Cirsium Hookerianum Nuttall [Cirsium scopulorum (Greene) Cockerell]; cordilleran; montane-alpine; Mc-Intyre Gulch, B 200-65; Slate River Valley, B 140-60 CS, RMBL; Gothic, B 227-65; Mt. Ouray, B&S 66-154; Sylvanite Basin, B 246-61 CS. This species seems to be equally partial to the northern half of the Basin where, however, it is far more widespread and varied. It is a plant both of open places and of the forest, and can be collected both with its heads growing individually on branches from the leaf axils, and with its heads gathered together in a terminal cluster.

Cirsium Parryi (Gray) Petrak; southwestern; montane-subalpine; Gothic, B 222-52; Fish Creek Valley, B&S 335-62 RMBL; Gothic Natural Area, B 140-59 RMBL.

Cirsium undulatum (Nuttall) Sprengel; cordilleran; submontane-montane; Almont, Bro 8/7/60 RMBL; Dubois, B&S 103-65 RMBL; Cathedral, B&S 440-62 RMBL.

## Crepis L., The Hawksbeards

Crepis acuminata Nuttall; cordilleran; submontane-montane; Quartz Creek Valley, B 90-60 CS, RMBL; Razor Creek Valley, B&S 60-66. This is an easy hawksbeard to identify. The principal calyx is glabrous; but the little calyx at the base of the main calyx is pubescent on the edges of the calycules. The lower cauline and basal leaves are pinnatifid, the upper cauline leaves usually linear.

Crepis atrabarba Heller; cordilleran; submontane; Vulcan, B 24-64; Gold Basin Creek drainage, B&S 47-66. Here both calyces, big and little, are pubescent; and in addition, the big calyx usually has a number of conspicuous or inconspicuous black hairs, whence the specific name. The pinnae of the pinnatifid leaves are threadlike.

Crepis intermedia Gray; cordilleran; submontane-montane; Almont, B 13-55; Red Creek Valley, B 60-65, B 61-65; Fish Creek Mesa, B&S 97-62; Gothic, C 1108 (1960) RMBL. Here the whole plant is pubescent with short, matted hairs, and the pinnae of the leaves are never threadlike. Frequently, beneath the sun-reddened parts of the stems and petioles, the bases will be found to be yellow, or a yellowish brown. This is the prevalent crepis of the Basin.



Crepis modocensis Greene; cordilleran; submontane; Sapinero, Wh 931 (1898) COLO. Once again, the whole plant is pubescent and the pinnae of the pinnatifid leaves are not threadlike. And like C. atrabarba, the calyx can grow nonglandular black hairs. The hairs that set this plant apart are the yellow ones on the stems and petioles.

Crepis nana Richardson; boreal; alpine; Conundrum Pass, B 46-54; North Italian Mtn., L 1457 (1951) COLO. The plant collector's day is always made when he finds this rare, alpine hawksbeard. The dwarf flowers emerge out of a cluster of basal leaves and attract the eye either by the yellow of their rays or by the white pappus of their achenes. The plant is strictly glabrous, and the small rhomboidal leaves at the end of their petioles are occasionally indented at the base.

Crepis runcinata (James) Torrey & Gray; cordilleran; submontane-montane; Parlin, E (1888) COLO; Sapinero, Wh 505 (1898) COLO; Cebolla Hot Springs, B&S 444-62 RMBL; North Beaver Creek (south), B&S 584-62 RMBL. C. runcinata is a species of moist meadows, whether salt or fresh. Its conspicuous stems are essentially bereft of leaves, and the oval basal leaves are merely dentate, not pinnatifid.

## Erigeron L., The Erigerons or Fleabanes

The distinction between Erigeron and Aster presents enough difficulty to merit a few words of clarification. For one thing, the involucres of Aster are usually imbricated, those of Erigeron unimbricated. Again, the asters are usually more woody, and usually possessed of a greater number of heads. Finally, the phyllaries of Aster frequently lose their greenness toward the base, the white edges taking over the whole phyllary except

for the midrib. In Erigeron, on the other hand, the phyllaries are commonly uniform from top to bottom, the heads are usually fewer in number, and the plant is noticeably more herbaceous.

The alpine erigerons

Erigeron melanocephalus Nelson; cordilleran; alpine; Blaine Basin, B 112c-57 COLO; East Maroon Pass, B 232-52; Rough Creek Cirque, B&S 604-62 RMBL. With its white rays and contrasting black involucres, this is probably the most quickly identified of all the Gunnison Basin erigerons. The basal leaves are spoon-shaped.

Erigeron simplex Greene; cordilleran; alpine-subalpine; Blaine Basin, B 112d-57 COLO; Taylor Pass, B 45-59 RMBL; Gothic Natural Area, B 67e-54; Mineral Mtn., B&S 523-62; Rough Creek Cirque, B&S 591-62. This species is closely related to the preceding; the basal leaves can be almost, but not quite, spoon-shaped, and the crosswalls of the involucral hairs can be clear or red, but not black; most conspicuously, the rays are not white but a purplish pink. The plant grows taller than E. melanocephalus, and is both more frequent and more extended in its range.

Erigeron lanatus Hooker; cordilleran; alpine; Conundrum Pass, B 51-54 RMBL (= B 8824 COLO). Here although the rays are also a purplish pink, the crosswalls of the involucral hairs are entirely clear, which contributes to the woolly appearance of the heads. More importantly, some of the leaves are always three-toothed. Since the above collection was made, the plant has been collected several times at the same station; but no new station has been reported for the Gunnison Basin or for Colorado.

Erigeron humilis Graham; cordilleran; alpine; North Italian Mtn., L 3967 (1954) COLO, B 77-54 (= L 3967). This is a much smaller plant than E. lanatus, rising barely an inch and a half above the ground. The crosswalls of the involucral hairs are black, as in E. melanocephalus; but here, as pointed out in Rydberg's 1917 Flora, by means of which the above collections were first identified as E. unalaschkensis, the inconspicuous erect rays are involute and incurved, while between the rays and the disk is a ring of rayless pistillate flowers. First collected shortly after E. lanatus, the story of E. humilis is much the same. It has been re-collected at the same location; but no other location has been reported for the Gunnison Basin or for Colorado.



Erigeron grandiflorus Hooker; cordilleran; alpine; Carson Pass, B&S 264-65; Uncompahgre Peak, S 66-112; Cottonwood Pass, S 67-228. This plant most closely resembles E. lanatus, and indeed the heads are about the same size, and woolly with the same clear-walled hairs. But the two plants differ sharply in habit. E. lanatus has a decumbent habit as it spreads out to form a loose cushion. The plants of E. grandiflorus grow individually, and are erect. Again, the rays of E. grandiflorus are more highly colored to begin with, and do not fade but dry a dark purple. Finally, the leaves of E. grandiflorus are not three-toothed, and are more conspicuously enlarged at the base.

Erigeron vagus Payson; cordilleran; alpine; Virginia Basin, B 14-54 RMBL; Engineer Pass, B&S 65-199 RMBL; Uncompahgre Peak, S 66-118. Here the small leaf on its short, wide petiole is three-fingered rather than three-toothed. The involucral hairs are clear-walled, but not profuse enough to make the head woolly, and the rays vary from white to pink. The plant has a low, creeping habit.

Erigeron pinnatisectus (Gray) Nelson; cordilleran; alpine; Red Mtn., B 169-61; Baldy Chato, B&S 478-62; Slumgullion Mesa, B 253-65; Spring Creek, B 148-65; Cement Creek, S 65-55 RMBL. If E. melanocephalus, on account of its white rays and black involucres, is perhaps the most readily identifiable among the alpine erigerons, this species surely comes next; but for quite different reasons. This species catches the eye for its very abundance and luxuriance. The blue-rayed heads seem innumerable, and the abundant basal leaves are as finely dissected as those of the parsley. There is

no other alpine erigeron quite like it, especially if the collector notes that the cauline leaves, by contrast, are linear and entire! Oddly enough (as indicated in the citations, and as an illustration of the theory advanced in the Introduction*), this alpine species has been collected in the valley of Cement Creek at 9,000 feet, and in the valley of Spring Creek (south) at 8,000 feet. And to make the latter collection doubly intriguing, E. pinnatsectus was growing with E. pulcherrimus, until then unknown in the Basin!

Erigeron leiomerus Gray; cordilleran; alpine; Conundrum Pass, B 42a-54; Castle Pass, B 109-59; Mineral Mtn., B&S 533-62; Mt. Ouray, B&S 124-66; Snodgrass Mtn., B 30-54 RMBL; Cathedral, B&S 178-62 RMBL. Widespread in the Gunnison Basin, this blue- or white-rayed alpine plant has also left relicts in the zones below, but not so spectacularly as in the case of E. pinnatisectus. For here the relict populations are left on rockslides or in habitats approaching conditions of the alpine zone. This species has been confused with E. ursinus (which apparently does not grow in the Gunnison Basin), but needlessly so. True, E. leiomerus also has a branching caudex; but underneath, one can always find a central root. Again, the leaves of E. leiomerus are spatulate, not sharp-pointed ellipses. Finally, in E. leiomerus, the involucres, although minutely glandular, are very nearly glabrous; in E. ursinus, they are lightly strigose, like the stems.

The subalpine erigerons

Erigeron peregrinus (Pursh) Greene; cordilleran; montane-alpine; Washington Gulch, B 187-52; Schofield Pass, B 307-61; Mill Creek (south), B&S 296-62; South Baldy, B 178-66; Gothic, B 194-61. With the widest rays and one of the largest heads of any erigeron in the Basin, this species is most at home in moist, subalpine meadows. Its rays are of a purplish color, and its glabrous leaves are oblanceolate and petiolate on the lower

* See above, pp. 6-7.



stem, lanceolate and sessile on the upper stem. Needless to say, in moist places, the plant descends to the upper montane zone. But I was much surprised to find it growing in great luxuriance on the 12,400-foot summit of South Baldy, which resembles a bald in the Southern Appalachians and is far removed from the moist meadows of the zone below. However, I recalled the well-known snowarch on the east face of the mountain, perhaps the longest-lasting snowfield in the Gunnison Basin, and gradually the truth dawned on me that South Baldy is the southern outpost of the West Elk Mountains, catching all the moisture for miles around. Here the rains and mists are sufficient to equal the moisture of a meadow in the subalpine zone.

Erigeron Coulteri Porter; cordilleran; montane-alpine; Gothic, B 113-52; Gothic Natural Area, B 67d-54; Alpine Plateau, B 115-61; Rough Creek Pass, B&S 655-62 RMBL. With its white rays and yellow disk, this erigeron more than any other in the Gunnison Basin resembles the common daisy. It is most at home in the light shade of spruce-fir forest where, by actual measurement of the third collection cited above, it grows twenty-two inches tall with a head two inches in diameter. In a sheltered gulch it will, of course, venture into the lower alpine zone, and in the partial shade of aspens descend into the upper montane zone. Its largish, upper cauline leaves are sessile and slightly dentate.

Erigeron acris L.; boreal; montane-alpine; Cathedral, B 195a-66; Copper Creek Valley, B 247-61; Queen Basin, L 3918 (1954) COLO. This plant, with solitary or corymbiform heads and with spatulate basal leaves and linear cauline ones, is a very odd erigeron. The rays are not like those of other erigerons, but threadlike vertical affairs almost lost to view amid the pappus. And then there is an inner ring of pistillate flowers without rays, so that the styles themselves are what one sees in the midst of the pappus. Of course, in the center are some ordinary diskflowers. But it is the ring of rayless pistillate flowers between the pistillate rayflowers and the diskflowers that links this plant with E. humilis in the alpine zone.

