

VASCULAR FLORA OF
EL MORRO NATIONAL MONUMENT,
NEW MEXICO

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May 20, 1981

INTRODUCTION

This report is one of the products of a three-year study of the vascular flora of El Morro National Monument, in Cibola (formerly Valencia) County, New Mexico. (Other products of the study are an on-site reference herbarium, a short history of the regional flora, and a map of plant associations.) The study began in July, 1978; the last specimen was collected in December, 1980, although random observations will continue indefinitely.

Virtually the entire Monument was covered, on foot, many times. Many observations and collections were made while I was also surveying for vertebrate animals. The three-year course of the study allowed coverage in seasons varying from exceptionally wet to dry, thus broadening the sample of species collected.

As with reports on the fauna of the Monument, I have attempted here to produce a document that is usable by nonspecialists. On the other hand, if one is to identify plants with any reliability, it is necessary to use a key. The keys in this report are thus a compromise, although the bias is toward the nonspecialist. I have tried to use as few technical terms as possible and to define each one I do use within the couplet in which it appears.

Nevertheless, many technical terms cannot be avoided. A glossary and diagrams are appended, with which even a complete novice should be able to use the keys successfully and, I hope, enjoyably. In the construction of these keys I have often devised novel, highly artificial, couplets. However, I also relied heavily on the regional floras listed in the brief bibliography which follows this introduction.

When the family or genus are not known, the keys may be entered on page 1. This key directs one to a key of a basic life-form (e.g., tree, shrub, vine) which in turn leads one to the family. The treatment for each family includes, where applicable, a short general paragraph on the family, a key to the genera, a short descriptive treatment on each genus, and a key to the species. The treatment of each species begins with the scientific name, including authorship and varieties. The general user should not be daunted by this information; it is primarily for the specialist. There follow one or more English names, which I have culled from various sources, and the distribution of the plant at El Morro. A brief description taken from McDougall (1973), is followed by a listing of the time of flowering at El Morro. Following this in some cases will be ethnobotanical uses of the Ramah Navajo (RN), as reported by Vestal (1952), and of the Zuni (Z), as reported by Stevenson (1915). Nomenclature follows, in the main, Martin and Hutchins (1981).

I appreciate the opportunity to work at El Morro and the confidence expressed by the Southwest Region in funding my study during an era of shrinking budgets. My gratitude to the staff at El Morro, especially to Ted Sullivan and Steve Miller, is great, for they have facilitated my efforts in every way possible. Many campers and staff members from Cottonwood Gulch assisted in the collection and preparation of data. I thank them all, but especially Wenda Trevathan.

BIBLIOGRAPHY

- Benson, L. 1959. Plant classification. Lexington, Mass., D.C. Heath & Co.
- Benson, L. 1969. The cacti of Arizona (3rd ed.). Tucson, University of Arizona Press.

- Gould, F.W. 1951. Grasses of southwestern United States. Tucson, University of Arizona Press.
- Harrington, H. D., 1964. Manual of the plants of Colorado. Chicago, Sage Books.
- Hermann, F.J. 1970. Manual of the Carices of the Rocky Mountains and Colorado Basin. USDA Agr. Handb. 374
- Hermann, F. J. 1975. Manual of the rushes (*Juncus* spp.) of the Rocky Mountains and Colorado Basin. USDA For. Serv. Rocky Mt. For. Range Exp. Sta. Gen. Tech. Rep. RM-18.
- Hitchcock, A. S. 1935. Manual of the grasses of the United States. USDA Misc. Pub. 200.
- Kearney, T. H., and R. H. Peebles. 1960. Arizona flora (2nd ed.). Berkeley, University of California Press.
- McDougall, W. B. 1973. Seed plants of Northern Arizona. Flagstaff, Northern Arizona Society of Science and Art.
- Martin, W. C., and R. Hutchins. (1981) A flora of New Mexico. MS in University of New Mexico Herbarium, published 1981.
- Stevenson, M. C. 1915. Ethnobotany of the Zuni Indians. In 30th Ann. Rep., U. S. Bur. Amer. Ethnol.
- Vestal, P. A. 1952. Ethnobotany of the Ramah Navaho. Papers Peabody Mus. Amer. Arch. and Ethnol. 40: 1-94.
- Weber, W. A. 1972. Rocky Mountain Flora. Boulder, Colorado Associated University Press.

KEY TO THE MAJOR GROUPS

- 1a. Plants reproducing by spores; flowers and seeds absent. DIVISION PTERIDOPHYTA, Ferns and their allies, p. 10.
- 1b. Plants reproducing by seeds, these produced in flowers or cones (DIVISION SPERMATOPHYTA, Seed Plants).....2
- 2a. Parasites or saprophytes, chlorophyll absent or masked; plants orange, red, brown, or greenish-yellow. Key A, p. 1.
- 2b. Plants not parasitic, at least partly green in color.....3
- 3a. Stems thick and succulent, spiny; true leaves absent or greatly reduced. CACTACEAE, Cactus Family, p. 23.
- 3b. Plants not as above.....4
- 4a. Trees, with bark-covered trunks, when mature at least 2 m tall. Key B, p. 2.
- 4b. Plants seldom more than 1 m tall, only very exceptionally more than 2 m tall.....5
- 5a. Leaves simple and entire, with parallel veins; flower parts (sepals, petals, stamens, pistils) in multiples of 3; herbs (except for yuccas) (CLASS MONOCOTYLEDONAE, Monocots). Key C, p. 3.
- 5b. Leaves simple to compound, usually with netted veins; flower parts usually in multiples of 5, 4, or 2 (rarely 3); herbs or shrubs (CLASS DICOTYLEDONAE, Dicots).....6
- 6a. Vines, climbing or twining among other plants, often with tendrils. Key D, p. 3.
- 6b. Herbaceous or woody plants, perhaps creeping on the ground but not climbing or twining.....7
- 7a. Shrubs; stems woody well above the base (this does not include hardened dead stems which will not bear leaves or flowers in succeeding years). Key E, p. 3.
- 7b. Herbs; stems wholly herbaceous or woody only at the base (intermediate forms will key both ways). Key F, p. 6.

KEY A (PARASITES)

- 1a. Plants attached to the bark of trees, or attached by suckers to the above-ground parts of herbaceous plants.....2
- 1b. Plants without obvious above-ground attachment to their hosts.....3
- 2a. Plants attached to the trunks or branches of trees. Phoradendron, in LORANTHACEAE, Mistletoe Family, p. 47.
- 2b. Plants thread-like, attached by suckers to herbaceous plants. Cuscuta, Dodder, in CONVULVACEAE, Morning-glory Family, p. 27.
- 3a. Flowers radially symmetrical, arranged in a long raceme. Pterospora, Pine-drops, in ERICACEAE, Heath Family, p. 42.
- 3b. Flowers not radially symmetrical.....4

- 4a. Flowers tubular, petals united; ovary superior. Orobanche, Broomrape, in OROBANCHACEAE, Broomrape Family, p. 51.
 4b. Flowers with separate petals; ovary inferior. Corallorhiza, Coralroot, in ORCHIDACEAE, Orchid Family, p. 21.

KEY B (TREES)

- 1a. Leaves needle-like or scale-like, without an obvious central vein, evergreen; seeds borne in cones although these may look like berries (SUBDIVISION GYMNOSPERMAE, Gymnosperms, p. 10.).....2
 1b. Leaves flat, with an obvious central vein, deciduous; seeds borne in acorns or samaras (fruits with papery wings) (SUBDIVISION ANGIOSPERMAE, Angiosperms, p. 11.).....6
- 2a. Leaves scale-like or narrowly triangular, appressed to the twigs; cones berry-like (Juniperus, junipers, in CUPRESSACEAE, Cypress Family, p. 10.).....3
 2b. Leaves needle-like, in clusters of 2-5, sheathed at the base at least when young; cones with dry scales (Pinus, pines, in PINACEAE, Pine Family, p. 11.).....5
- 3a. Bark divided into rectangular plates, suggestive of alligator hide. Juniperus deppeana, Alligator Juniper, Box Canyon and moist sites below cliffs.
 3b. Bark fibrous, longitudinally fissured.....4
- 4a. Branchlets flattened, often drooping; leaves bluish-green, often bearing a resin gland on the back. Juniperus scopulorum, Rocky Mountain Juniper, moist places, frequently in association with Alligator Junipers.
 4b. Branchlets not flattened, not drooping; leaves yellowish-green, usually without a resin gland. Juniperus monosperma, One-seed Juniper, throughout the Monument, the only species of juniper in the flats, but apparently retreating there.
- 5a. Needles 2-5 cm long, in bundles of 2, the sheaths peeling back and falling off; cones without prickles; seeds large and wingless. Pinus edulis, Pinyon, Colorado Pinyon; widespread but not extending into the flats.
 5b. Needles usually more than 8 cm long, in bundles of 3, the sheaths persistent; cones with prickles; seeds small and winged. Pinus ponderosa, Ponderosa Pine, Western Yellow Pine; Box Canyon and other moist sites.
- 6a. Leaves pinnately compound; fruit a samara; flowers with petals. Fraxinus cuspidata, Flowering Ash, a few plants on talus slopes in the extreme SE corner. In OLEACEAE, Olive Family, p. 49.
 6b. Leaves simple, toothed or lobed; fruit an acorn; flowers without petals. (Quercus, Oak, in FAGACEAE, Beech Family, p. 42.).....7
- 7a. Leaves deeply lobed, the lobes not terminating in a point. Quercus gambelii, Gambel Oak, Box Canyon and other moist sites, usually in association with Ponderosa Pine.
 7b. Leaves shallowly lobed, the lobes often terminating in a point. Quercus undulatus, Wavy-leaf Oak, rare in and above the Box Canyon.

KEY C (MONOCOTS)

- 1a. Plants grass-like; perianth, if present, not petal-like.....2
- 1b. Plants not grass-like; perianth parts 6, at least 3 some color
other than green or brown.....4
- 2a. Perianth absent, flowers surrounded by chaffy bracts.....3
- 2b. Perianth of 6 chaffy or scale-like, similar segments. JUNCACEAE,
Rush Family, p. 20.
- 3a. Edges of leaf sheaths usually not fused together; stem cylindrical
or flattened; anthers attached to filaments at the middle. GRAMINIAE,
Grass Family, p. 12.
- 3b. Edges of the leaf sheaths united; stems triangular; anthers
attached at one end. CYPERACEAE, Sedge Family, p. 12.
- 4a. Ovary inferior, floral parts attached to the top of the ovary;
plants without chlorophyll. Corallorhiza, in ORCHIDACEAE, p. 21.
- 4b. Ovary superior, floral parts attached to the receptacle below the
ovary.....5
- 5a. Perianth consisting of 3 green sepal-like segments and 3 blue petal-
like segments. COMMELINACEAE, Spiderwort, p. 11.
- 5b. Perianth consisting of 6 petal-like parts, these white, pink, or
orangish. LILIACEAE, Lily Family, p. 20.

KEY D (VINES)

- 1a. Stems orange; leaves reduced to scales; flowers white. Cuscuta, in
CONVOLVULACEAE, p. 27.
- 1b. Stems green and leafy.....2
- 2a. Flowers tubular; leaves simple. CONVOLVULACEAE, Morning-glory Family,
p. 27.
- 2b. Flowers not tubular; leaves compound.....3
- 3a. Leaves opposite; flowers lacking petals, sepals white; fruit an
achene with long plume-like styles; plant climbing by means of
twining petioles. Clematis ligusticifolia, Virgin's Bower, in
RANUNCULACEAE, Buttercup Family, p. 53.
- 3b. Leaves alternate; flowers purple to blue or white, pea-like; fruit
a capsule; plants climbing by means of twining tendrils at the tips
of the leaves. Vicia americana, Vetch, in LEGUMINOSAE, Pea Family, p. 45.

KEY E (SHRUBS)

This key emphasizes leaves over flowers. It is highly artificial. If the flower is available and the family is known, the user may choose to go directly to the family keys, which are complete.

- 1a. Leaves opposite. Symphoricarpos utahensis, Snowberry, Box Canyon and N side of Inscription Rock, under oaks. In CAPRIFOLIACEAE, Honeysuckle Family, p. 25.
- 1b. Leaves alternate or fascicled.....2
- 2a. Leaves definitely compound.....3
- 2b. Leaves simple, entire or deeply divided.....4
- 3a. Leaflets 3, lobed but not spiny-margined. Rhus trilobata, Skunkbrush, Squawbush, thickets in the Box Canyon and N&E of Inscription Rock. In ANACARDIACEAE, Sumac Family, p. 21.
- 3b. Leaflets more than 3, spiny-margined. Berberis repens, Creeping Mahonia, Oregon Grape, under oaks in Box Canyon. In BERBERIDACEAE, Barberry Family, p. 22.
- 4a. Leaves lobed, toothed, or divided.....5
- 4b. Leaves entire.....13
- 5a. Leaves shallowly lobed or toothed.....6
- 5b. Leaves deeply divided.....8
- 6a. Leaves wedge-shaped, with three blunt teeth at the apex. Artemisia tridentata, Big Sagebrush, one plant near campground, abundant near Ramah and westward. In COMPOSITAE, Composite Family, page 28.
- 6b. Leaves generally circular in outline, toothed along the edges from the apex to the midpoints of the margins or farther.....7
- 7a. Leaves toothed and shallowly 3-5-lobed, with gland-tipped hairs;; flowers pinkish-white and tubular; fruit a berry. Ribes inebrians, Wax Currant, common in Box Canyon and sporadic under trees elsewhere. In SAXIFRAGACEAE, Saxifrage Family, p. 55.
- 7b. Leaves round, toothed but not lobed, not glandular; flowers white, flat; fruit a pome. Amelanchier sp., Serviceberry, rare N of Inscription Rock. In ROSACEAE, Rose Family, p. 54.
- 8a. Plants subshrubs, usually less than 20 cm tall, woody only at the base.....9
- 8b. Plants full-sized shrubs, usually more than 50 cm tall, woody throughout.....12
- 9a. Leaves deeply divided into linear segments that appear to be entire leaves, these tipped with rigid points; flowers yellowish-white. Leptodactylon pungens, Prickly Gilia, E of campground in sandy soil. In POLEMONIACEAE, Phlox Family, p. 51.
- 9b. Divisions of leaves not rigidly pointed (COMPOSITAE, Composite Family, p. 28.).....10
- 10a. Leaves white with hairs, at least the basal ones twice pinnately divided into linear segments; heads small and rayless. Artemisia frigida, Pasture Sagebrush, common in open places.
- 10b. Leaves green and glabrous; heads with rays.....11
- 11a. Woody part of the plant woolly with hairs; leaves pitted with oil glands (visible with hand lens); heads large, with rays more than 5 mm long. Hymenoxys richardsonii, Pingue, Colorado Rubberplant, open ground.

- 11b. Woody parts of the plant not woolly; leaves not glandular-pitted; heads small. with rays 2 to 5 mm long. Gutierrezia sarothrae, Snake-weed, abundant on the Monument and throughout the region.
- 12a. Stems and leaves white with hairs, the leaves sometimes simple and linear but more often divided into 3 thread-like segments; flowers very small, grouped in heads. Artemisia filifolia, Sand Sage, sandy ground below the pool and N of Inscription Rock. In COMPOSITAE, p. .
- 12b. Leaves somewhat hairy but decidedly green, pinnately divided into 3 to 9 segments, bottom of the leaf yellow; flowers large and white-petalled; styles in fruit up to 3 cm long and plume-like. Fallugia paradoxa, Apache Plume, on a single lava outcrop S of Highway 53 and rarely on the rim of the Box Canyon. In ROSACEAE, Rose Family, p. 54.
- 13a. Stems spiny; leaves usually more than 1 cm wide; flowers green and tubular; fruit a berry. Lycium pallidum, Wolfberry, dense stands on ruins and other disturbed sites. In SOLANACEAE, Nightshade Family, p. 57.
- 13b. Stems not spiny.....14
- 14a. Some leaves entire and linear but many divided into 3 thread-like segments. Artemisia filifolia (see 12a.).
- 14b. All leaves entire.....15
- 15a. Inflorescence a raceme, the flowering branches spreading and themselves racemose, the overall effect being that each stem has a clearly defined main axis to its tip; plants dioecious (male and female flowers on different plants) (CHENOPODIACEAE, Goosefoot Family, p.26.)16
- 15b. Inflorescence not racemose, the flowering branches ascending, the overall effect being of clusters of flowers at the tips of the stem rather than spread along its length. At least some of the flowers perfect (with male and female parts).....17
- 16a. Stems woolly with white hairs; fruits (on female plants only) crowded and densely covered with white hairs 5 mm or more long. Eurotia lanata, Winterfat, mesa and flats N of Inscription Rock.
- 16b. Stems perhaps minutely hairy but not woolly; fruits (on female plants only) large, with 4 papery wings. Atriplex canescens, Four-wing Salt-bush, disturbed sites.
- 17a. Inflorescence umbel-like (actually a cyme), several stems diverging from the same place, this place subtended by several small pointed bracts; leaves linear, their margins turned under, white-hairy underneath but green and sparsely hairy above; involucre a single cup, flowers emerging from the involucre on elongate stipes (stalks); bark of lower stem peeling and revealing reddish bark underneath. Eriogonum simpsonii, Wild Buckwheat, open country. In POLYGONACEAE, Buckwheat Family, p. 52.
- 17b. Plants not possessing the above characteristics; involucre made up of separate bracts; flowers without stipes, their bases hidden by the involucre (COMPOSITAE).....18

- 18a. Heads without rays, bracts of the involucre arranged in vertical ranks. Chrysothamnus, Rabbitbrush, p. 32.
- 18b. Heads with rays; bracts of the involucre either in a single series or arranged like shingles (imbricate), not in vertical ranks.....19
- 19a. Bracts of the involucre 4-6, more than 5 mm long, in one series; plants usually large. Tetradymia canescens, Horsebrush, a conspicuous plant in open areas. Many people mistake it for Big Sagebrush.
- 19b. Bracts of the involucre more than 10, less than 3 mm long, in several series; plants subshrubs. Gutierrezia sarothrae (see 11b).

KEY F (HERBACEOUS DICOTS)

- 1a. Flowers small and tubular and/or strap-shaped (like a single petal), few to many of these mounted on a common receptacle and surrounded by an involucre of usually at least partially green bracts, the entire head, as in sunflowers, daisies, etc., often appearing similar to a single large flower. COMPOSITAE, Composite Family, p. 38. (Various groups in this large family are also included, redundantly, farther along in this key in case the flowers are not recognized for what they are.)
- 1b. Flowers not as above.....2
- 2a. Plants with milky juice (pinching off a bit of a leaf will expose the juice.).....3
- 2b. Plants without milky juice.....4
- 3a. Inflorescence a head of flowers all of which look like petals, these heads like that of a dandelion in configuration; leaves all alternate. See couplet 12 in COMPOSITAE, p. 38.
- 3b. Inflorescence not as above; not all of the leaves alternate.....4
- 4a. If plants creeping along the ground the leaves less than 2 cm long, broad, always opposite; if stems erect the lower leaves alternate and the upper whorled; plants monoecious, a single pistillate (female) flower and 5 or more staminate (male) flowers collected in a structure called a cyathium, this with appendages which resemble petals simulating a perfect flower. The mature fruit is a capsule protruding from the cyathium on a short, limp stalk. Euphorbia, in EUPHORBIACEAE, Spurge Family, p. 42.
- 4b. If plants prostrate the leaves more than 4 cm long, narrow, not always opposite; if stems erect the leaves all whorled; flowers perfect, with 5-lobed calyx, 5-lobed corolla, and 5-lobed crown above the corolla. Asclepias, in ASCLEPIADACEAE, Milkweed Family, p. 22.
- 5a. Leaves fleshy and succulent, frequently purplish; flowers yellow; plants creeping annuals. Portulaca, in PORTULACACEAE, Portulaca Family, p. 53.
- 5b. Plants not as above.....6
- 6a. Some leaves opposite.....7
- 6b. None of the leaves opposite.....19

- 7a. Leaves entire to toothed.....8
- 7b. Leaves deeply divided to compound.....15

- 8a. Leaves always entire.....9
- 8b. Leaves, at least some of them, toothed to shallowly lobed.....14

- 9a. Stems 4-angled; plants perennial, low and almost mat-like; corolla white to pink, fused at the bottom, 4-lobed at the top. Houstonia, in RUBIACEAE, Madder Family, p. 55.
- 9b. Stems round, corolla not divided into 4 lobes.....10

- 10a. Flowers many, in heads, each head surrounded by an involucre of bracts, the whole simulating a single flower; flowers yellow, leaves narrow. Viguiera, in COMPOSITAE, p. 38.
- 10b. Inflorescence and flowers not as above.....11

- 11a. Small annuals with opposite lower leaves and alternate upper leaves; flowers white. Microsteris in POLEMONIACEAE, Phlox Family, p. 51.
- 11b. All leaves opposite; if plants small annuals then flowers yellow..12

- 12a. Petals united; corolla bilaterally symmetrical; red, blue, or yellow. SCROPHULARIACEAE, Figwort Family, p. 55.
- 12b. Petals lacking or not united; non-green parts of the flower purple, pink, red, or white.....13

- 13a. Leaves with petioles (stems), usually heart-shaped, often unequal in size; corolla absent, calyx appearing like a corolla and pink, purple, or white; flowers subtended by conspicuous bracts. NYCTAGINACEAE, Four-O'clock Family, p. 48.
- 13b. Leaves without petioles, not heart-shaped; corolla present, 5-petalled, white or red; flowers on pedicels (stalks), not subtended by conspicuous bracts. CARYOPHYLLACEAE, Pink Family, p. 25.

