A Buyer’s Guide to Greenhouses

A visit to the “greenhouse store.”

by Lucy L. Bodanza
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Stop a moment and imagine. It's a lousy night. The wind is howling around the corners of your home and the snow is blowing so hard that the tracks of flakes are nearly horizontal. Your thermometer says it is colder outside that it has any right to be.

Indoors, your plants are sullen. The dim winter light and cooler air of your living room have driven them into dormancy or slowed them to a crawl. Even your light-garden plants seem lethargic.

But, you have installed a forty-watt bulb in your new greenhouse. With a flick of a switch it goes on, filling the glass house in your back yard with light. There, standing in the snow, is a bubble of impossible beauty. Warm, humid, loaded with flowering tropical plants and desert succulents. All the plants in it are being pampered. Their environment is ideal. With a smile you realize that one small bit of the world you live in is absolutely perfect.

If you don’t own a greenhouse, but would like to, you are in good company. Thousands of amateur growers decide to build greenhouses every year. As they research the problem, select a glass house and then operate it, they make a number of both pleasant and unpleasant discoveries. First, greenhouses aren’t as expensive to buy as you may think. Second, they are more expensive to heat than you may fear, but not outrageously so. And, finally, no greenhouse is ever big enough.

The invasion of warm-climate plants into a greenhouse is inevitable. In fact, it’s historically as well as practically true. Though you may think your greenhouse is a terrific gardening aid, a great way to get a jump on spring, it probably will end up the permanent home of a wide assort-
ment of ornamentals. This is the way greenhouses developed.

Originally, the ancient Greeks assembled something very much like a glass hut. They used these units to hasten seed germination, boost small plant growth and give cuttings a better chance at survival.

The Romans picked up the idea. Their earliest greenhouses were large pits layered with manure. Potted plants were lined up on the manure and the pits were covered with sheets of talc or mica. These minerals are translucent and occur naturally in thin sheets, almost as though they were glass. The manure in a Roman pit produced heat as it decomposed, while the mineral sheets allowed plenty of light to enter so that plants could grow.

Later, Romans built forcing houses called *specularia*. These were similar to the early pits but much larger, with sloping roofs. Fruit trees were grown in them, particularly peaches. When the Roman Empire fell (roughly around the end of the fourth century), greenhouses virtually disappeared and the principles by which they were built were forgotten until the thirteenth century when large glass houses were built in Holland and France. Crude glass was used to glaze the wooden frames and, since the main goal of these early structures was to grow citrus fruit, they were called orangeries. Louis XIV had a huge orangery built into the garden at Versailles. It was more than five hundred feet long and forty-two feet wide.

It was right around Louis XIV's time that the first real hothouse was built. Technically, a hothouse has to receive some of its heat from something other than the sun. This one was heated by a furnace and was the first greenhouse capable of growing very tender plants year-round in a northern climate.

In England, now recognized as the greenhouse capital of the world, things moved more slowly. They had orangeries, too, but these were barely more than large cold frames. Then conservatories became popular among the aristocracy. At first, heating them involved carrying hot coals into the greenhouse in braziers and then replacing them when they had cooled.

A bit later, the stove house was invented. This was basically a conservatory with a large, coal-burning stove in it. It didn't take long for gardeners to discover that the fumes from the stoves were killing the plants and sometimes even the gardeners. As a result, some structures were left unheated, while others featured stoves vented to the outside.

Colonial America also had its greenhouses. On this continent, too, they were possessions of the wealthy. More often than not, they were located in pits, unheated except by the sun, and glazed with thick glass. Thomas Jefferson took great pride in his Christmas strawberries, which ripened in the middle of December.

**Shopping**

The problems of early greenhouse building have been replaced with the problems of modern greenhouse buying. It can be a complicated and chancy process. There's no greenhouse store you can visit and, unless you have several friends who grow plants under glass, there are very few ways to make "test-drive" comparisons.

Coming to the realization that you'd like to own a greenhouse is easy. Few dedicated house plant growers would turn down the opportunity to provide ideal growing conditions for their plants. But deciding to buy one is a big decision, one not taken lightly. The financial commitment alone is enough to make you think twice. And the complexities of choosing from among the many glass houses available are intimidating. So simplify the process. Begin at the beginning. Your first step is to decide how to construct it. You can build it from scratch, buy a kit or hire a contractor to do the whole thing. Even if you decide to use a contractor to do
beyond the scope of most people, a job for true handymen or part-time carpenters. But building a greenhouse from a kit is a fairly simple process; anyone who can hammer a nail and turn a screw can do it.

**Plant Paradise In A Box**

There are many hobby greenhouse companies around, many of which also manufacture commercial units. Some have been selling hobby kits for years, while others are relatively new on the scene. There seems to be a kit available for every possible need in every conceivable size. The kits are described in catalogs that most companies send along free of charge. And all of the reputable hobby greenhouse companies have representatives who are happy to talk on the telephone to potential buyers. (At the end of this article we've provided a list of companies, their addresses and telephone numbers.)

There are many variables to a hobby greenhouse and it often is difficult to decide which company offers the most of what you want. Leaning through greenhouse catalogs is an informative and interesting pastime. Such brochures are fun and often provide a lot of information about what they offer. But reading about polyethylene-covered models can become tiring if you're looking for a glass unit. Before you choose a specific model, or even a particular company, plan the house as completely as possible. Knowing something about what you want in the first place will ease your search.

**Upon This Rock**

The first thing you should do when choosing a greenhouse is to pick a structural design. There are two major styles. A freestanding greenhouse is an independent structure with all its own systems. It receives light from all sides and can be as large as you desire. An attached greenhouse has to hook on to a wall, preferably the wall of a house. It then can share the home's electrical and water systems and be less expensive to heat than a freestanding model. But an attached greenhouse must be fit to the size and style of your home. These restrictions quite naturally limit the choice of design in buying such a structure.

An attached glass house can be either a lean-to or an even-span structure. A lean-to has one long wall glazed and its back wall attached to the house. An even-span greenhouse is glazed along both its long walls while one of its short walls is attached to the home. Both units can be placed over doorways or windows so that the two buildings share heating and cooling systems.

There are many designs for freestanding greenhouses. Despite what you may have heard about the mystical qualities of certain shapes, all the buildings do about the same thing; let in a lot of sunlight. Choose the one that you think will look nicest in your yard.

Imagine your yard with a greenhouse sitting on your lawn. It can go any place that's level, yet some locations offer definite advantages. A site close to the house (and to water and electricity) is an important factor to someone living in an area with cold winters. Maybe you want it close to the vegetable garden or where it blocks your view of an eyesore in a nearby lot.

If you have only a small plot of land, you have to put the greenhouse wherever it fits. And if you have no land, of course, your only choices are to install a window greenhouse or to pen in your balcony with glass and plants.

Many of the basic site considerations make managing the final product easier. Sunlight is the most impor-
tant of these considerations. The long wall of a greenhouse should face south. In the winter, a southern exposure provides sunlight throughout the day. A greenhouse can face due north if there is no other choice. But this placement increases the cost of heating it and may require the installation of fluorescent lighting to supplement the sunlight.

Greenhouses should not be erected where they will be shaded much of the time by tall buildings or large evergreens. Placing the structure near a large deciduous tree, however, can be a good idea. During the winter when the tree is leafless, it won't block too much sunlight. And during the summer, it will shade the sun's most intense rays and keep the glass house cool.

Evergreens aren't always a problem either. Greenhouses should be shielded from strong winds. Privet hedge or other evergreen trees are much better wind buffers than solid walls that only redirect the force of the gusts. Good wind screens help a greenhouse last longer, cut heating bills and decrease repair costs.

Other site considerations to keep in mind include the natural drainage and slope of your greenhouse's future home. The ground should be level and not in the path of any gullies or ditches.

With a site in mind, decide on the size of your greenhouse. Some greenhouse styles come in only one size, while others vary as much as cars in a parking lot. Veteran greenhouse operators recommend that buyers purchase the largest model they can. The number one lament of a new greenhouse owner has nothing to do with the quality of the structure or the cost of heating it. It has to do with size: greenhouses of any dimension fill up in a hurry and almost immediately become too small. Large units cost more than small ones but, as commercial growers know, they provide cheaper growing space per square foot.

**Beyond Site and Size**

Having decided upon the site for and size of your greenhouse, you can begin to plan the building itself. You may not want it to be a permanent structure. A light, movable greenhouse does not require a building permit (almost any kit falls in this category). A slightly sturdier house may need only footings or earth anchors. Permanent structures require foundations and usually building permits, too.

Foundations range from simple earth anchors (large screws that bolt the greenhouse to the ground) to heavy timber bases such as railroad ties. Strongest of all are the foundations dug into the ground, usually descending below the frost line. These are made of masonry block or poured concrete embedded with "J" bolts.

While you're selecting a foundation, think about the sort of floor you'd like in the greenhouse. And if water is going to be pumped in, pipes have to be laid before the floor can go down. Though a water system isn't necessary to the functioning of a glass house, water is, hauling buckets around in the winter can be a real chore.

The best greenhouse floors drain as well as the best crocked pots. Gravel is one good base, although it shifts around and allows weeds to flourish in the warm, bright conditions you provide. Cement floors are easy to clean, prevent weed growth and provide good footing for the gardener. They are popular with commercial growers who have drainage systems installed below the floor. Brickwork looks nice but isn't a good choice. Bricks are slippery when wet and very conducive to algae growth. This green, slimy stuff prospers on bricks and makes them slippery. Bricks also permit weed growth and hide bug populations.

