The scapes of this plant rise vertically above the submerged stems and leaves, and bear at their summits conspicuous bilabiate yellow flowers with an even more conspicuous spur curving out under the lower (and broader) lip. The bladders are borne in the submerged foliage, and not only help float the plant but also trap small organisms to add to the plant's food.

Utricularia minor L.; boreal; montane; Crested Butte, M 1645 (1952) CS. This species, although similar to the preceding, is much less conspicuous, and likely to catch the attention only of the individual especially interested in aquatics, as was the case in the above collection. The blossoms of this plant, though yellow, are much smaller, and the spur is almost nonexistent.

## LILIACEAE, The Lily Family

### Allium L., The Onions

Allium Geyeri Watson; cordilleran; submontane-subalpine; Sheep Gulch, B 12-61; Cochetopa Park, H 9062 (1959) CS; Pine Creek Mesa, B 124-65; Gothic, B 70-52; Kebler Pass, K 552 (1947) DBG; Horse Park, B&S 43-66. In this list, the alliums appear in the order of their decreasing frequency and distribution in the Gunnison Basin, and it happens that the cordilleran A. Geyeri is by a large margin the most frequent and widespread of the species. It is found everywhere except in the alpine zone, and in a great variety of situations. The stems are not always, but usually, one to a bulb, and bear three or more leaves, while the umbel of flowers is erect and of a pinkish hue. The ellipsoidal buds are reddish, and with their pointed finials at the top, catch the eye almost as much as the flowers, especially in the early spring when they may be the only bit of color in the landscape.

Allium cernuum Roth; widespread North American; submontane-subalpine; Gunnison, B 240-61; Cathedral, B&S 315-62; Lujan Creek Valley, H 9013 (1959) CS; Cement Creek Valley, L 490-48 COLO. At its summit, the culm of this onion suddenly turns at right angles so



that the umbel of flowers is held sidewise instead of upright. This alone will identify the species. With the same altitudinal and geographical range in the Basin as that of A. Geyeri, and an adaptivity both to moist and to dry habitats, it is curious that this species should be only half as frequent and widespread as A. Geyeri.

Allium Brandegei Watson; cordilleran; montane-subalpine; Gothic, L 36 (1949) COLO; Oh-be-Joyful Creek, S 64-92 RMBL; Lake Irwin Basin, B 34-55. The perianth of this low allium of dryish places is striped red and white from the keels and hyaline margins of the perianth segments, which is certainly all the identification that the plant needs. In the Gunnison Basin it seems to have been collected only in the ten-mile stretch of country indicated by the above collections.

Allium rubrum Osterhout; cordilleran; montane-subalpine; Cathedral, B 98-59; Mill Creek, B&S 253-62, S 66-99. This species has been declared to be a variety of A. Geyeri. To a student of the plants of the Gunnison Basin this is almost unthinkable. Whereas the range of A. Geyeri is almost coextensive with the Basin, A. rubrum is confined to the valley of a single creek and its tributary at the southern margin of the Basin. Furthermore it grows not only to twice the height of A. Geyeri but in habitats twice as wet as A. Geyeri can endure. As for the bulbs which the plant produces instead of, or along with, its flowers, and which alone serve to identify it, I do not see why these cannot by themselves demarcate the species just as well in Allium as they have assuredly done in Poa for the last two hundred years.

Allium acuminatum Hooker; cordilleran; submontane; Pine Creek Mesa, B 123-65 RMBL. A. acuminatum is well known to approach the Gunnison Basin closely from the west. But here, on the open surface of Pine Creek Mesa, it penetrates within the Basin by at least three miles; and here, on the day of collection, it could be seen as a large spot of magenta a mile away. It was growing in heavy soil in a depression on the surface of the mesa. Scattered around the edges of the large colony were small groups of A. Geyeri. They were on slightly

higher ground, and by so much the better off; but they looked like poor relations at a rich man's feast. The color of this species, darker than that of any other allium in the Basin, is enough to particularize it. But if the collector would like a morphological detail, let him look at the minute, slightly glandular serrations on the edges of the three inner perianth segments.

## Erythronium L., The Trout Lilies

Erythronium grandiflorum Pursh; cordilleran; montane-subalpine; Crested Butte, Li 8/12/37 COCO; Schofield Pass, B 53-52. In the East, members of this genus are commonly called trout lilies from the mottled leaves. In the Rockies, the commonest name for the above species is snow lily, and in truth an entire population of the plant can be found in full flower only feet from a melting snowbank. The bright, medium-sized liliaceous blossoms are yellow, recurved, and nodding.

## Calochortus Pursh, The Mariposa Lilies

Calochortus Gunnisonii Watson; cordilleran; submontane-montane; Jack's Cabin Pass, B 180-52; Vulcan, B 168-65; Powderhorn Divide, B&S 449-62; Gothic, O 7/15/58 RMBL. This dryland lily is noticed by every one as soon as the blossoms appear in July. These are tinted with faded greens, blues, and lavenders, marked with Indianlike designs, and of interest to the morphologist for preserving the distinction between sepals and petals. The plant is seldom found apart from sagebrush, and even the Gothic collection cited above comes from the small bit of sage near Judd's Falls.

## Lilium L., The Lilies

Lilium philadelphicum L. [L. umbellatum Pursh]; boreal; submontane; Quartz Creek, B 142-65. The above species is the common wood lily of eastern North America, and the only member of the genus known from



the Gunnison Basin. The uniqueness of the Quartz Creek station was mentioned in the Introduction,* and what is especially interesting is that the residents of the valley are aware of the uniqueness, and also know that the lily was growthing there when the first settlers (their fathers or grandfathers) arrived. Being the only full-scale lily in the Basin, it does not need words of identification.

## Lloydia Salisbury, The Alp Lilies

Lloydia serotina (L.) Sweet; cordilleran; alpine; Mt. Belleview, Ed 63 (1939) COLO; Cumberland Pass, P 4516 (1955) COCO; Baldy Chato, B&S 256-62; Slumgullion Mesa, B 132-61. If L. philadelphicum is a full-scale lily, then this species is a small-scale lily--only six or seven inches high at the most, and with narrow, grass-like leaves. The blossoms, but little more than half an inch wide, are held erect, and are white within, purplish-brown outside. The plant is common in the alpine zone, but interesting to all newcomers, and always collected.

## Smilacina Desfontaines, The False Solomon's Seals

Smilacina racemosa (L.) Desfontaines; boreal; submontane-subalpine; Lake Fork Canyon, B&S 112-62; Pine Creek Mesa, B 32-60; Cement Creek Valley, Ke 7/26/49 WS; Schofield Pass, B 56c-57. The two Gunnison Basin (and Colorado) species of Smilacina have much in common. The stems of both arise from horizontal rootstocks, each stem being clothed in the upper part with sessile, alternate leaves, and each stem ending either in a panicle (as in S. racemosa) or in a raceme (as in S. stellata). But the leaf shape is the best field character. The leaves of S. racemosa are elliptical, even broadly so; those of S. stellata are lanceolate, and even oblong.

Smilacina stellata (L.) Desfontaines; boreal; submontane-subalpine; Hartman Rocks, B 9-61; Cebolla Camp

* See above, pp. 26-27.

Ground, B&S 182-62; Marshall Pass, B 85-61; Gothic Mtn., O 7/10/58 RMBL. For the differentiation of this species, the reader is referred to S. racemosa. Although I have never found the two species growing together, I should not be surprised if I did, for the requirements and tolerances of the two species seem to be much the same. Perhaps S. stellata has a little the greater tolerance for dry situations; but I am not sure even of this.

## Streptopus Michaux, The Twisted-stalks

Streptopus amplexifolius (L.) DC.; boreal; montane-subalpine; Beaver Creek (south), B&S 613-62; Taylor River, Ke (1949) WS; Peeler Basin, B 347-61; Gothic Natural Area, Ew 11784 (1938) COLO. The clasping-leaved twisted-stalk is a plant that cannot be missed. At each zig and zag of the usually branched stem occurs a clasping elliptical leaf, and from the same node (in season) are suspended one or two flowers, and later, usually only one red berry. The species seems to be exclusively a woods plant.

## Veratrum L., The False Hellebores

Veratrum californicum Durand; cordilleran; montane-subalpine; Gothic, B 31b-54; Mill Creek (south), B 99-64. V. californicum was the first plant mentioned in this flora, and I think it very likely the most individual plant in the Basin. It seems to have a life of its own, and to be independently and immediately responsive to all changes of season. With nothing but snow and meltwater around it, it is the first plant to begin the growing season; but if the season turns dry, it will wither as early as July, as if believing that the years to come are without number. Year after year, it arouses the primitive instincts of the children at the Laboratory, who like to lose themselves in the thickets of it and to make things out of it, and it is odd that the Forest Service should ever have attempted to replace it with Poa pratensis, as reported in J. H. Langenheim's Vegetation of the Crested Butte



Area.* The species is a dweller in moist places, and the ribbed, sculptured leaves and large panicles of small, cream-colored blossoms make it noticeable wherever it appears.

## Yucca L., The Spanish Bayonets

Yucca glauca Nuttall; relict of the plains; submontane; Gunnison, D 14268 (1963) RMBL, S 64-82 RMBL; Almont, B 58-60. This is the same Spanish bayonet or soapweed that one sees on the plains of eastern Colorado when he comes to Colorado from the east. In fact, the species can be taken as a typical plant of the American Great Plains, extending east where there are dry plains or sandhills, and curving south around the Rockies almost to Arizona, but not crossing the Rockies to Utah. Not only is the presence of the plant in the Gunnison Basin a great strengthener of the relict-of-the-plains hypothesis, but its presence in the Gunnison Basin is quite possibly its only presence west of the Continental Divide. There being nothing in the Gunnison Basin with which the plant can be confused, there is no need of identifying remarks.

## Zygadenus Michaux, The Death Camases

Zygadenus elegans Pursh; cordilleran; montane-alpine; Gothic, L 38 (1948) CS; Cathedral, B&S 316-62; Elk Creek Valley, B&S 169-66; Mineral Mtn., B&S 530-62; Conundrum Pass, B 217-61. As the cited collections are supposed to show, Z. elegans is widespread in the Gunnison Basin, although it cannot be called frequent. It bears a wand of racemed or panicled white flowers, and in aspen groves (where the plant can grow two feet tall), the backs of the sepals and petals are green. In the alpine zone, where the plant can still be ten inches tall, the backs are more apt to be bronze. The species is one of the most beautiful in the Basin.

* Ecological Monographs, 32, 271; 1962.

## LIMNANTHACEAE, The Meadowfoam Family

### Floerkea Willdenow, The False Mermaid

Floerkea proserpinacoides Willdenow; boreal; montane; Gothic, Bar 51-C-55 (1951) COLO. The only species of its genus, the plant in the cited collection is not more than four inches high, with its pinnate leaves composed of five leaflets on a relatively long petiole. Ordinarily inconspicuous, F. proserpinacoides is more noticeable (as in the present collection) when the calyx encloses the reddish, roundish fruit.