- 14a. Stems 4-angled; flowers bilaterally symmetrical. LABIATAE, Mint Family, p. 44.
- 14b. Stems not 4-angled; flowers in heads surrounded by an involucre of bracts. COMPOSITAE, p. 38.

- 15a. Plants creeping along the ground.....16
- 15b. Plants spreading, ascending, or erect.....17

- 16a. Leaves pinnately compound; flowers yellow, fruits spiny. Tribulus, in ZYGOPHYLLACEAE, Caltrop Family, p. 58.
- 16b. Leaves 3-lobed, the lobes toothed; flowers blue to purple; fruit not spiny. Verbena, in VERBENACEAE, Vervain Family, p. 58.

- 17a. Flowers purple or magenta, radially symmetrical. GERANIACEAE, Geranium Family, p. 43.
- 17b. Flowers not purple or magenta.....18

- 18a. Flowers yellow, bilaterally symmetrical, with a long claw perpendicular to the pedicel, not grouped in heads. Corydalis, in FUMARIACEAE, Fumitory Family, p. 43.
- 18b. Flowers grouped in heads surrounded by an involucre of bracts. COMPOSITAE, P. 38.

- 19a. True petals lacking (sepals sometimes petal-like).....20
 19b. True petals present.....24
- 20a. Stamens 10 or more; leaves basal or compound. RANUNCULACEAE, Buttercup Family, p. 53.
 20b. Stamens 9 or fewer; leaves neither all basal nor compound.....21
- 21a. Flowers small, each one subtended by 3 stiff, pointed, papery bracts, mostly unisexual. Amaranthus, in AMARANTHACEAE, p. 21.
 21b. Flowers not subtended by stiff, pointed bracts.....22
- 22a. Sepals yellow, white, pink or green, petal-like. POLYGONACEAE, Buckwheat Family, p. 52.
 22b. Sepals not petal-like.....23
- 23a. Sepals 6, the inner 3 becoming enlarged in fruit, at least 1 of these bearing a grain-like thickened area; stamens 6. Leaves glabrous. Rumex, in POLYGONACEAE, p. 52.
 23b. Sepals and stamens 5 or fewer. CHENOPODIACEAE, Goosefoot Family, p. 26.
- 24a. Petals separate to the base.....25
 24b. Petals united, at least at the base.....36
- 25a. Petals and sepals 4.....26
 25b. Petals and sepals not 4.....28
- 26a. Stamens 8 (4 of these reduced and usually sterile in one genus); ovary inferior. ONAGRACEAE, Evening-primrose Family, p. 49.
 26b. Stamens 6.....27
- 27a. Petals pinkish-purple or white; leaves compound with 3 leaflets. Cleome, in CAPPARIDACEAE, Caper Family, p. 25.
 27b. If leaves compound then not with 3 leaflets and petals not pinkish-purple or whitish; 2 of the stamens shorter. CRUCIFERAE, Mustard Family, p. 39.
- 28a. Inflorescence an umbel; leaves twice pinnately divided, glaucous, somewhat fleshy; fruits winged; plants stemless. Cymopterus, in UMBELLIFERAE, Parsley Family, p. 58.
 28b. Inflorescence not an umbel.....29
- 29a. Stamens more than twice as many as the petals.....30
 29b. Stamens not more than twice as many as the petals.....33
- 30a. Flowers bilaterally symmetrical, blue. Delphinium, in RANUNCULACEAE, Buttercup Family, p. 53.
 30b. Flowers radially symmetrical.....31
- 31a. Flowers yellow; leaves pinnately compound or pinnately veined.....32
 31b. Flowers white or orangish-red; leaves palmately lobed and veined. MALVACEAE, Mallow Family, p. 48.

- 32a. Leaves pinnately compound, the leaflets deeply toothed. Potentilla, in ROSACEAE, Rose Family, p. 54.
- 32b. Leaves toothed to entire, rough with barbed hairs. Mentzelia, in LOASACEAE, Loasa Family, p. 47.
- 33a. Leaves simple.....34
- 33b. Leaves compound.....35
- 34a. Leaves all basal; flowers on a leafless stalk (scape). Heuchera, in SAXIFRAGACEAE, Saxifrage Family, p. 55.
- 34b. Leaves evenly distributed on the stem; flowers yellow. Linum, in LINACEAE, Flax Family, p. 47.
- 35a. Leaflets spine-toothed; flowers radially symmetrical. Berberis, in BERBERIDACEAE, Barberry Family, p. 22.
- 35b. Leaflets not spine-toothed; flowers bilaterally symmetrical, with an upper petal (banner), 2 lateral petals (wings), and 2 lower petals fused into a keel. LEGUMINOSAE, Pea Family, p. 45.
- 36a. Stamens more numerous than the lobes of the corolla.....37
- 36b. Stamens as many as or fewer than the corolla lobes.....38
- 37a. Leaves twice pinnately compound. Calliandra, in LEGUMINOSAE, Pea Family, p. 45.
- 37b. Leaves simple, lobed; flowers orangish-red or white. MALVACEAE, Mallow Family, p. 48.
- 38a. Anther-bearing stamens 5.....39
- 38b. Anther-bearing stamens 2 or 4.....43
- 39a. Growing tip of the spike-like inflorescence coiled, flowers on the inside axis of the coil (this inflorescence is technically a "helicoid cyme").....40
- 39b. Inflorescence not as above.....41
- 40a. Inflorescence a spike; flowers yellow; leaves to 50 cm long, matted with hairs. Verbascum, in SCROPHULARIACEAE, Figwort Family, p. 55.
- 40b. Plants not as above.....41
- 41a. Fruit a capsule with 2 cells. Phacelia, in HYDROPHYLLACEAE, Waterleaf Family, p. 43.
- 41b. Fruit of 2 or 4 nutlets. BORAGINACEAE, Borage Family, p. 23.
- 42a. Style single below, divided into 3 segments above; fruit a capsule with 3 cells. POLEMONIACEAE, Phlox Family, p. 51.
- 42b. Style not divided (stigma may be shallowly 2-lobed); fruit a berry (in one genus enclosed in the papery, inflated calyx.) SOLANACEAE Nightshade Family, p. 57.
- 43a. Flowers papery and straw-colored, with 4 equal lobes, on a leafless stalk; leaves all basal, linear, silver-hairy. Plantago, in PLANTAGINACEAE, Plantain Family, p. 51.
- 43b. Flowers white, purple, red or yellow, not papery, on a leafy stalk or stem; leaves not all basal. SCROPHULARIACEAE, Figwort Family, p. 55.

ANNOTATED CHECK-LIST

WITH KEYS TO THE GENERA AND SPECIES

DIVISION PTERIDOPHYTA, FERNS ANDFERN ALLIESPOLYPODIACEAE--FERN FAMILY

One kind of fern has been found at El Morro, in a cave in the Box Canyon and under rocks on a steep slope in the SE corner. It has not been collected or identified, but it is a common species in the Zuni Mountains.

DIVISION SPERMATOPHYTA, SEED PLANTSSUBDIVISION GYMNOSPERMAE,GYMNOSPERMSCUPRESSACEAE--CYPRESS FAMILY

Small, monoecious (a few dioecious) trees. The best known genus is Juniperus (junipers, "cedars"). Leaves usually scale-like and more or less appressed to the twigs; seeds borne in cones.

JUNIPERUS. Juniper; Cedar

The cones of this genus are atypical of the family in being spherical and fleshy rather than woody.

- 1a. Bark divided into rectangular plates, suggestive of alligator hide. Juniperus deppeana, Alligator Juniper, common in Box Canyon and in moist sites below cliffs. Largest of the southwestern junipers, here near the northern terminus of its range. RN: food.
- 1b. Bark fibrous, longitudinally fissured.....2
- 2a. Branchlets flattened, often drooping; leaves bluish-green, often bearing a resin gland on the back. Juniperus scopulorum Sarg., Rocky Mountain Juniper, uncommon in moist places, frequently in association with Alligator Juniper. Closely related to J. virginiana, Eastern Red Cedar. RN: Enemyway, protection from witches.
- 2b. Branchlets not flattened, not drooping; leaves yellowish-green, usually without resin glands. Juniperus monosperma (Engelm.) Sarg., One-seed Juniper, throughout the Monument, the only species of juniper in the flats, but apparently retreating there. RN: food, dye, menstrual and obstetrical pain, bloating in newborn sheep, wood, tinder.

PINACEAE--PINE FAMILY

A large, predominantly Northern Hemisphere family of monoecious trees which includes pines, firs, spruces, and hemlocks, many of which are important for timber. Leaves (needles) are evergreen in all genera except Larix (larch); seeds are borne in woody cones.

PINUS. Pine

Needles in clusters surrounded at the base by a sheath of scales.

- 1a. Needles in clusters of 2, sheaths soon deciduous (peeling back and falling off); cones without prickles; seeds large and wingless. Pinus edulis Engelm., Pinyon, Colorado Pinyon, widespread but not extending into the flats. A short tree. The sweet, succulent meat of the seeds is important as food to both humans and animals, but large crops are produced only every 4-6 years. RN: food, wood, resin: pottery, baskets; head colds. Z: syphilis, food, ceremonial
- 1b. Needles in clusters of 3, sheaths persistent; cones with prickles; seeds small and winged. Pinus ponderosa Lawson, Ponderosa Pine, Western Yellow Pine, Box Canyon and other moist sites. A tall tree, with reddish bark when mature. The bark is said to have a vanilla-like odor. RN: blackening, emetic, medicine, wood, food. Z: ceremonial.

SUBDIVISION ANGIOSPERMAE,

FLOWERING PLANTS

CLASS MONOCOTYLEDONAE, MONOCOTS

COMMELINACEAE--SPIDERWORT FAMILY

A mostly tropical family which extends into the southern U.S. The best known genus is the Wandering-Jew, a native of Mexico which is cultivated as a house plant.

- 1a. Flowers irregular; stamens of 2 types (3 of them sterile), the filaments naked; inflorescence enfolded by a single spathe-like bract. Commelina.
- 1b. Flowers regular; stamens all alike (all fertile), the filaments bearded below; inflorescence subtended by several leaf-like bracts. Tradescantia.

COMMELINA. Dayflower

Commelina dianthefolia Delile var. longispatha (Torr.) Brashier, woodland. Perennial with tuberous roots; leaves linear; petals blue. Late summer. RN: aphrodisiac for livestock.

TRADESCANTIA. Spiderwort

Tradescantia occidentalis (Britton) Smyth var. occidentalis, woodland. Perennial with thickened roots; leaves linear; petals blue. Late summer. RN: aphrodisiac for livestock.

CYPERACEAE--SEGE FAMILY

A worldwide family of mostly perennial, grass-like plants partial to moist or wet soil. Bulrushes, tules, and papyrus are among its best known members.

CAREX.

Perennials; male (staminate) flowers with 3 stamens; female (pistillate) flowers with 2 or 3 stigmas, enclosed in a sac (perigynium); flowers borne in spikelets, these wholly staminate or pistillate or with both sexes.

- 1a. Staminate flowers above the pistillate ones in each spikelet.
Carex occidentalis Bailey, Rocky Mountain Sedge, found only in cracks in the canyon rim, side canyon E of Box Canyon.
- 1b. Pistillate flowers above the staminate ones in each spikelet. Carex microptera Mack., common below spigot in campground.

GRAMINIAE--GRASS FAMILY

A worldwide family of unparalleled importance to mankind. Not only are corn, wheat, oats, millet, rice, sugar cane, and bamboo provided by this family, the vast majority of forage plants are also grasses. The grass family has a unique inflorescence (see drawing) composed of usually bisexual flowers with 3 stamens and 2 styles and stigmas surrounded by 2 bracts, a smaller palea and a larger lemma. Palea, lemma, and flower comprise one floret. One or more florets are mounted together within a pair of bracts called glumes. The whole is called a spikelet. While this arrangement seems complicated, once it is mastered on a genus with large spikelets (e.g. Bromus or Agropyron) the identification of most grass genera is straightforward and interesting if not easy. The family is divided into numerous tribes, but in the interest of simplicity they are not included in the artificial key below.

- 1a. Inflorescence spike-like or appearing spike-like (i.e. spike-like raceme or contracted panicle), branchlets, if existing, closely appressed to the axis and often hidden by lower spikelets.....2
- 1b. Inflorescence obviously a panicle of 1 to many spike-like terminal or lateral branches, not at all appearing like a single spike.....10
- 2a. Inflorescence with long awns or bristles.....3
- 2b. Inflorescence with short or no awns.....6
- 3a. Perennials; awns straight when young, curved when mature; inflorescence separating below the glumes; common. Sitanion, p. 19.
- 3b. Annuals; not common.....4
- 4a. Plants tall (frequently 1 m or more), not tufted or spreading.
Secale, p. 19.
- 4b. Plants less than 50 cm tall, several spreading culms arising from a single rootstock.....5
- 5a. Spikelets bulbous, with bristles up to 10 mm long at their base.
Setaria, p. 19.
- 5b. Spikelets linear, with awns 15 to 25 mm long on the glumes.
Hordeum, p. 17.

- 6a. Spikelets large (10 mm or more long), closely appressed alternately on opposite sides of the axis, internodes (space between attachment of spikelets) greater than 2 mm long. Agropyron, p. 14.
- 6b. Spikelets small (5 mm or less long), on short more or less appressed pedicels (stalks).....7
- 7a. First glume usually bearing 2 teeth; inflorescence less than 5 mm wide. Lycurus, p. 17.
- 7b. First glume not 2-toothed; inflorescence more than 5 mm wide.....8
- 8a. More than 1 perfect floret per spikelet; glumes and lemmas with broad, whitish, translucent margins; main axis of the panicle densely hairy. Koeleria, p. 17.
- 8b. Only 1 perfect floret per spikelet; glumes and lemmas not as above; main axis of the panicle not densely hairy.....9
- 9a. Nerves of the lemmas densely hairy, glumes and lemmas awnless. Blepharoneuron, p. 15.
- 9b. Nerves of the lemmas not densely hairy, lemmas short- to long-awned (occasionally awnless). Muhlenbergia, p. 17.
- 10a. Inflorescence of 1 to many spike-like branches, the branches covered with spikelets from the base to the tip and either clustered terminally or spread along the upper part of the culm.....11
- 10b. Inflorescence a panicle, lower portions of the branches naked.....14
- 11a. Spikelet branches erect or ascending.....12
- 11b. Spikelet branches horizontal or descending.....13
- 12a. Florets with conspicuous hairs and awns. Andropogon, p. 15.
- 12b. Florets bulbous, without conspicuous hairs and awns. Paspalum, p. 19.
- 13a. Several branches originating at one point on the axis of the inflorescence. Chloris, p. 17.
- 13b. One branch (these short in B. curtipendula) originating at one point on the axis. Bouteloua, p. 16.
- 14a. Spikelets with 1 perfect floret, if reduced florets present then appearing glume-like and located below the perfect floret.....15
- 14b. Spikelets with 2 or more perfect florets, or if only 1 then at least 1 reduced floret above the perfect one.....22
- 15a. Glumes (at least the first) shorter than the lemma (beware of Panicum, couplet 19, whose second glume and glume-like sterile lemma often exceed the fertile lemma).....16
- 15b. Glumes longer than the lemma (not including awns, if present).....20
- 16a. Lemmas greater than 5 mm long, hard and circular in cross section, terminated by 3 long awns (except 2 of these vestigial in A. orcuttiana). Aristida, p. 15.
- 16b. Lemmas awnless or terminated by a single awn.....17
- 17a. Lemmas awned or at least awn-pointed.....18
- 17b. Glumes and lemmas awnless.....19
- 18a. Lemmas less than 5 mm long. Muhlenbergia, p. 17.
- 18b. Lemmas more than 5 mm long. Aristida orcuttiana, p. 15.

- 19a. Spikelet consisting of a short first glume, a longer second glume, a sterile floret which looks like the second glume, and a fertile floret with 3 or more prominent nerves. Panicum, p. 18.
- 19b. Spikelet consisting of 2 glumes and a fertile floret, glumes 1-nerved; sheaths with tufts of long hairs on either side of the collar. Sporobolus, p. .
- 20a. Glumes 1 cm long or longer. Stipa, p. 19.
- 20b. Glumes less than 5 mm long.....21
- 21a. Glumes and lemmas awnless; branchlets often whorled; palea minute or absent. Agrostis, p. .
- 21b. Lemma with a short awn, this easily shed; palea about as long as the lemma. Oryzopsis, p. .
- 22a. Spikelets mostly more than 15 mm long; lemmas awned. Bromus, p. .
- 22b. Spikelets less than 15 mm long.....23
- 23a. Plants obviously annuals, usually less than 15 cm high.....24
- 23b. Plants obviously perennials, usually more than 15 cm high, with a dense tuft of leaves.....26
- 24a. Lemmas awnless. Eragrostis, p. 17 .
- 24b. Lemmas awned.....25
- 25a. Plants tufted, with stolons (runners which root at the nodes); spikelets in head-like clusters, mostly enclosed in broadened leaf sheaths. This species is most likely to appear after summer rains, the young, flowerless plant only a few cm tall, covered with cobwebby hairs. Munroa, p. 18
- 25b. Plants not tufted or stolon-bearing; spikelets on a well-exserted axis; appearing in spring; culms usually greater than 2 cm tall; plant green and glabrous. Festuca octoflora, p. 17.
- 26a. Lemmas lanceolate, gradually tapering to a point; glumes 4 mm or more long. Festuca, p. 17.
- 26b. Lemmas broadly acute or obtuse; glumes 4 mm or less long. Poa, p. 19.

AGROPYRON.

Our species perennial, usually with rhizomes; inflorescence a spike with 1-3 spikelets at a node in our species. More than 1 floret per spikelet; glumes not longer than the first lemma; our species awnless.

- 1a. Plants glaucous; glumes firm, mostly narrow and tapering from below the middle to a short awn tip, often assymetrical and with faint nerves; plants with rhizomes. Agropyron smithii Rydb, var. smithii, Western Wheatgrass, campground, roadsides, and probably elsewhere, a common grass in the region. Good forage plant and soil binder. Summer.
- 1b. Plants green; glumes thin, with prominent nerves, usually broad to above the middle and symmetrical.....2
- 2a. Rhizomes absent. Agropyron trachycaulum (Link) Malte, Slender Wheatgrass, uncommon N of Inscription Rock. Excellent forage grass. Early summer.
- 2b. Rhizomes present. Agropyron pseudorepens Sribn. & Smith, False Quackgrass, uncommon in sandy washes at mouth of Box Canyon. More robust than A. trachycaulum, both considered varieties of the same species by some authorities. Late summer. RN: horse feed.

AGROSTIS. Bentgrass

Agrostis scabra Willd., Rough Bent, pot-holes in Inscription Rock. Perennial without rhizomes; inflorescence a spreading panicle with long thin branchlets naked for $\frac{1}{2}$ their length; glumes longer than the single floret; palea minute or absent. Summer.

ANDROPOGON.

Perennials with flat blades; inflorescence of spike-like racemes; spikelets in pairs, the lower perfect, the upper staminate or sterile and reduced; second glume longer than the lemma, which bears a twisted, bent awn.