Assembling the greenhouses usually is the next step once the floor is down. Some glass houses, however, are mounted on built-up walls, also called knee walls. These are the half-walls built up the side of a greenhouse, usually as high as the benches. They used to be standard on all greenhouses. (Most hobby models today are "glass-to-ground.") Knee walls eliminate the possibility of plantings beneath the benches because they block out the light necessary to support plant growth.

**The Greenhouse For You**

The frame of the house that sits on the knee walls or floor can be made of galvanized steel, aluminum or wood. Steel frames are strong, heavy and more expensive than the other alternatives. Aluminum has replaced steel in many greenhouses, though steel is still used for the main ribs in some large glass structures.

Aluminum is strong but light in weight and so is easy for an amateur builder to work with. The most inexpensive aluminum frame is unpainted, unfinished metal. The metal is sparkling at first, but eventually becomes coated with a thin layer of white powder, aluminum's equivalent to rust. This powder, though unattractive, should not be washed from the greenhouse since it prevents any further decay of the metal.

Finished aluminum has a baked-on coating of enamel. A white finish generally is better than a black or copper finish because it reflects more heat into the house.

Wood may be the most attractive material for greenhouse frames. Wood conducts heat poorly so it also is the best material for heat conserva-

**Glazings**

The glazing is the most important part of the greenhouse. Its job is twofold: it allows light to enter and prevents heat from leaving. Since heat and light are similar, this is a challenging task for one material.

So there is a trade-off between heat and light with any kind of material used: the glazings that allow the most light to enter also allow the most heat to escape. Double-glazed greenhouses help solve this problem. A double-layered wall has an insulating cushion of dead air in it, yet does not block much of the incoming light. While double glazing costs more than single glazing, it save significantly on winter fuel costs.

Twenty years ago there was one glazing material available for covering a greenhouse. It was glass. Today there are several materials available, with glass still being one of the best. It is both the longest lasting and most fragile material, damaged relatively easily by hail storms, falling branches and flying rocks. And while unscathed glass lasts forever, the caulking and sealing that hold it in place do not.

Another rigid greenhouse glazing material is fiber glass. This is much like glass in its light and heat permeability. Fiber glass is lightweight and virtually unbreakable. Though less expensive than glass, fiber glass re-
queries more maintenance. It has to be cleaned often and, even with the proper care, the fibers rise to the surface and the material yellows with age and “blooms.” The bloom traps dirt and debris. To restore it, the product has to be cleaned and coated with a liquid refinisher.

Though relatively inexpensive and quite effective, fiber glass is flammable. Fiber glass burns so easily that most commercial greenhouse operators can’t obtain fire insurance for their fiber glass units. Home owners should check to see if an attached fiber glass unit would affect the cost of their home insurance.

Another rigid material sometimes used as greenhouse glazing is acrylic, also called by the brand names Plexiglass and Lucite. An expensive and excellent greenhouse glazing, it lasts about fifteen years and has most of the properties of glass.

Flexible, translucent films are gaining in popularity and occasionally are used when a grower must replace broken glazed made of rigid material. The most common greenhouse film is polyethylene. Since the material is easily damaged by the sun’s ultraviolet light, it must be replaced every two years. But because it is so inexpensive, its replacement cost is very low and so this material is being used by many commercial greenhouses. Polyethylene is not very sturdy, but it is unbreakable and not much of a fire risk.

The Catalogs

After you have decided on the style, frame and glazing for your greenhouse, it’s time to start figuring out its cost. Call some electricians and plumbers to get estimates on the services you get when you buy a greenhouse and take advantage of the knowledge your agent has to offer.

Most important, enjoy yourself. Buying a greenhouse, building, stocking and working in it are all fun. But the whole process is made much more pleasant if you become well informed before you buy a glass house.

Greenhouse Suppliers

Bromack Construction Co.
6554 East 41st St.
Tulsa, OK 74145
918-664-5300
Burpee Seed Co.
Warminster, PA 18974
215-674-4900
Edward Owen Engineering
Snow Shoe, PA 16874
841-387-4284
(Will send erection manual for $1.00.)
El-San Inc.
P.O. Box 242
Crystal Lake, IA 50432
515-565-3312
(Free delivery within 300 miles of factory.)
Everlite Aluminum Greenhouses Inc.
14605 Lorain Ave.
Cleveland, OH 44111
216-251-6100
(Also sells polyethylene sheets and clips for installing a double wall.)
Four Seasons Solar Products Corp.
672 Sunrise Hwy.
West Babylon, NY 11704
212-925-0386
Gothic Arch Greenhouses
P.O. Box 1564
Mobile, AL 36601
205-432-7529
Janco Greenhouses
9990 Davis Ave.
Laurel, MD 20810
301-498-5700
Lord & Burnham
Irvington, NY 10533
914-591-8800
McGregor Greenhouses
1195 Thompson Ave.
Santa Cruz, CA 95063
408-476-5390
National Greenhouses Co.
P.O. Box 100
Pana, IL 62557
217-562-3919
(Agents throughout the country to help customers with on-site problems.)
Peter Reimuller
980 Seventeenth Ave.
Santa Cruz, CA 95062
408-476-3145
Santa Barbara Greenhouses
390 Dawson Ave.
Camarillo, CA 93010
805-482-3765
Sturdi-Built Mfg. Co.
11304 S.W. Boones Ferry Rd.
Portland, OR 97219
503-244-4100
Sunglo Greenhouses
4441 26th Ave. West
Seattle, WA 98119
206-284-8900
Texas Greenhouse Co. Inc.
2717 St. Louis Ave.
Ft. Worth, TX 76110
817-926-5447
Turner Greenhouses
Box 1260
Goldboro, NC 27530
919-734-8345
Vegetable Factory Greenhouses
100 Court St.
Copiague, Long Island, NY 11726
516-842-9300
(On-site technical assistance available.)
Victoria Greenhouses
Box 947
Stump Bridge Rd.
Southampton, PA 18966
215-355-6084

The most important accessory is the heater. Before you choose one, decide just what you want the greenhouse for. If you are going to keep it cool during the winter at temperatures around 40-50°F (4-10°C), you may need only a small heater for a large glass house. But if you want to keep the greenhouse at the ideal tropical levels of 60-70°F (16-21°C), you may need a large heater for a very small glass unit. Talk with both your oil, gas or electric company representatives and your greenhouse agent on this matter.

All in all, your greenhouse agent is the person to go to for suggestions. Think of the agent as one of the services you get when you buy a greenhouse and take advantage of the knowledge your agent has to offer.

For tropical levels of 60-70°F (16-21°C), you may need a large heater for a very small glass unit. Talk with both your oil, gas or electric company representatives and your greenhouse agent on this matter.

After you have decided on the style, frame and glazing for your greenhouse, it’s time to start figuring out its cost. Call some electricians and plumbers to get estimates on the work you need. Also get estimates on foundations and gravel floors. The greenhouse manufacturer will send you complete plans for the foundation you need, so you won’t have to lay down anything yet.

From the catalogs you receive, pick the house you want. Add the cost of the house to the other estimates to come up with the final price for erecting your greenhouse. Then, when you have the greenhouse planned and priced, consider the accessories needed to run the structure.

Plants need fresh air year-round to survive. Although all the kits contain vents, the vents don’t open and close automatically. Many times they are nothing more than ducts to the outside. Automatic vent systems maintain the correct temperature inside the house without requiring your opening and closing them.

You also need benches, the work counters that hold the plants. Benches are easy to make from scrap lumber and have simple requirements: they must be sturdy and they must allow water to drain away.

If you know what you want, you are more likely to get it.
The Primroses of Alaska

by Sylvia Kelso
Dept. of Biology, Colorado College
Colorado Springs, CO 80903

Oil and gold, glaciers and blizzards, giant grizzly bears and salmon, northerly climates and the midnight sun: the State of Alaska is famous for all of these. But we should also add to the list of its many attributes a claim to being the state with the most number of native species of Primula. Nine species of primrose can be found there, a fact that may be surprising to those unacquainted with the flora of the North. These nine species represent four different sections of the genus. In section Aleurina, we have Primula anvilensis (the Anvil Mtn Primrose), P. borealis (the Northern Primrose), P. incana (the Mealy Primrose), and P. mistassinica (the Mistassini or Bird’s Eye Primrose). In section Armerina, there is P. nutans (the Siberian Primrose) and P. egalikensis (the Greenland Primrose); in section Cuneifolia there is one species, P. cuneifolia (the Wedgeleaf Primrose), and finally, in section Crystallopholmis, this are two species, P. tschuktsohorum and P. eximia (the Chukchi Primrose and the Extraordinary Primrose).

Why are there so many primroses in Alaska? Certainly the large size of the state with its diverse landscape offers many ecological opportunities. However, the basis for the plenitude of arctic primroses may lie in Alaska’s geographic position and the environmental changes that have occurred there in the last 100,000 years.

On a clear day at Cape Prince of Wales on the west coast of Alaska, the Cape Dezhnev cliffs on the Asiatic coast loom up only 50 miles away across the stormy Bering Strait. To the east, the mountain chains of the Seward Peninsula connect to the high peaks of the Brooks and Alaska Ranges, which in turn join the coastal and Cordilleran mountains of North America. Westward, the peaks of the Chukchi Peninsula link to the great Asian ranges: the Altai and the Himalayas. The Bering Strait region is not the only North American connection to Asia. The long chain of the Aleutian Islands reaches out across the time zones to merge with the coastline and islands of the North Pacific: the Commander Islands, Kamchatka, the Kurile Islands, Sakhalin, and the Japanese Archipelago. Over many thousands of years, these links to Asia have provided highways for the migration of many plant species from the rich floristic regions of Asia to the North American continent. Undoubtedly the famous Primula belt of mountainous Central Asia has been the ultimate ancestral home for many of the species we see in Alaska today.

