an equilaterally triangular leaf which in turn is composed of three smaller, but similar, triangular leaflets.

Dryopteris Phegopteris (L.) Christensen; boreal; montane; Cement Creek Valley, L 622-48 COLO. This is the common beechfern of northeastern North America, and is quite as uncommon in the Gunnison Basin as the oakfern. But whereas the oakfern is a delicate, membranous plant of moist openings in the subalpine zone, the beechfern is a thicker-textured plant of drier ledges in the montane zone. Its compound leaf, instead of being an equilateral triangle composed of three lesser equilateral triangles, is a single isosceles triangle, with the pinnae of each half being the mirror images of the pinnae of the other half. It also springs from a branching rhizomatous root.

Polypodium L., The Polypodies

Polypodium vulgare L.; boreal; montane-submontane; Spring Creek Campground, Htm 1653 (1959) COLO; Sapinero, Wh 631 (1898) COLO. The common polypody is easy to recognize. Whereas in the beechfern the pinnae on one side of the rachis are the mirror images of those on the other, in the common polypody they alternate with those of the other. Furthermore they are not only simple but confluent with one another down each side of the rachis.

Polystichum Roth, The Shieldferns

Polystichum Lonchitis (L.) Roth; boreal; subalpine; Oh-be-Joyful Creek Valley, B 260-60 CS; Schofield Pass, S 66-169. It is curious that this vigorous species, so much like the Christmas fern of eastern North America, should be as infrequent as it is in the Gunnison Basin. Judging from the isolated, sheltered ledges upon which it grows in the spruce-fir zone, one would think it was escaping predators of some sort. It is popularly known as the hollyfern, and one will note that its pinnae do resemble the leaves of the holly. The other popular name

of shieldfern comes from the round indusia, or protective scales, which look like small buttons attached in the middle of the immature sori.

Woodsia R.Brown, The Woodsias

Woodsia oregana D.C.Eaton; boreal; submontane-subalpine; Lake Fork Canyon, W 9321 (1955) COLO; Razor Creek Canyon, B&S 66-47; South Beaver Creek drainage, B&S 72-66; Gothic, S 65-173 RMBL; Gothic Natural Area, S 64-207. Widespread in the Gunnison Basin, this is a species of rock crevices, rockslides, and dry rocky places. At first glance, the plant might be taken for Cystopteris fragilis, for the fronds of the two species are much alike. But the conspicuous caespitose habit of this fern is totally unlike the rhizomatous habit of C. fragilis. Furthermore a glance at the underside of a frond with a handlens will reveal that here there is no indusium at all, not even the vestigial indusium of C. fragilis. On the contrary, the edge of the leaf itself rolls over the immature sorus to protect it until it approaches maturity.

PORTULACACEAE, The Purslane Family

Claytonia L., The Spring Beauties

Claytonia lanceolata Pursh; cordilleran; alpine-montane; Avery Peak, L 460-48 COLO; Kebler Pass, K 545 (1947) DBG; Copper Creek Valley, K 1241 (1948) DBG; Gothic, B 8b-54. C. lanceolata so much resembles the spring beauty of eastern North America (C. virginica) that a popular account of the latter will serve to identify the cordilleran species. The differences have to do with such details as the shape of the small sepals or the number of the thin stems coming out of the globose corm. As a matter of fact the stems are so thin just above the corm that it seems impossible to collect plant and corm together. As for the species in question, it is a twin-leaved plant rising about three inches above the ground

and bearing above the paired lanceolate leaves a loose raceme of small white flowers.

Claytonia megarrhiza (Gray) Parry; cordilleran; alpine; Mt. Belleview, Shp 7/3/58 RMBL; East Maroon Pass, B 230-52; Castle Peak, Ew 11738 (1938) COLO; Carson Pass, B&S 268-65. C. lanceolata is so close to the common conception of a spring beauty that almost any account will serve to distinguish it. C. megarrhiza, however, is a different matter. It grows a couple of inches taller, and most of the leaves are basal--broad, succulent, spoon-shaped affairs at the ends of long petioles. The loose racemes of the small white flowers are also basal, and bear one or two smaller leaves. In the alpine scree where it grows, the plant forms clumps sometimes the better part of a foot in diameter. But let no man attempt to remove the root without a shovel.

Lewisia Pursh, The Bitterroots

Lewisia pygmaea (Gray) Robinson; cordilleran; alpine-montane; Cumberland Pass, B 38b-54; Slumgullion Mesa, B 210-65; Schofield Pass, R 10060 (1959) CS; Oh-be-Joyful Creek, S 64-94 RMBL. L. pygmaea is not the famous breadroot plant of the plains and the state flower of Montana, but another species with longer leaves and smaller flowers. In the alpine zone the linear leaves grow erect, while the pedicels of the small, white or pink flowers radiate horizontally from the summit of the root. In the montane zone, the leaves are longer and the pedicels arch out and up. The root is often interestingly forked, and the sepals have small teeth at the summit.

Lewisia triphylla (Watson) Robinson; cordilleran; subalpine; Emerald Lake, Ke 7/4/49 WS. This little plant seems more of a claytonia than a lewisia. Instead of having a fleshy root and basal leaves, it has a globular corm and only stemleaves--in fact just three of them (as indicated by the specific name), which occur a short distance below the loose raceme of portulacaceous flowers.

Montia L., The Water Spring Beauties

Montia Chamissoi (Ledebour) Durand & Jackson; cordilleran; montane; Crested Butte, B 109-60 CS, RMBL. The stems of M. Chamissoi, a delicate plant of muddy streambanks, grow about five inches high and at the top bear two or three pinkish portulacaceous blossoms. The stems are clothed with six or seven pairs of smooth oblanceolate leaves; but most remarkable are the thread-like runners which the plant sends out hither and yon from the lower nodes of the stem. I regret to report that the station of the above collection was destroyed in the building of the new road to the ski resort at Crested Butte. But although I know of no other station for the plant in the Gunnison Basin, it is inconceivable to me that the plant is not growing on some other muddy streambank, perhaps not too distant from the old one.

Portulaca L., The Purslanes

Portulaca oleracea L.; adventive; submontane-montane; Powderhorn, B 148-64; Waunita Hot Springs, S 65-27 RMBL. This is that common purslane from which, gathered in his cornfield and boiled and salted, Thoreau made a "satisfactory dinner" at Walden Pond. It is curious that in the Gunnison Basin it should be found growing in a sandy sagebrush waste and over warm, mineral-spring pools. By exception the plant does not have white or pink, but yellow, flowers. When not growing over a pool, it grows prostrate upon the ground and branches at a frequently wide and distinctive angle.

PRIMULACEAE, The Primrose Family

Androsace L., The Rock Jasmines

Androsace septentrionalis L.; boreal; alpine-submontane; Conundrum Pass, B 45-54; Schofield Pass, B 82-52; Gothic, Wi 10072 (1954); Fish Creek Valley, B&S 365-62; Tenmile Springs, B 31-65 RMBL; Almont, Ke 6/22/49

WS. The only species of its genus to occur in the Gunnison Basin, A. septentrionalis is common over the whole Basin, at all elevations, and in a variety of habitats. Its foliage is confined to a basal cluster of toothed oblanceolate leaves; but its stems are green and photosynthetic and frequently account for four-fifths of the plant. Essentially, each stem supports an umbel of flowers or fruits. But these umbels can be reduced to a single flower, or they can become vast brooms twice as long and twice as broad as the length of the peduncle beneath them. I am sure that these variations have phenotypic significance, although I do not know what it may be. The plant, of course, undergoes the common reduction in size in the alpine zone, producing flowers at heights of less than an inch. In the lower zones, the plant grows six or seven inches high. The flowers are white.

Dodecatheon L., The Shooting Stars

Dodecatheon pulchellum (Rafinesque) Merrill; cordilleran; montane-submontane; Crested Butte, B 98-60 RMBL; Cathedral, B&S 84-62; West Pass Creek Valley, H 9052 (1959) CS; Parlin, H&Sm 1272 (1945) CS. The shooting star is one of the best known wildflowers in North America, and is recognized at once by all botanical visitors to the Gunnison Basin. The Gunnison Basin species is a plant of wet places only, and seems to be as frequent along irrigation ditches and in irrigated fields as in wilder surroundings. The flowers are pink.

Glaux L., The Sea Milkwort

Glaux maritima L.; boreal; montane; Cebolla Hot Springs, B&S 443-62, S 64-28 RMBL (two stations). The sea milkwort, which represents a monotypic genus, has an appropriately individual habit of growth. Above a cluster of roots, the largely underground stem rises vertically, finally being surmounted by a cluster of branches that balance the cluster of roots beneath. The plant is only a few inches high, and bears its small pink

blossoms singly in the axils of the leaves.

Primula L., The Primroses

Primula angustifolia Torrey; southwestern; alpine; Cumberland Pass, L 1281 (1951) COLO; Tin Cup Pass, B 163-61. This beautiful alpine plant also grows no more than a few inches tall. The leaves are oblanceolate and entire, and both leaves and flowers are essentially basal, although a peduncle will occasionally bear two flowers instead of one, and occasionally a small leaf. The blossoms are red with a yellow eye, and the lobes of the salverform corollas are notched.

Primula incana Jones; cordilleran; submontane; Parlin, E (1887) COLO; Sapinero, Wh 539 (1898) COLO. P. incana has the same habit as Dodecatheon pulchellum, that is, more or less the same proportion of basal leaves, scape, and terminal flower cluster. But with the strikingly white, farinose undersides of its leaves, and the similarly farinose backs of the sepals, the plant cannot be confused with any other in the Basin. Its flowers are lilac, and it grows in moist meadows.

Primula Parryi Gray; cordilleran; alpine-subalpine; East Maroon Pass, B 230a-52; Mineral Mtn., B 379-62; Marshall Pass, Fe 515 (1902) CS; Copper Creek Valley, L 437-48 COLO. By all odds the stoutest and most vigorous representative of its family in the Gunnison Basin, this species is by no means uncommon in the alpine and upper subalpine zones. Its one-sided cluster of large, reddish-magenta flowers clears the group of large, erect basal leaves, and the plant can often be seen from a great distance growing beside a stream or alpine tarn.

RANUNCULACEAE, The Buttercup Family

Aconitum L., The Monkshoods

Aconitum columbianum Nuttall; cordilleran; submontane-subalpine; Sapinero, Wh 619 (1898) COLO; Gothic,

B 107-52; Powderhorn, B 204-65; Mill Creek (south), B&S 297-62. This, the only monkshood in the Gunnison Basin (as well as in the state of Colorado and the West generally), is both widespread and frequent. It might seem that in the West the genus is on the way out. But in the Gunnison Basin, A. columbianum is anything but on the way out, and suggests that its exclusiveness is due to a superior adaptation. It is an inhabitant of moist, bushy or grassy meadows from the Basin floor to the spruce-fir zone, and occasionally has poisoned cattle.

Actaea L., The Baneberries

Actaea rubra (Aiton) Willdenow [A. arguta Nuttall]; boreal; montane-subalpine; Gothic, Ew 11,771 (1938) COLO; Spring Creek (north), Ke 7/30/49 WS; Cathedral, B&S 171-62, 607-62 (one station). The red baneberry enjoys a similar exclusiveness in the mountains of the West. But in the Gunnison Basin it is neither so frequent nor so widespread as Aconitum columbianum, perhaps because its habitat of moist thickets (whether in the shade or in the open) is less common. But I would look for the cause in its being a plant of boreal rather than of cordilleran origins. The berries of Actaea rubra may be white as well as red.

Anemone L., The Windflowers

Anemone globosa Nuttall; cordilleran; montane-alpine; Kebler Pass, B 34b-55; Slumgullion Mesa, B&S 139-62; Razor Creek Canyon, B&S 62-66. This widely distributed anemone with a tolerance for dryish places may be recognized by the globose heads of its fruits. The flowers are usually red, occasionally a pinkish- or a yellowish-white.