- 1a. Stem terminated with a single spike-like branch (raceme); second spikelet in each group reduced or rudimentary. Andropogon scoparius Michx var. neomexicanus (Nash) Hitch., New Mexico Bluestem, fairly common on rocky slopes and in woodland. Late summer. RN: blackening.
- 1b. Stem terminated with 2-5 racemes, second spikelet as large as the lower one but awnless, staminate. Andropogon gerardi Vitman, Big Bluestem, Turkeyfoot, rare. A principal constituent of the tall grass prairie of the Great Plains, where it grows much taller than here. Late Summer. RN: blackening.

ARISTIDA. Threeawn

Our species perennial, lacking rhizomes; inflorescence a panicle with 1 floret per spikelet; glumes not longer than the lemma, which is terminated by 3 (1 in one species) awns.

- 1a. Lemmas with 1 awn; awn-column twisted. Aristida orcuttiana Vasey, Beggartick Grass, Singleawn Aristida, sandy soil in cracks in the inner slopes of Box Canyon. Good forage plant. Summer.
- 1b. Lemmas with 3 awns.....2
- 2a. Column below the base of the awns twisted; glumes nearly equal in length. Aristida arizonica Vasey, Arizona Threeawn, sand-filled cracks below rim of Box Canyon. Late summer.
- 2b. Plants not as above.....3
- 3a. Awns usually more than 4 cm long; second glume usually longer than 15 mm; panicle branches usually erect but occasionally curving in a U or S shape under the weight of the mature spikelets. Culms sometimes aberrant. Aristida longiseta Steud. var. rariflora Hitchc., Red Threeawn, common along roadsides. Summer. RN: hairbrush.
- 3b. Awns usually less than 4 cm long; second glume frequently shorter than 15 mm. Aristida fendleriana Steud., Fendler Threeawn, a few plants N of the campground in sandy soil. Summer. RN: hairbrush.

BLEPHARONEURON.

Blepharoneuron tricholepsis (Nash) Torr., Pine Dropseed, fairly common on rocky slopes in woodland. Perennial without rhizomes; inflorescence a contracted panicle with 1 floret per spikelet, glumes not longer than lemma, whose 3 nerves are densely hairy. Good forage plant. Late summer.

BOUTELOUA. Grama grass

Our species perennials without rhizomes (other species have stolons); inflorescence of 1 to many spike-like branches on 1 side of the unbranched axis; spikelets in 2 rows on each branchlet, each spikelet with a single perfect floret about as long as the second glume and several rudimentary florets above, these usually represented by a 3-awned lemma.

- 1a. Branches of the inflorescence 1-3 (occasionally 4); spikelets pectinate (arranged on the branches like the teeth of a comb), more than 6 per branch. Bouteloua gracilis (H.B.K.) Lag., Blue Grama, widespread and locally abundant. The most important forage grass in our region, and the most abundant of the native species. Late summer. RN: forage, blackening, life medicine, castration incision (colt), too much life medicine, post-partum. Z: hairbrush, broom.
- 1b. Branches of the inflorescence 20 or more; spikelets not pectinate, 2-6 per branch. Bouteloua curtipendula (Michx.) Torr., Sideoats Grama, rare, found only below the rim of the Box Canyon in sand-filled cracks. Good forage plant. Late summer.

BROMUS. Brome

Annuals and perennials, ours without rhizomes; inflorescence a panicle with branchlets naked below; spikelets large (13 mm or more long) with many florets; lemmas awned.

- 1a. Spikelets laterally compressed; lemmas definitely keeled and V-shaped. Bromus polyanthus Scribn., Mountain Brome, mouth of Box Canyon in moist arroyo sand. Perennial with stiffly spreading panicle branches; lemmas keeled, with an awn $\frac{1}{3}$ to $\frac{1}{2}$ the length of the body. Good forage plant.
- 1b. Spikelets not laterally compressed; lemmas not or only slightly keeled, U-shaped.....2
- 2a. Annuals.....3
- 2b. Perennials.....4
- 3a. First glume 1 to 3-nerved, tapering gradually to a slender tip; teeth on each side of the awn long and slender. Bromus tectorum L., Cheat-grass, Downy Brome, Downy Chess, superabundant in disturbed ground, especially in the Box Canyon. Summer. RN: sheep and horse feed, blackening.
- 3b. First glume 3- to 5-nerved, broad at the tip with a rounded tooth on each side of the short awn. Bromus arvensis L., Field Brome, rare near campground. Summer.
- 4a. Leaf sheaths glabrous or nearly so. Bromus anomalus Rupr. ex Fourn., Nodding Brome, sand-filled cracks in cliffs and pine forest. Good forage plant. This and the following are considered varieties of a single species by many authorities. Late summer. RN: considered the first plant seen by the people after their emergence.
- 4b. Leaf sheaths densely hairy. Bromus lanatipes (Shear) Rydb., same habitat as the preceding. Good forage plant. Late summer.

CHLORIS. Fingergrass

Chloris verticillata Nutt., Windmill Grass, residence area only, probably an introduced weed. Low perennial, without rhizomes but culms often spreading somewhat. Inflorescence of several spike-like branches clustered at one or several points on the main axis; 1 perfect and 1 or 2 rudimentary awned florets per spikelet. Late summer.

ERAGROSTIS. Lovegrass

Eragrostis barrelieri Daveau, Mediterranean Lovegrass, only at the side of Highway 53 at the W boundary of the Monument, in a moist basin. Annual with spreading culms; inflorescence a spreading panicle; 6-15 florets per spikelets. Late summer.

FESTUCA. Fescue

Annuals and perennials, ours without rhizomes; panicle contracted to slightly open;; more than 1 floret per spikelet.

- 1a. Annuals; lemmas awned. Festuca octoflora Walt., Sixweeks Fescue, abundant and widespread. Low annual which appears in April after heavy winter precipitation.
- 1b. Perennials; lemmas not awned. Festuca ovina L., var. ovina, Sheep Fescue, widespread in open woods. This species closely resembles some species of Poa.

HORDEUM. Barley

Hordeum leporinum Link, Mouse Barley, collection locality unrecorded, but a common roadside weed elsewhere. Annual with spreading culms; inflorescence a spike-like raceme; spikelets 1-flowered, 3 per node; glumes with awns to 25 mm long. Early summer.

KOELERIA. Junegrass

Koeleria cristata (L.) Pers., Mountain Junegrass, Prairie Junegrass, widespread and common in wooded areas. Perennial without rhizomes; inflorescence a contracted panicle, branchlets flowered to near the base; spikelets with 2-4 florets, glumes shorter than lowest lemma, awnless. Good forage plant. Summer. RN: brush for cleaning metate.

LYCURUS.

Lycurus phleoides H.B.K., Wolftail, Texas Timothy, sand-filled cracks in canyon walls. Perennial without rhizomes; inflorescence a slender, bristly, spike-like panicle. Spikelets in pairs, the lower not perfect; first glume 2-awned, second glume 1-awned, the single lemma 1-awned. Good forage plant. Late summer.

MUHLENBERGIA. Muhly

Our species perennials without rhizomes; inflorescence an ascending to contracted panicle; glumes shorter than the lemma of the single floret. Our most common species, M. montana, is said to be distinguished from other muhlies in our area by the presence of 3 prominent nerves on the second glume. This characteristic is scarcely discernible on many of the plants at El Morro and is not dependable.

- 1a. Lower sheaths flattened, ribbon-like; ligules 10-20 mm long, often frayed or broken; awns 6-25 mm long. Muhlenbergia montana (Nutt.) Hitchc., Mountain Muhly, common on cliffs and rocky slopes, and in pine forest. Late summer.
- 1b. Lower sheaths not flattened and ribbon-like; plants without the above combination of characteristics.....2
- 2a. Awns mostly longer than 4 mm; panicle not spike-like. Muhlenbergia pauciflora Buckl., New Mexico Muhly, common in the same places as Mountain Muhly. Ligules less than 1 mm long but with vertical projections of the margin of the sheath on each side up to 3 mm long. Late summer.
- 2b. Awns shorter than 4 mm; panicle spike-like.....3
- 3a. Leaf blades elongate, up to 60 cm long; ligules 4-12 mm long. Muhlenbergia dubia Fourn., Pine Muhly, a large densely clumped species abundant in sand on slopes of the cliff, below mouth of Box Canyon. Late summer.
- 3b. Leaf blades not elongate, no longer than 12 cm; ligules 1-3 mm long. Muhlenbergia wrightii Vasey, Spike Muhly, uncommon in open country.

MUNROA.

Munroa squarrosa (Nutt.) Torr., False Buffalograss, uncommon to abundant after a rainy season in bare ground. Mat-forming annuals, spreading by runner-like culms which root at the nodes; leaves stiff and pointed, almost hiding the few-flowered spikelets. The tiny whitish seedlings often carpet the bare ground around ant hills after the late summer rains.

ORYZOPSIS. Ricegrass

Perennials without rhizomes; inflorescence an open, much branched panicle; glumes longer than the single lemma; lemma and palea rounded and plump.

- 1a. Spikelets 5 -10 mm long, on stems mostly 8-20 mm long; lemmas densely hairy. Oryzopsis hymenoides (Roem. & Schult.) Ricker, Indian Ricegrass, fairly common in sand N of Inscription Rock. Valuable forage plant. Summer. RN: food, horse feed. Z: food.
- 1b. Spikelets 2.5 - 4 mm long, on stems 4 mm or less long; lemmas usually glabrous. Oryzopsis micrantha (Trin. & Rupr.) Thurb., Littleseed Ricegrass, shade of Ponderosa Pines in Box Canyon. Summer.

PANICUM.

Annuals or perennials; inflorescence an open panicle; first glume shorter than the spikelet, second glume and glume-like sterile lemma longer than the fertile lemma which is hard and in-rolled over the palea.

- 1a. Perennials, with bulbous swellings at the base of the plant. Panicum bulbosum H. B. K. var. minus Vasey, Bulb Panicum, shady, moist soil in head of Box Canyon. Late summer.
- 1b. Annuals, without bulbous swellings at the base of the plant. Panicum capillare L. var. occidentale Rydb, Western Witchgrass, common rather low annual by roadsides. Late summer.

PASPALUM.

Paspalum stramineum Nash, Sand Paspalum, lawns, probably an introduced weed. Perennial with bent culms; inflorescence of 2-3 spike-like branches; first glume absent, second glume and sterile lemma enclosing the fertile floret. Late summer.

POA. Bluegrass

Our species tall perennials usually lacking rhizomes; inflorescence a closed panicle; glumes shorter than the first lemma; several florets per spikelet. A difficult genus.

- 1a. Ligules mostly 3 mm long or less. Poa fendleriana (Steud.) Vasey, Muttongrass, Fendler Bluegrass, common on wooded slopes. Valuable forage plant. Spring.
- 1b. Ligules 4-7 mm long. Poa longiligula Scribn & Willd., Long-tongue Muttongrass, wooded slopes. Except for the ligules not distinct from P. fendleriana and considered by some authorities a variety of it
RN: sheep and horse feed.

SECALE. Rye

Secale cereale L., Rye, a few plants in open country S of campground, probably an escape from cultivation. Tall annual; inflorescence a terminal spike; spikelets usually 2-flowered; lemmas long-awned. Early summer.

SETARIA. Bristlegrass

Setaria viridis (L.) Beauv., Green Bristlegrass, lawns, probably an introduced weed. Annual with spreading culms; inflorescence a spike-like panicle, 1-3 bristles at the base of each spikelet; first glume short, second glume and sterile lemma equalling fertile floret. Summer. RN: a related species used to treat pimple.

SITANION.

Sitanion hystrix (Nutt.) J. G. Smith, Bottlebrush Squirreltail, common and widespread. Tufted perennial without rhizomes; inflorescence a terminal spike; glumes awn-like to the base; lemmas also long-awned; awns erect when young but spreading upon drying, sections of the spike breaking off and blowing across the ground where they collect in great numbers in depressions. Fair forage when young. Summer. RN; sheep and horse feed when young.

SPOROBOLUS.

Sporobolus cryptandrus (Torr.) Gray, Sand Dropseed, uncommon in campground. Perennial without rhizomes; inflorescence a contracted to open panicle, usually partially enclosed in the sheath; the longer second glume about the length of the single floret. Fair forage. Late summer. RN: food, brush for metate, sore on horse's leg, blackening.

STIPA.

Perennials, ours without rhizomes; inflorescence a panicle; spikelets 1-flowered, large.

- 1a. Awns more than 8 cm long. Stipa comata Trin & Rupr., Needle-and-thread Grass, fairly common in sand N of Inscription Rock. Summer. RN: play arrows.
- 1b. Awns less than 3 cm long. Stipa columbiana Macoun, Columbia Needle-grass, one location in side canyon E of mouth of Box Canyon. The specimen keys to S. lettermanii Vasey in Gould. Late summer.

JUNACEAE--RUSH FAMILY

A worldwide family of grass-like plants. The flowers, however, are not grass-like. They have 6 chaffy segments in place of sepals and petals, as well as stamens and a pistil.

JUNCUS. Rush

Juncus interior Wieg. var. arizonicus (Wieg.) F.J.Herm., Inland Rush, sand-filled cracks below rim of Inscription Rock. Stamens 6, stigmas 3.

LILIACEAE--LILY FAMILY

A well-known worldwide family which includes various lilies, onion, garlic, leek, yucca, and asparagus. Sepals and petals 3 each, usually brightly colored and corolla-like.

- 1a. Plants woody at the base; leaves evergreen, stiff, in a dense basal rosette, their marginal fibers frayed; flowers and pods more than 2 cm long. Yucca.
- 1b. Herbaceous perennials; leaves not evergreen not stiff and not marginally frayed; individual flowers and fruits less than 2 cm long....2
- 2a. Flowers orange, borne along the stem in a raceme. Anthericum.
- 2b. Flowers pinkish, borne in a terminal, nodding umbel. Allium.

ALLIUM. Onion

Allium cernuum Roth, Nodding Onion, one record, among pinyons in the SE corner. Late summer. RN: food.

ANTHERICUM.

Anthericum torreyi Baker, Crag-lily, one record, among pines in Box Canyon. Late summer. RN: aphrodisiac.

YUCCA.

Perennial shrubs, our with the leaves all basal or nearly so; leaves evergreen, entire but with frayed margins (in ours), sepals and petals white, stamens 6; fruit a fleshy or dry pod.

- 1a. Leaves over 3 cm wide, concave and rigid. Yucca baccata Torr., Blue Yucca, Banana Yucca, Datil, wooded areas. Early summer. RN: food, fiber, medium for pigment, soap, stop snow or rain, lubricate hand for removing placenta. Z: food, weaving, basketry, ceremonial.

- 1b. Leaves less than 3 cm wide, flat, stiff but not rigid. Yucca angustissima Engelm., sparsely distributed throughout the Monument. Early summer. RN: Food, string, dye, prolonged labor, induce artificial menopause. Z: food, weaving, pottery decoration, soap.

ORCHIDACEAE--ORCHID FAMILY

One of the 2 or 3 largest plant families, but mostly tropical and poorly represented in our region.

CORALLORHIZA. Coral-root

Corallorhiza maculata Raf., Coralroot, a few plants under pines and oaks in the head of the Box Canyon. Perennials without chlorophyll and roots, parasitic on a fungus; leaves reduced to scales; flowers white, spotted with purple. June.

CLASS DICOTYLEDONAE, DICOTS

AMARANTHACEAE--AMARANTH FAMILY

A family abundant in the tropics and in other warm regions. Most members are weeds. Amaranths are difficult to identify because the flowers are small and they lack petals. Luckily there is only one genus at El Morro, and it is easy to recognize by the leaves and stems which often contain some red coloration.

AMARANTH. Amaranth pigweed

Annual weeds with alternate, entire, petioled leaves which often contain red and white bands; flowers unisexual with a 2- to 5-lobed calyx and no petals, each subtended by 3 bracts.

- 1a. Some of the stems creeping along the ground before ascending.
Amaranthus viridis L., Atsinna Ruin. Plants monoecious.
- 1b. Main stem erect and slender, without secondary stems creeping along the ground. Amaranthus hybridus L., Pigweed, Green Amaranth, roadsides. Plants monoecious. Summer. Z: rouge, ceremonial.

ANACARDIACEAE--CASHEW FAMILY

This family is best known in North America for poison oak, poison ivy, and poison sumac, all of which are placed by some authorities in the genus Rhus. The tropical cashews, pistachios, and mangos are also members of the family.

RHUS. Sumac

Rhus trilobata Nutt. var anisophylla (Greene) Jepson, Squawbush, Skunkbrush, thickets in Box Canyon and N and E of Inscription Rock. Shrubs with alternate, compound leaves, leaflets 3 and lobed; petals small, yellowish; flowers appearing before the leaves; fruit a red berry. May. RN: food, basketry, spear shafts, bows, dye, to induce impotency, stomach ache, prevent falling of hair. Z: basketry, ceremonies.

ASCLEPIADACEAE--MILKWEED FAMILY

The common genus Asclepias is the best-known member of this largely tropical family.

ASCLEPIAS. Milkweed

Perennial herbs with milky sap; flower parts in 5's; sepals small and reflexed, a 5-lobed crown between the usually reflexed corolla and the stamens; stamens fused to the style; pollen in masses called pollinia; seed with long hairs. The milky sap is noxious to most insects but Monarch Butterflies (Danaus plexippus) have evolved biochemical adaptations for feeding on milkweed leaves, thus making themselves distasteful to predators and providing the model which Viceroy (Limenitis archippus) mimic effectively.

- 1a. Corolla lobes ascending or erect; leaves 4 or more cm long; hoods (lobes of the crown) usually purple. Asclepias asperula (Decne.) Woodson subsp. asperula, Antelope Horns, Creeping Milkweed, top and E side of mesa. Stems usually spreading on or near the ground; leaves entire, usually alternate; corolla lobes greenish-white, about 8 mm long. mid-summer. RN: mad dog or coyote bite.
- 1b. Corolla lobes reflexed; leaves mostly less than 4 cm long; hoods usually white.....2
- 2a. Upper leaves whorled; stems always erect. Asclepias subverticillata (Gray) Vail, Poison Milkweed, roadsides. Petals greenish-white; hoods with incurved horns. This species is toxic, although not always lethal, to livestock. Z: boys eat the first buds, weaving, ceremonial.
- 2b. Leaves not whorled; stems spreading to ascending. Asclepias involuocrata Engelm., one specimen on the mesatop near the S fence. Petals white, pink, or purple; hoods with in-curved horns. In habit resembles A. asperula, but the smaller flowers with reflexed petals easily distinguish this species. Z: food.

BERBERIDACEAE--BARBERRY FAMILY

This family of mostly North Temperate Zone plants is best known in the West for the creeping Oregon Grapes (subgenus Mahonia of Berberis) and the desert-hollies (also Berberis).

BERBERIS. Barberry

Berberis repens Lindl., Creeping Mahonia, Oregon Grape, in the shade of oaks in Box Canyon. Low, creeping shrub with alternate compound leaves, the leaflets spine-toothed; flowers yellow, with 6 sepals, petals, and stamens (an unusual number for dicots); berries blue. The restricted distribution and failure of the few individuals to flower regularly suggest that the species is near an ecological limit at El Morro. RN: emetic, constipation, scorpion bite.

BORAGINACEAE--BORAGE FAMILY

Borages are troublesome to identify because their taxonomy is based on the morphology of the nutlets (fruit), but genera can be distinguished superficially with some practice. The growing tip of the spike-like inflorescence is coiled, with the flowers on the inside axis of the coil. The inflorescence uncoils as the buds mature. This "scorpioid" or "helicoid" inflorescence is also typical of the Hydrophyllaceae. All North American representatives of the cosmopolitan Borage Family are herbs. The best known are heliotrope and forget-me-not.

Flowers of our species white (sometimes light blue or pink), the petals united below; leaves alternate, entire; hairs stiff and sometimes prickly.

1a. Nutlets without spines. Cryptantha.

1b. Nutlets with hooked spines along the margins. Lappula.

CRYPTANTHA.

1a. Perennials; some leaves more than 3 mm broad. Cryptantha jamesii (Torr.) Payson var. multicaulis (Torr.) Payson, uncommon in sandy soil. This species usually has 1 or a few stems growing from a basal clump of leaves. It is quite variable. Summer. RN: life medicine, plumeway medicine, sores, birth injuries, sheep feed.

1b. Annuals; all leaves usually less than 2 mm wide. Cryptantha fendleri (Gray) Greene, very common in open sand. This species usually has a single much-branched stem with few basal leaves. In form it is more similar to the following than to the preceding species. Summer. RN: cough, sheep feed.