## LINACEAE, The Flax Family

### Linum L., The Flaxes

Linum Lewisii Pursh; cordilleran; submontane-montane; Long Gulch, B&S 94-66; Fish Creek Valley, B 147-64; Little Soap Park, S 64-114; Gothic, Br 8/5/57 RMBL. Lewis's blue flax, so much like the flax of gardens and the paint and linen industries, surely needs no description in this flora. Every blossom of this cordilleran species seems to set seed, and when the white capsules are nearing maturity they make a handsome sight resting in their green calyces.

## LOASACEAE, The Loasa Family

### Mentzelia L., The Evening Stars

Mentzelia dispersa Watson; cordilleran; submontane; Eagle Rock, Ke 6/25/49 WS. Unlike the next species, which is a tall perennial, M. dispersa is a low annual. It is finely glochidiate-pubescent throughout, and its yellow flowers are irregularly cymose in fairly compact clusters.

Mentzelia Rusbyi Wooton [M. nuda (Pursh) Torrey & Gray var. Rusbyi (Wooton) Harrington]; cordilleran; submontane-montane; Almont, B 236-60 CS; Gunnison, B&S 66-65; Little Iron Mtn., B 88-64. A coarse, perennial, shrublike herb with serrate cauline leaves, M. Rusbyi is as conspicuous as the preceding species is inconspicuous. In the submontane zone of the Gunnison Basin, it is a common roadside weed that will especially catch the motorist's eye in the late afternoon when its yellow flowers are fully displayed. But the next morning, when the blossoms of the previous evening are either closed or withered, the dark, inch-long, rectangular fruits are almost as striking. Yet it must not be thought that the plant is restricted to submontane roadsides. Actually, it has descended to the roadsides from the neighboring hills where, in the last collection cited, it formed part of a juniper-Douglas fir association.



## LORANTHACEAE, The Mistletoe Family

### Arceuthobium Bieberstein, The Dwarf Mistletoes

Arceuthobium americanum Nuttall; cordilleran; montane; Taylor River Valley, Ke 6/29/49 WS; Razor Creek Park, B&S 66-55. Since the species of Arceuthobium seem to be adapted to particular genera or species of conifers, it is not surprising that the one species of Arceuthobium known to occur in the Gunnison Basin should be found always on lodgepole pine. This is really a sufficient identification; but the species can also be distinguished by its paniculate rather spicate staminate flowers. The drawings and remarks in the first volume of the Illustrated Flora of the Pacific States* are here unusually helpful.

## LYCOPODIACEAE, The Clubmoss Family

### Lycopodium L., The Clubmosses

Lycopodium annotinum L.; boreal; subalpine; Gothic Natural Area, B 81-54; Gothic, B&S 605-62. This club-

* Abrams, L., Stanford, Calif., 1955 (third printing).

moss winds and twists over the floor of the spruce-fir forest, and shows its cordilleran adaptation by being equally at home in dryish openings and in moist shady places. The spikes it holds aloft every now and then are considerably thicker than the stems that bear the leaves and support the spikes.

Lycopodium Selago L.; boreal; alpine; Galena Mtn., S 67-163. Galena Mountain, on the north slope of which the above collection was made, is about a mile and a half distant from Schofield Pass and in that northwestward extension of the floristic Gunnison Basin already mentioned.* The collection is included here since the species (much like L. annotinum except for axillary sporophylls instead of spikes) must certainly grow in the topographic Gunnison Basin as well as in its floristic extension to the northwest.

## MALVACEAE, The Mallow Family

### Iliamna Greene, The Wild Hollyhocks

Iliamna rivularis (Douglas); cordilleran; montane; Black Sage Pass, B 53-55; Red Creek Valley, B&S 131-66. Here is a plant that grows over a yard high and has blossoms two inches in diameter. Yet I have seen it only twice in the Basin, and apparently no one else has seen it at all. It must be rare; but this I do not understand, for it requires only a moderate amount of moisture and tolerates partial shade. On account of its large aceriform leaves and large malvaceous flowers, the popular name of wild hollyhock is unusually appropriate.

### Malva L., The Mallows

Malva neglecta Wallroth; adventive; montane; Gothic, S 66-231. Trailing over the ground, this prostrate annual (or biennial) is noticeable for its round or reniform, crenate leaves on disproportionately long petioles. The

* See above, p. 269.



much smaller flowers occur in axillary clusters, and are two or three times longer than their calyces.

### Sidalcea Gray, The Checkermallows

Sidalcea candida Gray; cordilleran; submontane-subalpine; Sapinero, Wh 460 (1898) COLO; Fish Creek, B&S 427-62; Ohio Creek Valley, B 103-66; Nicholson Lake, S 66-156; Lake Irwin, Li 8/19/37 COCO. S. candida is something like Iliamna rivularis; but the white flowers in the raceme at the head of the stem are only an inch in diameter, and the leaves (instead of being aceriform in a malvaceous way) are palmately digitate at the top, round and crenate at the bottom. The plant needs far more moisture than Iliamna rivularis, and is not tolerant of shade; yet it is frequent in the Gunnison Basin, whereas Iliamna is rare.

Sidalcea neomexicana Gray; cordilleran; submontane-montane; Sapinero, Wh 396 (1898) COLO; Cebolla Hot Springs, S 66-178. Cathedral, B&S 278-62; Black Sage Pass, B 54-55. The kinship between this sidalcea and the preceding is readily apparent. There is the same contrast between the round and crenate leaves at the bottom and the palmately digitate leaves at the top; only here, the fingers of the latter become much narrower, even threadlike at times. Again, the flowers are magenta instead of white. Finally, although having been collected with Iliamna rivularis (as indicated by the cited collections) in the partial shade of aspens in a merely damp place, S. neomexicana is tolerant of water in great quantities, being common in wet meadows and along irrigation ditches. It is also tolerant of alkaline soil, as S. candida apparently is not.

### Sphaeralcea Saint-Hilaire, The Globe Mallows

Sphaeralcea coccinea (Pursh) Rydberg; cordilleran; submontane-montane; Almont, B 214-52; Gunnison, B 335-61; Lake Fork Canyon, B&S 110-62; Powderhorn, B 29-64. It would be a pity to get this genus mixed up

with the preceding simply because of the similarity in names. S. coccinea, popularly known as cowboy's delight, could hardly be more different. The two sidalceas are plants of moist to wet places. This sphaeralcea is a plant of dry places with dissected leaves and a large woody taproot. But the color is most distinctive of all. The two sidalceas are white and magenta respectively; the flowers of S. coccinea are of a salmon-pink so distinctive that after first acquaintance the color alone serves to identify the plant. The species is most frequent on the sagebrush floor of the Basin. But in the last collection cited it was growing in the dry openings of a Douglas-fir and ponderosa-pine forest.

## MENYANTHACEAE, The Buckbean Family

### Menyanthes (Tournefort) L., The Marsh Trefoil

Menyanthes trifoliata L.; boreal; montane-subalpine; Gothic, B 28c-55 RMBL; Peeler Basin, B 263-60. To collect this plant properly a small boat is necessary. The plant may be growing in only a foot of water. But the mud beneath the water is likely to be deeper than the water, and the plants are usually at a considerable distance from the shore. There, safe from the marauding hands of botanists without boats, the racemes of white flowers may be seen rising above the surface of water, while below them appear the glabrous leaflets of the trifoliate leaves.

## MORACEAE, The Mulberry Family

### Humulus L., The Hops

Humulus americanus Nuttall; cordilleran; submontane-montane; Biebel's Springs, B 185-60 CS; Cochetopa Creek Canyon, B 96a-55; Cathedral, B 694-62. In the Gunnison Basin, the vigorous vines of the American hop may be seen mantling the surfaces of rockslides and rocky slopes throughout the submontane and montane zones.



The large, curving, palmately digitate leaves are a memorable sight in themselves. But in summer, the sprays of white flowers are as conspicuous as the leaves, and in the autumn, the clusters of the green purselike hops never fail to attract the attention of persons interested in plants.

## NAJADACEAE, The Pondweed Family

### Potamogeton L., The Pondweeds

These delicate aquatic vascular plants are seldom collected, largely, I think, because the terrestrial vascular plants are so much more available. But with a basin to float them in, and a few extra blotters and sheets of clean newsprint, they certainly are no harder to press; and besides, the collector of these plants in the Gunnison Basin is favored by a pair of fortunate circumstances. Not only is there a little book given over to the vascular aquatics of Colorado,* but the authors in their field work did collecting in the Gunnison Basin. Each species in the book is admirably illustrated, and the little manual "fits," as I trust will be the case with this flora.

Potamogeton alpinus Balbis; boreal**; submontane-subalpine; Sargents, H&M 7138 (1952) CS; Crested Butte, B 224-60; Peeler Lake, B 325-61. Of all the potamogetons thus far collected in the Basin, this is the easiest to recognize. Its leaves, although all are submerged, are not filamentous but sometimes as much as half an inch wide. The thin rhizomes that connect plant with plant are red, and the thick fruiting spikes, more than half an inch long, are reddish if not red.

* Y. Matsumura and H. D. Harrington, The True Aquatic Vascular Plants of Colorado, Ft. Collins, 1955.

** The reader should note that these aquatics have their own world, and might better be left out of the phytogeographical considerations of this flora.

Potamogeton Berchtoldii Fieber; boreal; montane; Crested Butte, M 1460 (1952) CS, B 228-60 CS, RMBL (two stations). Here the fruiting spike is narrow and green and irregularly separated into two or three segments. The free, ligulate stipules are on the opposite side of the stem from the filamentous, submerged leaves, and the fruits are without a keel.

Potamogeton filiformis Persoon; boreal; submontane-montane; Doyleville, B&S 66-137; Almont, H&M 7167 (1952) CS; Crested Butte, H&M 7169 (1952) CS. In this similarly filamentous species the fruiting spike is much the same, but more regularly separated into segments, and the stipules are so joined together and to the leaf that they resemble the sheath of a grass with the ligule prolonged in front, if that can be imagined. The stigma is sessile on top of the ovary and the later fruit, and the ends of the leaves are blunt.

Potamogeton foliosus Rafinesque; boreal; submontane-montane; Sargents, H&M 7137 (1952) CS; Crested Butte, M 1643 (1952) CS. In P. foliosus, the small fruiting spike is capitate and the stipules are joined into a tube; that is, out of the mouth of such a tube appears the internode and then the next node bearing a new filamentous leaf and another tube. It will be noticed that the fruiting stalk tapers to the bottom and that the winged keel of the fruit is scalloped.

Potamogeton gramineus L.; boreal; submontane; Crookton, H&M 7144 (1952) CS. There are two kinds of leaves in this and the next two species: floating elliptical and submerged grasslike leaves. In this particular species, the floating leaves are more narrowly elliptical than those of the next two species, the stipules of these leaves are but weakly carinate, and the fruiting spike is less regularly dense.