Anemone lithophila Rydberg; cordilleran; alpine; Conundrum Pass, B 42d-54; North Italian Mtn., B 79a-54; Virginia Basin, B 7-67. The heads of this alpine species are prolate spheroids, and the flowers are blue. It is inconceivable to me that any one who knows the plant could take it as a variety of the preceding.

Anemone narcissiflora L. [A. zephyra Nelson]; cordilleran; alpine; Virginia Basin, B 152-52; Tin Cup Pass, B 162-61; Fossil Ridge, L 1365 (1951) COLO. Whereas A. lithophila is a plant of exposed dryish places in the alpine zone, A. narcissiflora is a plant of moist alpine meadows. Its large white blossoms in umbellate clusters at the top of the stem make it the easiest of the Gunnison Basin windflowers to identify.

Anemone parviflora Michaux; boreal; alpine; Matchless Mtn., L 1306 (1951) COLO; Virginia Basin, B 6-67. This low alpine plant, with never more than one flower proceeding from the involucre of leaves on the stem, is the rarest of the Gunnison Basin anemones and always a delight to the plant collector.

Anemone patens L. [Pulsatilla ludoviciana (Nuttall) Heller]; boreal; submontane-alpine; Sapinero, Wh 580 (1898) COLO; Powderhorn Divide, B&S 29a-62; Marshall Pass, B 89-61; Virginia Col, K 1284 (1948) DBG. This, the well-known pasque flower of the northern prairies, is omnipresent in the Gunnison Basin. The large spherical heads, composed of achenes with long feathery tails, will catch the botanical visitor's eye if he comes too late for the large bluish blossoms.

Aquilegia L., The Columbines

Aquilegia caerulea James; cordilleran; submontane-alpine; Sapinero, Wh 600 (1898) COLO; Virginia Col, K 1283 (1948) DBG; Devil's Hole, B&S 285-62. The blue columbine, which is also the Colorado state flower, is widespread in the Gunnison Basin. It attains its greatest luxuriance in the aspen forests of the southern half of the Basin.

Aquilegia elegantula Greene; southwestern; submontane-subalpine; Waunita Hot Springs, E (1888) COLO; Sapinero, Wh 560 (1898) COLO; Gothic, B 36-55; Cathedral, S 64-27. Closely resembling the common red columbine of the East, this species is found in denser forest

than the blue columbine, but does not, as far as I know, ascend to the alpine zone.

Caltha L., The Marsh Marigolds

Caltha leptosepala DC.; cordilleran; montane-alpine; Gothic, B 28-52; Marshall Pass, Fe (1902) COLO; Slumgullion Mesa, B&S 142-62. The marsh marigold of Colorado and the Gunnison Basin is white, not gold, and in the Basin, seeks out moist open places in the cooler parts. Its petals are conspicuously strap-shaped.

Clematis L., The Clematises

In the East, the genus Clematis has such quaint popular names as "virgin's bower" and "traveler's joy." But in the Gunnison Basin I have heard no name other than "clematis," not even "leather flower."

Clematis hirsutissima Pursh; cordilleran; submontane-montane; Mill Creek (north), B 18-55; Sheep Gulch, B 11-61; Ninemile Hill, B 11-66. This species, unlike the other two, which are essentially vines, forms a small bush. Its "leather flowers" are large, the recurved tips of the sepals being a dark purple.

Clematis ligusticifolia Nuttall; cordilleran; montane; Elk Creek Valley, B&S 66-226. A trailing vine with sprays of small white flowers, this species is a conspicuous plant, but seems to be rare in the Gunnison Basin.

Clematis pseudoalpina (Kuntze) Nelson; cordilleran; montane; Pine Creek Mesa, B 33-60 CS, RMBL; Signal Peak Ridge, B 13-61; Cathedral B 63-64. This species is a climbing vine with large flowers like paper lanterns. It apparently must have the shade, whether partial or full, of aspens, Colorado spruce, or Douglas fir.

Delphinium L., The Larkspurs

Delphinium Barbeyi Huth; cordilleran; montane-alpine;

Lake Irwin, E (1891) COLO; Gothic, W 9175 (1955) COLO; Alpine Pass, Fe (1905) COLO. This delphinium grows as much as two feet high, the dark-purple inflorescence being disproportionately small in comparison with the stem and leaves. In the Basin, the plant is apparently restricted to the Elk Mountains.

Delphinium Nelsonii Greene; cordilleran; montane-submontane; Gothic, S 62-31; Vulcan, B 22-64; Sapinero, Wh 484 (1898) COLO. The exact opposite of the above species, D. Nelsonii is a spring flower with tuberous roots instead of a summer flower with woody roots. Its blossoms are a dark blue instead of a dark purple, the plant itself is short rather than tall, and the inflorescence is not disproportionately small in comparison with the vegetative plant.

Delphinium ramosum Rydberg; cordilleran; montane-subalpine; Monchego Park, B 91-55; Cathedral, B&S 547-62; Mill Creek, S 62-52; Cabin Creek Cow Camp, B 146-60 CS, RMBL. The prevalent large larkspur in the southern half of the Basin, D. ramosum has light-blue flowers and finely dissected leaves. It is known to have poisoned cattle in its part of the Basin.

Myosurus L., The Mousetails

Myosurus minimus L.; widespread North American; montane; Gothic, L 4493 (1959) RMBL; Cathedral, B 7-64 RMBL. This plant, with its linear leaves and slender fruiting spikes like a mouse's tail, is seldom more than two and a half inches high. It inhabits moist, open places.

Ranunculus L., The Buttercups

The aquatic buttercups

Ranunculus aquatilis L.; boreal; submontane-subalpine; Sapinero, Wh 475 (1898) COLO; Jack's Cabin, M 1652 (1952) CS; Sargents, B 56-55; Horse Park, B 118-64. In this species, the leaves do not rise above the

surface of the still or running water in which the plant is found, but the white flowers do, allowing the species to be recognized from the shore. This is the only white-flowered buttercup in the Gunnison Basin.

Ranunculus Gmelinii DC.; boreal; submontane-montane; Gunnison, Be (1897) CS; Powderhorn, B&S 569-62. With its small, cartwheel-like leaves, this plant cannot be missed. It seems to like the habitat of irrigation ditches.

Ranunculus natans C.A.Meyer; cordilleran; submontane-montane; Parlin, E (1888) COLO; Crested Butte, W 9338 (1955) COLO; Spring Creek (south), B 129-65. The leaves of this plant are three-lobed, sometimes compoundly so, and it also cannot be missed. It apparently prefers the habitat of small pools.

The bog buttercups

In this classification, "bog" does not mean merely a moist place (most buttercups are found in moist places), but a swampy place where the footing is precarious.

Ranunculus Cymbalaria Pursh; boreal; submontane-montane; Gold Basin Creek, B 61-59; Grant Lake, B 183a-59; Cathedral, S 62-20. With its small crenate leaves, conspicuous mound of achenes, and long strawberry-like runners, this buttercup is unmistakable.

Ranunculus Flammula L.; boreal; submontane-montane; Parlin, D 14, 283 (1963) RMBL; Gothic, B 16-55, 114-59. For the most part, this plant in the Gunnison Basin consists of a single threadlike runner lying flat on the mud. At the nodes it sends up a few small leaves, and at the end, bears its small flower.

Ranunculus Macounii Britton; boreal; montane; Gothic, S 64-203 RMBL; Beaver Creek (south), B&S 88-65. This is a large, coarse plant with tripartite leaves, the parts of which are further dissected and frequently on petiolules. On occasion, the plant produces runners.

Ranunculus sceleratus L.; boreal; submontane-montane; Gunnison, B 156-61; Parlin, D 14, 276 (1963) RMBL; North Beaver Creek (south), B&S 585-62. R. sceleratus is also a large, coarse plant, with the leaves often showing three main divisions; but here the similarity ends. For R. sceleratus is glabrous (R. Macounii is pubescent), and none of the leaf divisions are on petiolules.

The alpine buttercups

Ranunculus adoneus Gray; cordilleran; alpine; Crystal Peak, B 33-54; Mt. Peck, B 77-60 CS. With its brilliant yellow corollas as much as an inch and a quarter in diameter, and its leaves like finely dissected seaweed, this species is easily the most spectacular buttercup in the Gunnison Basin. Its favorite habitat is in the runoff of melting snowbanks.

Ranunculus Macauleyi Gray; southwestern; alpine; Ohio Peak, B 39-55; Slumgullion Mesa, B&S 135-62; Calf Creek Plateau, B&S 84-66. Rare in the northern half of the Basin, this species is a common alpine plant in the southern half at elevations of 12,000 feet or higher. It may be told by its brown sealskin calyces, and by its narrow, oblong, and for the most part tridentate leaves.

Ranunculus pygmaeus Wahlenberg; boreal; alpine; North Italian Mtn., W&L 9271 (1955) COLO. In the Gunnison Basin, this buttercup is known only from the above station, where it grows to the height of one inch. It may be recognized by its one-flowered stems and three- to five-lobed minute leaves.

The drought-tolerant buttercup

Ranunculus cardiophyllus Hooker; cordilleran; montane-alpine; Cathedral, B 16-64; Dry Lake Park, B&S 54-62; Snow Mesa, B&S 327-62; Devil's Lake, B 30-64. In 1964, the June drought was more intense than usual. Yet in the unirrigated grasslands around Cathedral, this species bloomed as usual and was the only plant to do so. It is a pubescent buttercup, with its leaves passing from mere crenation at the base to linear segmentation at the top.

The ones that are left

The five species that are left are, as may be expected, median in all respects. They are found in moist places (but not bogs), they are at home in the montane and subalpine zones (but may extend above or below), they may be tolerant of shade (but not of dense shade), and so on.

Ranunculus alismaefolius Geyer; cordilleran; montane-subalpine; Ohio Pass, K 603 (1947) DBG; Gothic, B 73-61; Rustler's Gulch, L 851 (1950) COLO. With its entire leaves (longer than broad), and its narrow, strap-shaped petals, this species is easy to recognize.

Ranunculus Eschscholtzii Schlechtendal; cordilleran; subalpine-alpine; Schofield Pass, Sh 56-25 RMBL; Rustler's Gulch, L 883 (1950) COLO; East Maroon Pass, B 231e-52. The pubescence of this plant beneath the calyx is of a light golden color; but the way I tell it in the field is by the false involucre of leaves a short distance below the blossom.

Ranunculus inamoenus Greene; cordilleran; submontane-alpine; Sapinero, Wh 574 (1898) COLO; Gothic Natural Area, B 34-64; Lujan Creek Valley, H 9043 (1959) CS; Mineral Mtn., B&S 374-62. This species of buttercup is both the most widespread and the most variable in the Gunnison Basin. The plants (like those of R. uncinatus) vary in height from a few inches to considerably more than a foot, and the leaves vary from mere crenation at the base of the plant to complete dissection at the top. The achenes, always conspicuous, are pubescent.

Ranunculus ranunculinus (Nuttall) Rydberg; cordilleran; submontane-montane; Sapinero, Wh 402 (1898) COLO; Jack's Cabin Pass, B 20b-57; Waunita Hot Springs, E (1887) COLO; Fish Creek Mesa, B&S 99-62. This buttercup can easily be recognized in the field by the parsley-like foliage at the base of the plant, and by the flower stems which divide into peduncles about halfway up, the peduncles often further dividing into pedicels.

Ranunculus uncinatus D.Don; cordilleran; montane-subalpine; Ohio Creek, K 587 (1947) DBG; Gothic, B 196-

61; Rustler's Gulch, L 852 (1950) COLO. This buttercup grows as tall as R. Macounii, but can be distinguished by the peculiar combination of inconspicuous flowers and conspicuous globular heads of glabrous achenes. The leaves and petioles are pubescent; but the main stems can be surprisingly glabrous.