LAPPULA. Stickseed

Lappula redowskii (Hornem.) Greene var. desertorum (Greene) I.M. Johnst., seasonally abundant in open, sandy country. Readily identified by the barbed nutlets but befuddlingly variable in form and flower color. Flowers when very small in spring and continuously through the summer. RN: sores, swelling.

CACTACEAE--CACTUS FAMILY

A well-known family, native to the Americas and tropical Africa but introduced "successfully" in many of the warm parts of the world. Besides the familiar leafless, usually spiny stems (which contain chlorophyll and are the site of photosynthesis), the family is characterized by flowers with numerous sepals and petals which grade into each other in appearance and with numerous stamens. Cactus taxonomy is confused despite herculean efforts by generations of specialists. The reason is that most species intergrade with several others. Each specialist seem to define the species and varieties differently.

1a. Stems more or less globe-shaped, not jointed; spine-bearing areas (areoles) not bearing small barbed bristles (glochids).....2

1b. Stems jointed, the joints either flattened or cylindric; areoles bearing glochids. Opuntia.

- 2a. Flowers red, produced on an old part of the stem, not the new growth of the current season; stems somewhat tuberculate (i.e. the areoles on raised projections of the ribs); rare, to be expected only on rock outcrops. Echinocereus.
- 2b. Flowers pink, produced on new growth of the current season, near the apex of the stem; stems strongly tuberculate; uncommon, more likely not on rock outcrops. Coryphantha.

CORYPHANTHA. Pincushion Cactus

Coryphantha vivipara (Nutt.) Britt. & Rose var. arizonica (Engelm.) W.T. Marshall, uncommon in open country. Areoles on well-defined tubercles; spines all straight; flowers pink, arising from the areas between tubercles near the apex of the stem. Early summer.

ECHINOCEREUS. Hedgehog Cactus

Echinocereus triglochidiatus Engelm., one specimen seen but not collected on an outcrop of lava N of campground. Areoles on projections of the ribs; spines straight, flowers red, arising from the upper side of tubercles, not near the apex of the stem. Early summer.

OPUNTIA. Prickly Pear, Cholla

Areoles (in our species) not on well-defined tubercles; spines all straight; flowers produced on areoles of the previous year's joints, yellow in our species. This genus includes both the prickly pears (with flattened joints) and the chollas (with cylindric joints). The cholla in the courtyard of the visitor center is not native to El Morro and hence is not included in this key.

- 1a. Joints not strongly flattened, nearly as thick as broad, 5 cm or less long; spines strongly barbed. Opuntia fragilis Nutt. var. brachyarthra (Engelm. & Bigelow) Coult., Little Prickly Pear. Collected by Bigelow in 1853 under pines on the E side of Inscription Rock. The specimen served as the type of O. brachyarthra Engelm. & Bigelow, which has since been demoted to varietal status.
- 1b. Joints strongly flattened, most of them more than 5 cm long; spines not strongly barbed.....2
- 2a. Joints 5-10 cm long, 3-6 cm wide; spines usually not flattened. Opuntia macrorhiza Engelm. var. macrorhiza, widespread. See below.
- 2b. Joints mostly 12-20 cm long, 7-20 cm wide; some spines flattened. Opuntia phaeacantha Engelm., most common on cliffs but also in woodland. This and the preceding species intergrade at El Morro. The key is very tentative. Bigelow collected a plant in 1853 that Engelmann made the type of O. angustata. Lyman Benson has synonymized this taxon with O. phaeacantha var. discata (Griffiths) Benson & Walkington. However, discata is a southern variety. I have seen no specimens at El Morro that approach it. Attribution of O. angustata to El Morro by Engelmann may have been an error. Most, if not all, of the plants at El Morro are closest to var. major Engelm.
- RN: food, lubricate hand for removing retained placenta.

CAPPARIDACEAE--CAPER FAMILY

The mostly tropical Caper Family is remarkable for the elongation of the lower part of the ripening ovary into a stem-like stipe. The result is that pods may be seen drooping from flowers which still bear their petals.

CLEOME. Beeplant, Spiderflower

Cleome serrulata Pursh, Rocky Mountain Beeplant, widespread in loose sand. Annual herb, with alternate compound leaves; leaflets 3; flowers purplish-pink (occasionally white). Summer. RN: an old food, deodorant, drunk by Nightway god-impersonators. Z: pot herb, decorating pottery, ceremonial.

CAPRIFOLIACEAE--HONEYSUCKLE FAMILY

This family of largely Northern Hemisphere trees and shrubs is best known for the honeysuckles, viburnums, and elderberries.

SYMPHORICARPOS. Snowberry

Symphoricarpos utahensis Rydb., under oaks in Box Canyon and N of Inscription Rock. Shrub with peeling bark and opposite, mostly entire leaves; flowers white, tubular; berries white. June.

CARYOPHYLLACEAE--PINK FAMILY

A large family of annual and perennial herbs well-represented in our region. Carnations, pinks, and chickweeds are among its members. Leaves opposite; petals distinct.

1a. Petals white; sepals distinct. Arenaria.

1b. Petals red; sepals united. Silene.

ARENARIA. Sandwort

1a. Leaves needle-like, point-tipped. Arenaria fendleri Gray var. brevifolia (Maguire) Maguire, sandstone slopes and rarely sandy flats. Perennial. Summer. RN: Life medicine, congested nose.

1b. Leaves not needle-like, not point-tipped. Arenaria confusa Rydb., common in a cave W of the mouth of the Box Canyon. Perennial. Summer. RN: congested nose.

SILENE. Champion, Catchfly

Silene laciniata Cav., Fire Pink, Mexican Champion, shade of Ponderosa Pines. A handsome perennial with opposite, entire leaves and long red petals, each of which is divided into 4 segments; sepals united into a tube; upper stem sticky. Late summer. RN: burns, mad dog or coyote bite.

CHENOPODIACEAE--GOOSEFOOT FAMILY

An important world-wide family of herbs and shrubs, most of which are adapted to alkaline (salty) soil. Many have dandruff-like scales on stems and leaves. The flowers are small and lack petals, thus making identification in the key below dependent on general form and leaf shape. Most genera become easy to recognize with some experience. Many of the weedy genera in this family produce tumbleweeds, an adaptation for dispersing seeds by means of dispersing the entire plant. Common cultivated plants in this family are beets and spinach.

- 1a. Shrubs.....2
- 1b. Annual herbs.....3
- 2a. Upper stems not woolly; leaves flat; fruit with 4 papery wings.
Atriplex.
- 2b. Upper stems woolly; leaves rolled under on the margins; fruits not winged, but with long hairs. Eurotia.
- 3a. Plants spiny, tumbleweeds. Salsola.
- 3b. Plants not spiny.....4
- 4a. Stems and leaves either glabrous and sticky with glands or covered with dandruff-like scales. Chenopodium.
- 4b. Stems and leaves hairy, but not glandular; tumbleweeds. Kochia.

ATRIPLEX. Saltbush

Atriplex canescens (Pursh) Nutt., Four-wing Saltbush, Chamiso, common in disturbed sites. Shrub with alternate, entire leaves; dioecious (female and male flowers on different plants); fruits with 4 papery wings. RN: Sheep feed, emetic, singers use to insure strong voice, gastric pain, snake infection, bad cough, nose trouble, ant bites, hair tonic, cooking (for salt), yellow dye. Z: ant bites, ceremonial.

CHENOPODIUM. Goosefoot

Annual herbs with alternate, entire to lobed leaves; flowers mostly perfect.

- 1a. Upper stems sticky; leaves strong-scented when crushed.....2
- 1b. Upper stems not sticky, more or less covered with dandruff-like scales; leaves more or less odorless.....3
- 2a. Flowers in glo^umerules (dense clusters); odor fetid; plant not turning red in fall. Chenopodium ambrosioides L., Mexican Tea, under trees. Leaves lobed. Late summer.
- 2b. Flowers solitary or in loose clusters; odor not unpleasant; plants turning red in the fall. Chenopodium graveolens Willd. var. neomexicanum (Aellen) Aellen, woodland. Leaves pinnately lobed. RN: protection in warfare. Z: vapor inhaled to relieve headache.
- 3a. Leaves narrow, several times longer than broad, not lobed. Chenopodium leptophyllum Nutt., Box Canyon. RN: food. Z: food.
- 3b. Leaves triangular-lobed, nearly as broad as long. Chenopodium paganum Reichb., under trees near visitor center. Late summer.

EUROTIA. Winterfat

Eurotia lanata (Pursh) Moq., small stands in Box Canyon, on mesa, and in flats N of Inscription Rock. Shrub with alternate, entire leaves, their margins rolled under; dioecious (male and female flowers on different plants); almost the entire plant covered with long white hairs. Summer. RN: Datura poisoning, poison ivy, dermatitis, life medicine. Z: burns.

KOCHIA. Burning Bush

Kochia scoparia (L.) Roth, abundant on Atsinna. Annual weed, sometimes attaining a height of 1 m, some of the branches spreading and ascending, the whole breaking off at ground level and careering across the landscape in windstorms. Surprisingly this abundant and troublesome introduced weed has never acquired a popular name in our region.

SALSOLA. Russian Thistle

Salsola kali L., campground, ruins, and other disturbed sites. Much like Kochia in form and an even more troublesome tumbleweed. The leaves wither early and are replaced by spine-tipped bracts. Summer.

CONVOLVULACEAE--MORNING-GLORY FAMILY

A mostly tropical and sub-tropical family best represented in the U.S. in the southern states. The best-known genera are Ipomoea, which includes morning-glories and sweet potatoes, Convolvulus (bindweeds), and Cuscuta (the parasitic dodders). Most genera, including our three, are vines.

- 1a. Plants orange or yellow, leafless; flowers white. Cuscuta.
- 1b. Plants green and leafy.....2
- 2a. Flowers red, trumpet-shaped; stigma 1. Ipomoea.
- 2b. Flowers white to pink, bell-shaped; stigmas 2. Convolvulus.

CONVOLVULUS. Bindweed

Convolvulus arvensis L., Field Bindweed, beside entrance road. Perennial with alternate, entire, arrowhead-shaped leaves. Summer. RN: spider bite or swallowed spider.

CUSCUTA. Dodder

Cuscuta salina Engelm., parasitic on Portulaca retusa in campground. Rootless except as a seedling, twining about the stems of the host, parasitizing by means of deep-penetrating suckers called haustoria. Late summer. RN: a related species used as an emetic.

IPOMOEA. Morning-glory

Ipomoea coccinea L. var. hederifolia (L.) Gray, Star-glory, Box Canyon and Atsinna. Perennial vine with alternate, deeply-lobed, heart-shaped leaves and handsome brick red, tubular flowers. The typical variety has entire leaves; it has not been found at El Morro. Late summer.

COMPOSITAE--COMPOSITE or SUNFLOWER FAMILY

The Compositae can be an intimidating family, because of the complexity of the heads (flower clusters) and because of the tremendous number of species (more than any other family). But with the labelled diagram the unique terms can be mastered quickly and with a little practice the family can be recognized at a glance. This is half the battle; the rest is usually straightforward and enjoyable. Variation on the basic composite theme is enormous. Many tribes are recognized, but they are not used in this treatment.

- 1a. Flowers all tubular (none petal-like).....2
- 1b. Some or all flowers strap-shaped (petal-like).....12
- 2a. Entire head less than 5 mm high.....3
- 2b. Heads greater than 5 mm high.....4
- 3a. Plants annual, small, often low and spreading along the ground, producing spiny burs. Franeria, p. 34.
- 3b. Plants perennial, shrubs or erect herbs (Artemisia frigida is a low plant, but obviously perennial). Artemisia, p. 31.
- 4a. Disk flowers white.....5
- 4b. Disk flowers yellow.....8
- 5a. Phyllaries at least partially green.....6
- 5b. Phyllaries chaffy, completely white or straw-colored.....7
- 6a. Achenes usually 5-nerved; heads erect; all leaves opposite. Eupatorium, p. 34.
- 6b. Achenes usually 10-nerved; heads nodding; some leaves alternate. Brickellia, p. 32.
- 7a. Plants with an erect, leafy stem more than 20 cm tall. Gnaphalium, p. 34.
- 7b. Leafy stems creeping on the ground; inflorescence on a short stalk less than 20 cm tall. Antennaria, p. 30.
- 8a. Inner phyllaries fused at the base to form a smooth cup; leaves opposite, deeply divided into narrow segments. Thelesperma, p. 38.
- 8b. Phyllaries separate to the base.....9
- 9a. Phyllaries gummy-sticky, their tips curved down. Grindelia, p. 35.
- 9b. Phyllaries neither gummy nor curved down.....10
- 10a. Plants low, much-branching annuals with mostly opposite leaves. Bahia, p. 31.
- 10b. Plants shrubs or stout herbs with deep tap roots; leaves alternate.11
- 11a. Shrubs; leaves entire, green. Chrysothamnus, p. 32.
- 11b. Herbs; leaves deeply divided, gray with hairs. Hymenopappus, p. 35.
- 12a. Flowers all strap-shaped, sap milky.....13
- 12b. Flowers not all strap-shaped; strap-shaped flowers (rays) on the margins of the heads; sap watery.....18
- 13a. Flowers pinkish, drying brown. Stephanomeria, p. 37.
- 13b. Flowers yellow.....14
- 14a. Leaves spine-toothed; rank plants of roadsides. Lactuca, p. 36.
- 14b. Leaves not spine-toothed.....15

- 15a. Leaves grass-like; phyllaries much longer than the rays.
Tragopogon, p. 38.
- 15b. Leaves not grass-like; phyllaries shorter than to slightly longer than the rays.....16
- 16a. Achenes 4-5-nerved; plants of lawns and disturbed areas. Taraxacum, p. 37.
- 16b. Achenes 15-nerved; plants of more natural settings.....17
- 17a. Plants with a basal rosette of green, sparsely hairy leaves, and usually a single stem; plants of shaded forest floors. Hieracium, p. 35.
- 17b. Plants freely branching; plants of open country. Malacothrix, p. 36.
- 18a. Rays white or purple.....19
- 18b. Rays yellow.....26
- 19a. Rays purple, at least partly so.....20
- 19b. Rays white, sometimes fading to purple.....21
- 20a. Rays more than 4 mm wide, purplish-brown; disk cylindric; leaves pinnately divided into linear segments. Ratibida, p. 37.
- 20b. Rays less than 3 mm wide, purple or occasionally white; leaves entire, toothed, or pinnately divided. Machaeranthera, p. 36.
- 21a. Rays scarcely exceeding the involucre. Conyza, p. 33.
- 21b. Rays perhaps small but clearly exceeding the involucre.....22
- 22a. Leaves entire or occasionally minutely toothed.....23
- 22b. Leaves deeply divided.....25
- 23a. Phyllaries in a single series. Erigeron, p. 34.
- 23b. Phyllaries in several overlapping series.....24
- 24a. Pappus of stiff bristles or scales, involucre 7 mm or more high; plants low; rare. Townsendia, p. 38.
- 24b. Pappus of soft, thread-like bristles; involucre 7 mm or less high; plant small but freely branching. Leucelene, p. 36.
- 25a. Rays as broad as long; leaves feathery, alternate; heads about 4 mm high, in a flat-topped cluster. Achillea, p. 30.
- 25b. Rays much longer than broad; leaves divided into linear segments but not feathery, opposite; heads 6-7 mm high. Cosmos, p. 33.
- 26a. Pappus of thread-like bristles.....27
- 26b. Pappus of stiff bristles, awns, scales, or lacking.....30
- 27a. Plants definitely shrubby. Tetradymia, p. 38.
- 27b. Plants not shrubs.....28
- 28a. Phyllaries of equal length, narrow, in one series (except for 1 or 2 very short ones at the base of the head). Senecio, p. 37.
- 28b. Phyllaries in 2 or more series.....29
- 29a. Leaves entire; plants perennial. Chrysopsis, p. 32.
- 29b. Leaves bristle-toothed; plants annual. Haplopappus, p. 35.
- 30a. Pappus not present.....31
- 30b. Pappus present.....35
- 31a. At least some of the leaves deeply lobed to pinnately divided.....32
- 31b. All of the leaves entire to toothed.....34

- 32a. Disk flowers brown, inner phyllaries united at the base to form a cup. Thelesperma, p. 37.
- 32b. Disk flowers yellow, all phyllaries distinct to the base.....33
- 33a. Disk flowers on a convex to cylindric receptacle; rays often partially purplish-brown. Ratibida, P. 37.
- 33b. Disk flowers on a more or less flat receptacle. Rays short, always yellow. Bahia, p. 31.
- 34a. Leaves usually entire. without stems; achenes not winged. Viguiera, p. 38.
- 34b. Leaves toothed, with stems; achenes winged. Verbesina, p. 38.
- 35a. Receptacle chaffy (i.e, chaffy bracts included among the disk flowers).....36
- 35b. Receptacle not chaffy.....38
- 36a. Disk flowers reddish-brown. Helianthus, p. 35.
- 36b. Disk flowers yellow.....37
- 37a. Most leaves deeply divided; receptacle convex. Ratibida, p. 37.
- 37b. Leaves triangular, irregularly toothed; receptacle basically flat. Verbesina, p. 38.
- 38a. Leaves , stems, and involucre with conspicuous translucent oil glands. Dyssodia, p. 33.
- 38b. Leaves, stems, and involucre without oil glands.....39
- 39a. Phyllaries distinctly graduated; leaves entire. Gutierrezia, p. 35.
- 39b. Phyllaries essentially equal in length.....40
- 40a. Rays about as broad as long, no more than 5 in number. Psilostrophe, p. 37.
- 40b. Rays much longer than broad, usually about 10 in number. Hymenoxys, p. 36.

ACHILLEA. Yarrow

Achillea lanulosa Nutt., uncommon but widespread. Perennial herb with alternate, finely dissected leaves that resemble those of a fern, for which the young plant is often mistaken; flowers white, in a flat-topped inflorescence; pappus none. Spring onwards. RN: Enemy-way, blackening, emetic. Z: burns, to make skin cool for exposure to live coals.

ANTENNARIA. Pussytoes

Low, perennial, dioecious herbs; leaves alternate but mostly basal, entire; disk flowers white; pappus of white thread-like bristles.

- 1a. Leaves becoming green and glabrous above; phyllaries 6 mm long or less. Antennaria marginata Greene, abundant on sandstone slope in SE corner.
- 1b. Leaves usually remaining white-hairy above as well as below; phyllaries 7 mm long or more. Antennaria parvifolia Nutt., only under Ponderosa Pines W of the trail on the N side of Inscription Rock. RN: mad coyote bite, whirling coyote ceremony, protection from witches.

ARTEMISIA. Sagebrush, Wormwood

Perennial herbs or shrubs; leaves alternate, entire to deeply divided, silvery-hairy (except in 1 species); disk flowers yellow; pappus none. Flowering in late summer and autumn.

- 1a. Shrubs or subshrubs.....2
- 1b. Herbs.....4
- 2a. Leaves, at least the lower ones 2 or 3-times pinnately divided; low subshrubs. Artemisia frigida Willd., Pasture Sagebrush, Estafiata, widespread in sandy soil in open country. RN: life medicine, cough, toothache, witchery-way prayer sticks.
- 2b. Leaves at most once pinnately divided; full-sized shrubs.....3
- 3a. Leaves thread-like and entire or divided into 3 thread-like divisions. Artemisia filifolia Torr., Sand Sage, abundant below the pool in sandy soil, on the site of an arroyo filled in the 1930's. RN: snakebite.
- 3b. Leaves wedge-shaped, with 3 blunt teeth at the apex. Artemisia tridentata Nutt., Big Sagebrush, one plant, a large individual W of the beginning of the loop of the campground road. Big Sagebrush is abundant in the West and is thought by many to have extended its range at the expense of grasslands as a result of overgrazing. Once established it is difficult to eradicate. This species forms a virtually uninterrupted carpet at certain elevations in the foothills in the W half of the Zuni Mountains. It is just as conspicuously absent in the E half, which includes El Morro. The carpet of sagebrush ends about 1 mile E of Ramah. RN: big cough, postpartum pain, swellings, cuts in sheep, sweat bath medicine, brooms.
- 4a. Leaves entire, toothed, or lobed.....5
- 4b. Leaves pinnately divided.....6
- 5a. Leaves green, glabrous or slightly hairy but never white with hairs, almost odorless, entire. Artemisia dracunculoides Pursh, Wormwood, False Tarragon, locally common in the Box Canyon and in open country. RN: cuts, hair rinse.
- 5b. Leaves white with hairs, aromatic when crushed, entire to toothed or lobed, the lobes 2 mm or more wide. Artemisia ludoviciana Nutt. subsp. mexicana (Willd.) Keck, Prairie Sage, Box Canyon in sandy soil. RN: blackenings, applied to unravel strings, life medicine.
- 6a. Leaves once pinnately divided. Artemisia carruthii Wood, sandy soil in open places. RN: life medicine, fever, blackenings, beautyway, sores, sore back in sheep, sweat bath medicine. Z: seeds in smoke for bodily pains of severe cold, food.
- 6b. Leaves 2 or 3 times pinnately divided.....7
- 7a. Leaves with long petioles, clustered near the base of the tall stems. Artemisia pacifica Nutt., mouth of Box Canyon.
- 7b. Leaves not as above; plant a straggling subshrub without a prominent stem. Artemisia frigida. See 2a.