But are all the Alaskan species Asian immigrants? Probably not. Alaska has had a fascinating environmental history during the past 100,000 years. During this time period several lengthy episodes of glaciation occurred over much of North America. Periods of cold temperatures and extensive ice-cover alternated with warmer periods when glaciers melted, and temperatures were as warm or warmer than they are today. These cycles of change drastically affected plant and animal species. Almost certainly extinctions occurred. Plants and animals migrated south and north, east and west. Some groups were isolated for long periods of time when glaciers cut them off from other populations of the same species. Climates changed, ecological conditions changed, and species changed with them.

Twenty to thirty thousand years ago in Alaska, alpine glaciers filled the mountain valleys, but most of the state and the lowlands of the neighboring Yukon Territory were ice-free. The picture was very different in the rest of North America: massive ice sheets covered most of Canada and northern United States, and Alaska was essentially cut off by the glacial ice in the Canadian Rockies. Gradually, the climate began to warm again, the glaciers retreated to the relatively few we see today, and the mountains once again became potential habitats and migration routes for plants and animals.

I believe that these periods of isolation and traumatic climate change were critical for several species of Alaskan primroses. One species, the Anvil Mt. Primrose of northwestern Alaska, is most closely related to the eastern mistassini or Bird’s Eye Primrose. It probably developed from a branch of that species when Alaska was isolated from the rest of North America by long periods of extensive glaciation. While the Fairy Primrose can be found in Alaska today, it is quite rare, and most likely migrated north along river valleys later in the postglacial era.

The cases of the Wedgeleaf Primrose and the two close relatives, the Chukchi Primrose and the Extraordinary Primrose, are quite similar. Here I believe that ecological changes, particularly the loss of critical pollinators, led to the development of the forms we see today.

Primrose enthusiasts all know that many species have two forms of flowers, called pin and thrum, that differ in the placement of their reproductive organs. These must be crossed in order for successful seed set. This reproductive system called heterostyly was first studied in detail by Charles Darwin. For heterostylous species, insect pollinators are crucial. If pollination and seed production are not successful over a long period of time, the species may be doomed to extinction.

Not all species of Primula, however, are heterostylous. There are some homostylous species, and in these, the reproductive organs are set close together and flowers are able to self-fertilize. Genetically we know that only a simple mutation is required to convert heterostyly to homostyly. However, as many plant breeders are well aware, prolonged self-fertilization may lead to the expression of deleterious genes and weak or inferior individuals. Thus, while mutations to homostyly may occur frequently in heterostylous primroses, only rarely does a homostylous species succeed in getting established.

The origin of the Alaskan primroses is quite complex and involves some fascinating stories in plant evolution. Of course, we cannot see the past to know for certain from where they came, but thoughtful speculation and ecological detective work is part of the fun of plant geography.

Alaska is a bridge between East and West and its flora reflects that posi-
tion as a crossroads. But, Alaska is a unique place as well, and as truly native Alaskans, the endemic primroses there exemplify well its specialness.

SECTION ALEURITIA (Farinosae)

*Primula anvilensis* Kelso “Anvil Mountain Primrose”

Named for Anvil Mountain in the Nome area.

Range: Endemic to the Seward Peninsula or northwestern Alaska.

Habitat: Gravelly limestone slopes, stream banks, and snowbeds.

Description: A small delicate plant characterized by a few-flowered umbel, white flowers with a yellow throat, flat bracts, and efarinose denticulate leaves. Heterostylous.

*Primula incana* Jones “Mealy Primrose”

Range: In Alaska known only from the interior, particularly along the Tanana River and its tributaries. Otherwise, known from the Canadian Prairie Provinces and south to Colorado.

Habitat: Alkaline clay river flood plains in successional plant communities.

Description: A tall slender plant with a tight umbel of tiny lavender flowers, and a distinctive heavy coating of white or cream-colored farina. Homostylous.

*Primula mistassinica* Michaux “Mistassini or Bird’s Eye Primrose”

Named for Lake Mistassini in Quebec

Range: Very rare in Alaska, known from a few scattered locations in the Alaska Range, along the Tanana River, and the western Brooks Range. Otherwise known from across the boreal forest region from Newfoundland to the Yukon.

Habitat: Riverbanks.

Description: A variable species, with 2-3 violet flowers, flat bracts, and efarinose denticulate leaves. Heterostylous.

NOTE: Most Alaskan floras list the arctic species *Primula stricta* Hornemann as present in Alaska. These records are based on misidentifications of several species, including *P. anvilensis* on the Seward Peninsula, *P. incana* in the interior of the state, and *P. borealis* on the north coast. *Primula stricta* is a high arctic maritime species found in the Canadian Arctic Archipelago and the European Arctic; in North America it is not found west of the Mackenzie River delta.

SECTION ARMERINA (Farinosae)

*Primula egaliksensis* Wormskjold “Greenland Primrose”

Named for a location called Igaliko in Greenland where it was discovered.

Range: Infrequent, but found throughout all of Alaska, across northern Canada east to Greenland, and south to two isolated locations in Colorado and Wyoming.

Habitat: Cold mossy streambanks

Description: A small and inconspicuous species, characterized by 1 or 2 tiny white or lavender flowers, and efarinose ovate or elliptical leaves. Homostylous.

*Primula nutans* Georgi “Siberian Primrose” (formerly called *P. sibirica* Jacq.) “Nutans” means nodding, a reference to the drooping flowers

Range: In Alaska common along the west coast of the Bering Sea and the
coastal Seward Peninsula. Known also from a few locations in the interior in the Yukon-Tanana Uplands.

Habitat: Along the west coast, in salt marshes and saline bogs. In the interior found in cold, wet, freshwater bogs.

Description: A heterostylous species that is superficially similar to the Northern Primrose, but easily distinguished by its fewer lavender flowers on droopy pedicels, distinctive auriculate bracts, and efarinose ovate leaves. *Primula nutans* is also known from northern Europe across the steppes of Central Asia. It may have been more abundant in North America prior to the glaciations. If so, the Alaskan populations represent relicts that survived only in the unglaciated lowlands of the north.

**SECTION CRYSTALLOPHLOMIS**

*Nivales*

**Primula eximia** Greene

"Extraordinary Primrose"

The specimen used by Greene to name this species was dramatically large and robust, probably from the effects of massive amounts of bird fertilizer. St. Matthew Island in the Bering Sea from which it was described, is known for its abundant seabird colonies.

Range: The Aleutian Islands north along the west coast of Alaska and south along the south coast, inland throughout the Alaska Range east to the Mackenzie Mountains in the Yukon.

Habitat: Late snowbeds along coastal bluffs and ravines, in the mountains in alpine herb and herb-sedge communities and in streambeds.

**Primula tschuktschorum** Kjellman

"Chukchi Primrose"

Range: A rare endemic of the Bering Strait region, including the Chukchi Peninsula in the USSR, St. Lawrence Island, and the Seward Peninsula in Alaska.

Habitat: Frost boils and late snow beds.

Description: This is a small and delicate species with very narrow linear leaves, and 1 or 2 heterostylos

magenta flowers. Its rarity is of concern, and the species is a candidate for the threatened and endangered plant list in Alaska.

**SECTION CUNEIFOLIA**

**Primula cuneifolia** Ledeour ssp. cuneifolia "Wedgeleaf Primrose"

Range: Known only from the western Aleutian islands of Attu, Agattu, and Adak. In Asia, common in the Commander and Kurile Islands, Kamtschatka and northern Japan.

Habitat: Moist herb meadows.

Description: This subspecies differs from its relative *P. saxifragifolia* in having larger heterostylos flowers, and a taller stem. The leaves are efarinose, with broad teeth, and the flowers are pink.

**Primula cuneifolia** ssp. saxifragifolia (Lehm.) Smith & Forrest

Range: The Aluetian Islands north and south along coastal Alaska, and throughout the mountains of the interior of the state. Also known from the coastal mountains of British Columbia.
A further problem with cultivation of Primula spectabilis is its long roots. These play a major role in the plant’s survival and are responsible for its ability to obtain nutrients. Removal of the roots during transplanting is not advisable, as it can lead to the death of the plant. The roots are thick and white, and they penetrate the soil to a depth of several meters. Therefore, it is important to choose a site that is well-drained and has good soil structure for best results.

Primula spectabilis is one of the most commonly cultivated species in gardens and is often grown for its showy flowers. It is a hardy perennial and can withstand cold temperatures, making it an excellent choice for colder climates. However, it is important to provide sufficient care and maintenance to ensure the plant’s health and longevity.

In conclusion, Primula spectabilis is a beautiful and hardy species that is worth cultivating in gardens. With proper care, it can thrive and produce stunning flowers for many years. Its ability to withstand cold temperatures makes it a popular choice for colder climates. With its showy flowers and hardiness, Primula spectabilis is an excellent addition to any garden.
pathians where it does not exist. Much later the error was corrected by Pax and by Widmer, but in the meantime other names had been suggested for it, thus adding to the synonymy. From the other members of the subsection it is easily separated by the numerous minute semi-transparent glandular pits on the surface of the leaf. It is esteemed the finest species of its subsection, has been in culture from at least 1879 and is amenable."

The Genus Primula by W. Wright Smith, G. Forrest, and H. R. Fletcher

I have been growing Primula spec- tabilis for about 6 years, and last year was the first year I had it bloom. It put on a very good show, and was exhibited at the Washington State Chapters Show in Seattle. Growth was very slow on most of the cultivars I raised from seed. The seed was collected in the Alps. Neglect seems to be the key to my success. P. spec- tabilis does well in a very coarse soil mix, and can take long periods of drought. I grow them in pots, both outdoors and in the alpine house. The plants I grew in the alpine house appeared to grow at a much faster rate than the plants in pots outdoors. I added some lime and fertilizer to the plants in the alpine house and it was one of those that rewarded me with two nice umbels of flowers. This past summer the plants survived very well throughout the drought, in pots, outdoors, in full sun, without water for weeks at a time.