Thalictrum L., The Meadow Rues

Thalictrum alpinum L.; boreal; alpine; Baldy Chato, B&S 257-62; Calf Creek Plateau, B&S 82-66; Cement Creek Valley, S 65-44; Razor Creek Park, B&S 66-51. The meadow rues all bear a strong resemblance to one another, and this small alpine species will be instantly recognized. Its flowers are perfect.

Thalictrum Fendleri Engelmann; cordilleran; montane; Gothic, B 99-52; Glacier, K 522 (1947) DBG; Devil's Hole, B&S 162-62; Cathedral, B 85-66. Although apparently limited to the montane zone, this meadow rue is by all odds the most frequent in the Gunnison Basin. Its flowers are dioecious.

Thalictrum sparsiflorum Turczaninow; cordilleran; montane-subalpine; Cebolla Creek Campground, W 12,147 (1964) COLO; Cathedral, B 169-65 RMBL; Capitol City, S 66-125. This species, which has perfect flowers, may be identified by its strongly ribbed follicles and, if carefully collected, by the bright-yellow rhizomes advancing underground for the next year's plant.

Thalictrum venulosum Trelease; boreal; submontane; Sapinero, Wh 575 (1898) COLO; Almont, Ke 6/22/49 WS. This species has dioecious flowers and may be recognized by its thick, often revolute leaflets, which are strongly veined underneath.

Trollius L., The Globeflowers

Trollius laxus Salisbury; boreal; subalpine-alpine; Gothic, B 8a-54, 25a-54; Kebler Pass, K 557 (1947) DBG; Slumgullion Mesa, B&S 143-62. With its large, white

blossoms and luxuriant, dark-green leaves, this species is one of the most striking in the Gunnison Basin. The only plant it could be confused with is the white marsh marigold; but the leaves of the white marsh marigold are light green and entire, and its petals are strap-shaped. As with Chamaerhodos Nuttallii in the Rosaceae, Trollius laxus seems to be the only American species of an essentially Eurasian genus.

RESEDACEAE, The Mignonette Family

Reseda L., The Mignonettes

Reseda lutea L.; adventive; montane; Powderhorn, B 204a-65 RMBL. To one unfamiliar with this plant it might well at first glance seem to be a crucifer, say, a new lepidium or sisymbrium. But closer inspection will reveal the horned, Triglochin-like fruits, probably the most striking character of the species, and there is also a distinctive leaf--a long, linear affair with two linear arms not quite at right angles.

RHAMNACEAE, The Buckthorn Family

Ceanothus L., The New Jersey Teas

Ceanothus Fendleri Gray; cordilleran; montane-submontane; Roaring Judy Gulch, L 458 (1949) COLO; Ohio City, B 127-64; Vulcan, B 167-65 RMBL; Willow Creek Mesa, B 122-65 RMBL. This particular New Jersey tea is a handsome shrub with a gray bloom on the branchlets, and gray-green leaves of two hues, top and bottom. The twigs frequently end in thorns, and the small white flowers are displayed in umbel-like clusters.

ROSACEAE, The Rose Family

Amelanchier Medicus, The Juneberries

Once again, the sample is equal to the whole. The three species of Amelanchier found in the Gunnison Basin are the three species found in the state of Colorado. That the three are of cordilleran origin is surely a factor. But undoubtedly there are other reasons, reasons perhaps dealing with Amelanchier itself.

Amelanchier alnifolia Nuttall; cordilleran; montane-submontane; Blue Mesa, B 61a-55; Powderhorn, B 10-64; Cochetopa Park, H 9072 (1959) CS; Almont, Ke 6/22/49 WS; Gothic, S 65-169 RMBL. The alder-leaved juneberry can have been so named only because of the serrations of its leaf, for the leaf itself is roundish; in fact an occasional leaf can be found that forms a perfect circle. The species is the most widespread in the Gunnison Basin.

Amelanchier utahensis Koehne; cordilleran; montane-submontane; Sapinero, Wh 645 (1898) COLO; Signal Peak Ridge, B 19-61; Jack's Cabin Pass, B 9-54, 20c-57 (two stations); Oh-be-Joyful Creek Valley, S 64-91 RMBL. The leaves of the Utah juneberry are smaller and more oval than those of the alder-leaved juneberry, and the serrations do not proceed so far down the sides of the leaf. In the Gunnison Basin, the Utah juneberry is also much less frequent than the alder-leaved juneberry.

Amelanchier pumila Nuttall; cordilleran; montane-subalpine; Copper Creek, L 152-48 COLO; Schofield Pass, B 51-52; Gothic, D 14, 254 (1963) RMBL. This species, which seems to have been collected only in the vicinity of Gothic, is the easiest to recognize of the three. Its petals are the longest and whitest, and its leaves (as large as those of A. alnifolia) are oblong, with the serrations descending almost to the bottom.

Cercocarpus HBK., The Mountain Mahoganies

Cercocarpus montanus Rafinesque; cordilleran; submontane-montane; Hartman Rocks, B 25-59; Red Creek Valley, B 62-65; Steuben Creek Valley, B 175-65. This is not the well-known mountain mahogany of the Great Basin (which is commonly a small tree), but a lesser, shrubbier plant commonly known as feather bush. Each

flower has a single fruit with a feathery tail, and when the collector observes that the flowers have no petals but only a cuplike calyx, he will remember this plant if only for its oddity as a member of the rose family.

Chamaerhodos Bunge

Chamaerhodos Nuttallii Pickering; cordilleran; montane; Cochetopa Park, W 5780 (1950) COLO; Cathedral, B 223-62, S 62-70 (two stations). This small, obscure, brushy herb of dry places is so obscure as never to have received a common name. The five white petals are all but lost in the small, five-sepaled calyx, and the calyces themselves seem but the final brushing-out of this commonly vase-shaped little plant. As with Trollius laxus in the Ranunculaceae, Chamaerhodos Nuttallii seems to be the only American species of an essentially Eurasian genus.

Crataegus L., The Hawthorns

This genus is legendary among botanists for the number and difficulty of its species. Fortunately, only three have been collected in the Gunnison Basin, and only one of these is at all frequent.

Crataegus erythropoda Ashe; cordilleran; submontane; Quartz Creek Valley, B 128-64. Apparently partial to the granitic soils and warming cliffbacks of the pre-Cambrian center of the Basin, this species can be recognized by its smooth stems and by its leaves, which are glabrous even under a handlens. The upper surface of the leaves is a darker green than the lower.

Crataegus rivularis Nuttall; cordilleran; submontane-montane; Sapinero, Wh 532 (1898) COLO; Hot Springs Creek, B 83-61. Frequenting the banks of streams, this hawthorn has stems that are rough, leaves that are not really glabrous when viewed under a handlens, and finally, leaves that are pretty much the same color, top and bottom.

Crataegus saligna Greene; southwestern; submontane; Lake Fork Canyon, B 37-60; Gold Basin Creek Valley, B 16-59; Gunnison, B 331-61; Parlin, W 9433 (1955) COLO. This is the common species of the Gunnison Basin, and the most adaptable, whether to open streambanks or to the shade of dryland cottonwoods. It is entirely different from the two preceding species, having small, profuse, willowlike leaves (that is what the name saligna means), smaller thorns, and blue fruits.

Dryas L., The Mountain Avenses

Dryas octopetala L.; boreal; alpine; Avery Peak, L 842 (1950) COLO; Tin Cup Pass, B 164-61; Mineral Mtn., B&S 527-62; Slumgullion Mesa, B 139-61. The eight-petaled, white corolla, often an inch in diameter, makes this species a conspicuous member of the alpine flora. But the elongated ellipses of its crenate leaves, green and glabrous on one side, white and tomentose on the other, serve equally well as a diagnostic.

Fragaria L., The Strawberries

Fragaria americana (Porter) Britton; cordilleran; montane; Gothic, R 10,074 (1959) RMBL; Cochetopa Creek, Ke 7/17/49 WS; Cathedral, B&S 210-62, B 64-64 (two stations). See Fragaria ovalis.

Fragaria ovalis (Lehmann) Rydberg; cordilleran; submontane-alpine; Schofield Pass, B 7e-54; Virginia Ridge, B 14c-54; Parlin, B 7-65; Fish Creek Valley, B&S 71-62. These two species (the only ones either in Colorado or the Gunnison Basin) can be separated by many characters. A diagnostic that seems never to fail is the tooth that ends the midvein of the leaflet. In F. ovalis it is shorter than the teeth on either side; in F. americana, it is longer. Again, in F. ovalis the petioles and the stolons are stouter. And still again, F. ovalis is the wider-ranging of the two species, at home in all the zones, and in fact sending out stolons at 12,500 feet!

Geum L., The Avenses

Geum triflorum Pursh; [G. ciliatum Pursh]; cordilleran; submontane-alpine; Sapinero, Wh 507 (1898) COLO; Ohio Creek, K 581 (1947) DBG; Waunita Park, B 16-66; Dry Lake, B&S 19-62; Slumgullion Mesa, B 258b-65. Finding its home in all prairies, whether moist or dry, G. triflorum is one of the most widespread of plants in the Gunnison Basin. The redness of its flowers comes principally from the sepals and bracts, and the flowers are by no means restricted to three. The leaves are highly dissected along a common rachis, and the long, horizontal, perennial root is especially typical.

Geum macrophyllum Willdenow; boreal; submontane-subalpine; Avery Flats, B 10d-54; Lujan Creek Valley, H 9041 (1959) CS; Cathedral, B&S 176-62; Almont, Ke 7/4/49 WS. The preference of this species is for moist meadows whether in the open or in partial shade. Its corollas are yellow (the calyces green), and the name macrophyllum, or large-leaved, comes from the enormous, three-lobed segment at the end of the rachis of the basal leaves.

Geum rivale L.; boreal; montane; Gothic, B 97-60 CS, RMBL; Crested Butte, W 9337 (1955) COLO; Cathedral, S 64-193. The least widespread of the Gunnison Basin geums, this species seems to be confined to streamsides in the montane zone. Here the calyces are purplish, the cream-colored corollas (as with G. triflorum) frequently being tinged with the color of the calyx.

Geum Rossii (R. Brown) Seringe [G. turbinatum Rydberg]; cordilleran; alpine-subalpine; East Maroon Pass, B 231f-52; Rough Creek Pass, B&S 620-62; Slumgullion Mesa, B 135-61; Mill Creek (south), B 53-61. G. Rossii is a common alpine plant in the Gunnison Basin, descending, in open places, to the subalpine zone. Its leaves are similar to those of G. triflorum, but the perennial root tends toward the vertical, and the blossoms are a bright yellow.

Holodiscus Maximowicz, The Rock Spiraeas

Holodiscus dumosus (Nuttall) Heller; cordilleran; montane-submontane; Copper Creek Valley, L 480-48 COLO: Taylor Canyon, B 179-52; Cochetopa Creek Valley, D&Wil 14,563 RMBL; Fish Creek Valley, B&S 403-62. The popular name of rock spiraea fits this plant perfectly. It looks like a spiraea, and it is found sprawling over sunny rocks, often in company with Rhus trilobata. The white flowers are very small, and the seeds very hairy.

Ivesia Torrey & Gray, The Ivesias

Ivesia Gordonii (Hooker) Torrey & Gray; cordilleran; alpine-subalpine; Elko Park, Ge 2238 (1955) COLO; Virginia Col, B 156-52; Cumberland Pass, Ke 7/30/49 WS. With its hemispherical heads of yellow, chaffy-looking flowers, this is always one of the first alpine plants to catch the eye of a newcomer to the Gunnison Basin. Its leaves (almost entirely basal) are compound and cylindrical, the leaflets being divided into small linear segments.