Erigeron superbus Greene; cordilleran; subalpine; Marshall Pass, Cr (1896) CS; Copper Creek Valley, L 3919 (1954) COLO. This is another tall erigeron of the spruce-fir forest which, however, seems not to have ventured above or below its favored habitat. It has long, purplish rays, and an involucre that is both finely glandular and pubescent with white, multicellular hairs. The oblong-reticulate leaves are glabrous with some cilia on the edges.

The montane erigerons

Erigeron elatior (Gray) Greene; cordilleran; submontane-subalpine; Sapinero, Wh 542 (1898) COLO; Gothic, R 10411 (1959) CS; Dorchester Pass, B 14-67. This plant of moist to mesic montane meadows (but extending to the zones both immediately above and immediately below) is noted for its large, handsome heads with woolly involucres and pinkish rays. The stems are leafier at the top than at the bottom, the upper leaves being sessile and ovate-lanceolate. The plant grows about a foot and a half tall.

Erigeron flagellaris Gray; cordilleran; montane-submontane; Gothic, B 124-52; Slate River Valley, B 110-61; Lake San Cristobal, B 32-61; Fish Creek Mesa, B&S 62-62; Gold Basin Creek drainage, B 18-59. In aspen-bordered grassy places throughout its range, this erigeron sends out the leafy stolons that have given it its specific name. But the plant ventures forth into open, even rocky, places and the leafy stolons may be totally lacking from individual plants. Then the plant becomes confusable with the next species, to which the reader is referred.

Erigeron divergens Torrey & Gray; cordilleran; submontane-subalpine; Gold Basin Creek drainage, B 12-60 RMBL; Cathedral, S 62-7; Dry Lake Park, B&S 17-62 RMBL; Inferno Canyon, B 32-64. Not only does E. divergens lack the leafy stolons of E. flagellaris, but it seems to be more restricted in its distribution. At least it seems not to have been collected north of the Gunnison River although in its own half of the Basin it



climbs to the edge of the alpine zone. In the manuals, the starkly divergent hairs of its stem are used to separate the two species; but there are many other differentiae. The rays of E. divergens are always more colored than those of E. flagellaris, and the leaves are far more linear. In fact on pages 438 and 439 of the third volume of the second edition of Britton & Brown,* excellent drawings of the two species face each other and not only bring out the last-mentioned distinction but others also. In the Gunnison Basin, both species are perennial, E. divergens being the longer lived of the two. It is found in open, dryish places, and reaches a height of some four inches. Under favorable circumstances, E. flagellaris grows a couple of inches taller.

Erigeron lonchophyllus Hooker; boreal; montane-submontane; Copper Creek, B 165-59 RMBL; Cochetopa Park, B 78-55; Mineral Creek, B&S 516-62; Gunnison, B 239-61. This plant is related to E. acris, which the reader is advised to consult among the subalpine erigerons. There are the same vertical pistillate rayflowers, even if the inner ring of rayless pistillate flowers is lacking. Again, the inflorescence of this plant is solitary or racemose, just as that of E. acris is solitary or corymbiform. On the other hand, E. lonchophyllus is always more leafy than E. acris. In fact, in the moist grassy meadows where it grows, it is frequently difficult to distinguish it from the grass.

Erigeron compositus Pursh; boreal; montane-alpine; Crested Butte, B 65-61; Cement Creek Valley, S 65-54 RMBL; Alpine Plateau, B 120-61; Baldy Chato, B&S 475-62; Virginia Ridge, B 70f-54. E. compositus is placed in the montane group arbitrarily since the fifteen or more Gunnison Basin collections examined show an avoidance of the submontane zone, but no preference for any of the three upper zones. The species is close to E. vagus, the leaf of which was described as being three-fingered at the end of its petiole. Here the fingers usu-

* Illustrated Flora of the Northern States and Canada, 3 vols., N.Y., 1913.

ally develop into a hand, and indeed the hand can be as much as twelve-fingered; but always the multiplication is by threes. The plant is much more robust than E. vagus, and the full head at the end of its stem frequently appears like a small dome. The species occurs both with rays and without, the latter being the case in the Cement Creek Valley collection cited above.

Erigeron speciosus (Lindley) DC.; cordilleran; montane-submontane; Washington Gulch, B 271-61; Gothic, S 64-199; Glacier, S 65-120 RMBL; Steuben Creek Valley, B 173-65 RMBL. See the next species for annotations.

Erigeron subtrinervis Rydberg; cordilleran; montane-subalpine; Powderhorn Divide, B&S 452-62 RMBL; Mineral Creek Valley, B 152-65 RMBL; Ohio Creek Valley, B 101-66; Marshall Pass, B 128-60 CS, RMBL. In most keys, E. speciosus and E. subtrinervis are separated from each other by the relative glabrousness of the first, the relative pubescence of the second. But there are other distinguishing characteristics less easily put in a key or manual. For instance, in the Gunnison Basin, although both species are centered in the montane zone, E. speciosus descends to the zone below, E. subtrinervis ascends to the zone above. Again, E. speciosus, besides producing white-flowered variants, bears many more heads on an individual plant--as many as thirty-nine by actual count. Yet although I examined a greater number of plants of E. subtrinervis, the greatest quantity of heads I could find on an individual plant was thirteen. Finally, E. speciosus is more moisture-loving than E. subtrinervis, E. subtrinervis more drought-tolerant than E. speciosus, which I suppose is the reason E. subtrinervis has been collected more frequently in the southern half of the Basin.

Erigeron formosissimus Greene; cordilleran; subalpine-submontane; Tin Cup, B 40b-54, B 165-60 RMBL; Gothic, Bro 7/20/60 RMBL; Cathedral, B 102-64; Gunnison, B 238-61 CS. This species is confusable with E. subtrinervis; in fact in the submontane zone they can so closely resemble each other that one must look close



to separate them. Nevertheless E. formosissimus is a greener, more herbaceous plant, E. subtrinervis a more cinereous, woody plant, as befits one adapted to more xeric conditions. Again, the stems of E. formosissimus are more curved, those of E. subtrinervis stiffer and straighter. Finally, E. subtrinervis is more prolific of stems, leaves, and heads. E. formosissimus seldom has more than a couple of stems to a plant or more than two or three heads to a stem, and often but one of each.

Erigeron pulcherrimus Heller; cordilleran; montane; Spring Creek, B 126-65. In the Gunnison Basin, there are but two erigerons with indubitably imbricated involucres, so that the recognition of either of them becomes relatively easy if one is provided with a handlens. Both species are low perennials, both have linear or linear-oblanceolate leaves, and both occur in white- as well as in blue-flowered forms. Yet E. pulcherrimus has hairy achenes, E. canus glabrous achenes, and the difference will distinguish the two species. It should be noted that the collecting of E. pulcherrimus on the bank of Spring Creek in the shade of aspens is an anomaly, for the other known Colorado collections are from the dry country west of the Gunnison Basin. Still, the plant was growing with E. compositus and E. formosissimus and quite as much at home as they, and we must remember that an anomaly is nature's way of telling us something if we could but put two and two together.

The submontane erigerons

Erigeron glabellus Nuttall; cordilleran; submontane; Parlin, S 65-110 RMBL; Gunnison, B 69-60 CS, RMBL; Cebolla Hot Springs, B 68-64. Here is a plant that in the Gunnison Basin is most at home in the moist floodplains of the submontane, or sagebrush, zone. It is confusable with E. formosissimus, which has the same habit of inflorescence and is also tolerant (though not loving) of moist places, and in fact the two species have frequently been collected together. However, the two plants are readily separable if one looks closely. Not only are the basal leaves of E. glabellus more or less

dentate but the stems rise directly from the root without the initial decumbency of E. formosissimus. Again, the rays of E. glabellus are of a lighter color and its involucres are strictly glandless. It is interesting that this plant of the fresh-water meadows around Gunnison should also have been collected growing vigorously in the runoff of one of the saline springs of Cebolla Hot Springs.

Erigeron pumilus Nuttall; cordilleran; submontane; Almont, B 6-54; Sapinero, K 1509 (1949) DBG; Gunnison, B 70-60 RMBL; Marshall Creek Valley, B 90-61; Powderhorn, B&S 45-62. If there is one erigeron more typical of the sagebrush zone than any other, it is this. Indeed it might be called the bunchgrass erigeron, for in habit of growth and in the spacing-out of individuals it resembles the short bunchgrasses that dot the sagebrush floor of the Basin. The small heads are white-rayed, the involucres are finely glandular, and the whole plant (including the involucres) is cinereous-strigose.

Erigeron Eatonii Gray; cordilleran; submontane; Soap Creek Valley, W 7447 (1952) COLO; Lost Canyon Gulch, B 68-61; Sargents, R 10245 (1959) RMBL; Vulcan, B 25-64. Next in frequency in the sagebrush zone comes this erigeron, which also has the bunchgrass habit, but is more open and a little taller. In fact the bowl-like symmetry of its stems is the character I use in identifying this plant in the field. The stem bases are purplish, and in the Gunnison Basin the rays seem to be pink or a light purple.

Erigeron Bellidiastrum Nuttall; relict of the plains; submontane; Almont, B 353-61 CS; Parlin, B&S 66-63. This annual erigeron, with its small, obtuse, linear, almost uniform leaves, and pink to light-purple rays, would seem to be an excellent example of the relict-of-the-plains category. Its home today is conspicuously on the Great Plains from South Dakota to western Texas, and so little in the Rocky Mountains that neither Coulter & Nelson in their 1909 New Manual of Rocky Mountain Botany nor Weber in his 1967 Rocky Mountain Flora include the species. Yet sporadic collections have been



made west of the Rockies, as one would expect if the relict theory is true. There was always an avenue south of the Rockies across northern New Mexico to Arizona, and it is characteristic that the only known collection from Arizona comes from close to the extreme northeastern corner. Furthermore it is the supposition of this study that prior to the present-day Rockies there were high grasslands both to the east and to the west of the cordilleran axis.* In any event, E. Bellidiastrum, not properly a member of the cordilleran flora, can scarcely be regarded except as a remnant of the once more extensive flora of the plains. Like E. Eatonii, it has the bowl-like habit, although it can grow to twice the size.

Erigeron canadensis L.; widespread North American; submontane; Gunnison, B 294-61 CS. Closely linked to E. acris and E. lonchophyllus by the preponderance of outer, pistillate to inner, perfect flowers, and by the vertical, threadlike rays that really are not rays at all, this annual erigeron is uncommon in the Gunnison Basin. It is curious, not only that the whole group of irregularly pistillate erigerons (humilis, acris, lonchophyllus, and canadensis) is infrequent in the Gunnison Basin, but that infrequent as they are, each one of the group is apparently partial to a different zone of the Basin. Once again, this may be just an oddity; but there are so many of these oddities that surely some of them are significant. If the plant is not yet sufficiently distinct, the collector should note that its heads are the smallest of any erigeron in the Basin and that the phyllaries are slightly imbricated.