Larry Bailey

As your committee meets, we become more and more aware of the tremendous amount of work and planning that will have to be done - on a very tight schedule. Necessary deadlines are being carefully determined, and must be held to, or we will never be ready in time! This means that when we ask all of you for input and assistance, we need your immediate cooperation. So please, don't hang back.

We are pleased to report more firm commitments to the conference. They are from one section of the British Primula and Auricula Society, as well as the Scottish Rock Garden Club. Michael Upwood also has promised the support of the Alpine Garden Society, and states their eagerness to participate in the revision of the Primula Directory and our anticipated primula-hunting expedition. Richard expects to hear from other potential contributors and supporters very soon.

The conference is to be dedicated to that marvelous woman who has just gone from us - Florence Bellis. What a gap she leaves! Fortunately, she has left a great deal of knowledge behind from which we all can profit. Let's hope the conference will be worthy of her memory!

Richard is, among other things, working at finding the best possible speakers. He needs suggestions from the membership concerning speakers you want to hear, and subjects that you feel would be most pertinent. If you want to hear about a particular subject, let him know. He isn't a mind reader, so don't let's hear any of you gripe later about the conference content!

Those of us who do not live on the west coast are looking forward to seeing all those wonderful primulas that you grow and we can't. We hope many of you are planning to spruce up your gardens and open them for us to look at and envy. Get busy and put in all those exotic primulas you have been meaning to try so they'll be established by the time we arrive...

You can be sure that the Berry Botanic Garden will have the red carpet rolled out. The arrangements committee is to be chaired by Sue Chilton and Ruth Korn, and they have great plans. Those of our members who are not familiar with the Berry Botanic Garden might be interested to know that its nucleus was the former home of Rae Berry, who not only was a primula lover, but also created beautiful plantings of many other genera, including rhododendrons. There is a rock garden crammed with fine alpines, and an eye catching collection of troughs. At the edge of a woodland are extensive beds filled with a variety of primulas, and in a moist ravine grow many of the rare Asiatic petiolarids. Some acreage has been added since the formation of the Botanic Garden, so bring your walking shoes.
We hope you have been thinking of the revision of "A Pictorial Dictionary of the Cultivated Species of the Genus Primulas", and are ready to send your suggestions for improvements, corrections and additions to Richard. Remember that the revised version is to be greatly expanded and will cover not only the same material but also many more species. Hopefully, there will be drawings and/or color photos of each. There will be information on the cultivation of primulas, their use in the garden, propagation, cultural potential in various areas, the hybrids, showing primulas, and even hybridizing. There will be a brief history of primulas, their discovery and introduction. Short bios of well-known "primula people" will be an interesting addition. Of necessity, this is all very general, and as work gets underway there will be more specific details for you.

Remember, for a trifling 22¢ you, too, can be part of the process!! So let's get those letters going.

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Dear Richard,

My copy of the APS Fall Journal arrived at breakfast time today. Your mystery Primula on the cover is a Vernales species – by the leaves – so that narrowed the field. By the process of elimination it must be Primula amoen. That's about the only one of the section I have not grown. It's a lovely photo, leaves in better focus than the flowers.

I applaud your series on plant photography. However, I don't think I would have awarded the prizes you did in the competition. I think your cover photo far better. Why? Because we are a practical Society, and the pictures we publish – I am Editor of "Argus" – should not only look good, they should teach us something about that particular Primula. Your winning photograph is excellent from a photographers point of view, but what does it tell us about the PLANT. The same criticism goes for the other two, they are photographers choice, not Primula Growers. However, I suppose all this just bears out what Bruce Gould has to say about your point of view – and my objections prove his point. I am not looking from an artist's point of view, but as a journalist and a scientist – and they were judged by a man who studied Art & Design.

'Nuff said. Especially as of his photo-

letters to the editor . . .

Dear Mr. Critz,

As one who has recently recovered from a severe case of "primrose poisoning" I would like to share my experience with others who might be tempted to choose Primula obconica as a house plant.

I also take exception to the statement in the INDOOR PRIMROSES article in the Winter 1988 issue that "the fine hairs on the plant cause a rash in some people, but only after they've handled numerous plants."

What I got was much more than a rash – severe dermatitis which was extremely painful and debilitating, and
required medical intervention. This after what I am sure was only my second encounter with obconica. It has well-earned its epithet, the "Poison Primrose!"

I had gone to a large wholesale-retail nursery with a friend to pick out greens and plants for the holidays. It was a place I had never been before and she, knowing of my interest in plants, wanted me to see their immense selection.

As we wandered into the greenhouse, I immediately saw a whole table of Primula obconica. I had seen this plant only once before just before her arrival and pick out a Christmas, so when I saw the rose had died during the summer and I knew she asked me to repot it, to live with; but, so far after 35 years working with them for years. My advice is to learn what you are allergic to. The doctor asked me what I had contacted, and I honestly couldn't say I knew, except that it must have been something in the greenhouses since it has come on within twelve hours of my visit. I suspected a sensitivity to a spray they might have used.

The diagnosis was "severe allergic reaction." I was injected with cortisone and given a prescription for liquid cortisone to take for the next week. I was also given drops for my eye which was half-closed due to the swelling of my lid.

The doctor's fee was $65, the cost of medication another $20, which I could have used for other things at Christmas. But within two days my condition had improved markedly and by week's end I began to be able to use my hand somewhat. I still looked red and peeling when my company arrived, and my hand continued to peel for a month. Both my forehead and the back of my thumb are slightly scarred and red-looking. However, I feel fortunate not to have injured my sight, which was a real possibility.

I did not connect any of this until I read an article in a local paper warning people of the hazards of various gift plants, Primula obconica among them. Suddenly, I put it all together—the two attacks of dermatitis following contact with this plant. When, a few days later your quarterly arrived and I read the article, I felt compelled to write this in hopes of saving others from the torture I have been through.

Suppose a small child touches this plant and then rubs his eyes? A reaction such as I got could blind him. No one of right mind would consider growing poison-ivy as a house-plant. And as far as I am concerned, in a lifetime of handling plants of all kinds, it is the only one equal to the virulence of Primula obconica.

A question I have for Mr. Dickson is this: "Are there any other primroses known to be toxic?" When I read the seed list and see such species as 'poisinii' and 'mala-coide' ('mal' is 'bad' in French) I get suspicious. I want to avoid any such.

I do feel, also, that the American Primrose Society should make an effort to warn and educate the public about primroses which are, by any standard, toxic, and not encourage people to grow them as houseplants. Perhaps (and hopefully) people as hyper-allergic as I are in the minority, but we do deserve consideration, I feel.

Yours truly,
Joyce Descloux
32 Longridge Road
Randolph, NJ 07869

HERB DICKSON'S ANSWER:

Primula Obconica is the only Primula known to cause an allergic reaction on many people, but not on all people.

Allergies depend on the chemical and nerve sensitivity of the individual. Medical science does not understand fully why one person is allergic to certain things and others are not.

A few people develop an allergy to Primula auricula and its hybrids after working with them for years.

I have many allergies I have learned to live with; but, so far after 35 years of working with Primulas of many species I have not developed an allergy to any Primula.

My advice is to learn what you are allergic to and avoid it, or find an easy prevention or cure.

Readers please note:

Xeroxed copies of the Pictoral Directory are still available from Treasurer Brian Skidmore. At $7.50 a copy, the 102 page classic is a steal!
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All About Seed Sowing and Growing
by Joe Dupre
Anacortes, WA

The APS Seed Exchange 1988 has arrived. And as usual Candy has again done a superb job. Looking over the seed offerings reminded me of the National Gardening Association 1985 Seed Conference Proceedings which arrived late last year.

Several of the talks and workshops addressed subjects of interest to primrosers.

Dr. Eric E. Roos, a plant physiologist, presented his views on some ways genetic purity is lost or compromised.

First is human error. We make mistakes in names or numbers, we mislabel and we mix things up.

The next major area for error is in the way we grow things. Too many similar plants too close which lead to pollination problems and then to errors at harvest time.

Failure to control the pollination stage. Save only those seed pods you have hand pollinated (pin-eyed flowers) lest they be the result of a visit by a friendly bee.

All of the stages of harvesting from initially collecting mature pods, to cleaning and gross storage hold the potential for error and mix up.

At the packaging stage seed get put into the wrong packet, inner and outer packets get mixed up and packets in common storage get broken or accidently spilled.

Dr. Bruce Bugbee, another physiologist, talked about seed physiology and long-term seed storage.

His talk mostly concerned seed germination and seed vigor. Proper storage conditions preserve both.

Unless a variety has a post-harvest dormancy period the best germination percentage occurs right after harvest.

Seed vigor he defines as the ability of seeds to germinate and grow rapidly even in less than favorable conditions. Under all storage conditions, both vigor and germination percentage decline with time but vigor is lost much more quickly.

Seeds of low vigor are still alive but will produce plants only if germination and growth conditions are favorable, as in a greenhouse or other heated space.

He emphasized seed longevity begins with the mother plant. The cultural care the mother plant gets affects the seed produced. A healthy, well-nourished plant produces seed with a high protein content. Low seed protein is associated with lack of vigor in some species. To maximize seed quality don’t let the mother plant run short of nutrients.

Flowers which set seed first usually produce the highest quality seed.

The best seed storage is summarized in two words: cold and dry. Dr. Jim Harrington, U.C.-Davis-1963, found that useful storage life of seed is doubled for each 1% decrease in seed moisture and doubled again for every 9°F decrease in storage temperature. This applies for seed moisture between 5% and 14% and storage temperatures between 32°F and 122°F. These effects are additive and results are supported by a great deal of research.
The moisture content of freshly harvested seed varies between 20% and 40%. Seed can be dried by carefully heating them or by using desiccants such as silica gel.