Physocarpus Maximowicz, The Ninebarks

Physocarpus monogynus (Torrey) Coulter; cordilleran; submontane; Sapinero, Wh 646 (1898) COLO. This Western ninebark is a rock-loving shrub with currantlike leaves. The flowers, in clusters, are small and white, and the fruits are pubescent.

Potentilla L., The Cinquefoils

Potentilla is a genus of unusual ecological and taxonomic interest in the Gunnison Basin. Its fifteen species form a significant part of the flora, and admirably illustrate that parceling out of the landscape discussed in the Introduction. When overlapping in area, they will almost

always be found to be staggered in flowering season, so that there is no overlapping in time if there is in space. In other regions, some of the species listed here are said to hybridize. This I have looked for in the Gunnison Basin and not been able to find. Surely, a Basin-wide study of the genus would yield a number of important ecologic truths.

Potentilla anserina L.; boreal; montane-submontane; Gothic, L 326 (1949) COLO; Sargents, B 57-55 RMBL; Dry Lake, B&S 226-62; Dutch Gulch, B&S 107-62; Sapinero, Wh 553 (1898) COLO. The popular name of this species is silverweed; but the source of the name is not immediately apparent in the field since the silvery parts of the plant are the undersides of the leaves, which face the ground. More immediately apparent is the lustrous green of the uppersides of the leaves, the bright yellow of the flowers, and especially, the red stolons that radiate from the plant in all directions over the moist ground.

Potentilla arguta Pursh; boreal; montane-submontane; Gothic, B 132-52; Glacier, K 529 (1947) DBG; Lake Fork Canyon, B&S 115-62. This plant, called sticky cinquefoil, will always be found to have collected dust and occasional insects in its sticky hairs. The petals are a yellowish-white, lighter in color than those of any other cinquefoil in the Basin.

Potentilla biennis Greene; cordilleran; submontane; Sapinero, Wh 481 (1898) COLO. The annual (or biennial) nature of this plant can be determined by a look at its root. It can be separated from the only other annual or biennial cinquefoil in the Basin by a look at the multicellular hairs of its stem. Those of the other species (P. norvegica) are not multicellular.

Potentilla concinna Richardson; cordilleran; submontane-alpine; Sapinero, Wh 487 (1898) COLO; Waunita Park, B 17-66; Cochetopa Park, B 25-57; Sawtooth Mtn., B&S 88-66; Cathedral, B 4-65. The basal leaves and flowering stems of this species radiate out from the root close to the ground, which is probably why, in the cold prairies of the Basin, the plant is often the first of the

spring to bloom. It may be told from P. Hippiana (with which it is confusable but which has pinnate leaves) by its palmate leaves.

Potentilla diversifolia Lehmann; cordilleran; montane-alpine; Copley Lake, B 111-60 CS, RMBL; Conundrum Pass, B 42e-54 RMBL; Mt. Ouray, B&S 125-66; Henson Creek Canyon, B&S 37-66. This widespread cinquefoil may be identified by its cuneate-bottomed, palmate leaflets without petiolules. There are five principal ones and usually two extra smaller ones; but the five large ones give the plant an unmistakable look.

Potentilla fruticosa L.; boreal; submontane-alpine; Sapinero, Wh 601 (1898) COLO; Virginia Basin, L 497 (1949) COLO; Cathedral, S 62-28; Horse Park, B 698-62. This, the only shrubby species of Potentilla in the world so far as I know, needs no introduction. It is extraordinarily widespread in the Gunnison Basin.

Potentilla gracilis Douglas; cordilleran; submontane-subalpine; Sapinero, Wh 629 (1898) COLO; Gothic, S 64-180 RMBL; Cottonwood Pass, I 19,030 (1961); Mineral Creek Valley, B 153-65 RMBL. This plant, occasionally called goldcup on account of a spot of darker yellow at the center of the fresh flower, has sessile palmate leaflets, and might be thought confusable with P. diversifolia; but it is not. The sessile leaflets of P. diversifolia are entire-edged toward the base, the leaflets of P. gracilis toothed nearly to the bottom. Again, P. gracilis is a much more pubescent plant. The undersides of its leaflets are usually white with pubescence, and the contrast between the white undersides and the green uppersides is the character most people use to tell this species in the field.

Potentilla Hippiana Lehmann; cordilleran; submontane-alpine; Gunnison, W 9329 (1955) COLO; Crested Butte, B 136-59; Cottonwood Pass, I 19,120 (1961); Mineral Creek Valley, B 154-65 RMBL; Fish Canyon Flats, B 173-66. This species grows both with P. concinna and with P. gracilis, and has been confused with them; but at least in the Gunnison Basin the confusion is needless.

For the leaves of P. concinna and of P. gracilis are palmate; those of P. Hippiana are conspicuously pinnate.

Potentilla nivea L.; boreal; alpine; Virginia Ridge, L 765 (1950) COLO; Cumberland Pass, P 4518 (1955) COCO; Slumgullion Mesa, B 206-65. The trifoliate leaves (green above and white below) make this plant easy to identify. Of course, the leaflets are of the cinquefoil, not the trefoil, variety; that is, they are elliptical to oblong, and toothed on either side.

Potentilla norvegica L. [P. monspeliensis L.]; boreal; montane-submontane; Crested Butte, R 10,331 (1959) RMBL; Parlin, W 9448 (1955) COLO; Gold Basin Creek, B 74-65 RMBL; Beaver Creek (south), B&S 612a-62. This species was discussed with P. biennis, its fellow annual (or biennial) in the Gunnison Basin.

Potentilla palustris (L.) Scopoli; boreal; subalpine; Leechmere, W&B 9363 (1955) COLO; Lily Lake, B 208-60. This semi-aquatic potentilla may be known at once by its dark-purple blossoms. Although unknown in the rest of Colorado, it is not infrequent in the West Elk Mountains.

Potentilla pensylvanica L.; boreal; submontane-alpine; Sapinero, Wh 485 (1898) COLO; Doctor Gulch, L 3884 (1954) COLO; Sargents, R 10,619 (1959) CS; Mineral Creek, B 155-65; Devil's Lake, B&S 638-62. Widespread in the Gunnison Basin, this plant is not difficult to identify. It is the brushiest herbaceous potentilla in the Basin, with many ascending basal leaves and a number of ascending flowering stems bearing a profusion of yellow blossoms half-hidden in the green calyces. The leaves are pinnate, the pinnae being regularly and deeply pinnatifid.

Potentilla plattensis Nuttall; cordilleran; montane-submontane; Ohio City, W 9148 (1955) COLO; Sargents, B 58-55 RMBL; Cathedral, S 66-31; Gold Basin Creek, B 52c-57 RMBL. This is the least brushy of the Gunnison Basin herbaceous potentillas. Its weak flowering stems are apt to rest on the wet ground for support as they radiate out from the central root. The pinnate

leaves are as finely dissected as those of the carrot.

Potentilla quinquefolia Rydberg; cordilleran; alpine; Virginia Col, Sh 56-77 RMBL; North Italian Mtn., W&L 9285 (1955) COLO; Slumgullion Mesa, B 207-65. This species is much like P. nivea, but the plant is taller and more open, the leaves are less densely green above and white beneath, and the leaflets are five instead of three.

Potentilla rubricaulis Lehmann; cordilleran; alpine; Virginia Ridge, B 14b-54 RMBL; Gothic Mtn., B 60d-55; North Italian Mtn., L 391 (1949) COLO. P. rubricaulis is like a miniature P. pensylvanica, for the leaves are similarly pinnate with the pinnae deeply pinnatifid. But this dissection of the leaves is all within the bounds of an inch or two, and the little leaves are also much more hairy.

Prunus L., The Cherries, Plums, and Peaches

Prunus virginiana L.; boreal; montane-submontane; Cement Creek, L 67 (1949) COLO; Jack's Cabin Pass, B 20a-57; Hartman Rocks, B 26-59; Fish Creek Valley, B&S 74-62. In the upper montane zone (as in the last collection cited), this plant grows luxuriantly, with racemes of white blossoms four inches long. In the drier habitats of the submontane zone, it grows more compactly and the racemes shrink to an inch or an inch and a half. But the plant is still the common chokecherry of the East, and easily recognizable as such.

Purshia DC., Antelope Brush

Purshia tridentata (Pursh) DC.; cordilleran; montane-submontane; Roaring Judy Creek, L 468 (1949) COLO; Parlin, E (1889) COLO; Sargents, R 10,235 (1959) CS; Powderhorn Divide, B&S 25-62. With its small tridentate leaves, small yellow flowers, and conical, monocarpellary fruits, this low shrub is like no other in the Basin.

Rosa L., The Roses

Rosa Woodsii Lindley; cordilleran; montane-submontane; Gothic, B 36b-54; Gunnison, B 330-61; Cochetopa Park, H 9067 (1959) CS; Cathedral, B 695-62. The wild rose of the Gunnison Basin can vary from a small shrub on a rocky ledge in the upper montane zone to a tall bush, six feet high, growing in the shade of cottonwoods near Gunnison. Nevertheless, as careful study will show, all specimens are members of but one species.

Rubus L., The Blackberries and Raspberries

Rubus parviflorus Nuttall; cordilleran; subalpine; Ohio Pass, B 74a-59. The specific name of this raspberry means small-flowered. But the five-petaled white blossoms, as much as an inch and a quarter in width, are small only in comparison with the large, maple-like leaves, which are as much as six inches in diameter. Leaves and flowers make the shrub unmistakable.

Rubus strigosus Michaux; boreal; montane; Granite Basin, L 139 (1949) COLO; Cebolla Camp Ground, B&S 181-62. This, the only other raspberry in the Basin, is much more typical. The canes are covered with prickles (R. parviflorus is devoid of them), and the leaves are trifoliate.

Sibbaldia L., Sibbaldia

Sibbaldia procumbens L.; boreal; subalpine-alpine; Schofield Pass, B 191-52; Cumberland Pass, Sh 56-48 RMBL; Slumgullion Mesa, B 134-61; Capitol City, S 64-57. This monotypic genus is popularly as well as scientifically known by the name derived so long ago by Linnaeus from that of the Scottish physician, Sir Robert Sibbald. A low ground plant with trifoliate, tridentate leaves, one might mistake it for a potentilla except that the yellow petals are minute in comparison with the sepals and that its trailing, procumbent habit seems unlike that of a potentilla.

Sorbus L., The Mountain Ashes

Sorbus scopulina Greene; cordilleran; subalpine-montane; Kebler Pass, K 569 (1947) DBG; Schofield Pass, B 55-52; Gothic, L 225 (1949) COLO. With its cymes of white flowers often more than four inches in diameter, and its luxuriant, sumac-like foliage, this is one of the handsomest shrubs in the Gunnison Basin. It is only unfortunate that it seems to be confined to such a small portion of the Basin.

Spiraea L., The Meadowsweets or Steeplebushes

Spiraea caespitosa Nuttall; cordilleran; alpine-subalpine; Blaine Basin, L 91-48 COLO; Copper Creek Valley, L 8/29/54. The caespitose spiraea is anything but a steeplebush, being a low, matted perennial apparently restricted to cliffs and ledges.

RUBIACEAE, The Madder Family

Galium L., The Bedstraws

Galium bifolium Watson; cordilleran; montane; Gothic, Wi 10073 (1954), B 29-57. In the mesic aspen woods of Gothic, this little annual grows erect and from two to four inches high. The small white flowers are solitary, curving out from the leaf axils on short pedicels, while the leaves occur in pairs except for one or two whorls of four in the middle of the stem. Usually, the stems are simple; but sometimes, from the leaf axils, auxiliary stems sprout and grow at a narrow angle from the main stem. It is curious that this plant, which is not infrequent at Gothic, should be known from nowhere else in the Gunnison Basin.