Potamogeton illinoensis Morong; widespread North American; montane; Gothic, S 64-145 RMBL. In the cited collection, the floating elliptical leaves are as much as three and a half centimeters wide, their large brown stipules are doubly carinate, and the fruiting spike is



half a centimeter thick with great regularity.

Potamogeton nodosus Poiret; widespread North American; Waunita Hot Springs, E (1889) COLO. P. nodosus is a pondweed of the same general sort as the two preceding species. But there are a couple of characters by which it may readily be told from them. The submerged leaves, although still gramineous, or ribbonlike, are on petioles that compare favorably with those of the floating leaves, while the free stipules of the plant are without any kind of keel.

Potamogeton pectinatus L.; boreal; submontane; Almont, H&M 7168 (1952) CS. P. pectinatus is confusable with P. filiformis, but there are several good differentiae. To begin with, the leaves are sharp-pointed, not blunt as in P. filiformis. Again, the stigma is prominent; in P. filiformis it is barely elevated above the surface of the fruit. Finally, the whorls of fruits are more widely separated than in P. filiformis. As in the remaining species, the leaves are all submerged.

Potamogeton pusillus L.; boreal; submontane; Parlin, M 1609 (1952) CS. Like P. pectinatus, P. pusillus is a filamentous potamogeton with submerged leaves. It is confusable with P. foliosus, and as in that species its stipules are joined into a tube. But its fruits do not show the scalloped keel of P. foliosus, the fruiting spike is spiciform, not capitate, and the stalk of the spike does not taper to the bottom.

Potamogeton Richardsonii (Bennett) Rydberg; boreal; submontane-montane; Parlin, H&Sm (1945) CS; Peanuts Lake, H&M 7174 (1952) CS. After P. alpinus, this vigorous, non-filamentous potamogeton is the easiest in the Basin to recognize. Its wavy-margined, lanceolate to ovate leaves (all submerged) are not only sessile but clasping; and where the older leaves clasp the stem, may be seen the residual fibres of the disintegrating stipules. The stem runs into a quadrangular peduncle, which bears the fruiting spike.

## NYCTAGINACEAE, The Four-o'clock Family

### Mirabilis L., The Four-o'clocks

Mirabilis linearis (Pursh) Heimerl; cordilleran; submontane; Almont, B 99-55; Biebel's Springs, B 183-60; Powderhorn, B 278-65. The linear, opposite leaves of this species might suggest a member of the pink family to one not acquainted with the four-o'clocks. But a glance through a low-powered lens will reveal that what seems to be a calyx is really an involucre enclosing not one, but several showy magenta flowers, flowers that have but a single floral envelope. The perennial roots are frequently half an inch thick, with an even wider crown, from the edges of which appear the annual stems, usually few in number, but often more than two feet tall.

## NYMPHAEACEAE, The Water Lily Family

### Nuphar Smith, The Yellow Water Lilies

Nuphar polysepalum Engelmann; cordilleran; subalpine; Lily Lake, B 207-60. Lily Lake, about five miles by airline southwest of Crested Butte, is the only place in the Gunnison Basin where I have seen the yellow water lily growing. It is true that in the University of Colorado herbarium there is a sheet of this species collected in 1889 by Alice Eastwood, and, as was the custom in those days, labeled simply "Crested Butte." * But it would seem to me that she probably collected the plant in Lily Lake, and was told about its growing there by a Crested Butte resident, just as I was many years later. The Floresta railroad passed within two miles of the spot in those days, and it would have been as easy of access as it is now. It is a pity that the USGS map of 1961 by a gross mistake transferred the name of Lily Lake to a small pond three miles west where the lilies do not grow.

* See above, pp. 277-278, under Scutellaria galericulata.



## ONAGRACEAE, The Evening Primrose Family

### Epilobium L., The Willow Herbs

The large-flowered epilobiums

Epilobium angustifolium L.; boreal; montane; Gothic, B 59b-54; Fish Creek Valley, B&S 367-62, B 145-64 RMBL. In the montane zone, along roads and at the edges of the meadows and aspen groves, this species with its spires of pink flowers and willowlike leaves, covers acres of ground. It makes a brave sight, and is recognized and known (perhaps as "fireweed") by every one. Yet it also occurs in moist and shady places, in which case its blossoms are usually a deeper red.

Epilobium latifolium L.; boreal; montane-alpine; Gothic, B 182-52; Capitol City, S 64-219; Conundrum Pass, B 42f-54 RMBL; Queen Basin, S 64-219 RMBL. With its deeper-colored blossoms and shorter, broader leaves (which don't look at all like willow leaves), this lower plant can usually be identified at a glance. But sometimes specimens of the preceding species from shady, moist places can be taken for this species, in which case one must look at the style and stigmas. In E. angustifolium they are longer than the stamens; in E. latifolium, they are shorter.

The low small-flowered epilobiums

Epilobium anagallidifolium Lamarck [E. alpinum L.]; boreal; submontane-subalpine; Quartz Creek Valley, S 65-112 RMBL; Copley Lake, B 113-60 RMBL. Both this species and the next frequently have sigmoid stems, and these stems can be the most striking thing about them. But the differences between the two plants are many. E. anagallidifolium is a plant of moist, meadowy places in the lower three zones; E. clavatum of dryish alpine slopes. Again, in the Gunnison Basin, the stems of E. anagallidifolium are apparently only one to a plant; those of E. clavatum numerous and caespitose. Finally, the leaves of E. anagallidifolium are relatively oval;

those of E. clavatum more narrowly elliptical.

Epilobium clavatum Trelease; cordilleran; alpine; Rustler's Gulch, B 246-60 RMBL, B 192-61; Emerald Lake, D 14468 (1963) RMBL. The reader should note that the Rustler's Gulch plants came from over 12,000 feet, the Emerald Lake collection from only 10,500 feet, yet from an open talus constituting a downward extension of the alpine zone. For descriptive details, the reader should consult the preceding species.

Epilobium Hornemannii Reichenbach; boreal; subalpine-montane; Mirror Lake, B 161-61; Schofield Pass, B 65-55 RMBL; Avery Flats, B 84a-59; Castle Park, B 74-59 RMBL. E. Hornemannii is the tallest of the low, small-flowered epilobiums, and also the largest-flowered. In the Gunnison Basin, its rich magenta blossoms are about a quarter of an inch broad and a quarter of an inch high; at the same time, the plants average about six inches in height. The stems are simple and erect with four or five pairs of glabrous leaves, while the short rootstocks (at right angles) are without the scaly buds called turions which characterize the roots of many of the epilobiums.

Epilobium lactiflorum Haussknecht; boreal; montane; Gothic, L 211 (1949) COLO. This plant, which is rare in comparison with E. Hornemannii, is nevertheless much like it, differing chiefly in its flowers and in its seeds. Its flowers are only half as large and essentially white, while its seeds are smooth instead of rough. It is found in the same moist places as E. Hornemannii; but it is occasionally branched, whereas I have never seen a branched specimen of E. Hornemannii in the Gunnison Basin.

The tall small-flowered epilobiums

Epilobium saximontanum Haussknecht; cordilleran; montane-alpine; Gothic, B 57-59 RMBL; Cathedral, B&S 277-62; Fish Creek Mesa, B&S 397-62; Schofield Pass, B&S 77-66; South Baldy Pass, B&S 170-66; Mt. Belleview, B 100b-55 RMBL. It does seem as if in those



genera represented by more than a few species in the Gunnison Basin there is one species peculiarly constituted for phenotypic variation within the Basin. Among the epilobiums it is certainly E. saximontanum. E. angustifolium is more conspicuous; but that is because it frequents roadsides and produces a mass effect at flowering time. Where the climate is cool enough and there is sufficient moisture, E. saximontanum penetrates everywhere. At 12,000 feet, I have collected it beside an alpine tarn. When I picked a comfortable spruce to lean against for lunch in South Baldy Pass, there was E. saximontanum growing in dense shade. I have also collected the plant in soil pockets on a long rockslope in Schofield Pass where the moisture could only have come from rain water flowing down the slope. Yet across the Basin, in Hinsdale County, also in full sun, it grows between rocks in sand at the very edge of Mineral Creek. It is accordingly important to mark the forms and individuality of this plant, especially since it has often been misidentified as another species.

In size, E. saximontanum ranges from two inches in the alpine zone to two feet in the montane zone, where it finally yields epilobium territory to the lower-ranging E. adenocaulon. It also exists in two forms, sometimes having but a single, erect stem; at other times sending forth many vertical (and thinner) side stems from the base and from the leaf axils of the main stem. The roots always produce turions, and the small blossoms may be white or red. However, amid all the variation, the plant has a growth habit that persists with all individuals unless accidental circumstances prevent it. At flowering time, the branches (including the summit of the stem) curve out and down, as if to protect the flowers from the rain. Midway to maturity of fruit, the branches project at right angles from the stem. Finally, when maturity advenes, the branches will be found to be erect. At midseason, when the capsules are held two inches out from the stem, the species cannot be confused with any other plant in the Basin.

Epilobium adenocaulon Haussknecht; boreal; submon-

tane-montane; Biebel's Springs, B 186-60 RMBL; Almont, B 203-60 RMBL; Gothic, B 162-60 RMBL; Fish Creek Valley, B&S 359-62, B&S 410-62. This is the lower-ranging plant that takes over from E. saximontanum at various places in the montane zone. I have never observed the two plants growing together as ecological equivalents (which is a common occurrence under such circumstances), and I don't know what occasions or marks the transition. But I know that it occurs, and that in the submontane zone E. adenocaulon takes the place of E. saximontanum.

The two species are remarkably similar. E. adenocaulon has the same habit of sending forth thin vertical stems from base or leaf axil, and it closely approximates the montane size of E. saximontanum. But E. adenocaulon is without turions, and the evolution of the floriferous branches from nodding to upright is totally lacking. There are also a number of minor differences (such as the greater slenderness of the capsules of E. adenocaulon), which contribute to an understanding of the two species, but are not necessary to separate them.

Epilobium brevistylum Barbey; cordilleran; montane; Crested Butte, H&M 7178 (1952) CS. This species, which has turions, resembles the form of E. saximontanum that is content with a simple, erect stem. But the change from drooping to erect floriferous branches is lacking, and the seeds are quite different. The seeds of E. saximontanum, like those of E. adenocaulon, are distinguished only by some faint, papillose, vertical striae. But those of E. brevistylum, as in the above collection, are brown, ridged, and muricate like minute dandelion seeds.

The annual epilobium

Epilobium paniculatum Nuttall; cordilleran; montane-submontane; Grant Lake, B 183b-59 RMBL; Cathedral, S 62-66; Gold Basin Creek drainage, B 52e-57 RMBL. This annual epilobium is so different from the various perennial species as almost to suggest a different genus.