Temperatures below 95°F cause no biological damage. Silica gel is available from hardware and drug stores, camera shops and some florists. It can be dried or redried in a warm oven. Place seed and packets of silica gel in a sealed glass jar.

After cleaning, drying and packaging store seed in a sealed glass jar in the refrigerator. This author uses old peanut butter and similar jars. You know the kind I mean: wide mouthed with a rubber-rimmed metal lid.

Dr. Mike Turner, a researcher with Funky Seeds International, discussed seed-borne diseases. Besides describing various disease causing organisms he emphasized two points: care of the seed-producing plants and protection of seed after harvest. He also emphasized that comparatively little is known about seed-borne diseases. It is simply not a high priority area of scientific study. (Yet back in the 1950’s the annual APS Seed Exchange was cancelled for a year or so due to fear of seed-borne virus disease. I wasn’t in APS then but read about it in an old quarterly. Elmer Baldwin was seed exchange chairman at the time.

Except for virus, diseases are more likely to affect primrose plants and hence seed production than the seeds themselves. Viruses are principally spread by insect vectors such as aphids, leaf hoppers, white fly and nematodes. These insects must be controlled.

Basic cleaning of seed is very important in preventing the transmission of diseases (and possibly insects). Avoid contaminating seed with soil and remove all other plant parts. If chemical pesticides are used, use them carefully. (This author treats most of his seed with combination of ingredient dusts such as Tomato Vegetable dust or Rose and Flower dust. These contain a mild insecticide and fungicide. Several brands and combinations are on the market. Most of this is removed in final cleaning before seed are stored in the fridge.)

An interesting finding reported elsewhere might be applicable to primula. In pollination tests with summer squash, massive amounts of pollen on the pistil resulted in larger, more vigorous seed. Not necessarily more seed. Those super pollinated seed resulted in more vigorous plants, earlier and more productive plants over a longer period of time. If you are an inveterate fiddler who likes to try things, here’s a challenge for you.

On the same plant, preferably a pin-eyed flower, hand pollinate two (or an even number) flowers with pollen from another plant. Heap pollen on one (set) and merely coat the pistil of the other (set). When seed are ripe, count them, note any differences in size of seed, plant the seed and check out the results. Then write a letter to the Editor of Primrose letting him (and us) know.

Someone may also want to check Dr. Bugbee’s assertion that first fruits on one (set) and merely coat the pistil of the other (set). When seed are ripe, count them, note any differences in size of seed, plant the seed and check out the results. Then write a letter to the Editor of Primrose letting him (and us) know.

Some may also want to check Dr. Bugbee’s assertion that first fruits produce the highest quality seed, though this one might be a bit tougher. Genetic variability resulting from cross pollination would be difficult to differentiate. But selling the plant early and late might produce useful results. As a primrose once told me he didn’t get around to thinking about seed production until his chapter’s show was over. Since that show was a bit late that year it is perhaps just as well. The seed produced could very well have been inferior. If someone tries this let our beloved Editor know.

III. The Art of Lighting

by Bruce G. Gould
Vincent, New Jersey

Pho-to-graph (fo tə graf) n., an image produced by a chemical reaction to light.

As the definition indicates, without light there can be no photo. A simple, yet all-encompassing statement. Light is the single, most important consideration in making a photograph, more important than cameras, lenses, or any other piece of equipment. In fact, light can be thought of as equipment. If the sun is out, it can be used with a simple cardboard box and a sheet of film to take a picture.

Seems obvious, doesn’t it? But you can improve your photographic product by planning how to use light. What are some of the important things to consider? Direction, intensity, color, level and psychological effect are all controllable variables that apply whether the light is natural or artificial.

Direction and intensity of light greatly affect the detail, three-dimensionality and color of your subject. The two things that combine to make a subject look “solid” or 3-D are a bright highlight leading to a dark shadow. The more pronounced and in contrast these are, the greater the three-dimensional effect. The stronger the light, the stronger the highlight and shadow will be.

To think about the effect the direction of the light will have, imagine photographing a red ball with a light source mounted on wheels. As the light rolls around the ball, the highlights and shadows shift.

First, position your imaginary light in the traditional way. Those of us old enough to remember the Kodak box camera will recall the instructions to stand between the subject and the sun, with the solar rays coming over the left shoulder. This was to give the subject even lighting, good color and to prevent the photographer from casting a shadow on the subject. Light coming from behind the photographer and shining directly on the subject does give it the best color. The problem is that it tends to flatten the image out, turning your red ball into a red disk. This type of light is what you get when you mount the flash on your camera, producing strong, true colors but poor detail and limited three-dimensional effect.

Let’s get our imaginary light source rolling. As it travels towards and past the subject, on the same plane or to about 45° above, the shadows begin to lengthen. The highlights follow the light source. The color becomes more muted. The red ball that was just a circle when photographed with the light behind the photographer is now becoming a solid object. The bright red is now many shades of red, bright at the highlights and dark maroon in the deepest shadows. In photographing flowers, as with the ball, the best rule of thumb is light placement 45° to the right or left and 45° above the
subject.

When the light source moves directly overhead the shadows become very strong and the highlights burn out to white. This harsh, overhead light is the least recommended light placement.

Backlighting creates a feeling of mystery. When the light is only slightly behind the subject, the edges will take on a glowing outline, particularly in flower photography where many edges have small hairs. A silhouette emerges as the light moves further behind the subject. This can produce the most dramatic of photographs, or the most trite.

All this is very well, but how do you move the best light source, the sun? There are other possibilities. You can't move the sun, but you can move the camera. You can also photograph your subject at a different time of day.

One of the problems with the old, brownie box camera position is that it limits photography to about two hours in the morning and two in the afternoon, when the sun is high enough to fall over the picture taker's shoulder but not so high that it is directly overhead. Flexibility in direction and intensity gives many more options.

Let's look at the effect of the direction and intensity of the sun, without going into a lot of astronomy (and you thought all you needed was the manual dexterity to load the film!). The sun rises in the east and sets in the west, traveling on the south side in the northern hemisphere and on the north side in the southern hemisphere. In summer seasons, the sun rises higher in the sky and strikes the subject at less of an angle. So, as our solar light source moves from break to zenith to set it travels up and over the subject, with 45° falling about mid-morning and mid-afternoon. It is also filtered by the atmosphere. Light is much more intense in summer when the sun is higher and less filtered by the increased angle of winter. Man-made "atmosphere" can also have an effect. Generally, the atmosphere has less suspended material in it during early morning than later in the day, so the sun will appear brighter.

The special relationship of photographer, sun and subject is so basic that it's easy to forget about. However, as I said several articles ago, photography is a thinking person's sport. The photographer must keep questions in mind. "Where is the sun?" "What is it doing to my subject?" Is this what I want to happen?" Many times a small shift in position or time of day will bring out detail originally unseen or make a strong color more brilliant.

I have found that a small compass is a big help in tracking the sun across the sky and pin-pointing where it will be when in order to photograph at the most effective time of day. Of course, it is wise to realize that Nature has her own time table. Several years ago I visited a small Maine lake full of wonderful water lilies. I was struck with the thought of how good they would look at dusk. Well, the lake was beautiful in the evening, but I didn't realize that water lilies close up in late afternoon. Could I get the same effect at another time of day? The plan changed to early morning and a canoe. Since I had to make the photograph 180° from my original viewpoint, I needed the boat to get out on the water. All this just for a photograph? With my change in position the back-lit photo was just what I visualized.

Now let's look at color and how it is recorded by the film. Colors are created by white light falling on a subject. The colorant (surface finish of the subject) absorbs certain light waves and reflects others. It is the reflected light waves that we see as color. The stronger the reflected light, the brighter the color. If that light is reflecting directly back into the camera lens good renditions of color can be photographed. But as the reflection of the light changes angle to the camera this color is scattered, hence highlights often appear white. This type of scattered light can also be seen on bright days at midday. Then light bears down on a subject and creates a large highlight in which most light colors are washed out and the object appears almost white. At times like this it is a good idea to block out some of this light. Try casting a shadow across the subject. If the day is bright there will still be plenty of diffused light to make the photograph.

This brings us to the question of...
the best time and conditions for a

good photograph. When working
with flowers, if I had my druthers, I
would pick an overcast, early summer
morning in the southern part of our
hemisphere. Let me explain. The
clouds would make the light falling
on my subject soft and it would not
be so direct as to wash out the high-
lights so light colors would remain
bright and clear. The sun in the lower
part of the hemisphere would be at
less of an angle so it would be more
intense, good for slow films and
f/stops (topics we will get into in later
articles). In early morning the light
has a more pleasing color. Unfortu-
nately, I live in the northern part of
the United States which almost never
has these qualities all at the same
time. To compensate, I have found
that a few things packed away, both
physically and mentally, will help.

I usually work a little later in the
day than I would like, when the sun
is stronger. I also carry a small piece
of white nylon cloth, very thin, the
sort of fabric a woman's slip might be
made of. Voilà, clouds! If I can man-
age it, I like to work the morning after
a rain when the air is clear and the
blossoms are often just opening.

The last color consideration is color
shift of the sun itself. At sunrise, col-
ors are muted, cool and shadowless,
while subjects remain pearly and flat.
Early morning sun warms dramati-
cally, shadows turn cool and blue,
while highlights tend towards reds
and oranges. Mid-day sun is the
strongest. Then, highlights are white
and shadows are harsh and black. In
late afternoon, highlights again warm
up, but more to the red side. Shadows
lengthen and turn to cool colors. At
evening, subjects often take on more
delicate colors, and skies are rich with
red and gold. All of this should be
taken into consideration for the color
of highlights and backgrounds.