BAHIA.

Annual or biennial herbs; leaves deeply lobed or divided; flowers yellow.

- 1a. Pappus none; rays present; leaves alternate; plants biennial. Bahia dissecta (Gray) Britton, Yellow Ragweed, common. August and September. RN: menstrual pain, contraceptive, arthritis. Z: rheumatism and pains in the head.
- 1b. Pappus of about 8 scales; rays none; some leaves opposite; plants annual. Bahia neomexicana Gray, disturbed soil in the campground. August and September. RN: astringent.

BRICKELLIA.

Brickellia grandiflora (Hook.) Nutt. var. grandiflora, head of Box Canyon and below E face of Inscription Rock. Perennial herb; leaves alternate or some opposite, toothed, triangular in shape; disk flowers white; phyllaries striate, chaffy, green; pappus of long bristles. The nodding heads flower in September. RN: influenza, headaches, emetic.

CHRYSOPSIS. Golden Aster

Chrysopsis canescens (DC.) Torr. & Gray, common and widespread perennial herb. On low lava outcrops N of Highway 53 it may be the most common vascular plant. Leaves alternate, entire, rather hairy; flowers yellow; pappus in 2 parts, the inner of long thread-like bristles, the outer of short scales. Spring to fall. RN: emetic, sexual infection, indigestion, antway chant, life medicine, toothache, sheep feed.

CHRYSOETHAMNUS. Rabbitbrush, Chamisa

Perennial shrubs; leaves alternate and entire; disk flowers yellow; pappus of thread-like bristles; phyllaries in more or less distinct vertical ranks. August through October.

- 1a. Stems covered with a mat of hairs so dense that it appears to be epidermis but is capable of being scraped away with a fingernail to reveal the green epidermis. Chrysothamnus nauseosus (Pall) Britton, widespread in open or semi-open country. A widespread and quite variable species. Probably the most characteristic plant of New Mexican shrublands, it makes great expanses golden-yellow in fall with its masses of flowers. It is considered a pest by stockmen, but its very abundance may result from overstocking of the range by their predecessors. Three varieties have been found at El Morro; they are distinguished as follows:
 - A. Phyllaries glabrous or lightly hairy. Var. graveolens (Nutt.) H. & C. Tall shrub about 1 m tall with greenish-white stems. Most common beside roads and paths.
 - AA. Phyllaries densely hairy.....B
 - B. Achenes glabrous. Var. bigelovii (Gray) H. & C. Low shrub usually about 50 cm tall, with greenish-white stems. This variety is common in the NW quarter of the Monument and is more evenly distributed than the other 2. This and its smaller size suggest that it can tolerate drier sites. RN: emetic, cough, fever, old internal injury, cold, menstrual pain, headache, prayerstick, covering for sweathouse, yellow dye. Z: yellow dye, baskets.

BB. Achenes densely hairy. Var. speciosus (Nutt.) H. & C. Tall shrub about 1 m tall with yellowish stems. Abundant S of campground, N of Inscription Rock, local elsewhere.

- 1b. Stems not covered with a dense mat of hairs.....2
- 2a. Involucres 9-15 mm high, the phyllaries in sharply-defined vertical ranks; achenes glabrous to sparsely hairy. Chrysothamnus pulchellus (Gray) Greene subsp. baileyi Woot. & Standl. A small shrub, so far found only along the rim of the Box Canyon below Atsinna. It seems to prefer woodland sites.
- 2b. Involucres 5-9 mm high, phyllaries in obscure vertical ranks; achenes mostly densely hairy.....3
- 3a. Phyllaries acute to obtuse, that is, narrowing gradually to the tip. Chrysothamnus viscidiflorus (Hook.) Nutt. subsp. viscidiflorus. Shrub more than 50 cm tall, widespread but uncommon.
- 3b. Phyllaries acuminate, that is, narrowing to the tip rapidly, thus creating concave margins. Chrysothamnus greenii (Gray) Greene subsp. filifolius (Rydb.) H. & C. Small shrub, less than 50 cm tall, very common in open country. Modal individuals of this and the preceding species are relatively easy to identify on the basis of size, shape of phyllaries, and arrangement of leaves, but intermediates occur which are difficult to assign, suggesting that the 2 may not be completely distinct.

CIRSIIUM. Thistle

Cirsium neomexicanum (Gray) Greene, Lavender Thistle, common on ruins. Stout and spiny biennial herb; leaves spine-toothed, alternate; disk flowers pink to lavender; pappus of many white bristles; phyllaries spine-toothed, covered with cobwebby hairs, the outer one reflexed. Summer. RN: eye disease, life medicine, general malaise.

CONYZA. Horseweed

Conyza canadensis (L.) Cronquist, roadsides in campground. Leafy annual weed; leaves alternate, linear, entire; rays white, scarcely longer than the phyllaries; disk flowers yellow; pappus of soft bristles. July, August. RN: pimple, snakebite.

COSMOS.

Cosmos parviflorus (Jacq.) H.B.K., sandy soil in head of Box Canyon. Slender annual herb with opposite, deeply divided leaves; ray flowers white, disk flowers yellow; heads solitary on each stem or branch; pappus of 2-4 stout, prickly awns. Late Summer. RN: chant lotion (white form for males, rose for females).

DYSSODIA. Fetid Marigold

Dyssodia papposa (Vent.) Hitchc., roadsides and waste ground near buildings. Annual herb; leaves twice pinnately divided into linear divisions, mostly opposite; flowers yellow; pappus of yellowish bristles; phyllaries dotted with conspicuous yellow oil glands. August, September. RN: ant bite, swallowed ant.

ERIGERON. Fleabane, Daisy

Annual, biennial, or perennial herbs with entire, alternate or basal leaves; rays white (sometimes purplish), disk flowers yellow; phyllaries in 1 series of equal length. Erigeron usually begins flowering in early summer, while its close relatives Aster and Machaeranthera usually begin flowering in late summer.

- 1a. Stems producing trailing, leafy runners (stolons) in mid-summer. Erigeron nudiflorus Buckl., widespread but uncommon. Early heads produced on long nearly leafless peduncle (stalks). E. flagellaris Gray, which may occur on the Monument, is similar in producing stolons but its hairs are spreading or bent downward while those of this species are up-curving or appressed to the stems. RN: Hailway medicine, plumeway fumigation, hemostatic, eyewash for animals, snakebite.
- 1b. Stems not producing stolons.....2
- 2a. Biennials or annuals; hairs soft; rays usually drying blue or lavender. Erigeron divergens Torr. & Gray, widespread. Similar to E. nudiflorus, but early heads produced on leafy peduncles. To 70 cm tall, more often about 20 cm tall. RN: Same as E. nudiflorus.
- 2b. Perennials with taproot and much-branched caudex (the woody, perennial base of the plant); hairs rather coarse; rays usually drying white or pink. Erigeron pumilus Nutt. subsp. concinoides Cronquist (considered a separate species, E. concinnus, by some), rare, found only on lava outcrops between campground and sewage lagoon; our one specimen about 9 cm tall. RN: antelope infection, general body pain.

EUPATORIUM. Thoroughwort, Boneset

Eupatorium herbaceum (Gray) Greene, head of Box Canyon under Ponderosa Pines. Perennial herb with opposite, triangular, toothed leaves; disk flowers white; pappus of long, thread-like bristles; heads erect. August, September. RN: fever, headache. Z: rheumatism, swelling.

FRANSERIA. Bursage

Franseria acanthicarpa (Hook.) Coville, roadsides. Annual, monoecious, erect or spreading weed; leaves alternate, twice pinnately divided; staminate (male) heads in racemes, pistillate (female) heads in clusters farther down the stems; fruit with spines up to 4 mm long. Late summer. RN: blackening. Z: obstructed menstruation, toothache.

GNAPHALIUM. Cudweed, Everlasting

Gnaphalium pringlei, head of Box Canyon under Ponderosa Pines. Perennial herb; leaves alternate, entire, green above and white-hairy below; disk flowers and phyllaries white; pappus of thread-like bristles. September. The occurrence of this species at El Morro is noteworthy because heretofore it has been found only in SW New Mexico. However this taxon may not be distinct from the more widespread G. macounii Greene. The complex has not been carefully studied in W New Mexico.

GRINDELIA. Gumweed

Grindelia aphanactis Rydb., uncommon in field between campground and sewage lagoon, also near E fence and probably elsewhere. Biennial weed with entire to toothed, alternate leaves; disk flowers yellow; phyllaries spreading and gummy; pappus of 2-3 awns. Summer. RN: swallowed ant, to hold skin cuts together, emetic.

GUTIERREZIA. Snakeweed

Gutierrezia sarothrae (Pursh) Britt & Rusby, ubiquitous. Low shrub; leaves green, entire, alternate and fascicled; flowers yellow, pappus of scales. Late summer. This species is abundant throughout the region. It is said to be an indicator of overgrazing.

RN: blackenings, unravelers, prayerstick, pollen, red ant bite, bee sting, snakebite, fever, castration incision in lambs or colts, life medicine, to hasten delivery of placenta, stomach ache, painful urination, foreffects of taking too much medicine, especially life medicine.

HAPLOPAPPUS. Goldenweed

Haplopappus gracilis (Nutt.) Gray, abundant in open areas after extensive precipitation. Annual herb with alternate, bristle-toothed leaves; flowers yellow; receptacle chaffy; pappus of tawny bristles. Spring onward. RN: internal injury, pimples, sore eyes, congested nose, food, plumeway hole fumigation.

HELIANTHUS. Sunflower

Helianthus petiolaris Nutt., Prairie Sunflower, common on roadsides. Tall annual with alternate, entire leaves; rays yellow, disk flowers purplish-brown; receptacle chaffy; pappus of 2 readily deciduous awns. Late summer. RN: good luck in hunting, life medicine.

HIERACIUM. Hawkweed

Hieracium fendleri Schultz-Bip, rare under pines in Box Canyon. Perennial with a basal rosette of entire, green, oval leaves, these sparsely but conspicuously covered with long stiff hairs; heads solitary or few, seldom seen open; rays yellow; pappus of long thread-like bristles. Summer. RN: good luck in hunting, diuretic.

HYMENOPAPPUS.

Perennial or biennial herbs; leaves and stems white with hairs; leaves alternate, twice pinnately divided; disk flowers yellow; pappus of small scales.

- 1a. Perennials with a branched caudex; leaves mostly basal. Hymenopappus filifolius Hook. var. lugens Green (Jepson), fairly common in woodland and open country. Summer. RN: gunshot or arrow wound. Z: swelling of glands, emetic, chewing gum.
- 1b. Biennials with a single stout taproot and no caudex (if there is more than 1 stem it is probably 1a.); leaves evenly distributed on stem and at its base. Hymenopappus flavescens Gray var. canotomentosus Gray, abundant in open country. Summer.

HYMENOXYS. Actinea

Perennial herbs or subshrubs with yellow flowers; pappus of small scales.

- 1a. Strictly herbaceous; leaves entire, gray with hairs. Hymenoxys argentea (Gray) Parker, slopes of sandstone cobble, W side of mesa. Spring and summer. RN: life medicine, protection from witches, heartburn, coyote infection.
- 1b. Stems arising from above-ground, woolly and woody pedestals of the branched caudex; leaves pinnately divided into linear segment, pitted, not gray with hairs. Hymenoxys richardsonii (Hook.) Cockerell var. floribunda (Gray) Parker, widespread. Summer. RN: toxic to livestock, emetic, red ant bite.

LACTUCA. Lettuce

Lactuca serriola L., Prickly Lettuce, roadsides. Tall annual with lobed, spiny-margined leaves and prickly stems; rays yellow, enclosed by the involucre except in the morning; pappus of deciduous thread-like bristles; sap milky. Mid-summer onward. The typical variety serriola is the one found at El Morro; the entire-leaved var. integri-folia has not been seen. Some authorities consider the proper name of this taxon to be L. scariola L. RN: emetic, perfume.

LEUCELENE.

Leucelene ericoides (Torr.) Greene, widespread in sandy open country. Low, much-branched perennial with narrow, entire, alternate leaves; rays white, disk flowers yellow; phyllaries overlapping in several series (thus differing from Erigeron); pappus of thread-like bristles. Spring—autumn. Many authorities call this plant Aster arenosus (Heller) Blake. RN: nose trouble, toothache, snakebite. Z: reduce swelling, pain from cold or rheumatism, hasten parturition, ceremonial.

MACHAERANTHERA. Aster

Biennial herbs with taproots; ray flowers purple (rarely white), disk flowers yellow; pappus of thread-like bristles; phyllaries in several overlapping series, the tips spreading rigidly. This genus is considered part of Aster by some authorities.

- 1a. Leaves entire or toothed, the hairs not terminated with sticky glands. Machaeranthera canescens (Pursh) Gray, widespread in open country. Late summer. (A single plant in flower in December) Z: emetic.
- 1b. Leaves once or twice pinnately divided, the hairs tipped with sticky glands. Machaeranthera tanacetifolia (H.B.K.) Nees, widespread, but apparently in drier sites than the former species. Late summer.

MALACOTHRIX.

Malacothrix fendleri Gray, uncommon in open country. Small annuals with several stems; leaves lobed; ray flowers yellow; pappus of deciduous thread-like bristles, perhaps 1-2 of them persistent; main phyllaries equal in length; sap milky. RN: sore eyes, plumeway hole fumigation.

PSILOSTROPHE. Paperflower

Psilostrophe tagetina (Nutt.) Greene var. tagetina, rare, two plants in open country by S fence. Perennial herbs with more or less woolly stems and leaves; leaves alternate, entire to pinnately divided; flowers yellow, the rays persistent and becoming papery with age; pappus of 4-6 scales. Summer. RN: stomach ache, cathartic. Z: dye, ceremonial, rattlesnake bite.

RATIBIDA. Coneflower

Perennial herbs with entire to twice pinnately divided leaves; ray flowers brown to yellow, disk flowers yellow; receptacle chaffy; phyllaries in 2 series; pappus of 1-2 awnlike teeth or scales.

- 1a. Receptacle cylindric, 10-40 mm long; rays 8-30 mm long. Ratibida columnifera (Nutt.) Woot. & Standl., rather common in open country. Leaves divided. Plants with wholly yellow rays are the typical form; those with partly or wholly brownish-purple rays are form pulcherrima (DC.) Fern. Whether the forms merit separate names is arguable. Summer. RN: sheep "out of their minds," fever. Z: emetic.
- 1b. Receptacle convex but not cylindric, 6-13 mm long; rays 6-9 mm long. Ratibida tagetes (James) Barnhart, found only around trailer in housing area. Leaves entire to divided; rays yellow. Late summer. RN: sexual infection, life medicine, lifeway, stomach ache, cathartic, cough, birth injuries.

SENECIO. Groundsel, Butterweed, Golden Ragwort

Perennial herbs with yellow flowers; pappus of thread-like bristles; phyllaries in a single series.

- 1a. Leaves linear or pinnately divided into narrowly linear segments, basal leaves not conspicuous. Senecio multicapitatus Greenm., uncommon in open country. Stems tall and slender. Summer. RN: cathartic to facilitate delivery of placenta, chewing gum, food in time of famine. Z: inflammation of eye, "aching bones."
- 1b. Leaves pinnately lobed to divided but the lobes broad and square-tipped, never narrowly linear; basal leaves numerous. Senecio multilobatus Torr. & Gray, common in open country. Stems rather short and stout. Late summer. RN: menstrual pain, beadway medicine.

STEPHANOMERIA. Wirelettuce

Stephanomeria exigua Nutt., uncommon annual in open country. Leaves lobed (below) to small and scale-like (above); ray flowers pinkish, drying brown; pappus of thread-like bristles; sap milky. Summer.

TARAXACUM. Dandelion

Taraxacum officinale Weber, lawns. Perennial herb with basal lobed and toothed leaves; heads solitary on a hollow stem; ray flowers yellow; pappus of thread-like bristles. The phyllaries close after flowering and the achene (fruit) elongates as it matures. When the phyllaries open again it is to reveal a globular head of mature fruits tipped with rings of pappus bristles. These are the familiar "parachutes." This is the common species which infests lawns. To date it has not occupied other habitats at El Morro. Flowering year-round.

TETRADYMIA.

Tetradymia canescens DC. var. inermis (Nutt.) Gray, Horsebrush, common in open country. Shrub with entire, alternate, grayish leaves; flowers yellow; pappus of thread-like bristles; phyllaries 4-6, in a single series, persistent and conspicuous in winter. August-September. RN: blackening, emetic, ghost infection, cough, fever, headache, back ache, stomach ache, general body pain, cold, sweat bath medicine, yellow dye, to cleanse undertakers after burial.

THELESERMA. Navajo Tea, Greenthread

Perennial herbs with opposite, deeply divided leaves; disk flowers yellow or brownish; inner phyllaries fused to about the middle.

- 1a. Ray flowers absent; pappus of short awns. Thelesperma megapotamicum (Spreng.) Kuntz, N and E of Inscription Rock. RN: beverage, orange-yellow dye. Summer.
- 1b. Ray flowers present; pappus none. Thelesperma subnudum Gray, housing area. Anthers purple; styles red. Late summer.

TOWNSENDIA. Easter Daisy

Stemless or very low herbs with linear, entire leaves; ray flowers white, disk flowers yellow; pappus not of thread-like bristles. One plant seen but not collected between campground and sewage lagoon, on lava outcrop. RN (T. exscapa): unraveling medicine, facilitate delivery.

TRAGOPOGON. Salsify, Oysterplant, Goatsbeard

Tragopogon dubius Scop., uncommon but widespread. Perennial herb with long grass-like leaves; ray flowers yellow, shorter than the phyllaries; pappus of thread-like bristles; fruit like that of Taraxacum, but much larger; sap milky. Summer.

VERBESINA. Crownbeard

Verbesina encelioides (Cav.) Benth. & Hook. var. encelioides, common on roadsides and in open places. Rather robust annual with alternate, toothed leaves lighter below than on top; flowers yellow-orange; pappus none; receptacle chaffy; achenes winged. Summer, especially September. RN: prayerstick, good luck in hunting, to rid corn of cut worms, protection from lightning. Z: cramps in stomach, rattlesnake bite.

VIGUIERA.

Viguiera multiflora (Nutt.) Blake, open areas N of Inscription Rock. Perennial herb with mostly entire, stemless, opposite (below) and alternate (above) leaves; flowers yellow; receptacle chaffy; pappus none. Summer. RN: sheep and deer feed.

CRUCIFERAE--MUSTARD FAMILY

A large mostly Northern Hemisphere family that is now distributed world-wide in the form of cultivated plants and weeds. It is well represented in our region by both native and introduced plants. All of these are herbaceous and have alternate leaves and 4 petals. The genera of mustards are determined by the shapes of the fruits, which are pods divided in half by a membranous partition. Food plants in this family include turnips, radish, rutabaga, broccoli, kohlrabi, Brussels sprouts, kale, cauliflower, and cabbage (the last 6 derived from the same wild species, Brassica oleracea).