Erigeron canus Gray; cordilleran; submontane; Gunnison, W 9330 (1955) COLO. Known from the Gunnison Basin only by the cited collection, E. canus possesses an involucre as indubitably imbricated as that of E. pulcherrimus. But in habit it more resembles E. pumilus, and if it were not as infrequent in the Gunnison Basin as E. pumilus is frequent, the two species might be confused, especially since E. canus occurs in a white-flowered form. But the rays of the cited collection are

* See above, pp. 11 and 43-45.

bluish (as are those of the Gunnison Basin collection of E. pulcherrimus), and in any event the achenes of the species are glabrous. The latter character will separate E. canus not only from E. pumilus but also from E. pulcherrimus if the need for separation should arise.

Erigeron vetensis Rydberg; cordilleran; submontane; Cochetopa Park, H 8961 (1959) CS. This species, too, is known from the Gunnison Basin by a single collection only. Since its rays are white, it is conceivable that if collected again it also could be confused with E. pumilus, the common white-rayed erigeron of the sagebrush floor of the Basin. However, the stems and foliage of the latter plant are essentially glandless, those of E. vetensis glandular. It will also be noted that the spreading, scraggly hairs of E. pumilus are quite lacking from E. vetensis.

## Gaillardia Fougeroux, The Gaillardias

Gaillardia aristata Pursh; cordilleran; submontane; Gunnison, W 9159 (1955) COLO. With its red diskflowers and three-toothed orange rays, this composite is different from all others in the Gunnison Basin. It is partial to dry meadows, of which there are a good many in the gravelly parts of the old floodplain of the Gunnison River.

## Gnaphalium L., The Cudweeds

Gnaphalium Macounii Greene; boreal; subalpine; Schofield Pass, B 257-61 CS, RMBL. It is interesting that at this station in Schofield Pass (the only one known for the species in the Gunnison Basin) G. Macounii, a biennial, should have been growing with its close relative, the perennial Anaphalis margaritacea. The collector will note the wings left by the leaf bases as they start to run down the stem; these give the plant its popular name of winged cudweed. The smallish, domed, corymbose inflorescences of the species have the yellowish look of old ivory, and the outer phyllaries will be found to be acute.



Gnaphalium uliginosum L.; boreal; montane; Gothic, Wi 10373 (1954); Grant Lake, B 181a-59; North Beaver Creek (south), B&S 616-62 RMBL. This woolly, annual, little cudweed is apt to be found anywhere in the montane zone where the retreating shores of brook or pond lie open to the fall of its seeds. Note that the linear-oblanceolate leaves always overtop the inflorescences.

Gnaphalium Wrightii Gray; southwestern; subalpine; Carbonate Hill, L 1111 (1950) CS. This cudweed is about the same size as, and something like, G. Macounii; but the leaves are revolute and not decurrent down the stems, and the outer phyllaries tend to be obtuse rather than acute. Furthermore the inflorescence has a mushroom shape rather than a domelike shape like that of G. Macounii.

## Grindelia Willdenow, The Gumweeds

Grindelia squarrosa (Pursh) Dunal; cordilleran; montane-submontane; Lake City, B&S 164-66; Cochetopa Creek Canyon, B 196-66. With its gummy involucres composed of conspicuously squarrose phyllaries, there is no other composite in the Gunnison Basin like this. The rays are a bright yellow, and the leaves are serrate with small teeth.

## Gutierrezia Lagasca, The Matchwoods

Gutierrezia Sarothrae (Pursh) Britton & Rusby; cordilleran; submontane; Biebel's Springs, B 188-60; Tenderfoot Mtn., B 339a-61; Gold Basin Creek drainage, B 64-59; Powderhorn, B 134-64. This low shrub (the tallest specimen cited above is only nine inches high) is almost as good an indicator of the submontane zone as the sagebrush, which it replaces when the soil is sandier and drier. Its small, profuse, golden heads present an even surface at the top of the bush, and are very showy in the flowering season. The leaves are linear and only about an inch long. The phyllaries are shell-backed and color-

less except for the green tips, and the upper phyllaries frequently do not have these tips.

## Haplopappus Cassini, The Haplopappuses

Haplopappus armerioides (Nuttall) Gray; cordilleran; submontane; Sapinero, Wh 444 (1898) COLO; Iola, P&Ha 4127 (1951) COCO; Gunnison, W 9140 (1955) COLO. With its relatively large heads rising on their solitary (or occasionally branched) peduncles above the narrow, lanceolate, basal leaves, this is an unconfusable plant. Being as long as or longer than the rays, the cylindrical involucres are striking, especially since the phyllaries have conspicuous green tips.

Haplopappus Clementis (Rydberg) Blake; cordilleran; alpine-subalpine; North Italian Mtn., B 76-54; Mineral Mtn., B&S 521-62; Slumgullion Mesa, B 250-65; Powderhorn Park, B 57-64; Horse Park, B 120-64. As it grows in the Gunnison Basin, this is a distinctive plant. The root is usually fusiform, and from its summit the one or two stems tiller out, and then rise to bear their single large heads. The basal leaves vary from linear to linear-lanceolate, and are semiauriculate.

Haplopappus croceus Gray; cordilleran; subalpine-submontane; Copper Creek Valley, L 1044 (1950) CS; Waunita Hot Springs, E (1888) COLO; Doyleville, B 275-65 RMBL; Gunnison, Sto 7/53 WS. This is the largest haplopappus to grow in the Basin. Its flowering stems are frequently over two feet high, its basal leaves more than a foot long, and its heads more than two inches broad. The large, loose, herbaceous phyllaries are particularly striking.

Haplopappus lanceolatus (Hooker) Torrey & Gray; cordilleran; submontane; Cebolla Hot Springs, B&S 443a-62 RMBL. This species, as it grows at its only known station in the Gunnison Basin, is suggestive of H. Clementis, for its flowering stems tiller out and then rise in the manner of that plant. But here there can be half a dozen; in H. Clementis seldom more than two. And here the basal



leaves are not only a gray-green but "rigidly and acutely dentate," as mentioned in the Hall monograph.* The phyllaries, too, are quite different, being more like those of an aster; while the phyllaries of H. Clementis are loose, green, and similar to those of H. croceus, although smaller.

Haplopappus Macronema Gray; cordilleran; alpine-montane; Pearl Mtn., L 555 (1949) CS; Cumberland Pass, B 40a-54 RMBL; Glacier, S 65-121 RMBL. Since the heads are similarly rayless, and the branchlets equally covered with a white pannose tomentum, this species has been confused with Chrysothamnus Parryi. But the leaves of the two plants are entirely different. Those of C. Parryi are a light green, and long and linear--even filiform; those of H. Macronema are short, oblanceolate or spatulate, and a dark green.

Haplopappus Parryi Gray; cordilleran; montane-alpine; Fish Creek, B 146-64; Elk Creek Valley, B&S 168-66; Gothic, B 213a-52; Schofield Pass, B 65c-54; Rustler's Gulch, B 317-61. Although it can travel through the subalpine zone and appear on the crest of an alpine ridge (where it shrinks to a matter of inches), this plant is most at home in the aspen woods of the montane zone where it can be collected a foot and a half tall, with large lanceolate, oval or oblanceolate green leaves, and with thin, cordlike rhizomes. Here it closely resembles a number of woods goldenrods, and I know of no botanist (including the author) who has not once taken it for a goldenrod.

Haplopappus pygmaeus (Torrey & Gray) Gray; cordilleran; alpine; Cumberland Pass, B 39-54; Baldy Chato, B&S 480-62; Trallala Peak, B 242-65. This species is both a typical alpine plant and a typical haplopappus--typically alpine in that the leaves and flowering stems it sends up from the ground are only a few inches high; typically haplopappoid in that the loose, foliaceous invo-

* Hall, Harvey M., The Genus Haplopappus, Washington, D.C., 1928, p. 114.

lucre of the genus is conspicuously present. Sometimes, the inner phyllaries are handsomely tinted with red.

## Helenium L., The Sneezeweeds

Helenium Hoopesii Gray; cordilleran; submontane-subalpine; Sapinero, Wh 432 (1898) COLO; Gothic, B 101-52; Alpine Plateau, B 123-61; Mill Creek (south), B&S 298-62. Throughout its range in the Gunnison Basin this large composite, with its flat-topped but few-headed inflorescence, is a conspicuous plant of moist meadows. Its rays are orange, and it is the largest succulent in the Basin. It is said to poison sheep. But in the Gunnison Basin, there is not much animal poisoning, mainly because there is usually present other and more palatable forage.

## Helianthella Torrey & Gray, The Aspen Sunflowers

Helianthella Parryi Gray; southwestern; montane; Cochetopa Pass, Ra&Ga 16917 (1939) COLO, B&S 66-134 RMBL. This aspen sunflower is much the lesser of the two Gunnison Basin species. It grows to the height of about a foot; and the mostly solitary heads at the ends of their stems are seldom more than an inch and a half in diameter. The elliptical basal leaves are on petioles the length of the blades. Known only from the above station at the southern edge of the Basin, it is interesting that this single station should have persisted for nearly thirty years.

Helianthella quinquenervis (Hooker) Gray; cordilleran; montane-subalpine; Gothic, B 100-52; Marshall Pass, Bak 475 (1901) COLO; Slumgullion Pass, B&S 304-62 RMBL. This plant is double the size of the preceding although, to be sure, the larger heads are considerably fewer in number. The basal leaves are particularly distinctive, being essentially elliptical, but long-tapered at either end. The plant seems never to be found far from its favored associate, the aspen, its pale, but bright,



yellow rays furnishing a memorable bit of color in the prevailing green of meadow and grove.

## Helianthus L., The Sunflowers

Helianthus annuus L.; cordilleran; submontane; Quartz Creek Valley, Bro 8/7/60; Ninemile Hill, B 130-64 RMBL. The common sunflower is not frequent in the Gunnison Basin, but grows luxuriantly when it occurs. In the second collection cited above, the plants are twenty inches tall and the expanded heads four inches across. Curiously, the short, ovate leaves on their long petioles are disproportionately small.

Helianthus Nuttallii Torrey & Gray; cordilleran; submontane; Quartz Creek Valley, Bro 8/7/60 RMBL; Gunnison, B 336-61; Cochetopa Creek Canyon, W 9430 (1955) COLO; Powderhorn, B&S 171-66. This species, which superficially resembles Helianthella quinquenervis, is much more frequent than H. annuus, probably because it is moisture-loving and flourishes along neglected roadside and irrigation ditches. The fascicled, fusiform roots are especially distinctive.

Helianthus petiolaris Nuttall; relict of the plains; submontane; Eagle Rock, Ke 7/2/49 WS; Elkhorn, B 61c-55, B&S 182-65 RMBL. The above collections are essentially from the same station--from the narrows of the Gunnison River east of Elkhorn, where there are sandy stretches along the road and along the river. Between the dates of the last two collections cited, a new highway was blasted through the narrows, the heavy road machinery more than the blasting seeming to extirpate the last living plant. Yet this, the only known station for the plant in the Basin, endured, illustrating the persistence with which this plains species must have survived since pre-Pleistocene times.* It is altogether a slighter plant

* Some may disagree with this phytogeographical classification of H. petiolaris, but from the point of view of its behavior in the Gunnison Basin I find

than H. annuus, its rays being a paler yellow and its leaves being narrowly ovate instead of broadly and bluntly ovate.

Helianthus pumilus Nuttall; cordilleran; montane; Coal Creek Valley, K 6/22/47 DBG. This is a low, bushy sunflower with terminal heads and lower, paired axillary ones as in Arnica. The opposite leaves on short petioles are shaped like spearheads, and the whole plant is rough and hairy.