Many times, the most dramatic
photographs are taken in the absence
or altered intensity of light. Fog, rain
and storms change the color of the
sky drastically and also change the
quality of light that strikes the surface
of the subject. The pearl grey light
that encloses flowers or forest dims
highlights and shadows and mutes
the brightness found at other times.
Soft color, soft light, soft emotions.

As in all aspects of photography,
light must be observed and mental
images must be stored to be brought
forward when the photograph is start-
ing to come alive in the artist's eye.

Canada Thistle.
As fog shrouds the background, the plant is
thrust forward. The quality of the photo-
graph: soft color and detail.
The Natural Habitats of Chinese Primulas

By Dr. H. Handel-Mazzetti, Natural History Museum, Vienna


It was not without some hesitation that I accepted the honouring invitation to speak at a meeting of the Royal Horticultural Society, for, as a systematic botanist I know about as much of gardening as a zoologist as such knows of horsemanship. However, although I have not occupied myself with all the subtleties of the modern science of the soil and ecology, I have always endeavoured to study the phytogeographic structure of the countries I have explored, and have carefully noted the habitats of the plants collected.

As I collected in China eighty-three species of the genus Primula, I hope to be able to give some account which may be of interest to the growers of Primulas. Every gardener attempts to offer each plant as far as possible the same conditions as those under which it flourishes in nature. As he cannot alter the climate in which he works, he must substitute for climatic peculiarities different types of soil and situation which do not entirely but only partly coincide with their natural edaphic—that is soil—conditions.

Let us first consider the climatic conditions of the Chinese Primulas. The diagrams in Professor Smith's paper show us that the centre of the genus is in China as regards number of sections as well as species. If the actual area over which the Primulas occur is mapped it will be found that but a comparatively small part of China is involved, for if we subdivide still further, drawing a boundary line about 104° of East longitude, almost the whole of the Primulas lies to the west of this line, and the east part of China remains relatively empty. There are both climatic and geomorphic reasons for this. Most of the Primulas are mountain plants; in the east, however, we find low and hot country to which only a few species are adapted. But this is not the only way to divide China from a climatic and phytogeographic point of view.

In China proper seven districts each essentially different from the other can be distinguished. There is tropical China, reaching about to the tropic of Cancer; no Primulas grow there at all. The genus is represented in the tropics only on a few high mountains, but tropical China has no mountains high enough.

The biggest part of China consists of the Central Chinese Floral Province which includes Middle Japan and reaches in the west to the slope of the Yunnan plateau and of the high mountains of West Szechwan, and in the north to the Tsinling-shan. It is a low country, its mountain ranges retaining the natural forest limit only at its boundaries in the west and north. Much as I have travelled through Central China (i.e. in the provinces of Kweichow and Hunan), I saw not one Primula. To the north-east adjoins the Northern Chinese and Corean Floral Province where deciduous large leaved trees predominate over the conifers. Its climate is characterized especially by much severer winters and less humidity. The province is the home of a few Primulas of North Japanese and Siberian affinity.

In the west, somewhat on this side of the eastern frontier of Shansi, the Loess Steppe Province joins on, which includes the Kuku-nor and the upper course of the Hwang Ho. The loess steppe is by no means a place for Primulas. The loess, however, does not cover the highest ranges of this country, and on these some Primulas grow, particularly P. Maximowiczii, in the west P. stenocalyx and others, but none seems to be endemic in the mountains of the loess country; all must be considered enclaves from the south-western vicinities.

In the East Tibetan Grassland the conditions are probably similar. As far as can be judged from literature and from what I could observe in its southernmost corner at Chungtien in Yunnan, its natural meadows are not good localities for Primulas. There remains the Province of the highland and the high mountains of Yunnan and West Szechwan, the real home of the genus Primula, where more than the third part of all the species is indigenous. The climate of this phytogeographic province which extends from the Tropic of Cancer to beyond Sungpan over at least 8° of latitude, but is narrowed here more and more between the wet central China and the Tibetan grassland, is at least in the lower parts relatively dry. There is a very pronounced dry period in winter and spring; then the rain time indeed is very rich in precipitations, but these are kept away from the mostly deep cut valleys by the constellation of mountains. Thus we have in the lowermost, the subtropic zone, which reaches on the average as high as 6,000 feet (under special circumstances, however, 3,000 feet higher), arid steppe and even desert-like tracts, timbered at their best with savannah forest, and exceptionally only, luxuriant woods. Here we have some interesting Primulas. Here it is, seems the real home of the Malvaceae section, although some of its species ascend higher. The Carolinella species, not seen by me in the field, are obviously also at home here.

The largest space of the Yunnan plateau is taken up by the cold temperate zone, whilst it is very restricted on the steep slopes in the high mountainous country. We know its climate more exactly by means of the meteorological observations made at Yunnanfu. There the annual precipitation is about 42 inches, the annual mean temperature about 60°F., the maximum in summer 88°, the average temperature of January 48°, the absolute minimum 20°. Snow falls very rarely and lasts no longer than a few days. The minimum of the relative humidity of the air is little below 30 per cent. Thus it is by no means an extremely dry climate, and towards the high regions the precipitations increase visibly. The climate of Yunnanfu as characterized resembles closely that of the Mediterranean coast, and its influence on vegetation is a very similar one. Primulas are not yet as universal as in the higher and moister situations. The most common, at least in central Yunnan, is P. androsacea Pax. Alluvial soil, the mud of which is suited to the growth of rice, is its habitat. In the cold-temperate zone the group of P. denticulata...
also is at home. These Primulas flower in spring before the surrounding grass turns green.

*P. planiflora* is a characteristic plant of the meadows of the temperate region in N.W. Yunnan and neighbouring Szechuan. In enormous masses it colours the meadows red over large stretches, and these meadows are of quite a characteristic nature. The subsoil is probably always alluvial gravel which fills depressions and valley bottoms, or forms soft alluvial cones, and this is covered by a layer of black earth which is hardly more than one or a few feet in depth. Samples of this earth, collected, one over limestone, the other over sandstone, were analysed by an assistant of Professor Leiningen at the Vienna High School for Agriculture, and both were found practically free of lime, containing only 3/100 percent of calcium carbonate. The soil shows, however, no considerable amount of vegetable matter.

This soil, which holds water well might be compared with that of our fens. As to the general climate of this temperate region, which on the average extends as high as 12,000 feet, I should explain that it is excessively rainy in summer, so much so that working there is indeed no pleasure, but in winter it has no constant cover of snow. As there are no meteorological stations there, and I visited it only in summer, I can only state the absolute maximum of temperature at 75°F. Yet the winter is sufficiently cold to prevent plants flowering. Here all the Primulas flower in the rainy period, in July and August, but a few here and there sooner; I found, e.g., *P. Poissonii* once at the beginning of June, another time in the second half of September flowering typically. It goes without saying that a single individual of a more tiered Candelabra species flowers during a very long time and sheds seeds several times, like *P. planiflora*, and often growing together with it, *P. Beesiana*. No Candelabra Primula goes higher up than the temperate zone. The greater part of Yunnan is formed of kinds of limestone and sandstone, with occasional clay-slates alternating, but I remarked very little difference in the vegetation of these strata. The strong decomposition caused by great humidity in the higher situations may weaken or equalize the chemical differences, just as the red earth arising from the dark paleozoic limestone becomes externally very similar to the product of decomposition of red sandstone.

*P. aurantiaca* also grows on damp spots of meadows, often along rivulets on limestone as well as on slate, and is the only one of its section ascending as high as 11,000 feet. *P. Faberi*, of the Amethystina section, agrees in its requirements as a meadow plant. I found it on sandstone ground in Szechwan at a height of 9,000 feet. *P. nutans*, of the Soldanelloideae, grows there on stone strewn but earthy slopes rich in herbs on diabasic soil at an altitude of 9,900 to 12,130 feet. A typical member of the temperate zone is also the deservedly famous *P. Vialii*. It grows at altitudes from 9,250 to 11,350 feet. After this explanation of its habitat it must appear very strange that it is not easy to cultivate. There is no theoretical reason why any plant from its altitude in Yunnan should not be acclimatized without difficulty. In practice, however, we observe the quite unexpected fact that many plants from the low and hot Central China, as *Wistaria sinensis*, *Viburnum rhytidophyllum*, *Carpopters incana*, *Macleaya cordata* do much better even in our rough climate of Vienna without protection in winter. *P. Sikkimensis* is more common in the subalpine zone, preferring rivulets near the springs, and on humose place I saw it still on one of the highest spots reached by me, at 15,600 feet. *P. yar-gongensis* is a typical swamp plant.

There are then some forest plants: *P. sininisteri* growing on sandstone in forests of winter-green oaks. *P. crassa*, of the Davidi group, a plant loving more shade and humus. *P. set-temloba* found on limestone at a higher altitude than either of these, viz. at 11,500 feet, in most luxuriant mixed forest, where hardly any other Primulas grow. Rock plants of the temperate zone are: *P. aromatica*, in damp niches and crevices of limestone rocks, *P. Forrestii* and *P. ruta*, in crevices and ledges of limestone rocks, but on drier places, and their long lenticular rhizomes enable them to expand over the barren rock. *P. yunnanensis* is often a true rock plant content with the smallest cavities on perpendicular limestone rock-walls offering some nutrition. It is not, indeed, confined to such places, but found also on earth of rough broken edges of roads, and in the sandy soil of pine forests, but always as a decided limestone plant. *P. pulchella* is similar in its requirements, inhabiting the same localities, perhaps confined more to hard, stony soil. Like *P. sikkimensis*, the related *P. vitalis* is common to both zones, inhabiting swampy places on limestone ground. The closely related *P. secundiflora* Franch. is subalpine and alpine on both limestone and clay-slate on deep humus of depressions and moosy edges of clumps of rhododendrons.

