST. ELIAS NATIONAL PARK/PRESERVE ALASKA		
<i>Saxifraga davurica</i> Willd. subsp. <i>grandipetala</i> (Engler & Irmsch.) Hult.		
T2N, R22E, S11, SW $\frac{1}{4}$. Approximately $1\frac{1}{2}$ miles south of Beaver Creek and $\frac{1}{2}$ mile east of Sonya Creek. Nutzotin Mountains. 4500 feet elevation.		
On rocky bench, associated with <u><i>Dryas octopetala</i></u> and other <u><i>Saxifraga</i></u> spp.		
Kathleen A. Teare	1432	17 July 1983

Permanent Label.

FIGURE 4

Mounting Specimens

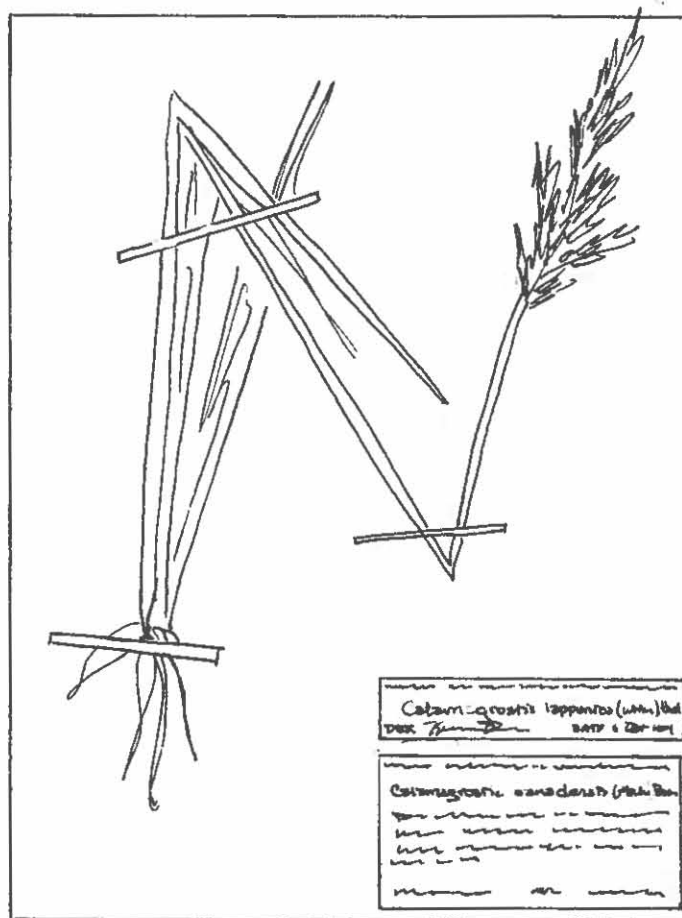
The mounting procedure is a critical step in specimen preparation. A carelessly mounted specimen can be essentially useless. Mounting, like pressing, is indeed an art. The mounting procedures described below can be used in conjunction with one another if necessary. (Figure 5)

1. Pasting or Gluing. Specimens are often attached to the herbarium sheets by gluing. An effective and efficient way is to coat a flat surface with glue (a paintbrush and a cookiesheet work well). If the glue beads up, add a little dishsoap and water. Place the specimen on the gluey surface and tap gently. Then lift the specimen using forceps, inspect to check distribution of glue, and place on the herbarium sheet. If the glue is not evenly distributed, more may be applied using a soft brush. Tap specimens down gently using a lint free tissue. Labels generally are applied using the same glue. Be sure to put the label in the lower right hand corner of the sheet before the specimen. If any glue is on the exposed surface, the sheet may be covered with waxed paper. This is a particularly good procedure for grasses and sedges.

When gluing delicate and tiny specimens, two variations may be used. One, use a paintbrush to dab the glue on the back of the specimen on the sheet and dribble glue over it to secure it to the sheet.

All fragments, fruits and seeds should be placed in packets or fragment envelopes. These are affixed to the herbarium sheet at this time. In cases where materials are too bulky, the packet should be numbered with the collection number and accession number and set aside to be mounted later. The specimen is then covered with a sheet of newspaper (usually the one containing the specimen, if not too dirty) and placed in a pile. Specimens are then stacked and a board and weight is then placed on the stack. Stacks should be allowed to dry for 24 hours. The papers are then removed and specimens are ready for sorting and filing.