## Hieracium L., The Hawkweeds

Hieracium albiflorum Hooker; cordilleran; montane; Crested Butte, E (1889) COLO. This white-flowered hawkweed is two or three times as tall as H. gracile, and its corymbose heads are two or three times as numerous. It is without the white branched hairs of the latter species.

Hieracium gracile Hooker; cordilleran; montane-subalpine; Gothic Natural Area, B 67a-54, B 141-59; Copper Lake, B 234-52, B 37d-54. This species is, in many respects, the opposite of the preceding. Its short rays are yellow rather than white, its inflorescence is racemose, and its heads are few in number, commonly only six, and sometimes only two or three. In addition to its long black hairs, it has short white hairs that are branched.

## Hymenopappus L'Héritier, The Hymenopappuses

Hymenopappus filifolius Hooker; cordilleran; submontane; Gold Basin Creek drainage, B 88-57; Sun Creek Valley, B 177-65 RMBL; South Beaver Creek drainage, B 190-65 RMBL. In this species, the leaves (mostly

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this the most reasonable hypothesis. I have seen H. annuus populating an entire field released from dry-farming, and can believe that the plant, though native, may well have entered the Basin



basal) are pinnately compound, the pinnae being filiform, while the inflorescence is corymbiform. The heads are small cups holding a small quantity of bright-yellow disk-flowers.

## Hymenoxys Cassini, The Hymenoxyses

Hymenoxys acaulis (Pursh) Parker; cordilleran; submontane-alpine; Soap Creek Valley, W 7449 (1952) COLO; Powderhorn, B&S 28a-62 RMBL; Iris, B 13-65; Monarch Pass, Ra 16128 (1937) COLO; Double Top Mtn., L 1007 (1950) COLO. This species will be found to bear out its specific name of acaulis: leaves and peduncles alike arise from the multicipital caudex, and there are no plantstems in the strict botanical sense. The leaves are linear and pitted, the heads bear yellow rays, and the involucres are woolly.

Hymenoxys grandiflora (Torrey & Gray) Parker; cordilleran; alpine-subalpine; Virginia Basin, L 541-48 CS; Cumberland Pass, Ke 7/49 WS; South Baldy, B 176-66; Slumgullion Mesa, B 128-61; Powderhorn Park, B&S 146-62. This alpine plant, with its large, yellow-rayed heads and woolly involucres, is perhaps the most famous alpine plant in Colorado--so famous, in fact, that its former generic name, Rydbergia, has survived as one of its popular names. Vigorous plants grow to the height of eight or ten inches, and the leaves, mostly basal, are pinnate, the pinnae being linear or filiform.

Hymenoxys helenioides (Rydberg) Cockerell; southwestern; montane; upper Cebolla Creek Valley, P 1548 (1940) COCO. This rare but distinct plant resembles a slender (but equally tall) version of the eastern Helenium autumnale, although with curious, linear-oblanceolate leaves that can be either entire, three-parted, or five-parted.

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with the white man. But in the case of H. petiolaris, I have seen only a plant clinging to a small stretch of the environment most suited to itself, a stretch it may have held for thousands of years.

Hymenoxys Richardsonii (Hooker) Cockerell; cordilleran; submontane-montane; Sargents, R 10244 (1959) RMBL; Cochetopa Pass, Ra&Ga 16913 (1940) COLO; Cathedral, B&S 220-62 RMBL; Gold Basin Creek drainage, B 58a-57. This species, popularly known as the Colorado rubber plant, is apparently limited to the southern half of the Basin. Basal leaves and flowering stems are padded with wool at the bottom, while the pinnae of the compound leaves are filiform. The small heads in their cymose inflorescences bear disproportionately wide rays.

## Iva L., The Poverty Weeds

Iva xanthifolia Nuttall; cordilleran; submontane; Parlin, W 9442 (1955) COLO; Gunnison, B 337-61. This is certainly the strangest composite that grows in the Gunnison Basin. A coarse annual three or four feet tall, it bears a number of petioled, coarse-toothed leaves on the way up, and finally an enormous panicle of compositaceous heads not more than a quarter of an inch in diameter. The collector should look at one of the florets of these heads with his lens--no rays, no pappus, but (if the plant is mature) five black achenes, partially enclosed by the five inner phyllaries, standing on end in a circle, for all the world like five black bedbugs standing on end, the forked styles serving as the forked antennae of the little beasts.

## Kuhnia L., The False Bonesets

Kuhnia rosmarinifolia Ventenat [Kuhnia chlorolepis Wooton & Standley]; southwestern; submontane; Almont, B 358-61. This low, bushy, herbaceous (but perennial) plant bears a great number of rayless, turbinate heads on the surface of the bush. When the heads are mature, one can see the dark achenes between the narrow phyllaries. These latter are generally in two ranks, long and short; they are also ribbed and glabrous, but at the edges scarious, hairy, and even provided with sessile glands. The leaves, which are glandular-punctate, are short and linear.



## Lactuca L., The Lettuces

Lactuca pulchella (Pursh) DC.; cordilleran; montane-submontane; Crested Butte, B 72-54; Fish Creek Valley, B&S 414-62 RMBL; Gunnison, B 237-61; Willow Creek, B 282-65. This handsome lettuce can be seen almost anywhere in the lower two zones of the Basin where there is sun and the soil is light and well drained. The rays are violet, the phyllaries and stems take on a pleasing redness from the sun, and the lower leaves are runcinate, the upper entire. However in heavy, poorly drained soils (as in the last collection cited), the rays become blue, the plant assumes a darker hue, and the lower leaves are merely pinnatifid, not runcinate.

Lactuca Serriola L.; adventive; submontane; Doyleville, Bro 8/3/60; Gunnison, B&S 433-62 RMBL; Ninemile Hill, B 280-65. Here the heads are small, and unless numerous, inconspicuous. The yellow rays are barely exserted beyond the phyllaries, and the leaves (in the Gunnison Basin) are not pinnatifid, but merely denticulate.

## Leucampyx Gray, Wild Cosmos

Leucampyx Newberryi Gray; southwestern; montane; Cochetopa Park, H 8970 (1959) CS; Los Pinos Pass, Ke 7/17/49 WS; Cathedral, B&S 188-62 RMBL. The popular name of wild cosmos suits this species (and monotypic genus) to a T. All along the base of the Northeastern San Juans, from Cochetopa Pass well up toward Slumgullion Pass, the large, white, cosmoslike rays of this plant make one of the most striking floral displays of the summer. The plant grows a foot or more in height, and has fine, pinnately compound leaves like many other dryland composites.

## Lygodesmia D.Don, The Rush Pinks

Lygodesmia juncea D.Don; cordilleran; submontane; Almont, B 195-52. This is another case of where the popular name is suggestive of the distinguishing characteristics of a plant. For L. juncea is almost devoid of leaves, the stem and branches carrying on the photosynthesis of the plant and being green and rushlike. Again, each head strongly resembles the flower of such a plant as the maiden pink; the glabrous, cylindrical involucre and the usually five pink rays look for all the world like the calyx and corolla of a dianthus. As if this false resemblance were not enough, the plant is confusable with Stephanomeria tenuifolia, which grows in the Gunnison Basin and which the reader is advised to consult.

## Madia Molina, The Tarweeds

Madia glomerata Hooker; cordilleran; montane; Castle Creek Valley, B 86-57; Peanuts Lake, B 297-61. This annual is characterized by an ascending habit; that is, its linear green leaves (of which there are at least two lengths) have a tendency to grow upward, a tendency shared by the branches, which begin as low as the base of the plant and ascend alongside the main stem. The heads in glomerules at the ends of the stems and branches are lost among the leaves, and the inconspicuous yellowish florets are lost within the heads. The plant exudes an offensive odor which can permeate an entire meadow.

## Matricaria L., The Pineapple Weeds

Matricaria matricarioides (Lessing) Porter; cordilleran; montane; Washington Gulch, B 188-52; Crested Butte, S 64-240. Oddly enough, the popular name of pineapple weed fits this plant not only with respect to fragrance but also with respect to looks. For there are no rays, and the cone of diskflowers that rises from the low involucre of white-edged phyllaries resembles perfectly the idealized pineapple used as a finial in architecture. At the same time the odor of pineapple emanating from the fresh plant is really extraordinary. The plant, an annual, grows only a matter of inches high, and the leaves are so finely dissected as to resemble those of a sea alga.



## Microseris D.Don, The False Dandelions

Microseris nutans (Geyer) Schultz-Bipontinus [Ptilocalais nutans (Geyer) Greene]; cordilleran; subalpine; Ohio Pass, K 604 (1947) DBG. With its yellow rays and narrow, partially pinnatifid leaves, this plant seems to be some kind of slender dandelion. But a look through a handlens at the pappus will clearly identify the plant. For the pappus is not hard to see, and is composed of scales surmounted by plumose awns. Clearly the plant is a microseris, and not a taraxacum or agoseris.

## Petasites Miller, The Sweet Coltsfoots

Petasites sagittatus (Banks) Gray; boreal; montane-submontane; Gothic, Bro 7/18/60 RMBL; Parlin, B 48-60 RMBL. Most plants attract attention during the flowering season. But there are some plants, obscure then, which become prominent in fruit. P. sagittatus is one of these. In flowering time, the stalks are low, and besides, the heads are a rather nondescript lot. But a month later, the flowering stalks have risen above the swamp, and each inflorescence is like a candelabrum, with every head bearing a white pappus-candle twice as long as the involucre. The leaves are arrow-shaped--green on one side, gray-tomentose on the other.

## Rudbeckia L., The Black-eyed Susans

Rudbeckia hirta L.; widespread North American; submontane; Sargents, R 10618 (1959) RMBL; Gunnison, B 255-61; Sapinero, Wh 640 (1898) COLO. This common wayside plant of much of North America needs no de-

scription here. At the edges of the moist meadows, and along the moist roadside ditches, it follows Tomichi Creek from Sargents to Gunnison, and the Gunnison River from Gunnison to Sapinero.

Rudbeckia laciniata L.; widespread North American; montane-submontane; Beaver Creek (south), B&S 618-62 RMBL. Growing five or six feet tall in river thickets, and notable for its yellow-rayed heads five or six inches in diameter, this plant is extraordinarily difficult to collect. Its roots come out hard, the long stems present a mechanical problem before they can be got into a plant press, and to make matters worse, the plant wilts immediately so that the collector has to untangle both leaves and rays. As a result, the above is the only collection from the Gunnison Basin I know of in any Colorado herbarium, although in its favored streamside habitat the plant is prevalent in the Basin throughout the lower montane and submontane zones.

Rudbeckia montana Gray; Coloradan; montane-subalpine; Soap Creek Valley, B&S 115-65 RMBL; Castle Park, S 64-234; Crested Butte, E (1887) COLO, B 346-61. This rayless, dark-headed coneflower is one of the botanical sights of a trip to this part of Colorado. Endemic to just this section of the Colorado mountains, it grows as vigorously as its range is restricted. Just over the topographical edge of the Gunnison Basin, on the western slope of Kebler Pass, the plant is so vigorous that population photographs are possible which yet bring out the extraordinary cones of the individual heads.