- 1a. Flowers white (occasionally purple) or pale yellowish-white or pinkish-white.....2
- 1b. Flowers yellow or purple.....7
- 2a. Fruits deeply lobed, shaped like spectacles, 1 large seed on each side of the partition. Dithyrea.
- 2b. Fruits not as above.....3
- 3a. Fruits strongly flattened perpendicular to the very narrow partition, not more than twice as long as wide.....4
- 3b. Fruits many times longer than wide, if flattened then flattened parallel to the partition.....6
- 4a. Fruits triangular; styles not persistent on fruit or if so then less than 1 mm long. Capsella.
- 4b. Fruits not triangular.....5
- 5a. Low perennials growing in Box Canyon and on mesatop W and N of Box Canyon; flowering March-May; more than 1 seed on each side of the partition; style persistent on fruit. Thlaspi.
- 5b. Weedy annuals growing in disturbed sites; flowering somewhat later; only 1 seed on each side of the partition. Lepidium.
- 6a. Fruits round in cross-section; calyx closed during flowering, flask-shaped; rare plants of the Box Canyon. Thelypodium.
- 6b. Fruits flattened parallel to the partition; calyx open during flowering, not flask shaped; abundant plants of woodlands. Arabis.
- 7a. Fruits not more than twice as long as wide; flowers yellow.....8
- 7b. Fruits several times longer than wide; flowers yellow or purple....9
- 8a. Fruits flattened parallel to the partition. Draba.
- 8b. Fruits globe-shaped. Lesquerella.
- 9a. Calyx closed during flowering, somewhat flask-shaped; flowers yellow or purple. Sisymbrium.
- 9b. Calyx open during flowering; flowers yellow (or orangish).....10
- 10a. Leaves pinnately compound or deeply pinnately divided; flowers small, petals less than 10 mm long; fruits usually less than 15 mm long. Descurainia.
- 10b. Leaves entire to pinnately lobed; flowers large and showy, petals more than 15 mm long; fruits usually more than 20 mm long. Erysimum.

ARABIS. Rockcress

Perennial or biennial herbs with entire, occasionally toothed, leaves; flowers white, sometimes pale yellowish-white or pink; mature fruits 40-60 mm long, 1-2 mm wide.

- 1a. Basal leaves ciliate (fringed with long hairs). Arabis fendleri (Wats.) Greene var. spatifolia (Rydb.) Rollins, one specimen from Box Canyon. The differences between this and the next species are noticeable only with close inspection. The specimen may not be pure A. fendleri. RN: life medicine.
- 1b. Basal leaves not ciliate. Arabis perennans Wats., abundant in woodlands. Spring. RN: general body pain.

CAPSELLA. Shepherd's Purse

Capsella bursa-pastorius (L.) Medic, one specimen growing in the road at campground. Introduced annual with pinnately divided leaves; flowers very small; fruits triangular. Summer.

DESCURAINIA. Tansy-mustard

Annual or biennial herbs with pinnately divided to compound leaves, small flowers, and fruits no more than 20 mm long and 2 mm wide.

- 1a. Lower leaves twice pinnate; fruits club-shaped (larger toward the apex); plants common. Descurainia pinnata (Walt.) Britton, widespread in open country. Some of the material from El Morro has been identified as subsp. glabra (Woot. & Standl.) Detling. April onward. RN: food, sheep feed, toothache.
- 1b. Lower leaves once pinnate; fruits not club-shaped.....2
- 2a. Seeds in 2 rows on each side of the partition. Descurainia obtusa (Greene) O. E. Schultz var. brevisiliqua Detling, Desert Tansy-mustard, under trees in campground and to the E. Late summer.
- 2b. Seeds in 1 row on each side of the partition.....3
- 3a. Fruits 3-7 mm long, tapering at the tip, the style prominent. Descurainia californica (Gray) O.E. Schultz, California Tansy-mustard, campground. Late summer.
- 3b. Fruits 8-15 mm long, not tapering at the tip, style very short or lacking. Descurainia richardsonii (Sweet) O.E. Schultz subsp. incisa (Engelm.) Detling, under Ponderosa Pines, N of mesa and W of trail. Late summer.

DITHYREA. Spectacle-pod

Dithyrea wislizenii Engelm., unshaded loose sand in Box Canyon and flats. Annual herb with pinnately lobed to entire leaves; flowers large, white, the petals occasionally streaked with purple; fruits 2-seeded, shaped like spectacles. Spring onward. RN: itch, remove scabs. Z: delirium, swelling, ceremonial.

DRABA. Whitlow-wort

Draba aurea Vahl., var. neomexicana (Greene) Tides., Golden Draba, rare beside the trail below the inscriptions on the N face of Inscription Rock. Perennial herb with entire or slightly-toothed leaves and yellow flowers; fruit flattened and somewhat twisted.

The few plants and a single Amelanchier seem to be clinging precariously to life in a site that is marginal for their needs. Both thrive higher in the mountains where there is more moisture. June and July.

ERYSIMUM. Wallflower

Erysimum capitatum (Dougl.) Greene, Western Wallflower, abundant and extensive in low sandy ground between campground and visitor center. Tall perennial with entire to toothed leaves; flowers yellow or orange; fruits 30-80 mm long, ascending. When in flower in mid-summer this species dominates the landscape around the big curve of the entrance road. Summer. RN: emetic, congested nose, headache, toothache, difficult labor. Z: headache from too much heat, sunburn, ceremonial.

LEPIDIDIUM. Peppergrass

Lepidium densiflorum Schrad. var. ramosum (A. Nels.) Thell., housing area. Weedy annual with toothed to divided leaves; flowers very small, sepals 2, petals dropping off early; fruits flattened and roundish, about 3 mm long. Warm months.

LESQUERELLA. Bladderpod

A perennial species of this genus is not uncommon in woodland on the Monument, but no specimen has been collected. L. fendleri is common in the area and is probably the one at El Morro. Flowers in spring and again in late summer if moisture is adequate. RN: tied to ceremonial rattle string.

SISYMBRIUM .

Annual or perennial herbs; leaves entire to pinnately divided; flowers yellow or purple; calyx closed; fruits 5-10 cm long, ascending.

- 1a. Petals yellow; annuals. Sisymbrium altissimum L., Tumble-mustard, widespread and somewhat weedy. Spring onward. RN: a new species that came in with oats, emetic.
- 1b. Petals purple; perennials. Sisymbrium linearifolium (Gray) Payson, found only along the Mesa Top Trail at the E base of the mesa but probably elsewhere. Summer. RN: eyewash, sore gums.

THELYPODIUM.

Thelypodium longifolium (Benth.) Wats., rare on sandy slopes in a side canyon W of the mouth of the Box Canyon. Tall, slender biennial; basal leaves toothed and hairy, stem leaves entire and reduced in size; sepals purple; petals white to pink or purplish; fruits to 7 cm long.

THLASPI.

Thlaspi alpestre L., Wild Candytuft, uncommon in woods on mesatop and in Box Canyon. Low perennial growing from a basal rosette of finely toothed leaves; flowers white (occasionally purplish); fruits small and triangular with persistent styles. RN: gameway: prevent injury from deer, itch, protection from witches. March-May.

ERICACEAE--HEATH FAMILY

The Heath Family is a large and diverse assemblage of mostly evergreen temperate-adapted plants. It includes rhododendron, azaleas, blueberries, wintergreen, and heath. Our genus is one of the more remarkable ones.

PTEROSPORA. Pinedrops

Pterospora andromedea Nutt., common under Ponderosa Pines. Perennial without chlorophyll, probably parasitic on roots of conifers and on a certain fungus; flowers nodding, urn-shaped. Summer.

EUPHORBIACEAE--SPURGE FAMILY

A large and diverse family of world-wide distribution characterized by milky sap. Some succulent Old World species have adapted to drought in ways similar to those of the New World cacti. Poinsettia, castor bean, and the commercial rubber tree are all in this family.

EUPHORBIA. Spurge

An incredibly diverse genus, which includes the cactus-like species of the Old World and the poinsettia, whose red "petals" are actually floral bracts (leaves). Our species inconspicuous; monoecious, flowers of both sexes mounted together in a flower-like cyathium; pistillate flower nodding on an elongate stalk, staminate flowers surrounding it, the whole enclosed by the cyathium which is fringed with petal-like appendages.

- 1a. Plants erect; lower leaves alternate and the upper whorled. Euphorbia lurida Engelm., locally common in open areas. Summer. RN: good luck in gambling, caked breast, causes dermatitis.
- 1b. Plants prostrate (creeping along the ground), small; leaves opposite. Euphorbia serpyllifolia Pers., roadsides, and Box Canyon. RN: stomach ache, diarrhea, snakebite in livestock, toothache, warts, hemostatic, lactagogue, breast injury, lotion for poison ivy. Z: increase flow of milk.

FAGACEAE--BEECH FAMILY

This family includes the oaks, beeches, and chestnuts.

QUERCUS. Oak

Trees or shrubs with alternate, entire to lobed leaves; flowers without corollas, male flowers in catkins; fruit an acorn.

- 1a. Leaves deeply lobed, never with a sharp point at the apex of each lobe. Quercus gambelii Nutt., Gambel Oak, common in Box Canyon and below N and E faces of Inscription Rock, i.e. with Ponderosa Pines. Shrubs or trees. May. RN: food, wood, shade houses, blackening, emetic, cathartic, life medicine, expedited delivery of placenta, post-partum pain.
- 1b. Leaves shallowly lobed, often with a sharp point at the apex of each lobe. Quercus undulata Torr., Wavy-leaf Oak, rare with Gambel Oak. RN: food, consecration of hogan, sand painting pigment, internal pain.

FUMARIACEAE--FUMITORY FAMILY

A mostly Eastern Hemisphere family, sparingly represented in North America. Often included in the Poppy Family, Papaveraceae.

CORYDALIS.

Corydalis aurea Willd., Golden Smoke, uncommon in open country. Biennial with finely divided, alternate leaves; flowers yellow, very irregular; stamens 6. Spring. RN: dysmenorrhea, menorrhagia, injuries, sore throat, backache, stomach ache, increase production of watermelons, sheep feed.

GERANIACEAE--GERANIUM FAMILY

A large family best known for the cultivated geranium. North American genera have opposite leaves. The elongate styles are persistent on the fruit.

- 1a. Annuals; anther-bearing stamens 5; leaves pinnately compound. Erodium.
- 1b. Perennials; anther-bearing stamens 10; leaves lobed. Geranium.

ERODIUM. Heronbill, Crane's-bill

Erodium cicutarium (L.) L'Her, Filaree, Alfilaria, widespread and common. Low annual; flowers purple; fruits remarkable: the persistent styles twist like a corkscrew when drying, thus driving the sharp-pointed fruit into the ground (or into the clothes or fur of a passer-by . This plant attains some stature during the summer, but it is quite low at other times; it may be found flowering throughout the year. RN: considered a new plant, although introduced fairly early by the Spanish, sheep feed in early spring.

GERANIUM.

Geranium caespitosum James, common under Ponderosa Pines. Erect or spreading perennial with purple to magenta flowers; leaves palmately lobed. Var. caespitosum, without glandular hairs, and var. eremophilum (Woot. & Standl.) Martin & Hutchins, with glandular hairs, are equally common and occur together in the Box Canyon. Summer. RN: life medicine.

HYDROPHYLLACEAE--WATERLEAF FAMILY

A nearly world-wide family with its center of abundance in W North America. It is characterized by the same sort of coiled inflorescence found in the Borage Family.

PHACELIA.

Phacelia neomexicana Thurb., uncommon in open country. Annual with shallowly-lobed leaves; covered with sticky hairs; flowers white, filaments purple. Summer. RN: causes dermatitis--avoided.

LABIATAE--MINT FAMILY

A large family well-represented in North America. Most of the genera are aromatic. Many are used by manking, but for medicines and seasoning rather than for food. The flowers are bilaterally symmetrical; young stems 4-sided; leaves opposite or whorled; stamens 2 or 4.

- 1a. Calyx teeth 10, or the calyx 2-lipped.....2
- 1b. Calyx teeth 5.....3
- 2a. Calyx teeth 10; stems white-woolly. Marrubium.
- 2b. Calyx 2-lipped, laterally compressed; stems not white-woolly. Salvia.
- 3a. Flowers white, spotted with purple; inflorescence a series of dense clusters of flowers separated by unflowered gaps on the main stems. Monarda.
- 3b. Flowers pink to purple, not arranged as above.....4
- 4a. Leaves sharply toothed; flowers in dense spikes; calyx teeth spine-tipped, the uppermost tooth twice as wide as the others. Moldavica.
- 4b. Leaves mostly entire, not sharply toothed; flowers mostly in small clusters or solitary above the leaves; calyx teeth not spine-toothed, the upper 3 teeth shorter than the lower 2. Hedeoma.

HEDEOMA. Mock-pennyroyal

Hedeoma oblongifolium (Gray) Heller, uncommon under Ponderosa Pines. Perennial; stamens 4; upper 3 calyx teeth shorter than the lower 2. Summer.

MARRUBIUM. Horehound

Marrubium vulgare L., Common Horehound, campground and trailside below pool. Perennial with toothed leaves; flowers usually white; stamens 4. RN: sheep feed, stomach ache, flu, lightning infection, medicine before and after parturition.

MOLDAVICA. Dragonhead

Moldavica parviflora (Nutt.) Britton, sandy semi-open places N of Inscription Rock and in Box Canyon. Annual or biennial; leaves with bristle-tipped teeth; flowers pink to lavender; stamens 4. Summer. RN: to remove odor of skunk, eyewash, headache.

MONARDA. Beebalm, Horsemint

Our species annuals growing in loose sand; leaves toothed; flowers in glomerules, the glomerules surrounded by leaf-like bracts; flowers pinkish-white with purple spots; anther-bearing stamens 2.

- 1a. Calyx teeth slender, almost thread-like; most of the bracts below each glomerule about 3 mm wide and shorter than the calices. Monarda pectinata Nutt., sandy soil. July-August. RN: headache, influenza, fever, cough, lotion.
- 1b. Calyx teeth wedge-shaped; most of the bracts below each glomerule 5 mm or more wide and much longer than the calices. Monarda punctata L. var. lasiodonta Gray, sandy soil. July-August.

SALVIA. Sage

Our species annuals with entire to toothed leaves and rather unspectacular flowers for the genus; stamens 2; flowers early deciduous but the compressed, strongly 2-lipped calyx readily identifies the genus. This genus provides the seasoning sage, but ours are not very aromatic.

- 1a. Flowers white to light blue; leaves entire to remotely small-toothed. Salvia reflexa Hornem., beside path at Atsinna. August, September.
- 1b. Flowers indigo blue; leaves regularly toothed. Salvia subincisa Benth., Box Canyon and open areas. August, September.

LEGUMINOSAE--PEA FAMILY

One of the largest of plant families, and distributed world-wide. The leaves of all our kinds are compound. The largest subfamily, Papilionoideae, is characterized by bilaterally symmetrical flowers, one petal forming a broad, erect banner, two becoming lateral wings which surround the keel, which is formed by the union of two petals and surrounds the stamens and pistil.

- 1a. Flowers radially symmetrical; stamens many more than 10, conspicuously longer than the petals. (subfamily Mimosoidea). Calliandra.
- 1b. Flowers bilaterally symmetrical; stamens 10, enclosed in the keel. (subfamily Papilionoideae).....2
- 2a. Leaves pinnately compound.....3
- 2b. Leaves palmately compound or appearing so.....8
- 3a. Leaf ending in a tendril or short bristle.....4
- 3b. Leaf ending in a leaflet.....5
- 4a. Leaf ending in a tendril; plant a vine. Vicia.
- 4b. Leaf ending in a short bristle. Lathyrus.
- 5a. Leaflets toothed, 3 in number.....6
- 5b. Leaflets entire, usually more than 3.....7
- 6a. Flowers small, in long loose racemes. Melilotus.
- 6b. Flowers larger, in dense spherical heads. Trifolium.
- 7a. Plants acaulescent (without a stem); leaflets gray with long hairs, more than 10 per leaf; flowers mauve to purplish blue. Astragalus.
- 7b. Plants caulescent; leaflets green and glabrous but dotted with glands, 3-9 per leaf; flowers white. Petalostemum.
- 8a. Leaves conspicuously hairy; flowers blue; plants annual. Lupinus.
- 8b. Leaves if hairy not conspicuously so; flowers white or red and yellow; plants perennial.....9
- 9a. Leaves with glandular pits; flowers white. Psoralea.
- 9b. Leaves not pitted; flowers yellow becoming red in age. Lotus

ASTRAGALUS. Milkvetch, Locoweed

A large genus of annual and perennial herbs with usually hairy, pinnately compound leaves. In our region it is not well-represented in sandy soil, which probably explains the paucity of species at El Morro.

Astragalus molissimus var. matthewsii (Wats.) Barneby, sparsely distributed in the E half of the Monument, commoner on some lava outcrops. Perennial; flowers mauve to purplish-blue; pods covered with stiff hairs. Spring. This variety is endemic to the Zuni Mountains. RN: Sheep feed, but may be poisonous, emetic.

CALLIANDRA. False-mesquite

Calliandra humilis Benth. A single plant of this genus, found at the base of the cliff of the side canyon W of the mouth of the Box Canyon but not collected, is probably, on account of the much more southerly distribution of other species, this species. Leaves twice pinnately compound; pods with thick rib-like margins, their two sides curling back after splitting apart when the seeds are shed. RN: life medicine.

LATHYRUS. Peavine

Lathyrus graminifolius (Wats.) White, collected by Woodhouse in 1851, but not seen in the current survey. This is a plant of moist, shady places.

LOTUS. Deer-vetch

Lotus wrightii (Gray) Greene, widespread. Perennial with pinnate leaves which appear palmate; flowers yellow and red; pods long and narrow.

LUPINUS. Lupine

Lupinus kingii Wats. var. kingii, a few plants near the sewage lagoon. Annual with palmately compound leaves; flowers blue, not far surpassing the leaves. Summer. RN: Poison ivy.

MELILOTUS. Sweetclover

Annual or biennial herbs, frequently as much as 1 m tall; leaves trifoliate, leaflets toothed; flowers small; pods small (2-3 mm long).

- 1a. Flowers white. Melilotus albus Desr., White Sweetclover, found only beside Highway 53 at the W boundary. Late summer. RN: cold from falling water or being in heavy rain.
- 1b. Flowers yellow. Melilotus officinalis (L.) Lam., Yellow Sweet-clover, abundant below pool. Summer. RN: same as M. albus.

PETALOSTEMUM. Prairie-clover

Petalostemum candidum (Willd.) Michx. var. oligophyllum (Torr.) F.J. Herm., found only near S gate on top of mesa in open woodland. Perennial with pinnately compound leaves dotted with glands; flowers small, in dense spikes; pods about 3 mm long. Late summer. RN: life medicine for fever, stomach ache, snake infection.

PSORALEA. Scurf-pea

Psoralea lanceolata Pursh, Lemonweed, abundant in well-watered, moderately disturbed areas, common in sand by boardwalk and locally elsewhere. Perennial with palmately compound leaves, leaflets pitted with glands; flowers white; pods 4-5 mm long. Summer. RN: venereal disease, lotion, protection from witches, stomach ache, menstrual pain.

TRIFOLIUM. Clover

This familiar genus has many species and occurs in a variety of habitats. Leaflets 3; flowers typical of the subfamily but crowded into a spherical cluster; pods small.

- 1a. Plants acaulescent (stemless). Trifolium subcaulescens Gray, found only in woodland in extreme SE corner. Did not flower in 1980.
- 1b. Plants caulescent, the stems creeping and rooting at the nodes. Trifolium repens L., White Dutch Clover, lawns only. Summer.

VICIA. Vetch

Vicia americana Muhl. var. linearis (Nutt.) Wats., Box Canyon. Perennial with vine-like stems; pinnately compound leaves ending with a tendril which clasps stems and branches across which the plant crawls; flowers mostly purple; pods 3-4 cm long. Summer. RN: life medicine, eyewash.

LINACEAE--FLAX FAMILY

A world-wide family with only 2 genera in the U.S. The commercial flax, an Asian species of Linum, yields linen from its stems and linseed oil from its seeds.

LINUM. Flax

Linum kingii Wats., found on top of Inscription Rock 08 August 1978. Leaves alternate, entire; petals 5, yellow; stamens 5; styles 5, distinct. This species has not been recorded elsewhere in New Mexico; it is a plant of the northern Rocky Mountains.

LOASACEAE--LOASA FAMILY

A small family occurring mostly in tropical America. Herbaceous plants with alternate leaves; stems and leaves rough to the touch.

MENTZELIA. Stickleaf

Mentzelia albicaulis Dougl. Small-flowered Mentzelia, common dwarf annual in spring 1979, also normal-sized plants near campground. Flowers yellow. Spring and summer. RN: snakebite, toothache.

LORANTHACEAE--MISTLETOE FAMILY

A tropical family with 2 genera in North America. Ours parasitic on the branches of trees.