The stems, although branched, are wandlike, and the wispy leaves have fascicles of even wispier leaves in their axils. The capsules are tapered at both ends, and the petals are not notched, but cleft in the middle.

## Gaura L., The Gauras

Gaura coccinea Nuttall; relict of the plains; submontane; W 9346 (1955) COLO. Occurring in South America as well as in North America, here is a genus that surely came from the south; and in the period of high plains before the present cycle of uplift and erosion that produced the Great and Gunnison Basins, it must have extended on the western side of the cordilleran axis as far north as eastern Washington and Oregon (where a species still survives), and as far north on the eastern side as Alberta and Manitoba, where this particular species is still found. To one who knows the plant as it grows lushly, say, in western Nebraska, its presence in the Gunnison Basin will surely recall the landscape of another age. It is a wandlike, slightly branched perennial plant, with linear-lanceolate, sessile leaves. The unequal petals of its corolla turn crimson with age and attract the attention of all persons interested in plants.

## Gayophytum A. Jussieu, Groundsmoke

The name of groundsmoke is an apt one for this genus of annual plants. The two Gunnison Basin species reach the height of a foot, and can be almost as wide; but the leaves, branches, and capsules are so slender (especially in the second species) that the plants seem like mist upon the ground. Like Gaura, this genus occurs in South America as well as in North America and must surely have come from the south. But here the species in question are obviously plants of the mountains rather than of the plains; and not only are they frequent in the Gunnison Basin, but in the form of G. Nuttallii, they reach the upper limit of the montane zone.

Gayophytum Nuttallii Torrey & Gray; cordilleran;

montane-submontane; Gothic, B 227-52; East River Valley, L 322 (1949) COLO; Willow Creek Mesa, B 50-65. As was true of Helianthella quinquenervis and H. Parryi, G. Nuttallii and G. ramosissimum are largely distinguishable by differences in size. Almost any one would know they were different plants; yet analytically what makes them so is that the leaves of G. ramosissimum are only half as wide as those of G. Nuttallii, the capsules only half as long, the petals only half as high, and so on. And the genus itself seems to be a kind of impoverished Epilobium!

Gayophytum ramosissimum Torrey & Gray; cordilleran; submontane; Almont, R 10347 (1959) RMBL; Willow Creek Valley, B 165-65; Cochetopa Park, D&Wil 14557 (1963) RMBL. For the differentiation of this plant, the reader is referred to the preceding species.

## Oenothera L., The Evening Primroses

Oenothera caespitosa Nuttall; cordilleran; montane-submontane; Baldwin, B 85d-57; Cathedral, B&S 422-62; Sapinero, Wh 604 (1898) COLO; Cochetopa Park, H 8939 (1959) CS. For a description of this species, the reader is asked to turn to page 22 of the Introduction.

Oenothera coronopifolia Torrey & Gray; cordilleran; submontane; Almont, B 197-52; Gunnison, W 9347 (1955) COLO; Sapinero, Wh 570 (1898) COLO; Cochetopa Park, B 125-64. The much smaller white blossoms of this plant, like those of the preceding species, turn red as they wither or as they dry in the botanist's plant press. The leaves are highly dissected, and the plant grows about six inches tall.

Oenothera flava (Nelson) Garrett; cordilleran; subalpine-submontane; Gothic Natural Area, La 36 (1950) COLO; Gothic, B 59-55; Fish Creek Mesa, B&S 68-62; Cathedral, S 64-23; Gunnison, Ca 6/7/51 WS. This is a stemless oenothera, like the Gunnison Basin variant of O. caespitosa, but with yellow blossoms and dandelion-like leaves.



Oenothera serrulata Nuttall; relict of the plains; submontane; Sw 6/14/40 WS. Although a perennial like the three preceding oenotheras, O. serrulata in other respects is quite different. The axils of the upper leaves bear the flowers of the plant; those of the lower leaves bear fascicles of other leaves. The stigma is discoid, and the stamens of two lengths. Apparently the petals do not redden upon drying, and in this and other ways the species shows that it is of other than cordilleran origins.

Oenothera strigosa (Rydberg) Mackenzie & Bush; cordilleran; montane-submontane; Capitol City, S 62-46; Cathedral, B&S 650-62; Gunnison, B 71-60; Almont, C 1134 (1960) RMBL. Among the oenotheras, O. strigosa is certainly the most widespread and frequent species in the Gunnison Basin. However, it does not follow that it is therefore the most collected. Many botanical visitors to the Gunnison Basin think that it is just the eastern O. biennis, and hence not worth collecting. Actually, the differences are many. O. strigosa is a lower, weedier, less succulent plant than O. biennis, and shows its cordilleran lineage as O. biennis shows its boreal lineage. The yellow blossoms of O. strigosa turn pink with age or drying, as do the blossoms of so many cordilleran oenotheras but as those of O. biennis do not, and the whole plant has a typically cordilleran tendency to redden in the sun. Finally, the upper part of the plant has the sparse, distinctive strigosity that prompted its specific name in the first place.

Oenothera Hookeri Torrey & Gray; cordilleran; submontane; Jack's Cabin, L 377-48 COLO; Gunnison, S 64-76 RMBL; Parlin, W 9455 (1955) COLO. Obviously, O. Hookeri is closely related to O. strigosa. Its yellow blossoms redden upon drying, its leaves are narrowly lanceolate, and its flowering raceme also has the peculiar white strigosity of O. strigosa. But the blossoms of O. Hookeri are half again to twice the size of those of O. strigosa, and the plant itself is half again to twice as tall! In fact, as I know from personal experience, it can be recognized with the unaided eye on the other side of a

river; and this cannot be done with O. strigosa. Both O. strigosa and O. Hookeri are biennial, or possibly short-lived perennial, plants.

## OPHIOGLOSSACEAE, The Adderstongue Family

### Botrychium Swartz, The Grape Ferns

In the botrychiums, there is but one leaf, or frond, which is divided into a lateral, vegetative portion and a vertical spore-bearing portion.

Botrychium Lunaria (L.) Swartz; boreal; montane; Gothic, Wi 10331 (1954). The vegetative part of the frond in this species is pinnate, with the pinnae more or less paired and distinctly fan-shaped. The plant in the cited collection is about four inches high, and was found in a dryish, open, turfy place.

Botrychium matricariaefolium A. Brown; boreal; montane; Gothic, Pe 3837 (1954) COLO. In this species, the pinnae of the vegetative part of the frond are further dissected, and in fact suggested to the author of the name, plants of the genus Matricaria. The species grows in aspen woods, and in the above collection, is a slightly smaller plant than B. Lunaria.

## ORCHIDACEAE, The Orchis Family

### Calypso Salisbury, Calypso

Calypso bulbosa (L.) Salisbury; boreal; montane; Crested Butte Mtn., B 32-57; North Quartz Creek Valley, S 65-33 RMBL; upper Needle Creek Valley, B 22-66; Rough Creek Valley, S 64-44. The five, free, magenta sepals and petals rise like so many pennants above the lip of this well-known orchis, and can be seen from afar. But the plant collector has got to get away from his beloved automobile roadside to find this species in the Gunnison Basin, although, as the cited collections show, it is widespread, and although I have also seen



it growing in great numbers in rich aspen and lodgepole-pine forest. The leaves at the time of flowering are, of course, those of the previous year. Each corm sends up but one leaf, and this occurs after the time of flowering.

### Corallorhiza Châtelain, The Coral Roots

Corallorhiza maculata Rafinesque; boreal; subalpine; Leechmere, B 66b-55; Whitmore Falls, S 62-50; Rough Creek Valley, B&S 588-62. This plant, which is a sort of brown, saprophytic bog orchis, grows a foot high and is readily observed if it happens to be within the range of one's vision. The ovary increases in size after flowering time, and as it increases in size it bends over, until finally, it is three-quarters of an inch long and appressed against the plant stem. The species grows in moist subalpine forest, whether spruce or aspen.

Corallorhiza striata Lindley; boreal; montane; Sapinero, Wh 937 (1898) COLO. The Wheeler sheet in the Boulder herbarium is the only one I know of from the Gunnison Basin, and is labeled "in pine woods." It is true that in those days the word pine stood for any kind of conifer. But there are no woods of any sort in the immediate vicinity of Sapinero, and it would be a matter of miles before one reached ponderosa or lodgepole pine. So the collection without further evidence must be regarded as questionable, and the reader is referred again to the discussion of the Wheeler collections on pages 277 and 278. The specific name comes not from the ribbed ovary but from the purple striae of the sepals and petals which, along with the unlobed lip, serve to identify the plant.

Corallorhiza trifida Châtelain; boreal; subalpine-montane; Gothic Natural Area, La 29 (1950) COLO; Comanche Creek, L 1368 (1951) COLO; Gothic, B 182-61. This species is not brown like C. maculata, nor a purplish pink like C. striata, but a yellowish green. It is also altogether a slighter plant than the two preceding corallorhizas. The specific name comes from the three-

lobed lip; but the name would apply equally well to C. maculata.

Habenaria Willdenow, The Bog Orchises

Habenaria hyperborea (L.) R.Brown; boreal; subalpine-submontane; Copper Creek, L 545 (1949) COLO; Fish Creek Mesa, B&S 202-62; Gunnison, B 149-61. The green bog orchis, as this species is called, is widespread in the Gunnison Basin. One can find it in almost any established bog if he looks for it, and usually he doesn't have to look for it since the plant grows more than a foot tall and with its spire of green flowers is strikingly handsome.

Habenaria obtusata (Pursh) Richardson; boreal; subalpine-montane; Gothic Natural Area, W 9233 (1955) COLO; Gothic, B 189-61. Like Corallorhiza trifida, H. obtusata is a deep-woods plant, and even shorter and less robust than that plant. In fact H. obtusata is a one-leaf orchis, and with its slender spike of greenish flowers rises only five or six inches high. But it is not uncommon in the neighborhood of Gothic, where its spikes may readily be seen above a carpet of even lower and more delicate plants mantling the moist forest floor.

Listera R.Brown, The Twayblades

Listera borealis Morong; boreal; montane; Gothic, B 188-61. When I came upon the Gothic population of L. borealis, the source of the belief in its existence in Colorado was its inclusion in Rydberg's 1906 Flora of Colorado,* although at the time, no Colorado botanist knew of a place in the state where he could find the plant. Since then, as reported in his fourth Additions to the Flora of Colorado,** the indefatigable W.A.Weber tracked down in the New York Botanical Garden the source of the Rydberg report, a sheet from Silver Plume in the Front

* Fort Collins, Colorado.
** Boulder, Colorado, 1966, p. 15.



Range. So Gothic is apparently the second known station for the plant in Colorado.