## Senecio L., The Senecios or Ragworts

The alpine senecios

Senecio Soldanella Gray; Coloradan; alpine; Virginia Col, Sh 56-80 RMBL; Conundrum Pass, B 41-54; Uncompahgre Peak, S 66-113. With usually but one large head to a plant, and with its reddish, succulent, circular or broadly elliptical leaves, this species never fails to catch the eye of the alpine botanist. Unfortunately,



it is a rare plant, even in its native state and native haunts.

Senecio Porteri Greene; cordilleran; alpine; Virginia Basin, L 537 (1949) CS; Conundrum Pass, B 70-55 RMBL. Although classified by definition as cordilleran,* this plant is even rarer than the preceding, for it is known only from the Wallowa Mountains of Oregon (on the basis of a single collection), from the northern edge of the Gunnison Basin, and from a mountaintop six miles beyond that edge. It does not remotely resemble the preceding species although also a low alpine plant. It grows in a great clump, with innumerable heads (although only one to a stem), which are top-shaped rather than cup-shaped. The leaves are small and fan-shaped with crenate margins.

Senecio saxosus Klatt; cordilleran; alpine; Castle Pass, B 108-59; Conundrum Pass, B 224-61; Baldy Chato, B&S 472-62 RMBL; Slumgullion Mesa, B&S 141-62 RMBL. This alpine species has been collapsed by a number of taxonomists into S. werneriaefolius, which also grows in the Gunnison Basin. But a field botanist in the Gunnison Basin would certainly have to climb the theoretical ladder by two or three rungs to be able to see the two species as one. The leaves of S. saxosus are very small. Spoon-shaped and with crenate margins, they scarcely average more than a centimeter in their greatest diameter. The rays are not a pale yellow as in S. werneriaefolius but a deep, orange yellow that does not fade after years in the herbarium case. The tips of the phyllaries are always red, and the petiole bases of the leaves are usually purplish.

Senecio Fremontii Torrey & Gray [S. carthamoides Greene]; cordilleran; alpine; Cumberland Pass, B 38-54; Gothic Mtn., B 72c-55 RMBL; Carson Pass, B&S 226-65 RMBL; Fish Creek Valley, B&S 358-62. It is a pity that the common name of oak-leaved was bestowed upon a small-leaved chenopod and not upon this ragwort, the much larger leaves of which, with their more com-

* See above, pp. 41-42.

plex dentation, really do suggest the leaf of an oak. The plant most commonly grows on rockslides at high elevations, yet is occasionally found at lower elevations as explained in the Introduction.* The white edges of the phyllaries of the relatively large heads are conspicuous, and after the oaklike leaves, are next best as a means of identifying the species.

The subalpine senecios

Senecio atratus Greene; cordilleran; alpine-montane; Long Branch Baldy, B&S 113-66; Schofield Pass, B 84-52; Fish Creek Valley, B&S 334-62 RMBL; Glacier, S 65-116 RMBL. With its fan-shaped, yellow, cymose inflorescence, this is one of the most easily recognized plants in the Basin. Although its center of distribution falls within the subalpine zone, it is by no means either a forest or a meadow plant, but a plant of loose soil and of open, rocky places. It is one of the chief pioneers in sheltered alpine or subalpine gulches, and is especially evident in roadcuts near timberline. The plant is gray all over, and the tips of its phyllaries are conspicuously black.

Senecio amplectens Gray; cordilleran; subalpine-alpine; Lake Irwin Basin, B 57a-54; Copper Creek Valley, B 230b-52; Baldy Chato, B&S 484-62 RMBL; Slumgullion Mesa, B 214-65. In open spruce forests, this senecio grows a foot and a half high and bears scalloped elliptical leaves as much as eight inches long. But in the alpine zone, the plant shrinks to a sixth of the size. At the same time, with an increasing reddishness of stems, petioles, and even leaves, it becomes in color more beetlike. But the long, yellow, straplike rays do not shrink, and in fact serve as one of the chief diagnostics of the plant at any altitude.

Senecio crassulus Gray; cordilleran; alpine-montane; Cottonwood Pass, I 19234 (1961) RMBL; Slumgullion Mesa, B 259-65; Gothic Natural Area, B 36-64; Hot

* See above, pp. 6-7.



Springs Creek Valley, B 10-66. As the specific name suggests, this species is to some degree succulent, and like the sedums, it will grow in the plant press for a day or two if artificial heat is not applied. On petioles at the base of the plant, the glabrous lanceolate leaves on the way up become sessile with auricles. The inflorescence in the Gunnison Basin is apt to be compact, with few heads rather than many. Every other phyllary is so thickened as to seem pleated after pressing, and all of them have darkened tips, frequently with an added tuft of wool.

Senecio canus Hooker [S. Purshianus Nuttall]; cordilleran; alpine-submontane; Virginia Ridge, B 70-54 RMBL; Cochetopa Park, B 80-55, B&S 509-62. This senecio, like S. atratus, is gray all over; but it attains to scarcely half the height. Its small leaves, usually elliptical, vary from spoon-shaped to pinnatifid, while the inflorescence is corymbose. In the beds of volcanic ash in Cochetopa Park, a rayless form appears, while the plant shrinks to about three inches. In passing, it should be noted that from the point of view of elevation Cochetopa Park may appear to be montane rather than submontane. But the place is treeless, an obvious (if somewhat elevated) extension of the Basin floor. As a matter of fact the vegetation here is probably more xeric than in any other extended area of the Basin. In this study the zones are botanical, not altitudinal, although as stated in the Introduction,* there is usually a correlation between elevation and flora.

Senecio dimorphophyllus Greene; cordilleran; alpine-montane; Virginia Basin, Sh 56-65 RMBL; Rough Creek Cirque, B&S 597-62 RMBL; Mill Creek (south), B&S 302-62; Copley Lake, B 110-60 CS, RMBL; Razor Creek Park, B&S 66-53. At one time it was fashionable to collapse this species and S. crocatus into one. The morphological folly of this I shall try to suggest under the latter species. But even the form, or morphology, of a plant is but an abstraction of the moving, concrete

* See above, pp. 1-2.

entity that is the species. Abstractly, S. dimorphophyllus and S. crocatus have the same altitudinal range. But S. dimorphophyllus is frequent in the alpine zone, S. crocatus rare. Similarly in the montane zone, S. crocatus is common, S. dimorphophyllus rare. The concentration of these two species is clearly in different zones. Again, they have different life requirements. In the moist meadow at the center of Razor Creek Park in the southern half of the Basin, both species can be collected. But S. dimorphophyllus stops at a certain saturation of the soil, and is replaced by S. crocatus, the more water-tolerant of the two species.

Senecio Wootonii Greene; southwestern; subalpine; Monarch Pass, R 10224 (1959) RMBL. Apparently, this is a rare plant in the Gunnison Basin; but it is unmistakable nonetheless. Certainly no other Gunnison Basin senecio has the combination of elliptical leaves on winged petioles coupled with rather widely spaced cartilaginous teeth on the leaf edges.

The montane senecios

Senecio crocatus Rydberg; cordilleran; montane-alpine; Razor Creek Park, B&S 66-52; Prosser Creek, B&S 59-66; Crested Butte, B 86-59 RMBL; Gothic, B 148-52; East Maroon Pass, B 230c-52. For the behavior of this species the reader is referred to S. dimorphophyllus. Descriptively, the most obvious difference lies in the orange-red rays and diskflowers of S. crocatus, in the yellow ones of S. dimorphophyllus. The sun is, of course, a notorious reddener of stems, petioles and involucres. But this is not a sun-induced redness; in fact it is deeper when the flowers are in the bud or the plant is in the shade! The next most obvious difference is vegetative. The stems of S. dimorphophyllus tend to be a little wider, and they are usually more clothed with leafage; in fact some of them look as if they were draped with spinach. Finally, the stemleaves of S. crocatus tend to have less body and to be more symmetrical.

Senecio werneriaefolius Gray; cordilleran; montane;



Cement Creek Valley, Ke 7/3/49 WS. Originally determined by its collector as S. perennans Nelson on the basis of the Coulter & Nelson manual, the above collection brings out the gulf between this species and S. saxosus. In the leaves of this collection there is no suggestion of roundness or crenation, and the plant is twice as high and the corymbose heads twice as large. Furthermore, as observed in Rydberg's 1917 manual, the rays are a bright yellow.

Senecio integerrimus Nuttall; cordilleran; montane-submontane; Gothic, B 94-52; Fish Creek Mesa, B&S 64-62 RMBL; Devil's Hole, B&S 151-62; Ninemile Hill, B 42-66; Gold Basin Creek drainage, B 6-60 RMBL. This species would be confusable with S. crassulus were it not for one conspicuous character. At the base of the corymb, and on the shortest pedicel, is the biggest head of all!

Senecio Fendleri Gray; cordilleran; montane-submontane; Cochetopa Pass, Ra&Ga 16911 (1939) COLO; Lujan Creek Valley, H 9034 (1959) CS; Sapinero, Wh 938 (1898) COLO. This species is of the same general sort as S. integerrimus, but not confusable with it. S. Fendleri lacks the big head at the bottom of the corymb, and above all it lacks the simple leaves both of S. integerrimus and of S. crassulus. Its leaves are occasionally entire, but normally pinnatifid, and it has the capacity (rare among Gunnison Basin senecios) of sending out rhizomes to start a new plant.

Senecio Serra Hooker; cordilleran; montane-submontane; Gothic, B 213-52; Gunnison, Ke 7/49 WS; North Beaver Creek (south), B&S 580-62 RMBL. The leaves of this plant, as the specific name suggests, are perfect little saws; in fact, if the acute ends could be ovalized, each leaf would be a perfect little chainsaw.

Senecio triangularis Hooker; cordilleran; montane-subalpine; Gothic, B 90-52; Fish Creek Mesa, B&S 200-62 RMBL; Irwin, E (1887) COLO. Here the leaves are not saws but isosceles triangles, and not so little either, for the larger leaves have a base of two and one-half inches and a length of four inches!

Senecio Bigelovii Gray; southwestern; montane-subalpine; Fish Creek Mesa, B&S 401-62 RMBL; Powderhorn, B 143-64; Gothic, B 211-52; Lake Irwin Basin, B 219c-52 RMBL. The heads of this senecio are large, nodding, and rayless, making it one of the most easily identified senecios in the Basin. In favorable situations, the plant grows a yard tall, with long, finely dentate leaves.

Senecio pudicus Greene; southwestern; montane-subalpine; Fish Creek Mesa, B&S 396-62 RMBL; Whetstone Canyon, B 180-60 CS, RMBL; Gothic, 212-52 RMBL; Marshall Pass, Cr 3059 (1896) CS. This is also a rayless, nodding-headed senecio; but the two species are completely unconfusable. The heads of S. pudicus are only a half or a third the size of those of S. Bigelovii, the plant is throughout more delicate, and it frequents drier habitats. Furthermore its basal leaves are broadly oval, whereas all the leaves of S. Bigelovii are elongate-elliptical.

Senecio eremophilus Richardson; cordilleran; montane-subalpine; Whetstone Mtn., B 176-60 CS, RMBL; Crested Butte, B 71a-55 RMBL; Schofield Pass, B 192-52. This senecio has heads that individually might be described as glabrous copies of those of S. atratus. And sometimes the usually loose inflorescence grows compact, so that it, too, resembles that of S. atratus. But a look at the foliage will separate the plants. Instead of the entire, merely denticulate, gray leaves of the latter species, the leaves of S. eremophilus are green and doubly pinnatifid--indeed about as dissected as it is possible for leaves to be.