PHORADENDRON. Mistletoe

Phoradendron juniperinum Engelm., common parasite on species of Juniperus. Leaves scale-like; plants dioecious. Birds eat the berries and in wiping their bills clean on branches deposit seeds, which germinate when conditions are favorable. RN: relief from eating too much meat.

MALVACEAE--MALLOW FAMILY

This large world-wide family is characterized by many stamens which form a tube around the styles. Well-known genera include hollyhock, cotton, and Hibiscus (which includes okra). Leaves of our species variously lobed, with palmate veins.

- 1a. Flowers white. Malva.
- 1b. Flowers reddish-orange. Sphaeralcea.

MALVA. Mallow, Cheeseweed

Malva neglecta L., Cheeseweed, lawns only. Annual or perennial herb with creeping stems; fruit disklike. Throughout the warm month. RN: injury or swelling.

SPHAERALCEA. Globe-mallow.

A difficult genus because species are determined by characters of the fruit. The key below uses leaf shape, but may not work with all specimens. Our species perennial, with stellate (star-shaped) hairs.

- 1a. Leaves shallowly lobed, the divisions much less than halfway to the midrib. Sphaeralcea incana Torr. var. cuneata Kearney, widespread, mostly in wooded areas. Hairs yellowish. Late summer.
- 1b. Leaves deeply lobed, the divisions nearly to the midrib.....2
- 2a. Carpels (individual sections of the fruit, like the sections of an orange) split only 1/3 of the way from the top; plants usually large (the size of S. incana). Sphaeralcea coccinea (Pursh) Rydb. var. dissecta (Nutt.) Rydb., same locations as 1a. Late summer. RN: life medicine.
- 2b. Carpels split 2/3 of the way from the top; plants usually small. Sphaeralcea digitata (Greene) Rydb., more open areas than the foregoing 2 species. RN: life medicine, stomach ache.

NYCTAGINACEAE--FOUR O'CLOCK FAMILY

A family of warm regions, well-represented in the Southwest. Leaves in ours opposite; clusters of flowers surrounded by involucre of sepal-like bracts; petals absent, the showy part of the flower the calyx.

- 1a. Flowers white.....2
- 1b. Flowers red to purple.....3
- 2a. Wings of fruit thick and opaque; calyx usually 5-lobed. Abronia.
- 2b. Wings of the fruit broad, thin, translucent, veiny; calyx usually 4-lobed. Tripterocalyx.
- 3a. Leaves heart-shaped; involucre not changed in fruit. Mirabilis.
- 3b. Leaves linear; involucre enlarged and papery in fruit. Oxybaphus.

ABRONIA. Sand-verbena

Abronia fragrans Nutt., loose sand. Annual or biennial herb with sticky hairs; stamen usually 5. Summer. RN: sores or sores in mouth, sweating feet.

MIRABILIS. Four-O'clock

Usually spreading perennials; involucre with bracts united, stamens 3-5.

- 1a. Calyx (petal-like purple structure) 4-6 cm long. Mirabilis multiflora (Torr.) Gray, under trees or in arroyos. A very handsome species. Summer. RN: beverage, swellings. Z: effects of over-eating.
- 1b. Calyx not more than 1 cm long. Mirabilis oxybaphoides Gray. Much like the former species in habitat and appearance, except for the smaller size of leaves and flowers. Late summer. RN: beverage.

OXYBAPHUS.

Perennial herbs; bracts united into a calyx-like structure; stamens 3-5.

- 1a. Plants tall and erect; involucre sparsely hairy. Oxybaphus glaber Wats., a few plants, up to 2 m tall, in the head of the Box Canyon. Late summer.
- 1b. Plants low, often sprawling; involucre densely hairy. Oxybaphus linearis (Pursh) Robins, one specimen from field S of campground. Flowers purple. Summer. RN: burns, cough, good luck.

TRIPTEROCALYX. Wing-fruited Sand-verbena

Tripterocalyx wootonii Standl., resembling Abronia fragrans in all respects except the fruit, and occurring with it. Summer. RN: protection from witches, injury from falling off horse. Z: snakebite (poisonous), swelling of glands.

OLEACEAE--OLIVE FAMILY

A mostly Eastern Hemisphere family of trees and shrubs. There are 3 genera in our region. Olive, ash, and privet are well-known members.

FRAXINUS. Ash

Fraxinus cuspidata Torr., Flowering Ash, a few plants on a talus slope in the SE corner. Leaves pinnately compound; petals 4, white, linear; fruit a winged samara. Spring. RN: arrow shafts, bows, weaving tools.

ONAGRACEAE--EVENING-PRIMROSE FAMILY

A world-wide family which is especially well-represented (by Oenothera) in the Southwest. Fuchsia and fireweed are 2 well-known members. The flowers have 4 sepals, 4 petals, and 8 stamens.

- 1a. Fruit nut-like, not splitting at maturity. Gaura.
- 1b. Fruit a long, thin capsule, splitting from the top at maturity.....2
- 2a. Flowers minute. Gayophytum.
- 2b. Flowers large and showy. Oenothera.

GAURA:

Annual, biennial, or perennial herbs, with narrow alternate leaves; sepals deciduous; petals white, fading red, clawed (narrowed at the base); stamens 8.

- 1a. Annuals or biennial; petals not more than 2 mm long; weedy plants of roadsides. Gaura parvifolia Dougl. These plants grow to 2 m in height. July, August.
- 1b. Perennials; petals 4-6 mm long; plants of more varied distribution. 2
- 2a. Body of fruit widest near the base, winged almost throughout. Gaura hexandra Gomez Ortega subsp. gracilis (Woot. & Standl.) Raven & Gregory, Box Canyon and roadsides. RN: stomach ache.
- 2b. Body of fruit widest at or above the middle, winged only above. Gaura coccinea (Nutt.) Pursh, widespread in open country. RN: life medicine, especially for serious internal injury, settle child's upset stomach.

GAYOPHYTUM.

Gayophytum ramosissimum Torr. & Gray, open country. Dwarf to small annual with alternate entire leaves (opposite below); sepals 4, deciduous; stamens 8 but 4 usually small and sterile; fruit a mustard-like capsule. May onwards. RN: hemostatic.

OENOTHERA. Evening-primrose

Annual to perennial herbs with alternate, entire to lobed, leaves; sepals not deciduous; petals white or yellow, often drying pink or red; stamens 8; stigmas with 4 linear lobes, i.e. cross-shaped; fruits more-or-less-ribbed capsules.

- 1a. Petals yellow when fresh.....2
- 1b. Petals white when fresh.....3
- 2a. Plants small. Oenothera sp., perhaps flava, a small plant seen in open country between visitor center and campground, but not identified because of absence of fruit. Not relocated later.
- 2b. Plants large, with tall, erect stems. Oenothera hookeri Torr. & Gray subsp. hirsutissima (Gray) Munz, locally common near pool, in arroyos, and in Box Canyon. A handsome biennial with densely hairy leaves; petals 25-40 mm long; seeds reddish-brown, sharply-angled. July-September. RN: life medicine for swelling.
- 3a. Flowers with long hairs in the throat (where the petals are attached). Oenothera coronopifolia Torr. & Gray, common in open sandy ground. Perennial with slender rhizomes; buds nodding, petals 7-15 mm long, aging pink; seeds in 2 rows in each cell. June-August. RN: swellings, stomach ache, with tobacco.
- 3b. Flowers without long hairs in the throat.....4
- 4a. Seeds in 2 rows in each cell of the fruit, with rows of shallow pits; annuals with taproot. Oenothera albicaulis Pursh, rare but widespread. Petals white, aging pink, 15-40 mm long. RN: life medicine, especially from carrying heavy load, throat trouble. Z: ceremonial.
- 4b. Seeds in 1 row in each cell, not pitted; perennials with deep rhizomes. Oenothera pallida Lindl. subsp. runcinata (Engelm.) Munz & Klein, campground and E, common. Petals white, aging pink, 15-20 mm long. Late summer. RN: snakebite, emetic, sore throat.

OROBANCHACEAE--BROOMRAPE FAMILY

A small family of root-parasitic herbs. The plants have no evidence of chlorophyll, but do have leaves, which are scale-like, and rather handsome flowers.

OROBANCHACEAE. Broomrape

Orobanche fasciculata Nutt., Clustered Cancerroot, open country. Plants purplish or yellowish; flowers purple or yellow, curved, tubular. RN: life medicine for birth injuries, food. Z: hemorrhoids, ceremonial.

PLANTAGINACEAE--PLANTAIN FAMILY

A small family dominated by the type genus, Plantago.

PLANTAGO. Plantain

Plantago argyrea Morris, common in all unshaded sandy sites. Annual with the leaves all basal and entire; flowers in a dense spike, corolla lobes not colored; stamens 4 or 2. Summer.

POLEMONIACEAE--PHLOX FAMILY

A mostly Western Hemisphere family well-represented in the West. Gilia (including Ipomopsis) are showy plants. Phlox is the best-known genus. Petals fused at least at the base; flower parts in 5's.

- 1a. Small shrubs; leaves simple but deeply divided, appearing to be fascicles of entire, spine-toothed leaves. Leptodactylon.
- 1b. Plants definitely herbaceous; leaves not as above.....2
- 2a. Leaves opposite and entire. Microsteris.
- 2b. Leaves alternate and lobed.....3
- 3a. Flowers purple to lavender; perennials. Ipomopsis multiflora.
- 3b. Flowers white to light blue; annuals.....4
- 4a. Flowers 30-50 mm long. Ipomopsis longiflora.
- 4b. Flowers 7-15 mm long. Gilia sinuata.

GILIA.

Gilia sinuata Dougl. common in sand in open places. Spring. RN: fever.

IPOMOPSIS.

This genus is often included in Gilia.

Ipomopsis longiflora (Torr.) V. Grant, common some years in sandy, open places. Summer. RN: life medicine, deer infection, stomach ache, arthritis, facilitate delivery of placenta, snake infection, heart-burn, hair tonic, heal incision in castrated colt.

Ipomopsis multiflora (Nutt.) V. Grant, rare in woodland. Flowers 7-15 mm long. Late summer. RN: Beautyway. Z: headache, dress wounds, relieve strangulation.

LEPTODACTYLON. Prickly Gilia

Leptodactylon pungens (Torr.) Nutt., E of campground in open country. Perennial subshrub with large white flowers. May, June.
RN: snake infection, facilitate labor.

MICROSTERIS.

Microsteris gracilis (Hook.) Greene, common in sandy open ground.
Dwarf annual. Spring.

POLYGONACEAE--BUCKWHEAT FAMILY

A North Temperate Zone family especially well-represented in the Southwest. The best-known members are buckwheat and rhubarb. The showy parts of the flowers are sepals rather than petals, which are absent. Eriogonum is remarkably diverse in our region, as its representatives at El Morro show.

- 1a. Flowers within an involucre of fused bracts. Eriogonum.
- 1b. Flowers not within an involucre.....2
- 2a. Calyx 5-parted, the segments all alike. Polygonum.
- 2b. Calyx 6-parted, the inner segments erect, the outer smaller and reflexed. Rumex.

ERIOGONUM. Wild Buckwheat

Annual to perennial herbs with alternate, entire leaves; stamens 9, styles 3.

- 1a. Plants perennial, the caudex, and sometimes the stem, woody.....2
- 1b. Plants without a caudex.....4
- 2a. Stems noticeably woody above ground. Eriogonum simpsonii Benth., widespread in open areas. Plants leafy throughout, the leaves 10-20 mm long, narrow, green on top, woolly beneath, margins turned under; calyx white. August, September.
- 2b. Stems not noticeably woody above the caudex.....3
- 3a. Leaves all basal; bracts at the base of the inflorescence not resembling the basal leaves. Eriogonum racemosum Nutt., Redroot Wild Buckwheat, fairly common near the SE corner, in and near woodland. A tall, unbranched plant (to 60 cm); leaves to 5 cm long, rather broad, white with hairs on both sides; calyx white. August, September. RN: blood poisoning, internal injuries.
- 3b. Leaves not all basal; bracts at the base of the inflorescence resembling the basal leaves. Eriogonum jamesii Benth. var. jamesii, Antelope-sage, widespread in open areas and woodland. A many-stemmed plant, to 25 cm tall; leaves to 35 mm long, green but hairy above, white with hairs below; calyx cream-colored. Summer.
RN: life medicine, labor pains, kill swallowed red ant, contraceptive.
Z: sore tongue, ceremonial.
- 4a. Calyx yellow; fruits winged; perennials. Eriogonum alatum Torr., Winged Wild Buckwheat, fairly common on mesatop. Tall perennial with taproot but not caudex, stems often solitary, up to 100 cm tall, unbranched below the inflorescence. Leaves mostly basal, to 10 cm long, green. Summer. RN: life medicine, cough, diarrhea, sore gums, sore navel (infant), food. Z: "general miserable feeling".

- 4b. Calyx white to pink; fruits not winged; annuals.....5
- 5a. Plants glabrous; inflorescence much-branched; involucre hanging down on long stems (peduncles). Eriogonum cernuum Nutt., Nodding Wild Buckwheat, widespread in open, sandy places. Leaves to 2 cm long, roundish, green on top, mostly basal; plant turning reddish-brown in fall. Summer. RN: red ant bite.
- 5b. Plants hairy; inflorescence rather compact; involucre without peduncles or with very short ones.....6
- 6a. Calyx decidedly pinkish; inflorescence not flat-topped; plant branching from the base. Eriogonum polycladon Benth., seen first in 1980, when abundant E of campground in open sand. Stems to 60 cm tall; leaves to 5 cm long, whitish. September.
- 6b. Calyx usually white; inflorescence usually decidedly flat-topped; plant sometimes branching at the base but often with a tall stem branching only in the inflorescence. Eriogonum annuum Nutt., open country. Stems to 100 cm tall, leaves to 5 cm long; whitish. July-September. RN: red ant bite or swallowed, lightning infection, protection from witches.

POLYGONUM. Smartweed, Knotweed

Polygonum sawatchense Small, Sawatch Knotweed, common in sand N of Inscription Rock. Glabrous annual with alternate, entire leaves; calyx green with white margins; stamens 6-8. Summer. RN: nose troubles.

RUMEX. Dock, Sorrel

Rumex altissimus Wood, Pale Dock, uncommon in sand by trail, N of Inscription Rock. Perennial with taproot; 50-100 cm tall; leaves alternate, to 10 cm long; sepals green, the 3 inner ones enlarged in fruit, to 6 mm long, some bearing a callosity (hardened, thickened spot), stamens 6, styles 3. Summer.

PORTULACACEAE--PORTULACA FAMILY

A rather small family best known for purslane, a wild green used occasionally for food. Spring-beauty and bitterroot are also in the family.

PORTULACA. Purslane

Portulaca retusa Engelm., sandy places. Low, spreading annual with nearly glabrous, flat but succulent, leaves. Petals yellow, 5, stamens 7 to many, sepals 2. Seeds with sharp tubercles (the only feature distinguishing this species from the very similar P. oleracea); capsules splitting at the equator. August, September. RN: food.

RANUNCULACEAE--BUTTERCUP FAMILY

A widespread family of mostly herbaceous plants. Buttercups, columbines, and larkspurs are among the best-known. Our genera are all rather specialized.

- 1a. Leaves compound; flowers lacking true petals.....2
- 1b. Leaves simple, basal; flowers sometimes with true petals.....3
- 2a. Plant a vine, supporting itself with twining petioles which wrap around stems of other plants. Clematis.
- 2b. Plant erect and self-supporting. Thalictrum.
- 3a. Dwarf annuals, petals when present yellow. Myosurus.
- 3b. Tall perennials; petals and sepals blue. Delphinium.

CLEMATIS.

Clematis ligusticifolia Nutt., Western Virgin's Bower, a single plant under oaks in the Box Canyon, not known to have flowered in 1978-80. The identification is tentative in the absence of floral parts, but the habit of the specimen fits the species, which is common in the region. Perennial with opposite leaves, leaflets to 8 cm long, toothed or lobed; dioecious; sepals white, petals absent, fruits with long white hairs, conspicuous in autumn. Summer. RN: protection from witches, backache or swollen limbs.

DELPHINIUM. Larkspur

Delphinium scaposum Greene, irregular in open country. Perennial with leaves mostly basal, divided; sepals 5, petals 4, all purple to blue, the flower with a long spur projecting to the rear. June. RN: Blue pollen for ceremonies.

MYOSURUS. Mousetail

Myosurus nitidus Eastw., abundant in sandy open places. Dwarf annual. The cylindric flower with its many pistils resembles a mouse's tail. Spring. RN: ant bite or swallowed ant.

THALICTRUM. Meadow-rue

Thalictrum fendleri Engelm., common in Box Canyon and in moist cracks in Inscription Rock. Perennial with alternate, compound leaves; dioecious, sepals 4-5, petals none. Summer. RN: blackening.

ROSACEAE--ROSE FAMILY

A large world-wide family well known to mankind. Apples, pears, cherries, plums, almonds, peaches, strawberries, and blackberries are among the most important members. The family is characterized by numerous stamens and flat flowers.

- 1a. Shrubs; flowers white.....2
- 1b. Herbs; flowers yellow. Potentilla.
- 2a. Leaves roundish, bluntly toothed. Amelanchier.
- 2b. Leaves oblong in outline, deeply pinnately divided. Fallugia.

AMELANCHIER. Serviceberry

A single unhealthy plant of this genus was found in 1979 beside the trail in the shade of Inscription Rock (same location as Draba aurea). Absence of flowers precludes specific identification. Shrub with alternate, roundish, toothed leaves. Petals white; stamens 10-20. June. RN: (A. mormonica) emetic, life medicine, food.

FALLUGIA. Apache Plume

Fallugia paradoxa (D. Don.) Endl., found only on a single lava outcrop N of campground and a single plant on the rim of the Box Canyon. The fruits have long, hairy, persistent plumes. Summer. RN: emetics, arrow shafts, lifeway lotion.

POTENTILLA. Cinquefoil

Potentilla pennsylvanica L., fairly common in E part of Monument, especially on lava outcrops. Perennial with caudex; leaves pinnately compound, the leaflets pinnately divided nearly to the mid-vein, not white with hairs below. July, August. RN: life medicine.

RUBIACEAE--MADDER FAMILY

A large sub-tropical and tropical family best known for coffee. The plant which yields quinine is also a member.

HOUSTONIA.

Heustonias wrightii Gray, one small population in a treeless area W of the entrance road. Low perennial with opposite, entire leaves; flowers small, petals white to bluish, 4. August. RN: sores, poison-ivy dermatitis, life medicine, gameway fumigation.

SAXIFRAGACEAE--SAXIFRAGE FAMILY

A widespread family partial to moist, cool places. Best-known members are the hydrangeas, mock-oranges, and gooseberries.

1a. Herbs with leaves all basal. Heuchera.

1b. Shrubs. Ribes.

HEUCHERA. Alumroot

Heuchera parvifolia Nutt., sandy slopes below oaks, N of Inscription Rock. Perennial with long-petioled, roundish, lobed, basal leaves; flowers small, petals 5, greenish to yellowish, stamens 5. June. RN: life medicine, to facilitate delivery of placenta, stomach ache, venereal disease.

RIBES. Currant, Gooseberry

Ribes inebrians Lindl., Wax Currant, Squaw Currant, common in Box Canyon, sporadic under trees elsewhere. Shrub with alternate, lobed leaves covered with sticky hairs; flowers whitish-pink, tubular; fruit a waxy berry covered with sticky hairs, barely palatable. Spring. RN: food, arrow shafts, indicator of seasons. Z: food.

SCROPHULARIACEAE--SNAPDRAGON FAMILY

A large, worldwide family widespread in the U.S. Many of the genera (e.g. paintbrush and beard-tongue) have handsome flowers. Flowers are bilaterally symmetrical in most genera. Stamens usually 4, but also 2 or 5.

- 1a. Stem thick, more than 1 cm in diameter, usually unbranched; anther-bearing stamens 2 or 5.....2
- 1b. Stem less than 1 cm in diameter, usually branched; stamens 4.....3
- 2a. Flowers yellow; leaves hairy above; stamens 5. Verbascum.
- 2b. Flowers whitish; leaves glabrous above; stamens 2. Besseyia.
- 3a. Leaves parted into thread-like segments; plants annual; flowers yellow. Cordylanthus.
- 3b. Plants not as above.....4
- 4a. Leaves alternate; inflorescence red. Castilleja.
- 4b. Leaves opposite.....5
- 5a. Flowers yellow; dwarf annuals. Mimulus.
- 5b. Flowers red or blue; perennials. Penstemon.