The cold temperate or subalpine zone is the zone of fir forests, the upper limit of which is at a height of 13,900-14,250 feet. The snow cover is of short duration here, too. On April 15, I found it almost gone at 14,200 feet, and the first Primulas began to flower. On May 18, on another mountain in Szechwan, there was at the same altitude no snow at all, and the same *Primula*, namely *sonchifolia*, was in full flower. It is indeed especially fitted for early flowering. On quite open places on rocks warmed by the sun, there are few other flowers open at the same time. Considering the small amount of snow and the bright sun before the rain period begins, this behaviour is remarkable. The next one flowering at this altitude seems to be *P. calliantha* on firm and less covered soil, no matter whether on limestone or slate, often in enormous masses, colouring large tracts purple. In July flowers *P. multiensis*, perhaps better known to gardeners by the name of *P. Coryana*, in exactly the same conditions as *P. sonchifolia*, lifting its splendidly fragrant flowers, among the largest within the genus, high up, clearly searching for the light which sparingly enters between the trees. *P. hymenophylla*, of the Conoids group, grows near by on more open and stony lime soil; *P. conica*, of the Muscaroides group is a spring plant of normal subalpine meadows. *P. floridula* grows on sandstone rocks as well as amongst pieces of limestone in subalpine coniferous forests, but flowers in summer, in July. After what I have said already, it is remarkable that most Primulas of the cold temperate zone develop earlier than those of the lower temperate, earlier at least than the species common there. This applies particularly to the tall species of the Nivalis section. They belong to a plant formation which does not conform with any other one known to me from anywhere else, and to which I was obliged to give the special name of "leaf mould pasture." The soil here consists chiefly of remains of plants, half rotten, and under these completely rotten leaves, and especially the leaf sheaths of the many deep-
rooting plants belonging to most various families, and having the bases of their stems enveloped in such. As most characteristic, may be named: Potentilla lucantha, stenophylla, Anemone coelestina, Veratrilla Baillonii, Souilea vaginata, Meconopsis pseudoindentigrifolia, Mandragora caulescens, Thermopsis alpina, and Nomocharis lophophora. A considerable part is constituted by the Nivalid pseudointegri folia, Mandragoraous families, and having the bases of their stems enveloped in such. As easily be understood that plants especially adapted to so particular a formation are difficult to cultivate. The soil so that it cannot be counted to steep slopes and on remarkably dry soil such as are found in our Alps.

It is quite different in the Province of the Burmese Monsoon Climate around the Burmese-Tibetan frontier, in the ranges between Mekong, Salween, and Irrawaddy. There we have snow several yards deep until June, strong glaciation, and avalanche tracks which break in up the forest region and allow only limp bushes to thrive, accompanied by certain herbs among which there are some Primulas. I spoke lastly of the Dryadifoliae, and of these we have in the Burmese monsoon province also high alpine representatives: P. mys- trophylla, P. cyciphylla, P. Valentiniana, the small P. Genestieriana, P. sulaensis and P. Dickieana. To finish with the high alpines, I must mention L. limbata which grows on bare limestone rocks at 14,000 feet, exactly like P. Auricula, and had done flowering at the beginning of August. On the same mountain and probably in the same places has been found the cushion forming P. Dubernardiana. Close by grew P. chrysopa, which I could not distinguish from P. gemmifera, in steep and not very damp pasture up to 14,000 feet. One more is partly high alpine, P. vernicosa, flowering immediately after the snow melted, in the very snow water, amongst slabs of slate, at an altitude of 13,850 to 14,450. The Primula also grows on bare earth of open fir forests down to 11,850 feet, on the same ground. In the uppermost thinned forests of Firs and Rowan trees, amongst the roots of trees in deep humus covering mica slate, I collected soon after the snow melted, P. humicola. P. sphaerocephala stood scattered over a grassy clearing of the forest at 11,800 feet, in the middle of September still in flower. P. muscarioiodes again is a swamp plant growing amongst willows along streams down to 10,900 feet, flowering in June, but is said to grow elsewhere in other places, too. A typical subalpine plant of avalanche tracks is the beautiful P. Agleniana. In a small valley, one of the last ramifications of the deep-cut Ch'ontson-lumpa, on the way from the Salwin to the Irrawaddy, which, although it rained deplorably and the river was the only road, impressed me deeply as being one of the most beautiful flower gardens, it stood in masses at an altitude of 11,500 to 13,000 feet, on rather stony soil, protected as a bud by its large leaf sheaths, and now partly by branches, and the roof of leaves of dwarf Cherry scrub, which is peculiar to this country, and Rhododendrons, at the lateral slopes near the stream, blooming in the alpine spring, but much after the snow melted. P. serratiolica grows quite similarly under Rhododendrons. P. flexilipes, in similar situations keeps more along the watercourses themselves at an elevation of only 9,700 to 10,400 feet, and flowers in summer. P. mielioma is a pronounced forest plant still in the cold temperate zone under Rhododendrons in Fir forest, 11,500 feet, flowering in the beginning of July, and is rare, as it seems. In the bamboo undergrowth of the Fir forests on very loose soil covered with leaves and needles on the slope to the Irrawady up to 12,550 feet grows P. eucycla of the Geranioides group. It was completely over by this time. Under exactly the same circumstances I found in the Salwin country P. praticola. There still remain of my collection P. euxoima and P. dumicola, which I found on granite rocks along rivulets in the dripping cold temperature mixed forests above the Irrawady between 8,000 and 9,000 feet, already fruiting in the beginning of July.

Ladies and gentlemen, the question which of the Yunnanese Primulas is the finest is an idle one, for the beautiful features of those which enter the final struggle are too different, and are incommensurable. But besides the Rhododendron, Cremanthodium, Corydalis, and the uncultivable Pedicularis, all are amongst the most impressive natural beauties presented by these wonderful mountains, and I conclude, wishing you may succeed in transplanting here very many of them, and that you may enjoy them without the evil accompaniments of sandflies, leeches, and Chinese soldiers.
A Saga to Find The Sierra Primrose, Primula suffrutescens

Larry A. Bailey
Edmonds, Washington

For many years, I was fascinated by the old and faded photograph appearing in the American Primrose Society's Quarterly of Primula suffrutescens. Being the only picture the Editors had to reproduce, this photo reappeared throughout the years. The quality of the photo was faded and fuzzy, adding to the mystique of this plant from California. The inscription on the photo indicated it was taken on Ellis peak. I can only guess why this plant held my attention maybe because it was the only primula from my home State, California; or as a kid, I spent summers in the high Sierras camping close to its location, never guessing the importance of Primulas in my later life. Slowly, over the years I started dreaming about seeing for myself this native plant of “my” State.

Very little information has been published about Primula suffrutescens, less on its habitat or location. Its range has been noted from Ellis peak in the mid-Sierra range all the way down to the southern extent of the Sierras; always noting its woody, branching stems which creep on the surface of soil and rocky areas. The American Primrose Society's Pictorial Dictionary did have a picture of the primula taken by Walter Blasdale, but no further clue as to its location. Locating Ellis Peak (close to Lake Tahoe) on a map, I put away my thoughts of finding the plant until more time and energy could be devoted to researching libraries and herbariums. If it wasn't for a chance meeting with Ted Kipping, it still might have been only a dream.

I came across Ted at the American Rock Garden's winter study weekend in Victoria, B.C. Knowing Ted was from San Francisco, I asked him if he knew of someone I might contact who could furnish me with information on Primula suffrutescens. "Like these", whipping out a sheet of slides from under his arm. There they were! Beautiful masses of red-pink primula. "Where on earth did you get these pictures”, I shouted, much to the annoyance of small groups of people chatting nearby. "I took them myself" he matter-of-factly but quietly replied, trying to distract the attention I was bringing. "They're fantastic", I blurted uncontrollably. By then a few others, who must have thought the pictures contained a private collection from Playboy, were straining to get a glimpse.

A flood of questions came pouring out of me; "Where did you take the pictures?", "What time of year were they in bloom?", "Is the area easily reached?", "Have you got more pictures?", and so on. After carefully answering each question, Ted sur-
prised me by saying, “if you want to come down to California some summer, I can arrange to show you the plants myself”. I jumped at the invite like a slug on a pip. “Great! I can fly down for a weekend; just say when”. Ted replied, “How about this summer?” “Mid-July would be the best time to find the plant in bloom”. Quickly looking at a calendar, I realized the weekend of July 18 would be ideal; what a wonderfully greedy birthday present for myself. Preliminary arrangements were settled. I would fly to Sacramento Friday evening, the 18th of July, Ted would meet me there and on Saturday the two of us would travel to the high Sierras, take a day hike to the primula location, spend the night at a small cabin nearby, then return to Sacramento on Sunday in time for a flight back to Seattle. I couldn’t believe it, Larry Bailey was going on a Suffrutescens expedition with one of the most knowledgeable plantmen and renowned wild flora photographers on the West Coast.

In June, Ted and I were finalizing the arrangements at the Hardy Plant Study Weekend in Edmonds. Going over flight schedules, making plans to stay Friday night at my sister’s home near Sacramento, and so forth, I noticed my wife, Linda, had a somewhat rejected look. “Gee, I would kind of like to go along with you two,” she finally ventured. “You’re not excluded”, I replied, “only, you have never expressed an interest in Primula suffrutescens”. Getting an approving nod from Ted, I added, “if you want to go, we can certainly make room for another”. Settled, Linda, Ted and I would be having a fun-filled weekend in the Sierras.