On account of the circumstances of my finding the plant, I think I understand why so few collections have been made of the plant in Colorado. For I came upon the plant quite by accident when I was searching for a certain low carex. The L. borealis was growing beneath Habenaria obtusata in that lower level of more delicate plants mentioned in connection with H. obtusata. It simply was not visible from eye level, and it was only by using H. obtusata as an indicator that I was able to collect a respectable number of plants without injuring the population. The use of indicator plants is an old device of plant collectors. But I never put it to greater use than on the occasion mentioned. In fact it seemed to me that H. obtusata and L. borealis had established a sort of big-brother, little-brother symbiosis, which had served admirably until I came along to upset it.

As for the plant itself, its identity need never be in question. The pair of leaves in the middle of the stem will tell at once that it is a twayblade; and with respect to the species, all one needs is the lip, projecting horizontally like a miniature shovel from the rest of the flower. If the collector would like a fine character, let him look with a handlens at the tooth at the base of the notch in this lip.

Listera cordata (L.) R.Brown; boreal; subalpine-montane; Gothic Natural Area, B 67-54; Gothic, B 252-61. After L. borealis, L. cordata presents no problem at all. Its two leaves (a closer pair to begin with) are heart-shaped, and the long and narrow lip is divaricately split down the middle.

Spiranthes Richard, Ladies' Tresses

Spiranthes Romanzoffiana Chamisso & Schlechtendal; boreal; subalpine-submontane; Leechmere, B 66-55; Crested Butte, B 174-59; Fish Creek, B&S 543-62; Gunnison, B 360-61. I should think most people interested

in plants would know, at least by hearsay, what ladies' tresses are--a low orchidaceous plant with a spiraled spike of fragrant white flowers. Since there is but one species in the Gunnison Basin, the identifying details of the lip do not have to be included in this annotation. But the collector should note the thick fascicled roots that are characteristic of the genus.

## OROBANCHACEAE, The Broomrape Family

### Orobanche L., The Broomrapes

Orobanche fasciculata Nuttall; cordilleran; montane-submontane; Gothic, O 7/15/58 RMBL; Round Mtn., L 123 (1949) COLO; Cathedral, S 62-27; Devil's Hole, B&S 286-62; Vulcan, B 42-64; Sapinero, Wh 574 (1898) COLO. As is well known, O. fasciculata is parasitic on the roots of the common sagebrush, Artemisia tridentata, and hence its distribution is linked with the distribution of that shrub. But not quite, for it happens that the elevation of all the first five collections cited is 9,000 feet or higher. Even more interesting is the fact that on Wheeler's Sapinero sheet, nominally, from less than 8,000 feet, the label bears the legend: "north side of cañons and on hills among sagebrush." Now Wheeler's sheets, like those of his fellow nineteenth-century collectors in the Gunnison Basin, are not given to superfluous data about habitat and things like that. As mentioned on page 278, the early collectors were interested not in plant geography and ecology but in the species of plants. Yet the absence of O. fasciculata from south-facing slopes and valley bottoms must particularly have struck Wheeler, and the truth of the matter is that whether from an intolerance of heat and drought, or from an inability to follow the roots of A. tridentata when they plunge deep, O. fasciculata can follow its favored host into only about half of its distribution in the Gunnison Basin. What is fascicled about this plant are the brownish pedicels, which take over from the stems in the middle of the plant and bear their tubular



flowers in broomlike clusters. The plant grows about six inches tall.

Orobanche uniflora L.; boreal; montane; Gothic, W 9099 (1955) COLO. This plant was collected at 9,600 feet in the meadows of the East River Valley a mile or so above Gothic. The host parasitized is not mentioned; but sedums, saxifrages, and composites all grow in these meadows and could have served. Although not strictly one-flowered, the blossoms of this species are far fewer to a stem than in the preceding species, and the pedicels account for most of the plant's height instead of merely one-half.

## PAPAVERACEAE, The Poppy Family

### Papaver L., The Poppies

Papaver nudicaule L.; cordilleran; alpine; North Italian Mtn., L 806 (1950) COLO, L 1458 (1951) COLO. This is a small, yellow-flowered poppy with leaves like those of Geum triflorum, and ranging in the above collections from two to five inches in height. North Italian Mountain is the only known station for the plant in the Gunnison Basin, the elevation of the site being about 13,000 feet.

## PINACEAE, The Pine Family

The conifers of the Gunnison Basin are so few in number of species, yet form such a conspicuous part of the flora, that they need but few words of differentiation in these pages. Herbarium specimens have infrequently been collected, chiefly no doubt because of the little need for them; but in the case of the spruces also because of the inferior results. No matter how carefully collected (and even if sprayed with plastic before pressing), eventually the needles fall from the twigs, leaving nothing but the skeleton-like bare stems and branches. I should like to mention Robert E. More's Colorado Evergreens (Denver, 1949). The less than one hundred pages contain

dozens of admirable photographs and hundreds of original observations concerning the species in question.

## Abies Link, The Firs

Abies lasiocarpa (Hooker) Nuttall; cordilleran; subalpine; Gothic, Ke 7/4/49 WS. It seems to be well known that the Engelmann spruce in the spruce-fir forests has a low reproductive rate (but high survival rate), that the subalpine fir (or A. lasiocarpa) has a high reproductive rate (but low survival rate), and that accordingly Engelmann spruce preponderates in the spruce-fir association. What is curious is that in the southern half of the Gunnison Basin the subalpine fir seems to disappear almost completely, leaving pure stands of Engelmann spruce. It seems hardly necessary to observe that spruces may be told by their pendent cones and square, pointed needles; firs by their upright cones and flat needles.

## Juniperus L., The Junipers

Juniperus communis L.; boreal; submontane-montane; Jack's Cabin Pass, B 9a-54; Cathedral, B&S 24-62. The common low juniper with its awl-like leaves whitened on the inner sides is widespread in the lower two zones of the Basin, and as far as I can see, does not differ significantly from the same plant as it occurs in eastern North America.

Juniperus scopulorum Sargent; cordilleran; submontane-montane; Sheep Gulch, B 126-60; Beaver Creek Valley (south), B&S 587-62; Johnson Gulch, B 100-66. This cordilleran species has been collapsed by a number of taxonomists into the eastern J. virginiana. I grew up with the latter species in southern Connecticut, and subsequently had opportunity to observe it both in Kentucky and Tennessee and in southern Wisconsin. The collapsing of the two species is wholly incredible to me, and indicative of a plane of Platonic abstraction which I do not wish even to visit. The eastern species in summer exhibits a rather dull vegetative green, but in winter



takes on a glorious golden bronze which I think one of the distinctive colors of the whole plant kingdom. The cordilleran species does not show either of these extremes of hue but has its own gray-green. Again, the branchlets of the eastern species depart from the central axis at a widish angle and are notably straight. The branchlets of the western species depart at a narrower angle and are notably sinuous. Still again, even after years of desiccation in an herbarium case, the resinous odor of the western species is a delightful fragrance; the odor of J. virginiana under the same circumstances is acrid and unpleasant. I could go on, but many years ago Friedrich Schlegel said that everybody is born a Platonist or an Aristotelian, and I need not point out that this is as true of botanists as of any other variety of the human race.

## Picea Link, The Spruces

Picea Engelmannii Parry; cordilleran; subalpine; Galena Mtn., D 14674 (1963) RMBL. Although about a mile northwest of the topographic Gunnison Basin, Galena Mountain is indubitably a part of the floristic Gunnison Basin. For the differentiation of this species the reader is referred to Abies lasiocarpa and to the following Picea pungens.

Picea pungens Engelmann; cordilleran; submontane-montane; Soap Creek Campground, W 7467 (1952) COLO. This tree, popularly known either as blue spruce or as Colorado spruce, can be differentiated even from horseback by a glance at the ground under the tree in question. The cones of P. Engelmannii are small and brown; those of P. pungens are pale and large. The behavior of the blue spruce is harder to understand. In the northern half of the Basin, it is found in the neighborhood of streams, whether as above, or in Taylor Canyon. In the southern half of the Basin, especially around Cathedral, it turns into a dryland tree and joins forces with the Douglas fir. The north-facing escarpment of Dry Lake Park near Cathedral, which very nearly comprises

the upper montane zone and is certainly dryland forest, is about evenly composed of blue spruce and Douglas fir. There certainly must be an explanation of this change of behavior, but I do not know it.

## Pinus L., The Pines

Pinus aristata Engelmann; cordilleran; montane-subalpine; Marshall Pass, B 87-61. The foxtail, or bristlecone, pine, as this species is popularly called, is common in the valley of Cebolla Creek southwest of Cathedral. There in its habit and ecology it suggests the pinyon, which does not grow in the Gunnison Basin. Like P. flexilis, P. aristata is a five-needled pine, but it is quite unlike P. flexilis except in this detail.

Pinus flexilis James; cordilleran; montane-subalpine; Spring Creek Canyon, Ke 7/20/49 WS. P. flexilis, or the limber pine, is the least frequent of the pines of the Gunnison Basin. Like P. aristata, it is a five-needled pine; but its cone-scales are not aristate and its branches, with their longer, looser needles, do not remotely resemble a fox's tail.

Pinus Murrayana Greville & Balfour [P. contorta Douglas]; cordilleran; montane; Washington Gulch, S 65-58; Taylor River Valley, Ke 6/29/49 WS; Los Pinos Creek Valley, B 700-62. In spite of being limited essentially to the upper montane zone, the lodgepole pine is the most frequent pine in the Gunnison Basin. Usually, it occurs in pure stands (being commonly a burn replacement); but four miles east of Los Pinos Pass, it forms a rich and interesting forest in association with Colorado spruce. It is a two-needled pine, and its cones are twisted as they are in that other fire tree, of the north and east, P. Banksiana.

Pinus ponderosa Douglas; cordilleran; montane; North Beaver Creek Valley, B&S 576-62; Powderhorn Divide, B 31-61. No plant except the sagebrush is more typical of the cordilleran flora than the ponderosa pine. It greets the traveler from the east before he descends into the rift



between the high plains and Pike's Peak; and he will find it in the coast ranges of California. Yet in the Gunnison Basin it seems to be on the way out. The only place where it forms even a limited forest is on the divide between Powderhorn and Gateview, and here not only does it seem not to be replacing itself but the forest is so open that there is as much sagebrush as pine. With its four-inch needles in bundles of three, its conspicuous cones, and its russet bark, the tree is unmistakable.

## Pseudotsuga Carrière, The Douglas Firs

Pseudotsuga Menziesii (Mirbel) Franco [P. taxifolia (Poiret) Britton]; cordilleran; submontane-montane; North Beaver Creek Valley, B&S 577-62; Gold Basin Creek drainage, B&S 66-26; Signal Peak Ridge, B 20-61. The Douglas fir is notable for the three-toothed bracts that protrude from between the scales of the cones, and are conspicuous from flowering time until the cones fall in the autumn. In the lowest elevations of the Basin, the species occurs in small clumps in protected gulch bottoms. It extends throughout the montane zone, usually in association with other conifers, but occasionally with aspen. The only place I know where it approaches a pure stand is on the north side of Signal Peak Ridge.