Senecio pseudaureus Rydberg; cordilleran; montane-submontane; Cathedral, B&S 281-62 RMBL, 289-62 RMBL; Gunnison, B 56-60 RMBL; Cement Creek, S 65-43. This senecio can be recognized by its trimorphic leaves. The basal leaves suggest those of S. streptanthifolius; but they are much thinner, and the crenations are not symmetrical, but point forward like sawteeth. The lower cauline leaves are pinnatifid, and the upper cauline leaves are mere linear bracts. The pinnatifid lower cauline leaves can even supplant the elliptical or



oval basal leaves, although there will always be individuals in a population that preserve the normal basal leaves.

Senecio streptanthifolius Greene; [S. cymbalarioides Nuttall]; cordilleran; alpine-submontane; Virginia Ridge, B 13d-54; Los Pinos Pass, B 653-62; Cement Mtn., B 66b-54 RMBL; Johnson Gulch, B&S 106-62 RMBL; Nine-mile Hill, B 14-66; Lake Fork Canyon, B 44-60 CS, RMBL. The oval, or rounded, basal leaves with crenate margins are probably the most distinctive character of this species, and gave it its old name of S. cymbalarioides. By the same token, there is a similarity between the basal leaf of this senecio and that of Ranunculus Cymbalaria, which also grows in the Gunnison Basin. But the basal leaves are not always rounded or oval, and the crenations can disappear along the sides, so that it is necessary to distinguish the plant both from S. neomexicanus and from S. tridenticulatus. In this situation the stemleaves are of great help, for those of S. streptanthifolius are often about halfway between the vestigial bracts of S. neomexicanus and the frequently full-scale leaves of S. tridenticulatus. Furthermore the crenations persist, and often survive as three minute teeth on the top of a small, upright, cuneate leaf. S. streptanthifolius is the most variable of the Gunnison Basin senecios.

Senecio neomexicanus Gray; southwestern; montane-subalpine; Cathedral, B 3-64, B 16-65; Razor Creek Park, B&S 68-66; Crested Butte, B 64-61; Monarch Pass, B 78-60 RMBL. Here is where the zones, if taken ecologically rather than altitudinally, prove to be of real assistance. For S. neomexicanus is essentially a montane species, seeking the protection from sun or wind, or perhaps only the increased moisture, to be found in the neighborhood of trees. I have never collected it in the alpine or submontane zones, and came upon it only once in the subalpine zone. Its fundamental leaf seems to be an entire, acutely elliptical affair, which can take on two or more teeth going down the sides. As previously mentioned, the fundamental leaf

of S. streptanthifolius seems to be a crenate, oval or roundish affair, which can lose crenations going up the sides. The pubescence of this plant is woolly rather than arachnoid (as in S. streptanthifolius), and is usually present throughout the plant.

The submontane senecios

Senecio tridenticulatus Rydberg; relict of the plains; submontane; Cochetopa Creek Canyon, B 28-57 RMBL; Gold Basin Creek drainage, B 7-60; Gunnison, B 55-60 RMBL, K 1503 (1949) DBG; Sapinero, K 1514b (1949) DBG; Mineral Creek Valley, B&S 519-62 RMBL. S. tridenticulatus in the Gunnison Basin is a plant of the submontane, or sagebrush, zone. It is true that the last of the collections cited was made in the partial shade of open montane spruces. But the soil was pure sand, and the collection is included only to show the kind of exception that will occur in all the zonal classifications of this study. In the above collections all the stemleaves are pinnatifid, and are as long as, or longer than, the oblanceolate basal leaves. The basal leaves can be pinnatifid also, but usually are merely crenate in the upper half. When they are thus crenate, they approach the basal leaves of S. streptanthifolius, which grows in the submontane zone as well as in every other zone. But the stemleaves of S. streptanthifolius are always reduced in comparison with the basal leaves, and apparently are never pinnatifid in the Gunnison Basin.

Senecio spartioides Torrey & Gray; cordilleran; submontane-montane; Gunnison, W 9338 (1955) COLO; Fish Creek Valley, B&S 412-62 RMBL. Sometimes called the broom ragwort, S. spartioides is easily recognized. A single stem, when spread out on an herbarium sheet, makes in outline a good whiskbroom, and the leaves are linear, passing to filiform.

Solidago L., The Goldenrods

Solidago canadensis L.; widespread North American;



montane-submontane; Crested Butte, B 151-60 CS, RMBL, B 152-60 RMBL; Fish Creek, B&S 560-62; Madeira Siding, B&S 508-62. This species is recognizable by a number of characteristics. The elliptical, acute leaves (which may be either serrate or entire) are inclined to wither and disappear from the lower stems, so that vegetatively, the plant seems to be weighted toward the top. The branches of the terminal, paniculate inflorescence tend to curve up and outward, bearing the small heads on their upper sides. Finally, the plant propagates itself vegetatively by means of slender rhizomes. It grows in both moist and dry places.

Solidago decumbens Greene; cordilleran; montane-alpine; Gold Creek Valley, B 157-60 CS, RMBL; Snodgrass Mtn., B 30b-54; Capitol City, S 62-53; Mineral Mtn., B&S 534-62; East Maroon Pass, B 37k-54. This goldenrod is clearly centered in the subalpine zone, reaching down into the montane zone, where it grows a foot and a half tall, but also extending well into the alpine zone where it may shrink to an inch or two. In the lower zones, it seems usually to be found in the partial shade of conifers. It may be told by its basal leaves which are oblanceolate, taper indistinguishably into the petiole, and are crenate either side of the rounded to acute top.

Solidago multiradiata Aiton [S. ciliosa Greene]; boreal; montane-submontane; Gothic, B 31-54, B 221-60 CS; Crested Butte, E (1891) COLO; R 10323 (1959) CS. This is the goldenrod of montane meadows, especially those of the more brushy variety. It is confusable with S. decumbens; but here the difference in habitat is of help. I have never found S. decumbens in the montane zone save in the partial shade of conifer or aspen, never found S. multiradiata except in open places. And there are morphological differences also. The petioles and lower leaf edges of S. multiradiata, in contrast to those of S. decumbens, are ciliate. Again, the ends of the leaves of S. multiradiata, although sometimes denticulate, are never regularly and plainly crenate. Finally, the phyllaries of S. multiradiata are acute, those of S. decumbens obtuse.

Solidago missouriensis Nuttall; cordilleran; submontane-montane; Almont, B 239-60 RMBL; Gunnison, B 241-61; Hierro, B&S 66-136; Cochetopa Pass, B&S 106-66. There are many ways in which to distinguish this species from the other goldenrods of the Gunnison Basin. In the first place (and unlike S. canadensis), its cauline leaves decrease on the way up until finally they are little more than bracts. The plant also has a tendency to produce fascicles of small leaves in some of the leaf axils. Finally, except in very dry habitats, the plant sends out lateral rhizomes which show the same tendency as the stems toward reddishness.

Solidago sparsiflora Gray; cordilleran; submontane-montane; Hartman Rocks, B 91-57; Madeira Siding, B&S 508a-62 RMBL; Powderhorn, B 142-64; Smith Hill, B 267-61. The reader will have noted that the goldenrods of the Gunnison Basin overlap very little with respect to habitat. In all the collections I have made, only once did I find two species growing together. Thus S. sparsiflora is the only really dryland goldenrod, the only goldenrod that apparently will grow nowhere else. It has an irregular, spreading rootstock, like that of Erigeron subtrinervis, but unlike the root of any other Gunnison Basin goldenrod. Its leaves are bluish-green and scabrous. But the best way to tell the plant is to hold a leaf up to the sun and note the translucency in little points and lines.

## Sonchus L., The Sow Thistles

Sonchus arvensis L.; adventive; submontane; Ninemile Hill, B 279-65 RMBL; Willow Creek, B 281-65. This adventive weed, with its large yellow heads in a corymbiform inflorescence, is like no other plant in the Gunnison Basin and will probably be recognized at once. The lower leaves may well have disappeared by flowering time, but the upper leaves will show the seahorse-like auricles that are characteristic of Sonchus. The two collections cited above were made on the same day, and offer an interesting lesson in the phenotypic variation of the plants of the Gunnison Basin. For the Willow Creek plant was collected with the blue-flowered form of Lactuca pulchella, in the same moist, heavy soil, and showed the same darkening of the leaves. Yet the Ninemile Hill collection, from dry, sagebrush country, is the glabrescent form sometimes called S. uliginosus. And the interesting thing is not that the Ninemile Hill collection came from light, dry soil, the Willow Creek collection from moist, heavy soil, but that the latter soil was causing at the same moment a modification of L. pulchella. How the dryland form of S. arvensis came to be called S. uliginosus (or swamp sow thistle) I do not know.



## Stephanomeria Nuttall, The Rush Pinks

Stephanomeria tenuifolia (Torrey) Hall; cordilleran; montane; Little Iron Mtn., B 87-64. In the way of popular names, in which fine distinctions are not maintained, this species as well as Lygodesmia juncea is called rush pink. And in truth, the stems and branches are green and photosynthetic, the leaves merely bracts. Yet the terminal heads are not nearly so pinklike as those of L. juncea, and the plant itself is more bushy and at least twice the size. Finally, there is a very sharp morphological distinction. The pappus here is conspicuously plumose; in L. juncea, it is merely capillary.

## Tanacetum L., The Tansies

Tanacetum vulgare L.; adventive; montane-submontane; Crested Butte, B 345-61; Gunnison, B 318-61 CS. The common tansy is well established in the Gunnison Basin, although I have never seen it much higher than 9,000 feet. Ranchers in the dry country plant it as an ornamental hedge in front of their houses, where it is unbelievably handsome.

## Taraxacum Zinn, The Dandelions

Taraxacum ceratophorum (Ledebour) DC.; boreal; alpine-montane; Ohio Peak, W&B 9207 (1955) COLO; Conundrum Pass, B 223-61; Rough Creek Cirque, B&S 599-62; Fish Creek Mesa, B&S 94-62. It was mentioned in the Introduction that the common dandelion is restricted largely to pastures and grazed meadows.* Thus the undisturbed sites of T. ceratophorum help to distinguish it from the common dandelion. But there are further means. For one thing, its petioles have a tendency to be a bright beet-red. Again, as every one knows, the heads of the common dandelion are really flat-topped; those of T. ceratophorum are more like small mops. Finally, the leaves of the common dandelion have more ragged edges; those of T. ceratophorum seem to concentrate on three or four major indentations.

Taraxacum officinale Weber; adventive; submontane-montane; Parlin, E (1889) COLO; Gothic, L 37 (1949) CS. The common dandelion has probably been sufficiently discussed under the preceding species.

Taraxacum erythrospermum Andrzejowski; boreal; montane-subalpine; Walrod Gulch, L 173 (1949) CS; Los Pinos Pass, B 20-65 RMBL. This species is listed as boreal rather than as adventive because in the Gunnison Basin it seems to be a thoroughly native plant. Both the cited collections are from meadows where the elk graze rather than the animals of man. Furthermore I examined the second site with great care to see if there were any adventive plants. There were none, and this plant alone was coming into flower between the bunches of fescue still in winter dormancy. In this small meadow of the lower subalpine zone T. erythrospermum was, in fact, the first flower of the spring, just as, a thousand feet lower down and in similar fescue meadows, it was Potentilla concinna that was the first flower of the spring.