Galium boreale L.; boreal; subalpine-submontane; Copper Creek Valley, L 350-48 COLO; Hot Springs Creek Valley, B 84-61; Cathedral, B&S 172-62 RMBL; Goose Creek Valley, B&S 106-65; Gunnison, B 150-61. Widespread in the Gunnison Basin, this shrubby perennial herb

grows a foot or more in height and with its panicles of small, four-petaled, white flowers frequently occurs on roadsides in populations large enough to make the passing botanist stop his car to investigate or admire. The leaves occur at the nodes in whorls of four, which frequently give rise to fascicles of other leaves. It is the only galium in the Basin stiff enough to be called shrubby.

Galium Brandegei Gray; boreal; montane-submontane; Grant Lake, B 183-59; Cathedral, B&S 392-62, B&S 430-62 RMBL (two stations); Sapinero, Wh 523 (1898) COLO. With the galiums, field observation is really essential. Morphological examination of herbarium specimens (especially those showing the wear and tear of dozens of years) is woefully inadequate. As for G. Brandegei, the plant in the first year or two of growth is caespitose, and is admirably illustrated in the third edition of Britton & Brown's Illustrated Flora.* But then as the years of perennial growth take place, the lateral stems are eliminated, the central stems become more vigorous, and the species forms thick mats. In the second of the cited Cathedral collections, the mats covered boulders in a flowing brook, entirely concealing the boulders and looking like great, green cushions in the midst of the flowing water. Yet the green growth was exclusively G. Brandegei. For taxonomic details the reader is asked to turn to the next species.

Galium tinctorium L. [G. trifidum L.]; boreal; subalpine-montane; Leechmere, B 37-55; Copley Lake, B 114-60; Spring Creek, B 133-65. G. tinctorium, at least in the guise of G. trifidum, is the species into which G. Brandegei is usually collapsed when taxonomists are in the collapsing mood. It just so happens that Galium is a genus that has always interested me and that I have collected dozens of specimens in New England and in the Southern Appalachians as well as in Colorado. I find it hard to imagine two species more different. G. tinctorium is not caespitose, and I have never found it matted.

* New York, 1952, 3, 289.

In the Gunnison Basin, instead of growing in pure stands, it seems always to be found with grass or moss or in a bank of humus, and to be supported by what it is growing with. Its leaves, usually in whorls of four, are of a thinner texture, of a lighter color, and far more linear in outline than those of G. Brandegei. Again, instead of being free-pediceled (as is the case with G. Brandegei), G. tinctorium shows peduncle and pedicel, with frequently as many as three pedicels springing from a single peduncle. As a matter of fact the drawing of G. tinctorium in the third edition of Britton & Brown fits the Gunnison Basin plant as well as the drawing of G. Brandegei fits the Gunnison Basin plant of G. Brandegei.

Galium triflorum Michaux; boreal; subalpine-montane; Gothic Natural Area, B 258-61 RMBL; Fish Creek Mesa, B&S 400-62 RMBL. There could hardly be an easier plant to identify than this galium. To begin with, when dried, it has the sweet fragrance of Hierochloë odorata or of Melilotus alba. Again, its broadly elliptical and mucronate leaves are gathered together in whorls of six. Finally, its axillary peduncles usually bear three pedicels, although these may be further subdivided.

Galium verum L.; adventive; submontane; Gunnison, Wr 7/24/39 WS, B 89-60 RMBL. For many years, a small, isolated population of this species on the west side of the highway between Gunnison and Almont caused much squealing of botanical brakes. The plant was too deep a yellow to be a goldenrod. So what could it be? As a result of repeated collections, specimens of this population have been pretty well distributed among various herbariums, although none reached Harrington in time for inclusion in his manual and the plant was first reported for Colorado in Weber's third Additions to the Flora of Colorado.* The two collections cited above are the earliest and the latest records of the population that I happen to have. Now that I am annotating the species, it seems to me that I have not seen the population for two or three years; but this may just be lack of ob-

* Boulder, Col., 1961, p. 22.

servation on my part. With its filiform, verticillate leaves, and yellow tetramerous flowers, the plant does not need further descriptive remarks.

SALICACEAE, The Willow Family

Populus L., The Cottonwoods

Three species of this genus are found in the Gunnison Basin, occurring both in the northern and in the southern halves.

Populus angustifolia James; cordilleran; submontane-montane; Graflin Gulch, B 14-65 RMBL, B&S 66-95. A tall tree, the narrow-leaved cottonwood forms veritable oases in the sagebrush desert of the submontane zone. But it is also planted in towns and around dwellings.

Populus balsamifera L.; boreal; montane-subalpine; Copper Creek, B 131-52; Cathedral, B 5-65 RMBL. A small tree, the balsam poplar is rare in the Gunnison Basin, as well it might be, since the Cathedral station is its southernmost outpost in North America. The species may be told by its ovate, yet acuminate, leaves.

Populus tremuloides Michaux; boreal; submontane-subalpine; Almont, Ke 6/49 WS; Gothic, Pe 7/6/57 RMBL. The aspen, or quaky, is probably the most widely distributed tree in North America, and certainly the best known in Colorado.

Salix L., The Willows

Thus far, seventeen species of Salix have been collected in the Gunnison Basin, and if coarse-divided first, are not too difficult to separate. With the willows, the secret of success seems to lie in working principally with pistillate plants. The pistillate catkins not only furnish a greater number of characters but present these characters for a longer period of time. The staminate catkins, once they have delivered their pollen to the fertilizing insects or wind, soon wither, and are then of

little help in the identification of species. True, the collector may find the staminate plant first. But a determined search will usually reveal a pistillate individual.

The alpine prostrate willows

Salix nivalis Hooker; cordilleran; alpine; Virginia Basin, B 19-54; Old Monarch Pass, B 147-59; Slumgullion Mesa, B 263-65. In this low, alpine species, the leaves are small, roundish, net-veined, and distinctly bicolored.

Salix arctica Pallas [S. anglorum Chamisso]; boreal; alpine; Conundrum Pass, B 46c-54; Baldy Chato, B&S 263-62. Here the leaves are larger, elliptical, pinnate-veined, and more or less of one color. Furthermore the species is not mat-forming (as is S. nivalis) but creeping; and whereas the aments of S. nivalis are short and inconspicuous, those of S. arctica are long and conspicuous.

The alpine bushy willows

Salix glauca L.; boreal; alpine; Mt. Belleview, B 169-60; Dorchester Pass, B 34c-54 RMBL; Slumgullion Mesa, B&S 564-62. Covering miles and miles of alpine slope and plateau, this willow is tolerant of dryish soil. It is confusable with S. brachycarpa, which the reader should consult for differentiation.

Salix brachycarpa Nuttall; boreal; alpine-montane; Virginia Basin, B 21-54; Gothic, B 12-55 RMBL; Rough Creek, B&S 186-62; Baldy Chato, B&S 270-62. More needful of moisture, this plant at the base of the alpine zone occasionally mingles with S. glauca, from which it may be told by its thinner pistillate aments and whitish-tomentose capsules. The aments of S. glauca are thicker, and the capsules, gray-pubescent to begin with, are usually suffused with pink in maturity.

Salix planifolia Pursh; boreal; alpine-montane; East Maroon Pass, B 37a-54 RMBL; Gothic, B 75-59; Henson Creek Basin, B 38-61 RMBL. More moisture-loving than S. brachycarpa, S. planifolia in maturity will be recognized by its reddish petioles, dark-red twigs, and

green, silvery capsules. But in the early spring it is more spectacular. Then when meltwater is flowing everywhere and the veratrum is first thrusting its spearheads into view, S. planifolia suddenly bursts into bloom although there is not a leaf on the plant. At this time, in the desert of snow and water, the thick staminate aments with their purple anthers are simply magnificent.

The three subalpine willows

These three willows seem either to be centered in, or to be confined to, the subalpine zone. The first two are confusable.

Salix monticola Bebb; boreal; subalpine; Lake Irwin Basin, B 34a-55; upper East River Valley, W 9359 (1955) COLO. In comparison with S. padophylla, S. monticola is a plant of relatively dry situations, and in the collection from Lake Irwin Basin was growing with Allium Brandegei and Stellaria Jamesiana. Its leaves are symmetrically elliptical, and there is a beak between the style and the capsule body. The hairs of the capsule scales have a tendency to be crinkly.

Salix padophylla Rydberg; cordilleran; subalpine; upper Cement Creek Valley, B 32b-54 RMBL; upper East River Valley, W 9358 (1955) COLO. S. padophylla, on the contrary, is a plant of moist situations, and in the upper valley of Cement Creek will be found growing with Pedicularis scopulorum and Lychnis Drummondii. Not all the leaves are asymmetrically elliptical, but enough are to give a strong impression which is quite at variance with that of S. monticola. The capsules of both willows are glabrous; but those of S. padophylla are a millimeter shorter with less of a beak or none, while the hairs of the capsule scales show a tendency to be straight. With the exception of Populus balsamifera, the leaves of this willow blacken in the press more than those of any other salicaceous plant in the Gunnison Basin.

Salix Scouleriana Barratt; cordilleran; subalpine-alpine; Teocalli Mtn., L 253 (1949) COLO. Although this willow has been little collected, the dense pistillate aments composed of long, pubescent capsules make it like no other in the Basin. The leaves are oblanceolate and cuneate-bottomed.

The four montane willows

These four willows seem only to be centered in, not restricted to, the montane zone. The first two, with glandular-serrate leaves, are the most confusable willows in the Basin. But if the given contrasting characters are taken merely as the extremes of a spectrum, and the observed characters are expected only to cluster toward the extremes, then these two species can be separated with comparative ease.

Salix pseudocordata (Andersson) Rydberg; cordilleran; montane-alpine; Virginia Basin, B 20-54; Gothic, B 12a-55 RMBL; Cathedral, B 58-62. In this willow, the branches show a tendency to depart from the main stem at an angle ranging from 30° to 50°, with the consequence that there seems to be less preservation of a central axis. The leaves are rather narrowly elliptical, with not much inclination toward oblanceolateness. The capsules show a tendency toward a beak, and the aments are inclined to be precocious.

Salix Barclayi Andersson; cordilleran; montane-alpine; Conundrum Pass, B 70h-55; Gothic, B 114-61 RMBL; Devil's Hole, B&S 155-62. In S. Barclayi, the branching angle is much wider, from 60° to 90°, so that there seems to be a greater preservation of a central axis. The leaves are more broadly elliptical, with some tendency toward oblanceolateness, and the capsules show little or no inclination toward a beak. The aments have a tendency toward coetaneousness.

Salix Wolfii Bebb; cordilleran; montane-alpine; Gothic, B 34a-57 RMBL; White Pine, B 93-61 CS. What with its short pistillate aments composed of glabrous capsules, and its gray-green, tardily glabrate leaves with reticulate venation, S. Wolfii is one of the most easily recognized willows in the Basin.

Salix Bebbiana Sargent; boreal; montane-submontane; Gold Basin Creek, B 22-59; Devil's Hole, B&S 154-62; Henson Creek, B&S 66-2. S. Bebbiana has thin, very long-beaked, slightly pubescent capsules. It is like no other willow in the Basin, and occasionally grows to be an old, apple-like tree with a thick trunk.

The glaucous-stemmed willows

These three willows are grouped by the whitish bloom on their dark or purplish upper stems.

Salix Geyeriana Andersson; cordilleran; submontane-montane; Slate River, Wa 17 (1927) COCO; Gold Basin Creek, B 23-59 RMBL; Devil's Hole, B&S 156-62. A plant of open watercourses and gulchbottoms, S. Geyeriana has pointed, elliptical leaves, pistillate aments about a half-inch long, and glabrous capsules.

Salix irrorata Andersson; southwestern; montane; Anthracite Creek, Wa 21 (1927) COCO. S. irrorata is a plant of much the same habitat as S. Geyeriana, but its pistillate aments are a little longer, its leaves are distinctly oblanceolate, and its capsules are pubescent.