# PLANTAGINACEAE, The Plantain Family

## Plantago L., The Plantains

The native plantains

Plantago eriopoda Torrey; boreal; submontane; Cebolla Hot Springs, B&S 448-62, B 25-66; Iola, Kl (1947) CS; Gunnison, Ke (1949) WS; Hot Springs Creek, B&S 66-138. This is a handsome plant, especially in alkaline situations, where the leaves become thicker, succulent, and a darker green. At the base of the plant, intermixed with the old leafbases forming a crown on the top of the

taproot, there is a lining of brown wool that is an infallible way to distinguish the species from the other plantains of the Basin.

Plantago Tweedyi Gray; cordilleran; subalpine; Rustler's Gulch, Sh 56-86 RMBL; Floresta, B 67-57; Gothic, K 1302 (1948) DBG. P. Tweedyi, with its lanceolate leaves tapered at both ends, can be said to resemble P. lanceolata; but its leaves are much shorter, and the whole plant is only a third or a half as tall. Again, whereas the spikes of P. lanceolata are conical and flower from the bottom up, those of P. Tweedyi are evenly cylindrical and seem to flower all at once. Finally, in the Gunnison Basin, P. Tweedyi seems to be known only from undisturbed sites in the subalpine zone.

The adventive plantains

Plantago lanceolata L.; adventive; montane-submontane; Gothic, Br 8/5/57 RMBL; Powderhorn, B 220-65 RMBL. This common weed of much of North America seems almost too well known to need descriptive remarks. Its cone-shaped spikes, rounded at the top and flowering from the bottom up, alone will identify it. The leaves are narrowly lanceolate, and taper at both ends.

Plantago major L.; adventive; montane-submontane; Gothic, S 65-170; Ninemile Hill, B 125-65 RMBL. In this weedy species, which is perhaps even more common than the preceding, the leaves are not narrowly lanceolate but rather broadly ovate, and the margins are sinuately toothed. The spikes are very much longer than those of P. lanceolata, and evenly cylindrical.

## POLEMONIACEAE, The Phlox Family

### Collomia Nuttall, The Collomias

Collomia linearis Nuttall; boreal; montane-submontane; Gothic, B 76-52; Cathedral, B&S 290-62, S 62-69; Powderhorn, B 141-64; Sapinero, Wh 398 (1898) COLO. This annual species is as variable as any plant in the



Gunnison Basin. In a well-watered montane meadow its sessile leaves are lanceolate and a deep green; and although they are clustered around the terminal capitate inflorescence, one can still see the small and narrow polemoniaceous flowers peeping out. On a gravel bar in the submontane zone the leaves become light green and linear, the stems wiry, and the heads so bracty that the species seems to be another plant. Especially is this true when the plant is in the fruiting state. Usually, the stems are unbranched; but on such a gravel bar as instanced above, they become much branched and at a wide angle.

### Gilia Ruiz Lopez & Pavon, The Gilias

Gilia aggregata (Pursh) Sprengel; cordilleran; alpine-submontane; Double Top Mtn., L 1006 (1950) COLO; Emerald Lake, D 14486 (1963) RMBL; Cathedral, B&S 103-62; Beaver Creek (south), B&S 612-62; Gunnison, B&S 78-62. I suppose there is no flowering plant better remembered by the nonbotanical visitor to the Gunnison Basin than the scarlet gilia. The tubes of its scarlet blossoms project as much as an inch and a half from the stem and in fact are often larger than the linearly dissected stemleaves. Then again, the plant is both common and abundant, and this from the alpine zone to the submontane zone. Indeed, as mentioned in the Introduction,* the plant can be so abundant that a hillside for a week or two is red with its blossoms. The species commonly grows two feet high, and even appears as a roadside weed.

Gilia calcarea Jones; cordilleran; subalpine-submontane; Marshall Pass, Be (1894) CS; Cathedral, B&S 391-62, S 62-30; Cochetopa Park, H 8978 (1959) CS; Almont, B 59-60. G. calcarea and G. aggregata are remarkably different. The blossoms of G. aggregata are large and scarlet; those of G. calcarea small and dark purple. Again, G. aggregata is smooth and glabrous; G. calcarea

* See above, p. 1.

viscid and usually covered with small grains of sand and bits of plant débris. Finally, G. aggregata can have several main stems; G. calcarea only one main stem, no matter how many side branches.

Gilia ophthalmoides Brand [G. sinuata Douglas]; cordilleran; submontane; Sapinero, Wh 535 (1898) COLO. The annual nature of this gilia should make identification easy if the plant is ever collected again, for the above is the only known collection from the Basin. It is a low plant, with few branches and few flowers, and with included stamens.

Gilia penstemonoides Jones; Gunnison Basin; submontane; Lake Fork Canyon, W 9356 (1955) COLO, B&S 111-62. G. penstemonoides is probably the narrowest endemic in the Gunnison Basin since it is confined to the seven or eight miles of a single canyon. Fortunately, the flooding of the lower part of this canyon has not destroyed the species, and may even have contributed to its preservation by cutting off the road. The plant grows in niches of the canyon walls, and may be told from G. calcarea (which it resembles) by its caespitose habit and by its lighter-colored, lavender blossoms.

## Leptodactylon Hooker & Arnott, The Leptodactylons

Leptodactylon pungens (Torrey) Rydberg; cordilleran; submontane; Cochetopa Park, H 8988 (1959) CS; Gold Basin Creek drainage, B 20b-60; Jack's Cabin, L 403 (1950) COLO. L. pungens is a low, wiry shrub sprawling over the sagebrush floor of the Basin and rising scarcely more than six inches above it. Its leaves are needle-like and seem to be (but are not) clustered in whorls along the stems and branches. The plant may be told by its white polemoniaceous blossoms that are as much as three-quarters of an inch long.

## Linanthastrum Ewan, The Linanthastrums

Linanthastrum Nuttallii (Gray) Ewan; cordilleran; submontane-alpine; Johnny Hill, Stro 7/24/22 WS; Monarch



Pass, R 10223 (1959) CS. This plant in some ways resembles Leptodactylon pungens. Its polemoniaceous flowers are white, and it is about the same size. But its opposed leaves really are paired, so that the segments of the two do constitute a whorl. The segments furthermore are foliaceous, not short, stiff, and pointed; in fact the whorls of leaflike segments beneath the capitate inflorescence form the most striking character of the species.

## Linanthus Bentham, The Linanthuses

Linanthus Harknessii (Curran) Greene; cordilleran; submontane; Almont, P&Ha 4218 (1951) COCO; Kezar Basin, S 65-38 RMBL. Until recently, the genus Linanthus included the genus Linanthastrum. But macroscopically one would never guess it from this little annual. The plants in the second collection cited are at the most three inches high, and the calyces only an eighth of an inch long. A lens is needed to view the plant properly. But when it is thus viewed, one finds the same whorls of leaf segments as in Linanthastrum (although just a quarter of an inch long), and the same white polemoniaceous blossoms (but barely longer than the eighth-inch calyces). After a node or two, the little plant branches dichotomously.

## Phlox L., The Phloxes

The submontane phloxes

Phlox bryoides Nuttall; cordilleran; submontane; Horn Gulch, Ba 48 (1955) CS; Cochetopa Park, B 26-57. The specific name of this species, of course, means moss-like; and it must be admitted that the plant is well named. The numerous short branches of imbricated leaves are only a sixteenth of an inch in diameter, and as the plant creeps over the ground it looks for all the world like a gray, dryland moss. The white blossoms when wide open are three-eighths of an inch in diameter.

Phlox Hoodii Richardson; cordilleran; submontane; Iola, P&Whe 4129 (1951) COCO; Quartz Creek Valley, B 3-65; Graflin Gulch, B 15-65 RMBL; Hartman Rocks, B 5-61; Cebolla Hot Springs, B 116-64. P. Hoodii is much like P. bryoides. It also is a gray, matted plant that keeps close to the ground. However, it is a larger plant all around, and its narrow, sharp-pointed leaves are not at all imbricated but only loosely appressed to the stem. Its white blossoms, when fully extended, are about five-sixteenths of an inch wide. The plant is tolerant of alkaline soil.

Phlox longifolia Nuttall; cordilleran; submontane; Pine Creek Mesa, B 30-60 CS, RMBL; Lake Fork Canyon, B 43-60 CS, RMBL; Tenmile Springs, B 28-65; Gunnison, P&Ha 4125 (1951) COCO. Although also an inhabitant only of the submontane zone, P. longifolia is anything but a carpet plant. With long slender leaves and innumerable slender stems, it rises five or six inches above the ground displaying its pink to magenta blossoms to insects or the passerby. The blossoms are often three-quarters of an inch wide when fully extended, and beneath them, the slender calyces are very stylish with their green ribs and white interstices.

The alpine phlox

Phlox caespitosa Nuttall; cordilleran; alpine; Virginia Col, K 1263 (1948) DBG; Fossil Ridge, L 1279 (1951) COLO; Slumgullion Mesa, B&S 140-62; Calf Creek Plateau, B&S 66-82; Spring Creek Pass, B 52-61. Although the last of the cited collections came from as low as 11,000 feet, the population was growing on an exposed ridge (in fact the Continental Divide) in what was clearly a downward extension of the alpine habitat, and in the Gunnison Basin P. caespitosa is essentially a cushion plant of the alpine zone. Over the spherical surfaces of the grayish-green cushions are displayed the white polemoniaceous flowers of the genus, usually about three-quarters of an inch wide, and really, no other plant of the alpine zone is confusable with it.



The universal phlox

Phlox multiflora Nelson; cordilleran; submontane-alpine; Lake Fork Canyon, B&S 121-62; Almont, B 16-60; Spencer, S 64-31; Crested Butte, L 116 (1949) COLO; Monarch Pass, P&Ha 4119 (1951) COCO; Cumberland Pass, B 173-52. It is interesting that Aven Nelson should have named this species multiflora, for he could have called it multifolia just as well. The species is, indeed, unusually vigorous, and is prolific both of leaves and of flowers. It is a low plant, forming in open places on dryish ground a dense mattress of vegetation. The flowers, of various shades of pink or magenta, are, when fully displayed, about five-eighths of an inch across, and the only other phlox in the Gunnison Basin with which the species could be confused is P. longifolia. Here, just a glance at the calyx with the naked eye will clarify the issue. As noted, the calyx of P. longifolia is noticeably slender and very stylish with its green ribs and white interstices. The calyx of P. multiflora is quite otherwise in these respects.