Taraxacum eriophorum Rydberg; cordilleran; alpine; Bent Peak, B&S 65-182; Agency Peak, B&S 66-93; Crystal Peak, L 420 (1949) CS. This species is different from the preceding taraxacums. Its peduncles do not grow much higher than five inches, nor its leaves longer than three inches. The leaves, for the most part, are entire or merely scalloped; only occasionally are they dentate. The heads on their peduncles are commonly only one to a plant, occasionally two, and apparently never more than three. In other words, the plant is a small, compact dandelion.

* See above, p. 23.



Taraxacum lyratum (Ledebour) DC.; boreal; alpine; North Italian Mtn., W&L 9269 (1955) COLO; Blaine Basin, B 111-57 COLO. This rare alpine species frequently bears only one head to a plant. The small, pinnatifid leaves radiate from the root, forming a rosette on the ground, while in the center, the head, only about a centimeter tall, rises on its diminutive peduncle to the height of about an inch. The plant, though minute, is a pioneer in alpine basins, seizing patches of fresh soil left after an avalanche, or new-formed at the base of a cliff.

## Tetradymia DC., Horsebrush

Tetradymia canescens DC.; cordilleran; submontane-montane; Gold Basin Creek drainage, B 58b-57; Almont, B 357-61; Taylor River Canyon, B 181-52; Cathedral, B&S 429-62 RMBL. This low shrub can easily be mistaken for a chrysothamnus, with no reflection upon the person mistaking it. In gross aspect, it very much resembles a chrysothamnus. There is, however, one unfailing diagnostic. The heads are four-flowered, and there are four phyllaries enclosing each head. As a matter of fact, this is the meaning of de Candolle's name.

## Thelesperma Lessing, The Greenthreads

Thelesperma megapotamicum (Sprengel) Kuntze; relict of the plains; submontane; Powderhorn, B 222-65 RMBL. By the nature of the concept, the term

relict of the plains cannot avoid being controversial. The cordilleran flora always embraced that of the intermontane plains and valleys, which would descend into the lowlands, or mount again into the mountains, in response to fluctuations in temperature and precipitation. Thus one can never be sure that a plant in the Gunnison Basin denominated as a relict of the plains is really that, or merely one of the thousand dryland species that form part and parcel of the cordilleran association. But here is a collection that seems more likely than most to have survived from the Pliocene plains that were once east and probably also west of the present-day Gunnison Basin, for Harrington lists the plant only for the eastern half of Colorado and it seems generally to be recognized as a plains species. My own overwhelming impression at the moment of collection was that I was back in western Nebraska. The plant with its green, threadlike leaves, welded involucres, and heads of small yellow flowers is unmistakable.

## Townsendia Hooker, The Townsendias

On the plains, this genus has the popular name of Easter daisy, although ground daisy as a name would have conveyed more meaning. In the Gunnison Basin, where the spring comes late, the plants are usually called simply townsendias.

Townsendia leptotes (Gray) Osterhout; cordilleran; montane-alpine; Cochetopa Park, W 9421 (1955) COLO; Fish Creek Mesa, B&S 66-62 RMBL; Virginia Ridge, S 64-72 RMBL. This is the most widely distributed species of the genus in the Basin, and the most varied in size. Yet even when the heads are two centimeters high, they are half hidden by the narrow leaves and do not look like any kind of daisy. The achenes in maturity are bald, or baldish, and the plant may be told by its grayish, purplish-green color.

Townsendia Rothrockii Gray; Coloradan; subalpine-alpine; Virginia Ridge, B 16-54; Cement Mtn., B 85d-55; Engineer Mtn., B&S 65-198 RMBL. Although confined to the alpine zone (and to open, rocky places in the subalpine zone), this is the most striking townsendia in the Basin and a favorite with photographers. It differs from all the other townsendias in the Basin by being essentially glabrous, while its white rays are usually tinged with blue or purple.



Townsendia exscapa (Richardson) Porter [T. sericea Hooker]; relict of the plains; submontane; Gunnison, L 1227 (1951) COLO. This is the plant that gave the name of Easter daisy to the genus, and is evidently a rare plant in the Basin since the above is the only known collection. It may be recognized by its large heads, and by the fact that it really resembles the daisy after which it is popularly named.

Townsendia incana Nuttall; cordilleran; submontane; Iola, P&Ha 4131 (1951) COCO; Sapinero, Bea&Er 1192 (1957) COLO. Whereas the preceding three species are essentially stemless, T. incana does develop short stems, forming miniature bushes close to the ground. It can further be recognized by its white-fringed phyllaries, and by its pubescent achenes.

## Tragopogon L., The Goatsbeards

Tragopogon dubius Scopoli; adventive; submontane-montane; Parlin, B 102-61; Cathedral, B 163-65; Gothic, Bro 7/10/60 RMBL. This annual or biennial weed, with innumerable grasslike leaves, is confusable only with the next species. Its pale yellow rays, shorter than the phyllaries, frequently have a purplish tint, and the stem is noticeably widened beneath the head.

Tragopogon pratensis L.; adventive; submontane; Gunnison, W 9131 (1955) COLO. Since this species requires more moisture than the preceding, it is less frequent in the Basin. Its rays, of a richer yellow and as long as or longer than the phyllaries, are more conspicuous than those of T. dubius, and its stem is not enlarged beneath the flowering head.

## Verbesina L., The Crownbeards

Verbesina encelioides (Cavanilles) Bentham & Hooker; relict of the plains; submontane; Powderhorn, B 154-64 RMBL, B 221-65. This vigorous annual, a foot or two in height, grows in populations which flower at the same time and always catch the attention of the passing botanist. The golden-yellow rays are three-toothed, and the dentate, rhombic-lanceolate leaves, apparently all cauline, grow branchlets in their axils. The plant is strictly cymose; that is, the terminal blossom, whether of main stem or branch, is always the first to mature.

## Viguiera HBK., The Sunspots

Viguiera multiflora (Nuttall) Blake; cordilleran; montane-submontane; Gothic, B 221-52; Cabin Creek Cow Camp, B 148-60 CS, RMBL; North Beaver Creek Valley, B&S 581-62 RMBL; Sapinero, Wh 436 (1898) COLO. In August, in dryish, brushy montane meadows all over the Basin, this is very nearly the most abundant yellow-rayed composite there is. Its generally opposite, lanceolate to linear leaves often suggest Arnica; but the leaves become alternate toward the inflorescence, and the inflorescence has not the regularity of Arnica but is, in fact, quite irregularly paniculate. The stems are unusually brittle, and the outer phyllaries are gray-green on account of their strigillosity. The plant grows about a foot and a half tall.

## Wyethia Nuttall, Mules Ears

Here is a genus that would surely repay a Basin-wide investigation. For it is represented by just two species, the one strictly southwestern, the other indubitably cordilleran. Furthermore, on the basis of the limited collecting that has been done of this genus in the Basin, the territories of the two species apparently overlap only in the Crested Butte-Gothic region, where there is abundant evidence of their hybridization. In fact these are the only



two species in the Basin for which the evidence of hybridization is abundant. Both plants are handsome, vigorous composites with yellow-rayed heads rivalling those of Helianthus annuus in size. Their long, elliptical basal leaves really do suggest mules' ears, and in flowering season, the plants, a foot or two in height, are as handsome as any in the Basin. W. amplexicaulis seems to favor moist, herbaceous meadows; W. arizonica, dry brushy meadows. The southwestern species is apparently much more common than the cordilleran, which is one of the curiosities of the genus in the Basin that a study of the genus in the Basin would hopefully explain.

Wyethia amplexicaulis (Nuttall) Nuttall; cordilleran; montane; Gothic, K 1294 (1948) DBG, Ke 7/9/49 WS; Crested Butte, Go 7/4/63 WS. As is well known, this species is characterized by its sessile, amplexicaul stemleaves and by its glabrousness.

Wyethia arizonica Gray; southwestern; montane; Sapinero Guard Station, B 70-65; Gothic, K 1316 (1948) DBG; Waunita Hot Springs, E (1887) COLO; Black Sage Pass, B 52b-55. This species, in contrast, is known by its petioled stemleaves and by its general pubescence.

W. amplexicaulis X W. arizonica; Gothic, W 9177 (1955) COLO; Crested Butte, B 77-52. In the last of the collections cited, the single plant represented on the sheet shows the petiolate cauline leaves of W. arizonica and the glabrousness of W. amplexicaulis.

# CONVOLVULACEAE, The Bindweed Family

## Convolvulus L., The Bindweeds

Convolvulus arvensis L.; adventive; submontane-montane; Marshall Creek Valley, B 133-60; Ninemile Hill, B&S 183-65 RMBL; Gothic, L 384 (1949) COLO. Harrington thinks this may be Colorado's worst weed.*

* Harrington, Harold D., Manual of the Plants of Colorado, Denver, 1954, p. 438.

But in the Gunnison Basin it is not, and here the botanist can observe that it is also a very beautiful plant as it winds over the ground displaying its vase-like, white, pink, or magenta flowers. The small leaves are hastate, but also rounded at the summit in a distinctly individual way.

## CORNACEAE, The Dogwood Family

### Cornus L., The Dogwoods

Cornus stolonifera Michaux; boreal; submontane-subalpine; Lake Fork Canyon, B&S 505-62; Gold Basin Creek Valley, B 144-65; Cochetopa Creek Canyon, B 87a-55; Henson Creek Canyon, B 57-61; Copper Creek Valley, Wi 10455 (1954). This species follows the watercourses throughout the Basin and, as mentioned in the Introduction, blooms not only in the spring but in the late summer along with the ripening fruit.* It also leaves the watercourses, and is found at the heads of the gulches between the last trees and the cliffs or bluffs leading to the drier slopes above. The plant may be told by the combination of white cymose flowers, opposite leaves, and red stems. One of its popular names is red-osier dogwood.

## CORYLACEAE, The Hazelnut Family

### Alnus Miller, The Alders

Alnus tenuifolia Nuttall; boreal; submontane-montane; Lake Fork Canyon, B 40a-60; Cathedral, B&S 169-62; Snodgrass Mtn., B 97a-60. With its distinctive leaves and stubby pistillate aments that persist as burlike cones, this typical alder should be recognized by any one interested in plants. It is a small (if many-stemmed) tree, and is, needless to say, a follower of watercourses, especially those given some shade by canyon wall or adjoining hillside.

* See above, p. 19.



### Betula L., The Birches

Betula glandulosa Michaux; boreal; montane-subalpine; Gothic, Wi 10099 (1954); Taylor Park, P 4510 (1955) COCO; White Pine, B 92-61; Slumgullion Gulch (south), B&S 242-62. This species is not so typical a birch as is the preceding species a typical alder. The usual cylindrical staminate and pistillate aments are present; but the leaves are small, roundish, and crenate except for the sloping bottoms. Indeed the leaves might suggest a species of Amelanchier. But the amelanchiers in the Gunnison Basin are median to dryland plants, not bog plants as is this birch, popularly known as the bog birch. Even years after collection, the dried specimens of this shrub emit a most pleasant resinous fragrance.

## CRASSULACEAE, The Orpine Family

### Sedum L., The Stonecrops

Sedum lanceolatum Torrey [S. stenopetalum Pursh]; cordilleran; alpine-submontane; Old Monarch Pass, B 148-59; Glacier, D 14247 (1963) RMBL; Gold Basin Creek drainage, B&S 66-24. The widest-ranging of the three species because of its adaptation to dry habitats, this species may be recognized by its yellow flowers. It is almost impossible to preserve the leaves in dried specimens.