Salix Drummondiana Barratt [S. subcoerulea Piper]; cordilleran; montane-subalpine; Copper Creek, B 22-57 RMBL; Mineral Creek, B&S 514-62; Henson Creek, B&S 66-6. A plant of partially shaded watercourses, with pistillate aments two to five times longer than those of the above two species, S. Drummondiana has leaves that are both silvery underneath and delightfully fragrant when recently dried.

The two floodplain willows

These two willows ascend the main streams of the Gunnison Basin through the floodplains until, whether at Lake City or Cathedral or Sargents or Crested Butte, they meet the wall of the Basin.

Salix amygdaloides Andersson; widespread North American; submontane-montane; Gold Basin Creek, B 21-59 RMBL; Powderhorn, B&S 48-62; Cathedral, B 58a-62; Lake City, B&S 66-4. With its long peachlike leaves, this willow should be quickly recognized, although the enormous yellow staminate aments will probably catch the collector's eye first. Note the glabrous scales of both kinds of ament.

Salix exigua Nuttall; cordilleran; submontane-montane; East River Valley, B 214-60; Cathedral, S 66-15. This willow has the narrowest leaves of any in the Basin, and cannot be missed, a typical mature leaf being two and one-half inches long and less than a quarter of an inch wide. The thin, pistillate aments have glabrous capsules.

SANTALACEAE, The Sandalwood Family

Comandra Nuttall, The Bastard Toadflaxes

Comandra pallida A.DC. [C. umbellata (L.) Nuttall]; cordilleran; subalpine-submontane; Alpine Plateau, B 119a-61 RMBL; Cement Creek Valley, Ke 7/3/49 CS; Hot Springs Creek Valley, B 78-61 RMBL; Sapinero, Wh 435 (1898) COLO. Undoubtedly a person seeing this plant for the first time would think it a milkweed from the pink color of its blossoms. A close look, however, will reveal that it is nothing like a milkweed at all, but a plant with a single floral envelope, the lower part of which encloses the ovary. But the strongest impression will be of the horizontal rhizomes linking plant with plant. For the species is, of course, semi-parasitic, and the roots serve to reach the roots of other plants as well as to propagate the species. The leaves are a glaucous green, and the terminal inflorescence is cymose rather than paniculate. Some botanists have collapsed this species into the eastern C. umbellata, but a look at the habit of growth of the two species should go far to dispel this notion. The individuals of both species rise at intervals from the rhizomes. But those of C. umbellata arise like wands, those of C. pallida with a vase-like proliferation of branches that is quite different.

SAXIFRAGACEAE, The Saxifrage Family

Fendlera Engelmann & Gray, The Fendlerbushes

Fendlera rupicola Gray; southwestern; submontane; Almont, Li 5/10/34 COCO. The old bark of this handsome shrub is a nondescript gray; but the new bark is a lustrous reddish tan, and the paired linear leaves are mounted opposite each other on stylish protuberances of the nodes. The large, four-petaled blossoms will remind one of the mock-orange (Philadelphus); but the fruits, I think, are distinctive. They are like gray-green, narrow acorns resting vertically within calyces rather than acorn cups. At the tapered summits of these acornlike fruits, the four styles of the flower remain and indicate that the capsule will split between them.

Heuchera L., The Alumroots

Heuchera parvifolia Nuttall; cordilleran; alpine-submontane; Mt. Ouray, B 132-60 RMBL; Slumgullion Mesa, B 215-65; Cathedral, B&S 180-62; Gothic, B 27a-54; Sheep Gulch, B 15-61; Gold Basin Creek drainage, B 17-59. Never was there such a disproportion between leaves and inflorescence. The leaves, round, crenate, and small, are all at the base of the plant, and the panicles of flowers, often racemose and even spikelike, are at the summits of scapes occasionally a foot and a half tall. The flowers have a yellowish-green color, and if the collector will look at one of the individual blossoms with a pocket lens, he will see a horizontal disk at the top of the ovary--one of the chief characters of the plant.

Lithophragma Nuttall, The Prairie Stars

The two Gunnison Basin species of this genus are delicate plants of moist open places and will be taken up together, not only because they grow together, but because the differences between them are so slight that they are frequently collected as a single species. The

plants are five or six inches tall, and have a conspicuous internode between the cluster of roots and the basal cluster of leaves. The leaves of the two species are roughly semicircular in outline and palmately dissected, while the glandular calyces are almost identical. When L. bulbifera produces bulblets in the leaf axils or inflorescence, all is easy. But the species does not always do this. Here I have found the difference between the petals, although requiring the use of a handlens, most useful. Both types of petal are elevated above the calyx on claws; but the blade of L. bulbifera is dissected into linear segments that almost reach the claw, while the blade of L. tenella not only is less deeply dissected but contains a big segment in the middle.

Lithophragma bulbifera Rydberg; cordilleran; montane; Gothic, B 30-57; Hot Springs Creek Valley, S 65-28 RMBL.

Lithophragma tenella Nuttall; cordilleran; montane-submontane; Hot Springs Creek Valley, S 65-28a RMBL; Tenmile Springs, B 25-65 RMBL.

Mitella L., The Mitreworts

Mitella pentandra Hooker; cordilleran; subalpine-montane; Gothic Natural Area, B 67c-54; Copper Creek Valley, B 139-52; Slate River Valley, B 104-61. In M. pentandra, the same disproportion as in Heuchera parvifolia between basal leaves, scape, and terminal inflorescence is evident, but less so. The individual blossoms are unusually interesting to observe with a pocket lens. Between the ovary and the styles, the entire interior of the flower is filled with a disk similar to that of H. parvifolia. At the edges, between the calyx lobes, occur the five sessile-appearing stamens. Behind the stamens, arise the five greenish petals with central rachis and pectinate arms looking like so many microscopic scarecrows.

Mitella stauropetala Piper; cordilleran; subalpine; Copper Creek Valley, B 140-52; Gothic Natural Area,

B 263-61. The leaves of this species much resemble those of M. pentandra; but the scapes are longer and the secund blossoms of the raceme differ markedly. There is no disk filling the interior of the flower, and the stamens are associated with the calyx lobes. From between the calyx lobes arise the thin white petals, which are cruciform, as indicated by the specific name.

Parnassia L., Grass-of-Parnassus

Parnassia fimbriata Konig; cordilleran; subalpine; Gothic Natural Area, La 124 (1950) COLO; Gothic, S 64-253; Cement Creek Valley, Ke 7/27/49 WS. The basal leaves and long scapes are as evident in this species as in any of the preceding species of the family, but with this exception: the scapes bear but a single blossom at the top, while halfway up the scape there is a single, sessile, and miniature edition of one of the basal leaves. The white, five-petaled flower is about five-eighths of an inch in diameter, and the collector will note that the petals are fimbriated on the lower edges. The plant grows in moist shady places.

Parnassia parviflora DC.; boreal; montane; Cathedral, B&S 550-62; Cement Creek Valley, S 64-244. The only other member of the genus to have been collected in the Gunnison Basin, this species is also the only other parnassia to be listed in Harrington's Manual of the Plants of Colorado. It is a much smaller plant than the preceding, with smaller basal leaves, shorter scapes, and the midstem leaf reduced to a bract. Curiously, the solitary blossoms are frequently as large as those of P. fimbriata, so that at least with respect to the Gunnison Basin plants the specific name is a misnomer. The plant grows in moist open places, and is tolerant of alkaline soil. The lower edges of its white petals are not fimbriated.

Philadelphus L., The Mock-Oranges

Philadelphus microphyllus Gray; southwestern; sub-

montane; Sapinero, Wh 425 (1898) COLO. With its opposite leaves, four white petals, and twenty or more stamens, Philadelphus is an easy genus to recognize, and really, since the above is the only species listed for the state of Colorado, the genus is all one needs to know in the Gunnison Basin.

Ribes L., The Currants and Gooseberries

To a collector interested in the ecologic and geographic distribution of plants, the eight species of the genus Ribes in the Gunnison Basin are a delight to study. They are as strongly marked ecologically and geographically as they are morphologically, and in observing their behavior in a large natural area such as the Gunnison Basin one senses his closeness to the great drama of moving plant populations that has produced the world of plant life that we know today.

Ribes aureum Pursh; cordilleran; submontane; Madeira Siding, B 54-65 RMBL. This handsome shrub grows eight or nine feet tall. The tubes of its golden calyces are more than half an inch long, and in between the lobes (which are bent back to present a rotate face), the short petals are a bright red, while at the same time the blossoms are fragrant. As mentioned in the Introduction,* I was able to ascertain that the ornamental plantings of this species in Gunnison and in the Quartz Creek Valley came originally from a native population in Taylor Park. The reader may wonder that the range of the plant has not therefore been extended to the montane zone. But the ranges of the species in this study are based not on report but only on my own collections or on the collections of others that I have been able to examine. The plant's favored habitat seems to be grassy glades, where it can assume its full height.

Ribes cereum Douglas; cordilleran; submontane-alpine; Gunnison, Ke 7/49 WS; Cochetopa Park, Jo (1959) CS; Cathedral, B 683-62; Gothic, B 8b-55; Blaine Basin,

* See above, p. 27.

B 103-59 RMBL. The wax currant seems to be suited to all climes and altitudes of the Gunnison Basin, although it much prefers an open, rocky surface to grow against. Thus at 12,000 feet on the headwall of Blaine Basin north of Gothic, it seems to grow with particular vigor, exuding a delightful resinous fragrance. But it likes a granite cliff in the submontane zone almost as well. I have also collected the plant in deep Douglas-fir forest. But although the leaves were larger, they were less waxy (and not at all crisp), and the plant seemed more delicate. The small half-inch blossoms, without a rotate face, are pink.

Ribes coloradense Coville; southwestern; subalpine; Copper Creek Valley, B 134-52 RMBL; Virginia Gulch, B 2128 (1952) COLO; Mt. Wilkinson, B 63-60; Alpine Plateau, B 121-61. Like a number of the species belonging to the southwestern element of the flora of the Gunnison Basin, R. coloradense has not been collected below 10,000 feet. It is a plant of the deep shade of the subalpine coniferous forest, and with its dark-green, aceriform leaves and red blossoms, there could scarcely be an easier ribes to identify. I remember the calyx lobes as a deep red, and I think the report in the manuals of a purplish color comes from partly faded herbarium specimens. The blossoms of herbarium specimens finally lose all their color, although the leaves retain their vivid green.

Ribes inerme Rydberg; cordilleran; montane-submontane; Gothic, B 31-57 RMBL; Cathedral, B&S 606-62; Devil's Hole, B&S 157-62; Parlin, W 9443 (1955) COLO; Gunnison, Ke 7/49 WS. This is a civilized ribes, with only an occasional spine beneath a node and with large, smooth, edible fruits. The greenish flowers are not much more than a quarter of an inch long, but some of the wine-colored berries are half an inch in diameter. They make delicious pie and are picked by all residents of the Basin. The plant likes open, meadowy places whether moist or a bit dry.

Ribes lacustre (Persoon) Poiret; boreal; subalpine-montane; Virginia Gulch, B 2129 (1952) COLO; Sapinero,

Wh 504 (1898) COLO. The first of the cited collections came from moist spruce-fir forest in the gulch below Virginia Basin, which is just north of Gothic. But no one knows where the Wheeler collection came from.* In the East, the plant is called the swamp currant; in the West, it does quite well in forest sites that are only moist. But such sites are far from the dry draws around Sapinero. The species is the only ribes in the Basin with conspicuous internodal as well as nodal spines. In fact the internodes are so bristly that one hesitates to handle the plant. It is interesting that at the station of the first collection, R. lacustre was growing with R. coloradense.