## Polemonium L., The Polemoniums

Polemonium delicatum Rydberg; southwestern; subalpine-alpine; Schofield Pass, B 7f-54; Marshall Pass, Fe (1902) COLO; Mill Creek Valley, B&S 291-62; Slumgullion Mesa, B 217-65. I don't think I have ever seen this plant in the Gunnison Basin except in association with the conifers of the subalpine forest. Even in the last collection cited, from the east edge of Slumgullion Mesa where the elevation is about 12,000 feet and the situation alpine, the plant was growing within isolated clumps of spruce Krummholz. The plant varies in height from about five inches to seven inches, the latter height being attained on the floor of the very rich spruce forest at the head of Mill Creek. In this species the basal leaves are long and pinnate, the cauline leaves are shorter and also fewer, and the inflorescence overtops the basal leaves.

1974 Schofield Pass ↑

Polemonium foliosissimum Gray; cordilleran; submontane-subalpine; Sapinero, Wh 464 (1898) COLO; Ohio Creek Valley, K 583 (1947) DBG; Gothic, B 8e-54; Slumgullion Gulch, B&S 243-62. The specific name of this species means much-leaved, and it is a fact that the numerous pinnate leaves clothing the stems constitute the most striking character of the plant. The stems are anywhere from a foot to three feet in height, and the collector will note that the upper leaflets of the leaves are confluent. This latter peculiarity is a sufficient diagnostic of the species.

Polemonium occidentale Greene; cordilleran; montane-submontane; Cathedral, B&S 276-62; Lujan Creek Valley, H 9021 (1959) CS; Cement Creek, B 205-61; Cochetopa Creek, Ke 7/10/49 WS. The rich blossoms of this polemonium are unusual in that they retain their lovely violet color for years after the date of collection. The solitary stems, a foot or more in height, are only scantily clad with the plant's small pinnate leaves, and the species is remarkable for its long, horizontal rhizomes. It is found only in wet places.

Polemonium viscosum Nuttall; cordilleran; alpine-submontane; Wolverine Basin, B 303-61; Rough Creek Pass, B&S 629-62; Henson Creek Valley, B 42-61; Bear Creek Canyon, B 78-66; Cochetopa Park, B&S 511-62. Undoubtedly this is the most frequent and widespread polemonium in the Gunnison Basin, which is tantamount to saying that it is also the most variable. The plant is caespitose, with the leaves almost exclusively basal, and in the alpine and subalpine zones, the leaflets along the rachises are condensed, while the flowers, usually blue, are gathered together in a nodding head. But in the montane and submontane zones the plant, morphologically speaking, explodes. The flowers become white or blue (apparently without significance), the leaflets become strung out, the heads become racemose, and the plant takes to living in mossy wet places in dense shade as well as in dry open places resembling its alpine habitats. In these dry open places in the lower zones the leaflets may well become condensed again; but the flowers are



apt to be white, and the inflorescence becomes a spike! The collections cited above have been selected to illustrate this variability.

## POLYGONACEAE, The Buckwheat Family

### Eriogonum Michaux, The Umbrella Plants

It is well known that in the buckwheat family the flowers possess but one floral envelope, usually called simply a perianth. It is the peculiarity of the genus Eriogonum that a number of these flowers are then gathered together in an involucre which is variously lobed and indeed simulates another floral envelope. In Eriogonum, the fruit is a three-angled or three-winged achene.

Eriogonum alatum Torrey; cordilleran; montane-submontane; Prosser Creek Valley, B&S 66-46; Razor Creek Valley, B&S 64-66; Razor Creek Park, B&S 69-66; Cochetopa Park, B 186-66. Apparently, E. alatum is restricted to the southeast quarter of the Basin where it grows in a variety of habitats--moist meadow in the partial shade of aspen, stony soil in the light shade of Douglas fir, brushy open place, and so on. The plant is very nearly the most departmentalized that I know. The leaves are practically all basal, the stemleaves being no more than mere bracts. From the enormous perennial root and host of basal leaves arises the bare stem, sometimes accompanied by a number of minor stems. At the top, the yellowish green florets in their involucres occur in numerous small umbels. But the plant is most conspicuous in fruit, when each floret that sets seed gives rise to a large, three-winged achene.

Eriogonum cernuum Nuttall; cordilleran; submontane-montane; Almont, Wi 10415 (1954); Red Creek Valley, B 61-55; Madeira Siding, B&S 506-62; Willow Creek Valley, B 164-65 RMBL; Fish Creek Valley, B&S 346-62, 545-62. E. cernuum carries on the philosophy of departmentalization, but less conspicuously so, for there are only two departments. There is the basal cluster of small round leaves, on petioles and with a mucro; and there is

the rest of the plant which may be described as fine brush, from which are suspended the innumerable, sharply reflexed small involucres with their white flowers. A warning must be issued. Just before the flowers appear and the short peduncles are reflexed, the plant can seem like an entirely different species.

Eriogonum coloradense Small; Coloradan; alpine-submontane; Virginia Ridge, B 155-52; Gothic, B 206d-52; Cochetopa Park, B 75d-55, B&S 66-243. As is so often the case in Eriogonum, the leaves of this plant, all basal, are petioled and linear-lanceolate. In this species they are also bicolored and somewhat revolute. The flowers are white, sometimes in umbellate clusters, but more often (especially at the extremes of altitude), condensed into compact heads. What I find most striking about the plant is the extensive underground growth of the stems. In the last collection cited, what seemed to be four individual plants about two and a half inches high turned out to be just the top of an underground plant ten inches wide.

Eriogonum flavum Nuttall; cordilleran; alpine-submontane; Baldy Chato, B&S 474-62, B&S 481-62 (two stations); Cochetopa Park, B 93-55. The zonal range of this plant parallels that of the preceding; E. flavum is also similar to E. coloradense in its extensive underground growth. But E. flavum is essentially a cushion plant with a taproot, and its leaves (elliptical rather than linear-lanceolate) are neither conspicuously bicolored nor conspicuously revolute. Finally, its flowers are yellow, not white.

Eriogonum racemosum Nuttall; southwestern; montane-submontane; Cement Creek Valley, L 376 (1949) COLO; Lake City, P&We 8/8/31 COCO; Sapinero Guard Station, B 202-65 RMBL; Cochetopa Park, Jo 15 (1960) CS. I find this tall plant one of the most distinctive eriogonums in the Basin. The leaves are strictly basal, while above the middle, the stems fork and even refork. But most individual are the blossoms. They occur in numerous clusters along the upper stems, and are pink with dark keels producing an effect of stripes.



Eriogonum subalpinum Greene; cordilleran; subalpine-submontane; Marshall Pass, Fe (1902) CS; Gothic, B 117a-59; Glacier, K 531 (1947) DBG; Vulcan, B 40-64. E. subalpinum is one of the handsomest of the Gunnison Basin eriogonums, and seems to have an especial appeal to botanists visiting the Basin for the first time. Out of a rather small mat of bicolored leaves hugging the ground a naked scape appears which after a foot or more, bears a large umbel of white blossoms. The blossoms can be tinted with red; but the prevailing color is white, and the plant is simply unmistakable.

It is curious that this plant should ever have been collapsed into the yellow-flowered E. umbellatum. For on the floor of the Basin, in peculiarly rich sagebrush country about a mile and a half east of the old town of Vulcan, I came upon a large population of the two species living together in the greatest of harmony and without a trace of intergradation. At first glance, the individual plants of E. umbellatum seemed to be more frequent; but closer study revealed that they only covered more ground. It was a splendid sight to see the tall white umbels of E. subalpinum contrasting with the shorter yellow umbels of E. umbellatum, and the larger and darker mats of E. umbellatum contrasting with the smaller and lighter mats of E. subalpinum. It also made me laugh to think of learned botanists, hundreds of miles from the scene of action, making generalizations about plants on the basis of dried and pressed specimens not of their own collecting.

Eriogonum umbellatum Torrey; cordilleran; montane-submontane; Gothic, B 27-55; Waunita Park, B 52a-55; Almont, Ke 6/22/49 WS; Vulcan, B 41-64. This plant must be distinguished from E. flavum and from E. subalpinum. Its leaves are greener and more glabrous than the leaves of either of those species, and it forms larger mats upon the ground than E. subalpinum. Its scapes are neither so straight nor so tall as those of E. subalpinum, and as mentioned, its flowers are yellow. Thus the species might be confused with E. flavum; but E. umbellatum is no cushion plant burgeoning from a

taproot, and as far as I know, the territories of the two species do not overlap.

Eriogonum tristichum Small; southwestern; submontane-montane; Parlin, P 5123 (1961) COCO; Sun Creek Valley, B 178-65; Madeira Siding, B 87-65; Iron Mtn., B 139-65 RMBL; Gothic, R 10548 (1959) CS. I should not be surprised if this species proved to be the most frequent and widespread eriogonum in the Gunnison Basin. It certainly is common enough in its own right. But what makes me think it may be the commonest eriogonum is that all the alleged specimens of E. effusum that I have examined have turned out to be E. tristichum. The revolute leaves are a match for those of E. coloradense; and like E. coloradense, the amount of the plant underground is prodigious. But in its successively dichotomized and trichotomized inflorescence, the plant does not remotely resemble E. coloradense. As a matter of fact, one of the most individual and striking characteristics of E. tristichum is the amount of dead leaf material clothing the old branches between the new branches and the thick taproot.

## Oxyria Hill, The Mountain Sorrels

Oxyria digyna (L.) Hill; boreal; alpine; Cumberland Pass, B 172-52; Conundrum Pass, D 14742 (1963) RMBL; Engineer Pass, S 62-45; Gothic, R 10299 (1959) CS; Spring Creek, B 131-65. In fruit, this species so much resembles the common sorrel, Rumex Acetosella, that the plant is soon identified and the appropriateness of the popular name recognized. It is prevailingly an alpine plant in the Gunnison Basin, but with more relicts left behind in the montane zone than is usual, so that one looks for an explanation--perhaps in a higher germination or survival rate. The last two collections cited are from such relict populations, the first from shaded cliff crevices, the second from that same Spring Creek in Hinsdale County where many other relicts have been found.



## Polygonum L., The Knotweeds

The single floral envelope of the buckwheat family has already been noted. In the genus Polygonum, there is another peculiarity. The hyaline leaf stipules make such conspicuous sheaths around the nodes that long ago they were called ocreae after the shinguards of the Roman soldiers.

### The perennial polygonums

Polygonum amphibium L.; boreal; montane-submontane; Meridian Lake, C 1176 (1960) RMBL; Grant Lake, B 183c-59; Parlin, B&S 66-144. The dense spikes of red flowers and the shiny, elliptical leaves of this plant make a sight to be admired as they float on the margins of ponds in the Gunnison Basin. The species, however, as the specific name implies, is not strictly aquatic; for if the water level falls, then it takes to life upon the muddy shore as easily as upon the surface of the water.

Polygonum bistortoides Pursh; boreal; alpine-montane; Conundrum Pass, B 214-61; Washington Gulch, B 188a-52; Lujan Creek Valley, H 9018 (1959) CS; Devil's Hole, B&S 152-62; Crested Butte, R 10336 (1959) CS. P. bistortoides reaches its maximum size and frequency in the lower subalpine zone where, as in the Washington Gulch collection cited above (and as mentioned in the Introduction),* it can cover acres of ground with its white spikes. The collector must be sure to collect at least one specimen showing the sigmoid root.