Sedum rhodanthum Gray; cordilleran; alpine-montane; Trallala Peak, B 238-65; West Pass, H 9022 (1959) CS; Copper Creek Valley, L 295-48 COLO; Crested Butte, Bu 19473 (1937) COCO. This species has pink blossoms, and is found only in wet situations. With moderate care its leaves, like those of the next species, can be preserved in dried specimens.

Sedum Rosea (L.) Scopoli [S. integrifolium (Rafinesque) Nelson]; boreal; alpine-montane. Slumgullion Mesa, B 216-65; Trallala Peak, B 237-65; Rustler's Gulch, Sh 56-17 RMBL; Gothic, Wi 10066 (1954). The inflorescence of S. Rosea is a deep red, and the prefer-

ence of the species is for rocky, median habitats. In the alpine zone it may be collected within feet of S. rhodanthum, but always the difference between moist and median situations is maintained. No sedum that I have seen in the Gunnison Basin is tolerant of shade. They are all plants of open places.

## CRUCIFERAE, The Mustard Family

### Arabis L., The Rockcresses

The submontane rockcresses

Arabis Crandallii Robinson; Coloradan; submontane-montane; Quartz Creek Valley, B 1-65; Gold Basin Creek drainage, B 27-60; Powderhorn Divide, B&S 26-62, B 9-64. The leaves of this plant, whether cauline and sessile, or basal and petioled, are gray-green with a close, dense pubescence composed of minute branched hairs. The petals are white (although occasionally, like the leaves, suffused with pink), and the glabrous narrow silicles seem to follow the stem upward.

Arabis lignifera Nelson; cordilleran; submontane; Sapinero, W 4849 (1949) COLO; Gold Basin Creek drainage, B 19-60 RMBL. The leaves of this plant have the close, dense pubescence composed of branched hairs that is characteristic of A. Crandallii. But here, as pointed out in Rollins's monograph,* the fruiting pedicels have a tendency to arch down, while the petals range from pink to purple.

Arabis Gunnisoniana Rollins; Gunnison Basin; submontane; Sapinero, Wh 518 (1898) COLO; Gunnison, Ro 2090 (1938) COLO (ISOTYPE); Gold Basin Creek drainage, B 76-65 RMBL; Powderhorn, B&S 49-62. In that its leaves are gray-green and about the same size, this arabis might be thought to resemble the two preceding species.

* Rollins, Reed C., Monographic Study of Arabis in Western North America, Rhodora, Vol. 43 (1941), nos. 511-513.



But a close look with magnification will reveal that the branched hairs of A. Gunnisoniana are about twice as large, twice as coarse, and twice as sparse. Furthermore the silicles seem to have no tendency to turn up or down, but can be found at the horizontal, and again at 45° above the horizontal or 45° below it. Its petals range from pink to purple, and like that other Gunnison Basin endemic, Astragalus anisus, it is not rare in its favored habitat although once thought to be.

Arabis Holboellii Hornemann; boreal; submontane; Almont, P&Ha 2602 (1951) COCO. With its sharply reflexed silicles, but ascending and revolute cauline leaves, this arabis is unmistakable.

Arabis demissa Greene; Coloradan; submontane-montane; Gunnison, Ro 2099 (1938) COLO; Gold Basin Creek drainage, B 75-65; Dry Lake Park, B&S 22-62; Cement Creek, W&L 9515 (1955) COLO. In small areas of the sagebrush zone, as reported in Rollins's monograph, this low plant becomes the dominant species. Indeed it is so much at home in the Gunnison Basin that it has twice been collected in moist situations far removed from its usual sagebrush habitat. It is rather easily separated from the other arabises of the Basin. Its small leaves have none of the close, dense indument of many of the other species, but are rather loosely hirsute with coarse, simple or forked hairs. The silicles are slightly curved to straight, and at first held out at right angles, finally become pendulous. In maturity, they seem to be more torulose than those of any other arabis in the Basin.

The montane rockcresses

Arabis Drummondii Gray; boreal montane-submontane; Gothic, B 117-52, B 129a-52; Taylor River Valley, B 21b-57; Big Soap Park, B&S 110-65; Fish Creek, B&S 338-62; Cathedral, B 13-64; Gunnison, B&S 11-62. This is the commonest arabis in the Basin, and as one would accordingly expect, it shows a great range of morphological variation and an adaptivity both to wet and to dry

situations. It is confusable with A. glabra (which is rare in the Gunnison Basin), but can be separated by its linear cauline leaves which show no tendency toward lanceolateness, by its silicles which are twice as wide as those of A. glabra, and by its colored rather than white petals.

Arabis glabra (L.) Bernhardi; boreal; montane; Crested Butte, E (1891) COLO; Gothic, Wi 10317 (1954). The cauline leaves of A. glabra, in distinction from those of A. Drummondii, have a marked tendency toward lanceolateness. Its silicles are no more than a millimeter and a half in width, and its petals are white. It is a plant of moist to median situations, and is tolerant of the shade of aspens.

Arabis hirsuta (L.) Scopoli; boreal; montane-submontane; Sapinero, Wh 414 (1898) COLO; Cathedral, B 66-65 RMBL. This plant of moist, partially shaded places is different from all the other arabises of the Basin. Its white flowers are in small corymbose heads, and there is no indument of stellate hairs (whether fine or coarse), but merely a scattering of mostly simple hairs over the basal leaves. The leaves are thin and green, and there are a good many of them, both at the base and on the stems. The chances are that the collector, seeing the plant at a distance, will think it a small, white-flowered erigeron, or possibly a new species of Thlaspi, but will not recognize it as an arabis until he has it in his hand.

Arabis Selbyi Rydberg; southwestern; submontane-montane; Gold Basin Creek drainage, B 21-60 CS, RMBL; Hartman Rocks, B 6a-61; Fish Creek Canyon, B&S 59-62. The first two of the three collections cited came from the sagebrush zone; but actually, both were collected in rocky or bushy places in the shade of aspens. The third collection came from the montane zone, but from the open, steep slope of a canyon in the sun for only part of the day. The plant is in many ways different from any other arabis in the Basin. There is no basal rosette, but rather, a broadish cluster of petioled cauline leaves that depart from the bases of the flowering stems as these branch and spread laterally before rising to bear their flowers and silicles. As with A. Crandallii, the silicles



seem to mount upward with the stems. The petals are white to pink.

Arabis divaricarpa Nelson; boreal; submontane-subalpine; Gold Basin Creek drainage, B 26-60; Cathedral, S 62-13; Schofield Pass, R 10049 (1959) RMBL. This species seems to find open rocky habitats as suitable as open brushy ones, and ranges from the floor of the Basin well up into the subalpine zone. It is rather easy to distinguish from its fellow rockcresses in the Gunnison Basin. In the first place, its basal leaves are only sparsely pubescent, while its cauline leaves pass from mere ciliolateness to glabrousness. Its fruiting pedicels, usually divaricate upward, bear silicles that can be very nearly horizontal as well as straight, and are frequently as much as two inches long.

The alpine rockcress

Arabis Lemmonii Watson; cordilleran; alpine; Conundrum Pass, B 49-54, B 222-61; Rustler's Gulch, L 8/15/61; Mt. Belleview, S 65-100 RMBL. Known only from the alpine zone, this is the least confusable of the Gunnison Basin rockcresses. Its flowers, borne in small corymbose heads at the summit of their short stems, are a deep purple. In fruit, the stems double in height, and the thick, secund silicles are displayed as if pennants.

## Armoracia Gaertner, The Horseradishes

Armoracia rusticana Gaertner [Rorippa Armoracia (L.) Hitchcock]; adventive; montane; Hot Springs Creek Valley, B 79-61. Harrington reports but one collection of this plant in Colorado;* yet at the above station it was growing three or four feet tall in a thicket of native plants lining an irrigation ditch that must have been in use for at least fifty years. The large, handsome sprays of white flowers, and the long, crenate cauline leaves,

* In the Manual as cited, p. 268.

will identify the plant to any one.

Barbarea R.Brown, The Yellow Rockets

Barbarea orthoceras Ledebour; boreal; montane; Gothic, Ke 7/4/49 WS; Cathedral, B&S 187-62. In every way, this species and the next show the difference between the native and the adventive plant. B. orthoceras is a plant of moist undisturbed habitats where it competes successfully with many other species. B. vulgaris is a plant of moist disturbed sites where it may be the only plant covering the ground. B. vulgaris is also a coarser plant, with its stems nearly twice as thick as those of B. orthoceras, its leaves less dissected, and its sepals greenish and herbaceous whereas the sepals of B. orthoceras are yellowish and petaloid. The flowers of B. vulgaris are a deeper yellow, and it is the handsomer of the two plants.

Barbarea vulgaris R.Brown; adventive; montane; Crested Butte, B 72-61. For annotation, see the preceding species.

Camelina Crantz, The False Flaxes

Camelina microcarpa Andrzejowski; adventive; submontane; Gunnison, D 14824 (1963) RMBL; Doyleville, R 10264 (1959) CS. Like Capsella and many another crucifer, this adventive plant is most conspicuous in fruit. The panicle is devoid of leaves and bracts, and in fruit is covered with innumerable, small, top-shaped silicles, with a vein on each side leading up to the persistent style.

Capsella Medicus, The Shepherds Purses

Capsella Bursa-pastoris (L.) Medicus; adventive; montane; Gothic, Wi 7/2/54; Beaver Creek (south), B&S 610-62. This species with its triangular, purse-like fruits is known to most children, and will be recognized at once when encountered in the Gunnison Basin. Here it does very well, but only in disturbed sites where it is temporarily freed from competition with other plants.



Cardamine L., The Bitter Cresses

Cardamine cordifolia Gray; cordilleran; montane-submontane; Lujan Creek Valley, H 9015 (1959) CS; Cathedral, B&S 177-62; Henson Creek Canyon, B 59-61; Gothic, L 29 (1949) COLO; Glacier, K 518 (1947) DBG; Sapinero, Wh 530 (1898) COLO. Of the native crucifers in the Gunnison Basin, this is one of the handsomest, and one of the most widespread. It is a lover of moist habitats, and is particularly at home on the surface of old beaver dams, of which there are a great many in the Basin. The corymbose heads of white flowers are conspicuous; but it should be pointed out that the leaves (which are mostly cauline) are by no means typically heart-shaped, as Gray's name would imply. Some are not even lobed at the base, but all are sinuous-dentate, or irregularly crenate.

Cardaria Desvaux, The Whitetops

Cardaria Draba (L.) Desvaux; adventive; submontane-montane; Red Creek Valley, B 63-65 RMBL; South Beaver Creek drainage, B 192-65 RMBL; Cochetopa Pass, B&S 66-132. This species is about equally conspicuous in flower and in fruit. In flower, a population of the plants will give the impression of a film of white. In fruit, the inverted, top-shaped silicles take the place of the film and are almost as conspicuous. Something like the fruits of Camelina, these are compressed contrary to the septum, and are, of course, turned broadside down. They are also much more densely aggregated than the fruits of Camelina.

Cardaria pubescens (Meyer) Rollins; adventive; submontane; Iola, W 9332 (1955) COLO. This species resembles the preceding in general appearance, but the