Ribes leptanthum Gray; southwestern; submontane; Sapinero, Wh 449 (1898) COLO; Lake Fork Canyon, B 57-65 RMBL. This ribes is in every way a plant of shaded dry places. The leaves are small and finely dissected, and they stick close to the long canes which are not much branched. The very narrow, slightly pubescent pink flowers are about half an inch long, and are borne in distinctive, Y-shaped pairs, the leg of the Y being the peduncle of the two flowers.

Ribes montigenum McClatchie; cordilleran; submontane-subalpine; Gunnison, Ke 7/49 WS; Almont, B 215-60; Whetstone Canyon, B 178-60; Gothic, L 389-48 COLO; Alpine Plateau, B 122-61. I am sure that R. montigenum is the most widespread and frequent currant in the Gunnison Basin. Not only is it ubiquitous in the montane zone, but it extends both to the zone above and to the zone below. Its leaf is much like that of R. leptanthum, but not so finely dissected and two or three times as large. Most striking are the multiple nodal spines joined at their bases. Between the nodes are some lesser bristles, but nothing to compare with those of R. lacustre. The flowers are red, and so are the fruits. It is interesting that in a damp ravine above the Alpine Counting Corrals, this plant at the upper limit of its range should have been growing with R. coloradense at the lower limit of its range. Such abutments and overlappings are frequent

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

in the Gunnison Basin, but what is especially interesting here is that R. montigenum was occupying the more open portion of the site, R. coloradense the more shaded portion, just as if it were Lupinus amplus and L. rubricaulis all over again.*

Ribes Wolfii Rothrock; southwestern; montane-alpine; Whetstone Canyon, B 179-60; Swampy Pass, K 580 (1947) DBG; Emerald Lake, R 10078 (1959) RMBL; Cement Mtn., B 85b-55. On the slopes of the Alpine Plateau above the divide between Elk Creek and Blue Creek, it was interesting to find R. montigenum growing with R. coloradense. On the gravelly open slopes of Whetstone Canyon southwest of Crested Butte it was equally interesting to find the same R. montigenum growing with R. Wolfii. For like R. coloradense, R. Wolfii is a currant principally of the subalpine zone, although unlike R. coloradense it has a predilection for open places; indeed it finally emerges on the broad, alpine, plateau-like summit of Cement Mountain. It is a black currant with a short raceme of white flowers and a medium-sized aceriform leaf of which the apices are rounded rather than acute.

Saxifraga L., The Saxifrages

Saxifraga adscendens L.; cordilleran; alpine; Rustler's Gulch, B 191-61; Conundrum Pass, B 70e-55; American Basin, B&S 167-66. This low alpine plant, never more than an inch or two high, will be recognized by its small tridentate leaves. The stems are usually simple, but occasionally auxiliary stems sprout from the lower leaf axils and follow the main stem at a close angle. The plant is glandular-pubescent in varying degrees, and the petals are white.

Saxifraga caespitosa L.; boreal; alpine; Handies Peak, P 1533 (1940) COCO; Mt. Belleview, S 65-101 RMBL; Conundrum Pass, B 42-54. This low, alpine saxifrage with white petals also grows to the height of an inch or two, and the botanical collector will be put upon his mettle to keep it straight from S. adscendens. Indeed, both species have tridentate leaves. But here comes the first difference. The leaves of S. adscendens usually have a big central tooth and two smaller side ones; the leaves of S. caespitosa are usually evenly trilobed, and resemble a miniature Neptune's fork. Again, the calyces of S. caespitosa seem rather uniformly turbinate; those of S. adscendens are commonly round-bottomed. There are other small differences, too; but these the collector will take pleasure in observing for himself.

* See above, pp. 33 and 293.

Saxifraga arguta D.Don; cordilleran; montane-alpine; Fish Creek, B&S 336-62; Gothic Natural Area, B 277-61; Rustler's Gulch, B 190-61; Henson Creek Basin, B&S 65-196. The brook saxifrage is one of the more memorable plants of the Gunnison Basin. Its reniform leaves are handsomely dentate with large teeth, and its panicle of white flowers is raised to the height of a foot or more. The plant seems to grow almost exclusively on the edges of brooks, developing a strong rootstock that is usually horizontal to the stem of the panicle.

Saxifraga bronchialis L.; boreal; montane-alpine; Cathedral, B&S 168-62; Henson Creek Valley, S 66-131; Emerald Lake, D 14472 (1963) RMBL; Cumberland Pass, Sh 56-51 RMBL. Were it not for the flowering scapes, this plant could be taken for a clubmoss, say, Lycopodium lucidulum. But the flowering scapes do appear, with their minute bracts, and after attaining the height of four or five inches, bear a small, loose panicle of unmistakably saxifragaceous blossoms. The white petals are remarkable for the red dots on their inner surface.

Saxifraga cernua L.; boreal; alpine; Mt. Belleview, B 55d-57; Conundrum Pass, B 42b-54; Baldy Chato, B&S 476-62. Although S. cernua grows to a height of five or six inches and is easily recognized, few collections have been made of the species in the Gunnison Basin for the simple reason that it is exceedingly rare. The stem of the plant is simple and erect, and bears a single white blossom at the top. In the upper leaf axils are bulblets, and the broad (though small) lower leaves are five- or six-toothed in a distinctive way. The specific name

means nodding, but does not seem to apply to the Gunnison Basin plants.

Saxifraga debilis Engelmann; cordilleran; montane-alpine; Los Pinos Creek, B 50-60; Whitmore Falls, S 62-39; Judd's Falls, R 10303 (1959) CS; Gothic Natural Area, La 121 (1950) COLO; Cumberland Pass, Sh 56-52; North Italian Mtn., W&L 9310 (1955) COLO. The broad (though small), five- or six-toothed lower leaves of this caespitose plant are practically the same as those of S. cernua, and obviously the two species are closely related. But S. debilis, although the weaker plant (as its specific name implies), is far more widespread and frequent. In the lower zones it is found in wet places, growing three or four inches high. In the alpine zone it shrinks in size and seems to have accommodated itself to less moisture. At all altitudes it bears bulbs at the base of the plant where, covered by soil or surface débris, they are light-colored instead of a purplish black.

Saxifraga chrysantha Gray; cordilleran; alpine; North Italian Mtn., B 79-54; Cumberland Pass, Op 7/7/58 RMBL; Trallala Peak, B 241-65; Uncompahgre Peak, S 66-108. S. chrysantha is quite as rare as S. cernua. But it is much more noticeable since instead of growing singly it forms mats, and presents to the eye one of the brightest and richest yellows of the whole floral kingdom. The bracted scapes that rise from the mats are seldom more than two inches high and bear anywhere from one to four blossoms at their tops. The plant sends forth underground rhizomes in contrast with the aboveground runners of S. flagellaris.

Saxifraga flagellaris Willdenow; boreal; alpine; Conundrum Pass, B 43-54; Cumberland Pass, Op 7/7/58 RMBL; Baldy Chato, B&S 266-62; Whitmore Falls, S 62-40. I have often thought it curious that there should be two yellow alpine saxifrages in the Gunnison Basin. But what begins by being curious ends by being interesting when it is noted that the two species belong to different phytogeographical elements. Furthermore S. flagellaris, the boreal plant, with runners, not rhizomes, does not form mats, but populations of individuals spaced by

about the distance of the runners or by multiples of the distance of the runners. Apparently the species is a sort of stolonic biennial, forming a stolon-engendered rosette one year, and a flowering stem and further runners the next year, or as soon as it can. Such an arrangement would produce a population with eternal youth, and would seem superior to the mat arrangement of S. chrysantha, where the clone or population of the mat must experience the cycle of youth, maturity, and old age. Perhaps this is why S. chrysantha is so much rarer than S. flagellaris. In any event it is intriguing that the more youthful, experimental solution belongs to the more ancient phytogeographical element; the more conservative solution, to the more recent element.

As for S. flagellaris itself, the basal leaves are glabrous except for their ciliate margins, while the stem-leaves are overtaken by a glandular pubescence which continues to the tips of the sepals. S. flagellaris is also more adapted to slopes; S. chrysantha to alpine benches, where it can more readily form mats. On page 273, in connection with Juncus Mertensianus, it was mentioned that the valley of Henson Creek is a perfect asylum for alpine relicts. S. flagellaris is one of these, having been collected (as cited above) on the moist rocks surrounding Whitmore Falls in the lower subalpine zone.

Saxifraga oregana Howell; cordilleran; montane-subalpine; Gothic, B 59b-57; Copper Creek Valley, R 10464 (1959) CS. This is a plant with large, sinuately dentate basal leaves and a scape that grows more than two feet tall without a leaf. The top eight or nine inches of the scape is taken up by a narrow, scraggly panicle in which the small, white, oval petals are quite the least part. The plant is like no other in the Gunnison Basin.

Saxifraga rhomboidea Greene; cordilleran; subalpine-alpine; Los Pinos Pass, B&S 42-62; Henson Creek Valley, B 40-61; Elkton Divide, B 127-52, B 27d-54; Mt. Belleview, S 65-94; Slumgullion Mesa, B&S 137-62. Clearly, S. rhomboidea is the most frequent and widespread saxifrage in the Gunnison Basin. It is, in fact, so frequent that I thought it grew in the montane zone, and was aston-

ished when I came to write this annotation to discover that I had not collected it in the montane zone and that I had no record of its being collected in the montane zone.

The popular name of snowball saxifrage for this species is a poor one, for the springtime head of white blossoms, at least in the Gunnison Basin, is longer than broad and cannot be called ball-like. The plant is, so to speak, a condensed version of S. oregana, the strung-out, scraggly panicle of the latter contracting into a head, the white petals becoming the most conspicuous part, and the sinuately dentate leaves becoming more or less rhomboidal. In fact one might think that the two species were one if it were not for certain salient differences such as the vertical root of S. oregana, the horizontal root of S. rhomboidea.

Sullivantia Torrey & Gray, The Sullivantias

Sullivantia Purpusii (Brand) Rosendahl; Coloradan; submontane-subalpine; Sapinero, Wh 926 (1898) COLO; Oh-be-Joyful Creek Valley, B 259-60 CS, RMBL; Schofield Pass, W 9361 (1955) COLO. In Sullivantia, as opposed to Saxifraga, there are only five stamens in contrast with ten. But surely what strikes the collector at first glance about the above species is either the curiously one-sided loose panicle of white flowers, or the reniform leaves dissected like those of a geranium. What is even more striking, later in the season, is that the flowers of the one-sided panicle, after anthesis, turn around and point in the direction of the missing half of the panicle! The species, at least in the Gunnison Basin, seems to be exclusively a plant of cliff niches.

SCROPHULARIACEAE, The Figwort Family

Besseya Rydberg, The Kittentails

Besseya alpina (Gray) Rydberg; cordilleran; alpine; Mt. Belleview, S 65-95 RMBL; Fossil Ridge, L 1280 (1951) COLO; Baldy Chato, B&S 259-62. This delightful

alpine besseya apparently does not grow taller than four inches. Its purple blossoms occur in a spike that may be half the length of the plant, and with its purple stamens projecting at right angles from the spike, the species is certainly suggestive of Phacelia sericea. But a look at the leaves will dispel any incipient doubt. Those of P. sericea are gray-green, sericeous, and dissected. Those of B. alpina are dark-green, glabrous, and merely crenulate.

Besseya Ritteriana (Eastwood) Rydberg; Coloradan; montane-alpine; Blue Mesa, W 9467 (1955) COLO; East Maroon Pass, B 37-54. In this species occurs one of those blessed differences in size that makes field recognition easy without fumbling for a pocket lens. Even at 12,000 feet, this besseya grows, not four, but eight or nine inches high. Furthermore its crenulate leaves, on long petioles, are elliptical and not truncate at the bottom as are those of B. alpina. Finally, its blossoms and stamens are yellow, not purple.