Polygonum viviparum L.; boreal; alpine-montane; East Maroon Pass, B 37f-54; Trallala Peak, B 230-65; Cathedral, B&S 85-62; Lujan Creek Valley, H 9020 (1959) CS; Gothic, Wi 10112 (1954). P. viviparum is a lesser edition of P. bistortoides. The sigmoid root is still present (or at least a suggestion of it), and likewise the spike of white flowers. But everything is on a reduced scale, especially on a more slender scale. Above all,

* See above, p. 1.

some of the white blossoms at the base of the spike are replaced by bulblets, and occasionally all the blossoms are replaced.

The annual polygonums

Polygonum aviculare L.; adventive; montane-submontane; Gothic, B 224-52; Fish Creek Valley, B&S 558-62; Cochetopa Creek Canyon, B 198-66; Almont, R 10353 (1959) CS. The habit of growth of this adventive plant is its most recognizable feature. The branches radiate from the summit of the root in all directions, sometimes lying completely prostrate on the ground, sometimes ascending after an inch or two, and sometimes growing erect. The ochreae are reddish, and the small axillary flowers vary from a greenish white to red. The plant is a common occupant of waste places in the Gunnison Basin.

Polygonum Douglasii Greene; boreal; montane-subalpine; Castle Park, S&Wb 64-220; Gothic, B 223-52; Middle Brush Creek, L 501 (1949) COLO. With its reflexed fruits evenly distributed in pairs or singly along the upper stems and branches, and with its curious mixture of large and small, narrowly lanceolate leaves, this is one of the easiest polygonums to recognize in the Gunnison Basin. It is a plant of open places, whether moist or dry, and hence is found along trails and forest roads, as well as in brushy meadows and on rocky slopes.

Polygonum sawatchense Small; cordilleran; submontane; Almont, W 9376 (1955) COLO; Gunnison, Ke 7/49 WS. This plant has the habit of P. Douglasii, and in a number of ways seems like a slightly smaller version of that species. Once again, the flowers are evenly distributed up and down the branches, and occur singly (or in twos or threes) in the leaf axils. But the fruits do not reflex, and this feature alone is sufficient to separate the two species. It also happens that in the Gunnison Basin there is apparently no overlapping of the territories of the two species.

Polygonum Kelloggii Greene; cordilleran; montane; Gothic, Wi 10491 (1954); Castle Creek Valley, B 87-57; Castle Park, S&Wb 64-221. This is a very small plant, ranging in height from less than an inch to about two and a half inches. The red, tell-tale polygonaceous blossoms are arranged in a small terminal spike, and also situated in the axils of bracts which, as they descend the stem, grow increasingly divaricate until finally they pass into leaves. This is a good macroscopic character. A good microscopic character is the reduction of the anthers to three.



Polygonum minimum Watson; cordilleran; subalpine; Elko Park, Wi 10401 (1954). This little polygonum is like no other in the Basin. It is a moistland species of higher elevations, and its leaves, of a broader, more succulent sort, are not reduced along the stem except in the cluster at the end. The flowers are borne axilly, and the short stems are a bright red. It has been mentioned that Elko Park is a quarter of a mile beyond the topographic Gunnison Basin, but well within the floristic Basin.*

## Rumex L., The Docks

Rumex differs from Polygonum chiefly in the development of the fruit. The inner three segments of the perianth become attached to the ovary, forming the well-known wings, which in turn are further specialized in various ways.

The native rumices

Rumex densiflorus Osterhout; cordilleran; subalpine-montane; Elkton Divide, B 27e-54; Mill Creek, B&S 303-62; Gothic, L 212 (1949) COLO. When it comes to collecting the large, native rumices of the Gunnison Basin, the collector must carry with him a folding trench shovel. It is questionable if the much-used hunting knife is ever adequate to collecting in the Gunnison Basin; but with R. densiflorus and R. occidentalis, it becomes absurd. For

* See above, p. 269.

in these two species, the stout horizontal root of the first, and the stout vertical root of the second, are all-important in the determination of the species.

Rumex occidentalis Watson; boreal; montane-submontane; Gothic, W 9482 (1955) COLO; Fish Creek, B&S 428-62; Cochetopa Creek, Ke 8/17/49 WS. For the separation of this rumex, the reader is referred to the preceding species. Since R. densiflorus and R. occidentalis are similar in all gross features except the roots, it is interesting that there should exist between them not only the distinction between a cordilleran and a boreal plant, but apparently also a zonal stratification within the Basin. This is a topic I should exceedingly like to explore, and should have done so before this had not the compiling of this flora taken double and triple the time allotted to it.

Rumex triangulivalvis (Danser) Rechinger filius; boreal; montane-submontane; Gothic, B 235-60; Dry Lake, B 224-62; Gunnison, B 242-61. The last of the native rumices to be listed is also the commonest. It is frequent in moist places in both halves of the Basin, and from the sagebrush floor to the beginning of the subalpine zone. The plant has a dark-brown rootstock, but light-tan annual stems, and long, lance-linear glabrous leaves. Most distinctive is the plant in mature fruit. The broadly triangular wings have in their center a narrowly triangular body that is undercut at the sides and looks like the living larva of an insect.

The adventive rumices

Rumex Acetosella L.; adventive; montane; Little Soap Park, S 64-117; Meridian Lake, Ka&C 1091 (1964) RMBL; Gothic, B 58-59; West Brush Creek, L 269 (1949) CS. The common sorrel, with its red flowering spikes and distinctive hastate leaves, is known to every one, and especially to children, who love its sharp, pleasant taste. As mentioned in the Introduction,* it behaves in the Gunnison Basin like a native plant. Being small and

* See above, pp. 27-28.



reddish, it is curiously different from the rumices called docks, which are large and greenish.

Rumex crispus L.; adventive; submontane-montane; Gunnison, I 18933 (1961), B&S 434-62 (two stations); Gothic, W 9468 (1955) COLO. Commonly known as the narrow or curly dock (and used in the past as a source of table greens), this species can be told by the long, narrow leaves which are finely undulated, or crisped, on the margins. The ovate wings of the fruits are interestingly reticulated.

Rumex fueginus Philippi; adventive; submontane; Gunnison, I 18934 (1961). This adventive species much resembles R. triangulivalvis. The narrowly triangular lozenge in the middle of each wing looks even more larval. But the wings themselves are much different. They are narrowly rather than broadly triangular, and in addition, have one or two sharp teeth on each side. I cannot help being puzzled by the adaptive significance of these teeth, since the seeds apparently fall clear and the wings do not assist in seed dispersal.

## POLYPODIACEAE, The Fern Family

### Athyrium Roth, The Lady Ferns

Athyrium Filix-femina (L.) Roth; boreal; subalpine-montane; Peeler Basin, B 348-61 CS, RMBL; Fish Creek Mesa, B&S 203-62, B&S 399-62. With fronds over a yard long and ten inches wide, this is the largest and handsomest fern in the Basin and not to be confused with any other.

### Pteridium Gleditsch, The Brackens

Pteridium aquilinum (L.) Kuhn; widespread North American; subalpine; Schofield Pass, B 198-60 CS. In size, this is the only competitor of the preceding species in the Basin. But the competition is not very real since the fronds of P. aquilinum are only about half as long as

those of Athyrium Filix-femina, and since in any event it is a dryland species of open places, not a moistland plant of shaded places in the forest.

### Notholaena R. Brown, The Cloakferns

Notholaena Fendleri Kunze; cordilleran; submontane-montane; Lake Fork Canyon, W 9467A (1955) COLO; Cathedral, B 126-62. This and the next species are essentially plants of cliff crevices. Both species have brown, thin, wiry stems, and both species grow to about the same size. But the undersurfaces of the leaves of N. Fendleri are white with a dense, granulated powder; those of Cheilanthes Feei tan with an upholstery of crinkled hairs.

### Cheilanthes Swartz, The Lipferns

Cheilanthes Feei Moore; cordilleran; submontane-montane; Lake Fork Canyon, B 47-60 CS, B&S 113-62; Henson Creek Canyon, B&S 66-7. For the differentiation of this plant the reader is asked to turn to the preceding species.

### Cystopteris Bernhardi, The Bladderferns

Cystopteris fragilis (L.) Bernhardi; boreal; submontane-alpine; Lake Fork Canyon, B 46-60; Almont, Ke 6/22/49 WS; Cathedral, S 62-9; Los Pinos Pass, B 652-62; Gothic Natural Area, Ew 11777 (1938) COLO; Old Monarch Pass, B 150-59. Without doubt this is the most frequent and widespread fern in the Basin. In the alpine zone, the delicate fronds shrink to a couple of inches--about the length of the incremental rootstock from the end of which they arise. Yet in the Lake Fork Canyon the fronds are a foot and a half long. The technical means of making sure that the fern is a cystopteris can be found at the end of a frond, where the pinnae are youngest. There, on the underside, one will find with the help of a handlens an immature sorus with a small



scale arching over only a part of it. This is all that remains of the original protective covering called an indusium. The species grows both in sun and in shade.

### Cryptogramma R. Brown, The Rockbrakes

Cryptogramma crispa (L.) R. Brown [C. acrostichoides R. Brown]; cordilleran; submontane-subalpine; Almont, Ke 6/29/49 WS; Cathedral, B 685-62; Whitmore Falls, S 62-43; Gothic Natural Area, B 67f-54; Virginia Ridge, B 70h-54. This species is a close runner-up of the preceding with respect to frequency of occurrence and wideness of range. If it falls short, this is because it apparently does not enter the alpine zone and because its habitat seems to be restricted to open rocky places. Its sori are borne on specialized fronds that rise above the rest of the plant, and the vegetative fronds are parsleylike and often of a peculiarly vivid green.

Cryptogramma Stelleri (Gmelin) Prantl; boreal; subalpine; Schofield Pass, W 9163 (1955) COLO. C. Stelleri is altogether a rarer and more delicate plant than C. crispa. In fact, since like Cystopteris fragilis, and unlike Cryptogramma crispa, its fronds arise from a creeping rootstock, one might think it another cystopteris except for the specialized, spore-bearing fronds. The plant has been collected in North Pole Basin as well as in Schofield Pass; but in both places it showed a preference for moist ledges in spruce-fir openings.

### Dryopteris Adanson, The Oakferns

Dryopteris disjuncta (Ledebour) C.V. Morton [Phegopteris Dryopteris (L.) Fée]; boreal; subalpine; Schofield Pass, W 9164 (1955) COLO, B 63b-55 (= W 9164). The common oakfern of northeastern North America is very uncommon in the Gunnison Basin; in fact the above station (which was also the station for Cryptogramma Stelleri) is the only known site for either of these plants in the Basin. The oakfern springs from a slender branching rhizome, and at the summit of its culm bears