The following week, Linda asked: “What do we do about the kids? I definitely do not want to leave them here by themselves”. After a couple of quick phone conversations, Edna and Edith would also be traveling to Sacramento.

It wasn’t many days later, our little party grew when Ted informed me that his wife, Pat and their young son Kirk would enjoy going along. Upon telling my sister, she remarked she would enjoy the opportunity to use her photographic skills in the high Sierras and asked if our party could support another.

Everything was still under control until I received a telephone call from my mother. Seeing how the “family was gathering for my birthday”, she would like to join us for the weekend. Every attempt I made to discourage her was met by a determination only mothers have. “I’ll be no trouble”, “I’ll even sleep on the floor”; “I won’t get out of the car if I am not up to it, it’s been so long since I have been with you on your birthday”, and on and on. Now don’t get me wrong, I really enjoy the company of my mother, but knowing she was in her seventies, had an artificial valve in her heart, and not at all used to hiking, the idea of her going along on this trip just didn’t seem right. I lost that argument!

Well, the day of the expedition finally arrived, our group assembled in Sacramento and headed off to the high Sierras in a caravan of vehicles. Ted, bless his kind soul, managed to arrange for our growing crowd accommodations close to the peaks we would be hiking. It took us over a half hour to unload our gear upon arriving. The simple rustic cabin for two had now become a luxurious four bedroom condominium, with sun decks and hot tub!

Traveling east on highway 88 over Carson Pass is one of the most beautiful drives in the country. From the hot Sacramento Valley at an elevation...
of 60 feet to over 8000 feet, a wide range of flora and scenery is encountered. The grassy rolling foothills with large silhouettes of oak, dense pines of the mountains and the dramatic contorted firs of higher ridges, all contribute. Close to the pass, the road offers expanded vistas of deep narrow valleys and rugged snow-covered peaks. Massive twisting granite formations uncovered by the scouring of ancient glaciers augment the wonder and amazement.

Reaching sub-alpine terrain, our caravan stopped to allow deep breaths of clear, fresh air, scented with pines and firs. Ted, a walking botanical dictionary, pointed out interesting examples of roadside flora: pink-flowered Sidalcea, white forms of Oxypolis sericea (loco), cute patches of Calytridium umbellatum (pussy paws), and small but brilliant, orange-colored, scented Erysimum perenne (wall flowers). Becoming intoxicated with the mountain air, fantastic scenery and the excitement of the hunt, I began to relax, figuring all my worries about the welfare of our large group was for naught.

Highway 88 intersects the Pacific Crest Trail at Carson Pass and it was just off this location that our merry group assembled for the trek south along the Trail. From the Pass at an elevation of 8500 feet, the Trail climbs at a fairly rapid rate to 9500 foot elevation, then at a lesser grade to greater heights. Being forewarned about the ascent, my sister and mother (yes my mother was out an dabout) indicated they would start at a very slow pace while the balance of the group waited for another member of the still growing party, Jane Holm, to arrive.

Finally, after months of anticipation, I started a meandering hike up the well-worn Trail into a botanical garden. Ted, scouting ahead, expanded upon the difficult botanical names like peas rolling from a pod. It wasn’t 100 yards before my youngest daughter, Edith, would ask, “Are we almost there yet? I’m tired.” Stopping frequently, we inspected the variations of species: shapes and colors of Eriogonums, Castillo, Phlox, a rare showing of Corollorhiza maculata (alpine orchid), a fine low sprawling example of Pinus albicaulis, Sambucus, along with an abundance of lupines and calytridium. Photographing our way up the incline, we occasionally came across patches of rapidly dissipating snow. Having almost reached the ridge of the first hill, who should we come across laying alongside the trail in the ferns and boughs, but my mother! Flush from exhaustion and with a rapidly beating heart, she was able to mutter for us “to continue on without her” and she “would manage somehow”. “Yes, I will be all right, I just need to rest”. Could she just manage the next 20 yards to a level area next to small Frog Lake where she would be much more comfortable? “No, I just can’t take another step”. She stubbornly refused any further help!

Refusing to be defeated, most of the party slowly but determinedly continued on; spotting tiny Lewisia triphylla amongst some grass, fields of Wethia mollis (yellow mule’s ears), penstemons (both P. speciosus var. kennedeyi, and P. newberryi), Chaenactis douglassi, delightful miniature rose plants with large flowers (Rosa woodsii), and the monument plant of the Sierras, Frasera speciosa mixed with glowing Ipomopsis aggregata (Skyrocket Gilia). The flank of the mountain was an immense sub-irrigated scree allowing a flower garden of undescrivable beauty and color; blue Lupines, Iris, Forget-me-nots; purple Monkshoods, Delphiniums, and Penstemons; yellow Muleseas, Butterweeds, Buck-wheats, Sunflowers, Monkeyflowers, Wallflowers and Hawkweeds; pink Gilia, Shooting Stars, Phlox; white Anagethicas, Cornlily, False Solomon Seal, Yarrows, Ranger’s Buttons, Valerian and Mariposa Lilies; orange paintbrush, and Wallflowers; and silver Artemisia, Willows and Lupines.

An occasional hiker or two, passing our party, would give a brief report on Mother; “yes she was still alive”, “a poke to the feet confirmed she was breathing”, “she sort of covered herself up with boughs trying to be inconspicuous”, adding to the startlement upon finding her. Quickly scurrying around us, I could see the expression in their squinting eyes: “How could that person possibly leave his mother on the trail like that?”

The gradual incline and higher altitude, was starting to take its toll; Linda, growing tired and concerned about her mother-in-law, felt it best to start heading back; Pat and Kirk, then Edna. Roberta, managed to make it as far as Lake Winnemucca. She was able to photograph Dodecatheon alpinum, Penstemon heterodoxa, Aquilegia formosa, and a wide selection of intensely colored Castilleja, before becoming somewhat pale, and retreated.

Lake Winnemucca, an alpine lake, was gorgeous, although the surrounding treeless, snow and wind swept peaks reminded one of the acute harshness that sudden changes in the weather could bring. Leaving the bowl of the lake, the climb onto Round Mountain steepened. Carefully we ventured over fields and bridges of snow, and across patches of wet marshes where bright yellow ranunculas and Salix (miniature willows) were wallowing in the chilled runoff of melting snow. Looking ahead at the stark mountain
sides, Ted expressed concern that the
primula might still be under banks of
snow.
Hiking to over 10,000 feet, the three
members left in the party finally came
upon a large area of earth free of snow
where the plants of the Primula suffrutescens were located. Nestled
among small rock outcroppings, the
Sierra primrose was in full bloom.
Beautiful shades of rose-pink flowers
rising above mats of small rosettes of
deeply serrated leaves. Almost over-
come with excitement; I was bounc-
ing around like a puppy, darting here
and there inspecting the various col-
onies. The flowers were much larger
and much more beautiful than I ever
expected to find. Some of the brilliant
pink pips were over an inch across.

The soil where the primrose grew
consisted of a very coarse granite
sand or crushed gravel, the larger par-
ticles similar in shape and size to tur-
key grit, but yellow-reddish in color.
We specifically noted the larger
granules were at the top of the soil
with finer particles under the surface.
The consistency was very loose, like
a kitty's dirt box.

Clusters of these woody-stemmed
primroses were throughout the area.
Those closest to the snow fields were
just coming out of dormancy, show-
ing signs of having survived winter
avalanches.

Jane looked over to me and said
"You are really interested in these
plants, aren't you?". "How can you
tell?" I answered. "You have been
crawling around here on your hands
and knees photographing and you
still haven't thought about taking
your backpack off yet". Suddenly I
felt the weight of the heavy pack,
realizing my difficulty in getting com-
fortable while taking close-up
photos. Awkwardly and red-faced, I
slipped the pack off and continued
the scrutiny of "my" plants.

Systematically bending down for
detailed observations, I abruptly
looked up at the surrounding peaks;
they were starting to double! Altitude
sickness! It wasn't long before the full
vengence of the mountain attacked.
Managing to pick my way back to Lake
Winnemucca, the only thought on my
mind was grabbing a small shovel and
heading for the bushes.

Throughout the ordeal Ted was a
real godsend; taking my heavy pack
while I staggered my way down the
mountain, stopping every now and
then to "wash off my beard" in won-
derful cool streams nature provides
for such situations.

Thinking back, the only nice thing
about the extremely long and tiring
trip down to the automobiles was not
hearing any reports about Mother.
"No", the hikers we passed, with a
suspicious look, "hadn't seen a little
old lady laying next to the trail". I
guileously remember passing the "spot"
where only matted-down grasses and
ferns remained of a quickly fading
crisis.

On Sunday morning, Ted, now
chancing his luck, directed our hag-
gled party to the north to romp in
some beautiful sub-alpine meadows
of wildflowers in full color, and on
fairly level terrain. Mother, still recov-
ering from her affliction, and without
any hassle, felt it best to remain in
the car.

It has been over a year and a half
since we traveled to the Sierras to see
"my" primrose. The trip was a marvel-
ous experience with wonderful
people (at least most of us can now
laugh about it). My thoughts are
again turning to Primula suffrutes-
cens and to the Sierras Gardens with
it's clean crisp air. Much is still to
learn on the growing habits of the
primrose and how to raise them in
civilization. If nothing else, I still owe
Ted a quiet weekend in the High
Country.
More Help Wanted
A generous member near Portland, Oregon was kind enough to provide your Editor with a copy of Blasdale's 'Cultivated Species of the Genus Primula' for which he is most deeply grateful. There is another important book missing from the editorial shelf - Doretta Klubu's 'Primroses and Spring!' If any of you readers have a copy which you can spare in a good cause (you will be compensated) please contact Mr. Critz at your earliest convenience.