Castilleja Mutis, The Paintbrushes

The red-flowered castillejas

Castilleja chromosa Nelson; cordilleran; submontane-montane; Powderhorn, B&S 47-62; Gold Basin Creek drainage, B 4-60 CS; Almont, B 19b-57; Granite Basin, L 708 (1950) COLO. Among all the castillejas of the Gunnison Basin this is the species to which the popular name of paintbrush is most readily applied. For the inflorescence at the top of each stem is flat-topped and about the width of a small paintbrush. Furthermore there is frequently just a band of scarlet color across the top as if the brush had been dipped only thus far in red paint. The plant is a low, shrubby, perennial herb never found far from sagebrush. The collector will note the long-celled translucent hairs that give the plant its pilosity, and also the linearly dissected leaves that are frequently tripartite.

Castilleja integra Gray; southwestern; submontane-montane; Cochetopa Park, H 8991 (1959) CS; Mineral

Creek Valley, B&S 55-62; Coal Creek, K (1947) DBG. This southwestern species is commonly found in drier habitats than C. chromosa. Its undissected leaves are long and linear, and its undissected bracts not only are red all over but can be quite the longest of any castilleja in the Basin. They are thinner than most, and being translucent, make a wonderful subject for color photography if one can manage the back lighting.

Castilleja linariaefolia Bentham; cordilleran; submontane-subalpine; Gunnison, B 183-61; Cochetopa Park, H 8966 (1959) CS; Glacier, B 38a-54; Gothic, L 219 (1949) COLO; Peeler Basin, K 612 (1947) DBG. The leaves of this red-flowered castilleja are also either linear or linearly dissected, and the reader may wonder how it is to be separated by gross features from the two preceding species. For really, this is the way it must be done. Until one knows his way about in Castilleja, separating the various species by fine characters is as apt to lead one wrong as right. To begin with, C. linariaefolia is not only much more common in the Gunnison, Basin than either of the preceding species but it is also a much larger, bushier plant. It is so large, in fact, that most specimens cannot be fitted into a plant press without bending the stems. Again, whereas the beautiful, red, translucent bracts of C. integra are undissected, those of C. linariaefolia are so much dissected that they exist as long, thin, strips of red. It is true that the bracts of C. chromosa are also dissected; but here just the tips are red; the bracts are never red down to the point of dissection. As a matter of fact one can tell the plants apart by their habits of growth. C. linariaefolia is a tall, rangy plant suggestive of the roadsides where it is commonly found. C. chromosa is a compact plant, as becomes a long-lived perennial of the sagebrush country. C. integra is sparse in its habit of growth, frequently being confined to a single stem and when there are several, forming a low, open clump. It is found in the driest habitats of any castilleja in the Basin.

Castilleja miniata Douglas; cordilleran; montane-subalpine; Gothic, O 7/28/58 RMBL; Los Pinos Pass, B&S

160-62; Red Mtn., B 180-61; Slumgullion Pass, B 130-61. The last of the red castillejas thus far collected in the Gunnison Basin is the easiest of them to know. It is confined to the montane and subalpine zones, and is never found far from the edge of woods, whether of spruce, fir, or aspen. Although its stemleaves are occasionally tripartite, they can seldom be called linear, and in fact are frequently lanceolate. Again, the red bracts are more often merely toothed rather than deeply dissected. But the best field character is the color. The red of the preceding species, although of various shades, is an indubitable red. The red of this plant has yellow in it, and in fact a yellow-flowered form has been collected near Gothic.

The white-flowered castillejas

Castilleja sulphurea Rydberg [C. septentrionalis Lindley]; cordilleran; submontane-alpine; Powderhorn, B 219-65 RMBL; Grant Lake, B 71-61; Cathedral, B&S 82-62; Gothic, L 495-48 COLO; Baldy Chato, B&S 274-62; Slumgullion Mesa, B 257-65. It may seem inconsistent to regard a plant with the specific name of sulphurea as one of the white-flowered castillejas. But the flowers of this plant (at least in the Gunnison Basin) are more white than yellow, and the trouble is in the name, not in the classification. In fact this is a plant of two colors, of a yellowish-white and a yellowish-green, and as such it is set apart from all the other castillejas of the Basin. It grows lushly in the floodplain meadows of the Basin floor yet climbs, when there is sufficient moisture, to 12,000 feet or higher. The parallel veins of the sessile, lanceolate leaves are often conspicuous.

Castilleja occidentalis Torrey; cordilleran; alpine; Avery Peak, L 1079 (1950) COLO; Conundrum Pass, B 219-61; Mineral Mtn., B&S 538-62; Rough Creek Pass, B&S 665-62; Slumgullion Mesa, B 262-65 RMBL. C. occidentalis is closely related to C. sulphurea, and obviously represents an adaptation to the aridity of high altitudes. When the two species are found growing in the same location (as on the alpine tableland of Slum-

gullion Mesa), a distinction in the moisture of their respective habitats will always be found. C. occidentalis is also a plant of two colors: of a purplish-white and a purplish-green, and is clearly distinct from C. sulphurea in this respect. Furthermore it is not only a bushier and lower plant (attaining to only about half the height of C. sulphurea), but also a longer-lived plant, to judge from the greater woody basal growth.

The purple-flowered castilleja

Castilleja rhexifolia Rydberg; cordilleran; montane-alpine; Gothic, O 7/15/58 RMBL; Washington Gulch, B 189-52; Alpine Plateau, B 116-61; Mill Creek, B&S 300-62; South Baldy, B 175-66; Conundrum Pass, B 221-61. Probably this is the most striking castilleja of the Gunnison Basin. The color varies from violet to magenta, centering on purple; but whatever the shade, there is a richness to the color not possessed by any other castilleja of the Basin. The leaves vary from linear to lanceolate, but seem to be undissected except just below the inflorescence. A plant of moist places, the species is more frequent in the alpine zone than in the montane zone, but most frequent in the subalpine zone. Its unusual occurrence on the summit of South Baldy should be compared with that of Erigeron peregrinus.*

Chionophila Bentham, The Snowlovers

Chionophila Jamesii Bentham; cordilleran; alpine; Rustler's Gulch, Ew 11830 (1938) COLO; Conundrum Pass, B 225-61; Rough Creek Pass, B&S 632-62. With paired, linear cauline leaves and a spike of white secund flowers rising three or four inches high, this plant is unique in the alpine flora of the Gunnison Basin. The lanceolate basal leaves are usually erect, and the species, although not common, is recognized at once when it occurs.

* See above, p. 107.

Collinsia Nuttall, The Blue-eyed Marys

Collinsia parviflora Douglas; cordilleran; submontane-montane; Gold Basin Creek drainage, B 22-60 CS, RMBL; Hot Springs Creek Valley, B 21-66; Little Soap Park, B&S 65-78 RMBL; Willow Creek Mesa, B 49-65; Henson Creek Valley, B 48-61. This annual figwort is so different from the other plants of the Gunnison Basin that it will be sure to attract the collector if he catches sight of it. It grows from two to eight inches high, and has paired or whorled, blunt, linear-lanceolate leaves. The flowers and branches, which arise axilly, are paired, and the collector will note the delightful blue-and-white small flowers. The plant grows both in shade and in the open, and in wet or dry habitats.

Limosella L., The Mudworts

Limosella aquatica L.; boreal; montane-subalpine; Gothic, R 30.26 (1960) CS; Meridian Lake, Ka&C 1086 (1964) RMBL; Grant Lake, B 182a-59; Horse Park, B 117-64. On muddy shores, by means of its short, thread-like rhizomes, this plant can cover large areas. On their long petioles the slender leaves rise to the height of an inch or two; but the blossoms, and later the fruits, remain basal, arching out on short pedicels. More interesting is the fact that the plant can grow as a submerged aquatic, the rhizomes increasing their reach, the leaves and petioles lengthening to five or six inches, and only the fruits remaining relatively the same.

Linaria Miller, The Toadflaxes

Linaria vulgaris Hill; adventive; submontane-montane; Gunnison, B 54-60; Crested Butte, B 322-61. It is incredible that any one interested enough in plants to open these pages should not know the common butter-and-eggs. Weed or no weed, it is a handsome plant with its flaxlike leaves and bright, yellow-and-orange flowers; but in the Gunnison Basin it is neither frequent nor widespread.

Mimulus L., The Monkey Flowers

The annual monkey flowers

Mimulus floribundus Douglas; cordilleran; submontane; Gold Basin Creek Valley, B 52-57; Lake Fork Canyon, B&S 117-62; Quartz Creek Valley, S 65-111 RMBL. This little plant ranges in height from half an inch to four inches, and is found in wet places, especially places that are both wet and rocky. The small leaves, which are sinuately dentate and mostly ovate or cordate, are paired, while the branches and the yellow flowers arise from the paired leaf axils, the flowers being about five-sixteenths of an inch long. The collections cited above are the only ones I know of from the Gunnison Basin, and are the basis of my remarks.

Mimulus Suksdorfii Gray; cordilleran; submontane-montane; Tenmile Springs, B 26-65 RMBL; Pasture Creek, B 5-64. M. Suksdorfii, as it grows in the Gunnison Basin, is even smaller than M. floribundus, ranging in height from a mere quarter of an inch to less than an inch and a half. In other words, to collect this plant, the botanist must get down on hands and knees. Even at this close range the yellow corollas are insignificant in comparison with the red calyces and reddish stems and leaves. As usual, there is a pair of roundish seedling leaves, then a pair or more of linear or lanceolate stem-leaves, and finally a terminal blossom, sometimes accompanied by lower axillary blossoms. Both of the above collections were made in moist open places.

The perennial monkey flowers

Mimulus glabratus HBK.; cordilleran; submontane-montane; Big Mesa, B 188-65; Cathedral, B&S 275-62; Spring Creek, B 128-65 RMBL; Fish Creek Mesa, B&S 201-62. Undoubtedly, M. glabratus is the largest of the Gunnison Basin monkey flowers. For although, as in the first collection cited, it can flower at three or four inches, in favorable situations (such as in rich aspen woods), it grows a foot and a half tall, has stems a quarter of an inch thick, and leaves that can measure two inches in diameter. The yellow flowers are never many, arising singly or in pairs at the ends of the stems or axillary branches. The plant is always found in wet places, whether in deep shade or in the open, and is difficult to separate from the next species, to which the reader is referred.

Mimulus guttatus DC.; cordilleran; montane-alpine; Gothic, O 8/3/58 RMBL; Slate River Valley, B 99-60; Cathedral, B&S 355-62; Henson Creek Valley, B 47-61; Sylvanite Basin, B 245-61; Rough Creek Cirque, B&S 598-62. In general, M. guttatus is a more erect and slender plant than M. glabratus, and considerably higher-ranging. The manuals give a number of differentiating characters such as the open throat of M. glabratus and the enclosing lower calyx tooth of M. guttatus. But these do not seem always to be present, and the characters I have found most useful are taken from the leaves and stems. The leaves of M. guttatus tend to be oval, ovate, or triangular; those of M. glabratus, round and even reniform. Again, the stems of M. glabratus show a greater recumbency, thickness, and height; those of M. guttatus are straighter, thinner, and lower. M. guttatus is also a frequenter of wet places, whether in the shade or in the open.

Orthocarpus Nuttall, The Owlclovers

Orthocarpus luteus Nuttall; cordilleran; submontane-montane; Gunnison, Str 8/12/29 WS; Cochetopa Park, Jo 18 (1960) CS; Cathedral, B&S 553-62; Gothic, B 216-52. The root of this annual is so slight that one suspects the semiparasitism for which the figworts are well known. The plant is wandlike (even when sending out one or two lateral branches), and toward the top bears its small yellow blossoms in curious, tripartite bracts.

Pedicularis L., The Louseworts

Pedicularis crenulata Bentham; cordilleran; submon-