Several glues or pastes are available. Some herbaria use the "Special 'A' Tin Paste", but glues such as "Elmers", "Nicobond" or "Wilhold" are also used. Or the Archer formula, a liquid plastic, can be used for gluing specimens. The plastic, dispensed from a squeeze bottle, is applied to the back of a specimen and the glued specimen is placed on the sheet, weighted down with washers or other suitable weights and the plastic is allowed to dry. All of these glues, except the plastic, are water soluble.



Mounted specimen.

FIGURE 5

2. Strapping. There are two methods of strapping. One method uses strips of linen tape (gummed cloth) that are moistened and placed across stems, larger branches or roots to supplement the gluing method to keep the specimen firmly attached to the paper. (Cellulose or plastic tapes which deteriorate or soften with age should not be used.) The length and width of the strips depend on the part to be secured, and care should be taken so that important details are not covered.

Another method of strapping, or stripping, involves the use of liquid plastic, the Archer formula. Store the mixture in an airtight container. The plastic is usually dispensed from a pistol-grip pressure can or a polyethylene (mustard or cat-sup) squeeze bottle. Metal washers can be used to weight down the specimens while drying. Do not stack the sheets until the plastic is dry.

3. Sewing. Some specimens, after gluing, need to be strapped or sewn with a heavy linen thread. Sewing is restricted to heavy stems, overlapping leaves, rhizomes, matted bases of grasses, cones or other places where the use of glue or plastic is impossible or impractical. Threads on the back of the sheets should be covered with linen or paper tape. Specimens that are heavy should be mounted on a heavy mounting paper (light cardboard thickness) and strapped or sewn.

4. Special handling. Bulky fruits or cones may be removed and stored in special boxes. Specimens should clearly indicate that both sheets and accessory materials are present in the collection. Mosses and lichens are stored in special labeled envelopes in boxes.

5. Seal and Accession Numbers

Each sheet should be stamped with the distinctive seal and name of the herbarium.

Each sheet should receive an accession number and be recorded in the accession book.

Sorting and Filing of Specimens

Once the specimens have been glued, sewn and/or strapped and allowed to dry, they should be sorted for filing. Specimens are sorted to family, genus, species and infra-specific taxa. Specimens should be arranged in the order they will occur in the herbarium. Considerable time and energy can be saved if this procedure is followed.

Mounted plant specimens are filed in genus and species folders on shelves in the herbarium cases. The specimen is placed in the species folder face up with the label in the lower righthand corner. The thin manila species folder is labelled with the specific binomial in the lower righthand corner. The species folder is then placed in the heavy manila genus folder which is labelled with the family name on the lower lefthand corner and the genus name on the lower righthand corner. (Figure 6)

Arrangement of Specimens in the Herbarium

There are several possible systems of arrangement of specimens in a herbarium. Since the park collection will be used for reference by seasonal biological technicians, park rangers, and interpreters as well as visiting professional botanists, a modified alphabetical system will be easier to use than a phylogenetic system.

The specimens will be segregated by the major groups as follows:

Cryptogams - mosses, liverworts, lichens

Pteridophytes - ferns, horsetails, clubmosses

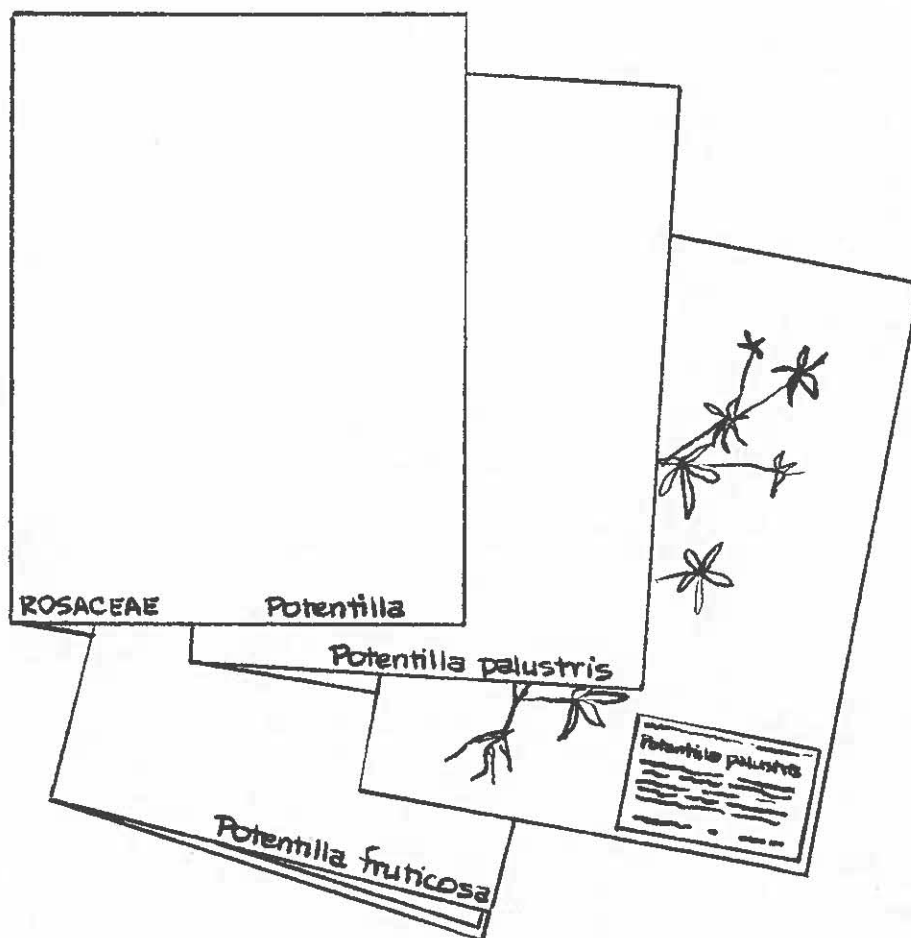
Gymnosperms

Monocots

Dicots

Within each of these groups, the plant families will be arranged alphabetically. The genera and species will also be arranged alphabetically within the family and genus respectively.

Undetermined materials are generally filed at the end of the genus or family and are usually in specially marked folders (i.e. "undet."). In addition to specimens and special materials, non-plant materials are often of great value and are included in the collection. These include photographs (e.g. a type specimen, a habitat), drawings, correspondence concerning a specimen, keys, notes on synonymy and cross-reference markers ('dummy' sheets or covers).



Labeling of genus and species folders.

Fumigation Procedures

The plant specimens need to be fumigated after they are pressed and dried, before they go into the herbarium cases. They may be fumigated after mounting, or before, if they are stored in the cases in their newssheet folders. The collection should be fumigated annually to prevent insect invasions. A safe and effective method of fumigation of specimens is to store them at -20°F for two days. This can be accomplished by placing them in a freezer, or in winter, place them in an unheated building. Mothball crystals should also be stored in the cabinet.

Access

Access to the specimens in the Research Study Collection should be limited to trained research, resource management and interpretive staff. Visits from qualified researchers outside of the National Park Service should be encouraged. Under very limited circumstances, and only when fully protected, will it be appropriate to exhibit specimens from the collection.

Specimen Use

Specimens are preserved for use, but should be handled with extreme care since they are of scientific value. The following suggestions are to aid users in handling specimens properly.

1. Keep sheets flat and right side up. Do not shuffle or leaf through a folder like a book. Specimens are brittle and easily damaged.
2. Store properly. Specimens should be stored in herbarium cases or at least on shelves. Do not crowd too many specimens into a box or a pigeon hole. Keep materials in folders when not in use.
3. Do not lay books or other heavy objects on specimens.
4. Place loose fragments in packets or envelopes if the specimen to which the fragments belong can be ascertained.
5. Use materials sparingly. It is often necessary to dissect flowers or fruits. Use no more than is required and place all fragments in a fragment envelope on the sheet. For dissection, flowers and fruits may be softened by soaking them in a solution of dish soap and water for a few minutes. Fragments may be blotted dry and returned to the fragment envelope.
6. It is preferable to use a long-armed dissecting microscope. An entire specimen can be studied with this instrument without bending the sheet.
7. Support the specimens with a corrugate or other stiff board when carrying specimens, even for a short distance.
8. Any specimens that are in need of repair should be called to the attention of the curator or vegetation specialist.
9. Do not write on the herbarium sheet unless permission to do so has been given.
10. Reshelve specimens with extreme care. If you do not know where to replace a specimen, leave it for the appropriate person to reshelve.

References

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Appendix A:

Illustration of a cabinet drier.