BESSEYA. Kittentails

Besseyia arizonica Pennell, Arizona Kittentails, sandy slopes below N face of Inscription Rock. Perennial with a basal rosette of large leaves and reduced leaves on the stem; stamens 2. June. RN: amuria, hunting deer, life medicine, skin sores, sore navel, emetic, birth injuries, protection while hunting, in war, and from witches.

CASTILLEJA. Paintbrush

A handsome genus with complex floral morphology. The leaf-like bracts and the tubular calyx are the brightly-colored parts. The corolla, which is usually nearly completely enclosed in the calyx, is mostly green. The longer upper lip (galea) encloses the 4 stamens. Our species perennial.

- 1a. Bracts entire to shallowly lobed. Castilleja integra Gray, widespread in open country. Summer. Z: dye deerskin black. RN: facilitate labor, burns, internal injuries.
- 1b. Bracts deeply divided into linear segments. Castilleja linariaefolia Benth. var. omnipubescens Pennell, mouth of Box Canyon, first seen in 1980. Late summer. RN: keep a baby small.

CORDYLANTHUS. Birdbeak

Cordylanthus wrightii Gray, locally abundant in open country. Much-branched annual with alternate, divided leaves. Corolla 2-lipped, the upper enclosing the 4 stamens. Summer. RN: menstrual pain, leg or body aches in men.

MIMULUS. Monkeyflower

Mimulus suksdorfii Gray, abundant in sandy soil. An ephemeral (appearing less regularly than annually) which appeared in May 1979 after heavy spring (vs. winter) precipitation. The genus is large and handsome. Most members grow in wet places. Species in our region are herbs with opposite leaves; flowers 2-lipped, stamens 4, calyx teeth 5, inflated in fruit.

PENSTEMON. Beardtongue

Handsome herbs with opposite leaves; flowers tubular with 2 lips, in the blue-flowered species the lower lip serving as a landing platform for insect pollinators; stamens, 4 fertile and a fifth sterile, the latter covered with hairs in some species and responsible for the common name.

- 1a. Corolla red. Penstemon barbatus (Cav.) Roth subsp. trichander (Gray) Keck, Scarlet Bugler, uncommon in wooded areas. These are hummingbird-pollinated (as are most red flowers) and the lower lip is not developed as a platform. Summer. RN: arrow wounds, swellings, menstrual pain, stomach ache, burns, cough, fracture legs in sheep. Z: ceremonial.
- 1b. Flowers blue.....2
- 2a. Plants low and shrubby. Penstemon linarioides Gray, a few plants in the extreme SE corner. Late summer. RN: facilitate labor, facilitate delivery of placenta, a female plant--insures female baby.
- 2b. Plants slender and erect.....3
- 3a. Corolla with sticky hairs on the outside; usually flowering in May and June. Penstemon jamesii Benth., common in open country in 1979, not seen 1980. RN: headache caused by hunting, blue pollen, eagleway infection, sore throat.
- 3b. Corolla glabrous outside; usually flowering in July or later. Penstemon virgatus Gray, locally common in woodland and open country. RN: blue pollen, life medicine.

VERBASCUM. Mullein

Verbascum thapsus L., locally common beside Highway 53 and in some arroyos. Tall biennial (to 2 m), only the large basal rosette of leaves appearing the first year; stem leaves to 40 cm long; stamens 5. Summer. RN: fever or cough.

SOLANACEAE--NIGHTSHADE FAMILY

A large family, occurring mostly in Latin America. Potatoes, tomatoes, eggplant, red peppers, and tobacco are among the many members which are used by man.

- 1a. Shrubs. Lycium.
- 1b. Herbs.....2
- 2a. Calyx expanded in fruit, enclosing the berry in a papery husk, which resembles a Japanese lantern; leaves entire to toothed. Physalis.
- 2b. Calyx persistent at the base of the berry, not enclosing it; leaves pinnately lobed to compound. Solanum.

LYCIUM. Wolfberry

Lycium pallidum Miers, in dense stands on ruins and other disturbed sites. Shrubs with spiny branches, leaves alternate and entire; flowers green, tubular, stamens 4-5; berry red or blue. Spring. A good indicator of archaeological sites. RN: food, blackening, emetic, toothache, life medicine. Z: food, ceremonial.

PHYSALIS. Ground-cherry, Husk-tomato

Herbs with alternate entire to toothed leaves; corolla yellowish, often with a dark center, stamens 5.

- 1a. Annual. Physalis foetens Poir. var. neomexicana (Rydb.) Waterfall, sandy soil in residence area. Late summer.

- 1b. Perennials. Physalis hederifolia Gray var. cordifolia (Gray) Waterfall, widespread in woodland. Summer.

SOLANUM. Nightshade

Our perennial or annual herbs with alternate leaves; corolla white, stamens 5, their anthers closely surrounding the style.

- 1a. Leaves pinnately compound. Solanum jamesii Torr., Wild Potato, sandy soil, locally abundant E of campground. Roots tuberous. Late summer. RN: food.
- 1b. Leaves pinnately lobed. Solanum triflorum Nutt., a single specimen by the trail just W of the visitor center. Annual weed with taproot. Late summer. RN: increase production of watermelon. Z: condiment.

UMBELLIFERAE--PARSLEY FAMILY

An important family of mostly North Temperate plants widely used for seasoning and for food (e.g. carrot, celery, parsnip). Poison-hemlock is the substance used for the execution of Socrates. The flowers, which have 5 petals and 5 stamens, are disposed in an umbel, an inflorescence in which the pedicels (stems) of several flowers arise at a common point.

CYMOPTERUS.

Cymopterus purpurascens (Gray) Jones, common in open country. Stemless perennial with large, starchy taproot; flowers emerge from the ground nearly fully developed, often with the leaves; leaves twice pinnately divided; umbels compound, papery, purple-veined bracts surround their bases; fruits with broad, membranous wings. February-April, the first perennial to flower each spring. RN: food, life medicine.

VERBENACEAE--VERVAIN FAMILY

A mostly tropical family represented in the U.S. primarily by Verbena. Young stems are usually 4-sided; leaves opposite.

VERBENA. Vervain

Verbena bracteata Lag. & Rodr., Large-bracted Vervain, roadsides. Spreading herbs with 3-lobed, toothed leaves; flowers small, purple to blue, nearly hidden by the large bracts. Summer. RN: lotion, centipede bite.

ZYGOPHYLLACEAE-CALTROP FAMILY

A mostly tropical family best known for puncture vine and for creosote bush, the characteristic plant of Southwestern deserts. Leaves pinnately compound.

TRIBULUS. Caltrop

Tribulus terrestris L., Puncture Vine, campground. Spreading annual with opposite leaves; petals and sepals 5, stamens 10; fruit with 5 formidable spines. Summer.

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GLOSSARY

- Achene. A small, dry, hard, one-seeded fruit.
- Alternate. With a single structure (e.g. leaf) occurring at each level of the axis.
- Annual. Completing the life cycle within less than a year.
- Anther. The pollen-bearing part of a stamen.
- Apex. The point or end of a structure.
- Appressed. Lying tightly against (another organ).
- Areole. A small, clearly marked space; specifically, the spine-bearing areas on a cactus.
- Awn. A long stout or stiff bristle.
- Basal. At or near the base.
- Berry. A fleshy, pulpy fruit with more than one seed.
- Biennial. Requiring two growing seasons to complete a life cycle.
- Bilaterally symmetrical. Divisible into only 2 similar sections, which are mirror images of each other.
- Blade. The broad, usually flat, part of a leaf.
- Bract. A leaf subtending a reproductive structure, such as a flower or cluster of flowers.
- Bristle. A stiff hair.
- Calyx. The outermost series of flower parts. It is usually green. Individual parts are called sepals.
- Capsule. A dry, many-seeded fruit splitting lengthwise at maturity.
- Cell. Cavity of an ovary.
- Chaff. Dry, membranous scales.
- Claw. Narrow basal portion of a petal. In Fumariaceae a spur in the flower.
- Compound. Having two or more similar elements. See diagrams.
- Corolla. The inner series of flower parts. Individual parts are petals.
- Crown. Special appendages of the corolla.
- Culm. The hollow stem of a grass.
- Cyathium. A cuplike involucre, which in Euphorbia holds one pistillate and several staminate flowers, the whole resembling a single flower.
- Cyme. An inflorescence with the flowers opening from the center outward. Since the length of the inflorescence is thus determined by inner flowers the cyme is more or less flat-topped.
- Deciduous. Falling off at the end of each growing season.
- Dicot. A member of a group characterized by two cotyledons (seed leaves).
- Dioecious. Flowers unisexual and the pistillate and staminate flowers on different plants.
- Disk. The central portion of the compound receptacle bearing the disk flowers.
- Disk flower. In Compositae, a flower with a tubular (vs. strap-shaped) flower.
- Divided. Indented to or near the midrib or base.

- Entire. Without division or toothings of any kind.
- Evergreen. Not falling off at the end of each growing season.
- Exserted. Projecting beyond, as the stamens of a corolla.
- Fascicled. In bundles or clusters, i.e. in leaves, too close together to be called opposite or alternate.
- Filament. The stalk of a stamen.
- Floret. The flower of a grass and the two immediately enclosing bracts, i.e. the palea and lemma.
- Fruit. A matured ovary with its enclosed seeds. Used properly only of angiosperms.
- Glabrous. Not hairy.
- Gland. A secreting surface or structure.
- Glaucous. Covered with a whitish bloom, as a plum. Glaucous surfaces are also glabrous.
- Glume. One of the pair of bractlets at the base of a grass spikelet; they do not enclose flowers.
- Head. A cluster of stalkless flowers at the apex of a peduncle, e.g. the flower-like head of a composite.
- Herbaceous. Not woody.
- Hood. A lobe of the specialized crown in a milkweed flower.
- Horn. An inward (toward the center of the flower) projection of a hood.
- Inferior. An ovary that is below the place of attachment of sepals and petals. Thus it appears to be imbedded in the pedicel.
- Inflorescence. The flowering area of a plant.
- Involucre. A series of bracts (sometimes fused) surrounding a cluster of flowers or sometimes a single flower.
- Irregular. Bilaterally symmetrical.
- Leaflet. A leaf-like segment of a compound leaf.
- Lemma. Lower of the two bracts surrounding a grass flower. It also surrounds the upper bract (palea).
- Ligule. A flat membranous scale at the point where the blade and sheath of a grass leaf join. It sometimes partly enfolds the culm.
- Linear. Long and narrow, the sides parallel.
- Lobe. Segment of a leaf.
- Lobed. Indented from moderately to deeply toward the midvein or base.
- Monocot. A member of the group characterized by one cotyledon (seed leaf).
- Monoecious. With unisexual flowers, both kinds occurring on the same plant.
- Nerve. A simple (unbranched) vein or rib.
- Node. The place on a stem that normally bears a leaf or leaves. A node of a grass stem (culm) may be enclosed in the sheath of a lower leaf.
- Nutlet. A hard, small, one-seeded fruit which does not split apart at maturity.
- Opposite. Of leaves: at the same node and on opposite sides of the stem.
- Palea. Upper of the two bracts surrounding a grass flower.

- Palmate. Arranged like the fingers of a hand, i.e. the leaflets or lobes arising at a common point.
- Panicle. A compound inflorescence.
- Parasite. A plant living on food or water obtained from another plant, usually one of another species.
- Pedicel. The stalk of a single flower or spikelet, technically the internode below a flower.
- Peduncle. The stalk of a cluster of flowers, or the next to last internode below a flower.
- Perennial. Continuing to grow year after year.
- Perfect. Having both functional pistils and functional stamens.
- Perianth. A collective term for the calyx and corolla. Used when they are undifferentiated.
- Perigynium. A special sac which encloses the ovary of Carex.
- Petal. One member of the series forming the corolla.
- Petiole. Stalk of a leaf supporting the blade (expanded portion).
- Phyllary. In composites, a single bract of the involucre surrounding the head.
- Pinnate. Compound, with the leaflets arising along an axis.
- Pistil. The female organ of a flower, composed of ovary, stigma, and style.
- Pollinia. Waxy masses of pollen.
- Pome. A fleshy fruit with several seed chambers, the seeds not embedded in the fleshy part, e.g. an apple.
- Prostrate. Flat upon the ground.
- Raceme. An inflorescence of flowers with pedicels along an axis.
- Radially symmetrical. Divisible into three or more similar sections.
- Ray flower. In Compositae, a flower with a strap-shaped corolla. These resemble petals.
- Receptacle. The expanded part of an axis (pedicel or peduncle) which bears a flower or group of flowers.
- Reflexed. Bent or turned abruptly downward.
- Regular. Radially symmetrical.
- Rhizome. A horizontal, underground stem.
- Saprophyte. A plant which lives on dead organic matter.
- Scape. A leafless flowering stem.
- Sepal. One member of the series of flower parts forming the calyx.
- Sheath. The tubular, basal portion of a grass or sedge leaf which encloses the culm.
- Simple. Not compound or branched.
- Spathe. A large bract enclosing an inflorescence.
- Spike. An inflorescence of unpedicelled flowers along an axis.
- Spikelet. The spike of a grass or sedge, enclosed in grasses in a pair of glumes.
- Spore. A simple, one-celled reproductive structure, formed directly as the result of meiosis.
- Stamen. The male organ of a flower, composed of an anther (which produces the pollen) on a filament.

Sterile. Not producing pollen or seeds.

Stigma. The apical portion of a pistil, the part receptive to pollen.

Stipe. A special stalk under the pistil of a flower, developed from ovary or receptacle. Not a pedicel.

Stolon. A branch which grows along the ground and produces roots at the nodes.

Style. The tubular portion of a pistil connecting ovary and stigma.

Subtend. Under or supporting.

Succulent. Fleshy or juicy.

Superior. An ovary above the place of attachment of petals and sepals.

Tendrill. A modified leaf, leaflet, or stem that serves as a supporting or climbing organ.

Toothed. With minor projections and indentations alternating along the margin.

Tubercle. Processes or bumps on a surface.

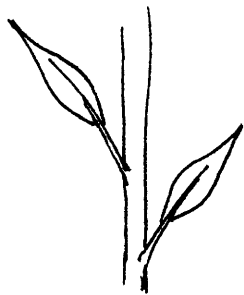
Umbel. An inflorescence with the pedicles arising from approximately the same place.

Vein. A thread of conducting tissue in a leaf or flower part.

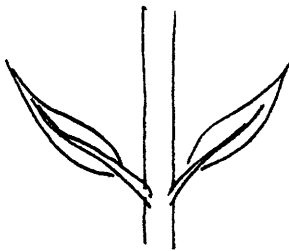
Whorled. With a group of leaves or other structures at a node.

Wing. Thin, membranous expansion on the surface of an organ.

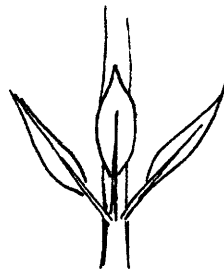
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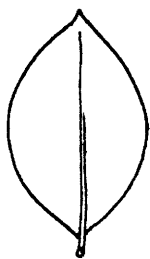
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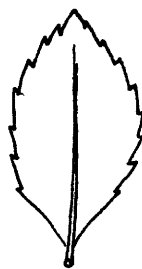
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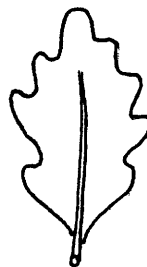
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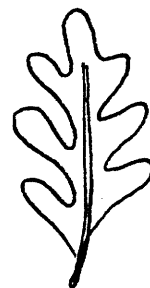
ENTIRE



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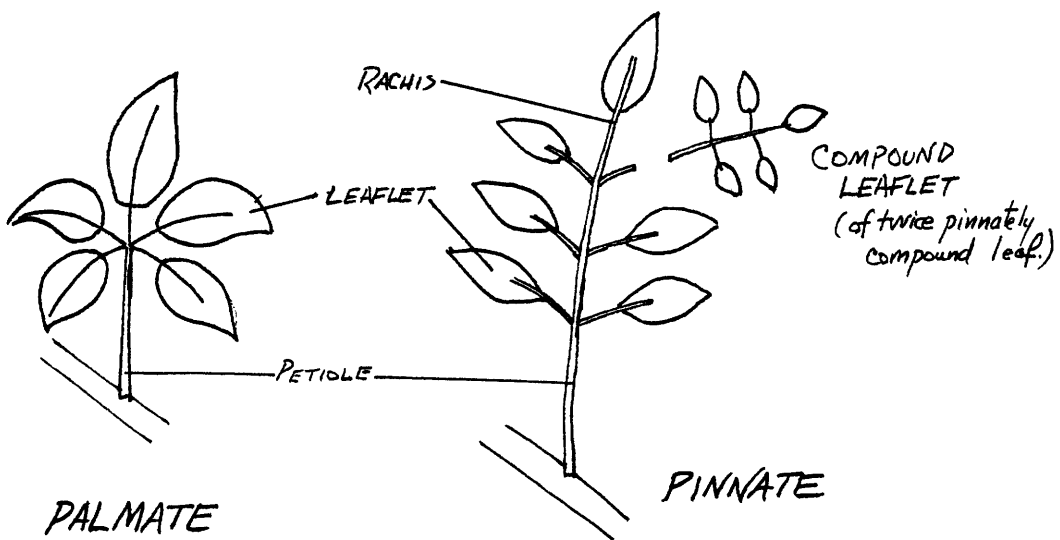


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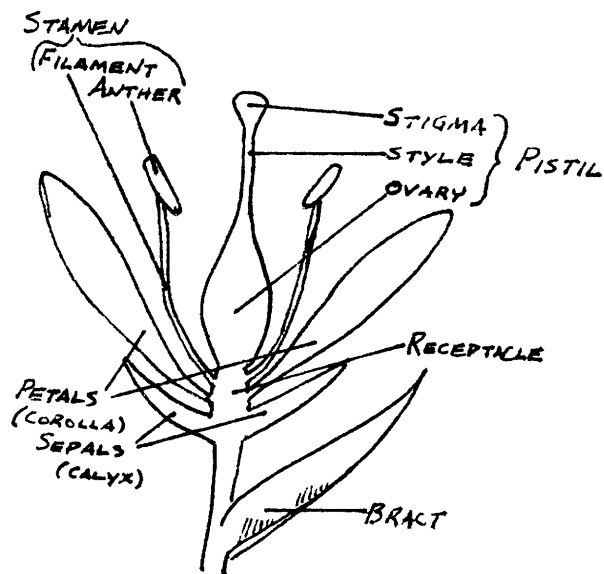


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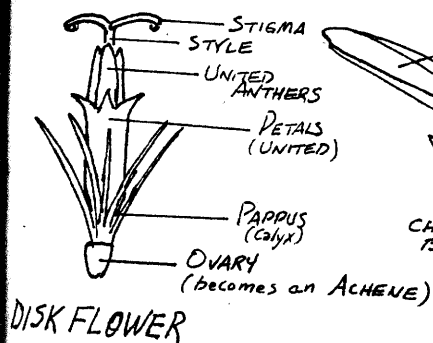
SIMPLE



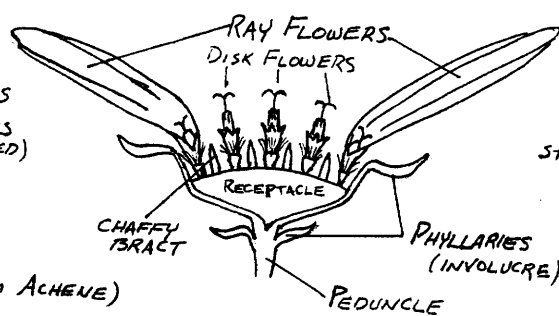
COMPOUND



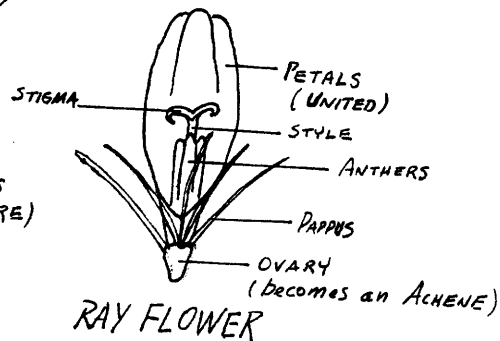
GENERALIZED FLOWER



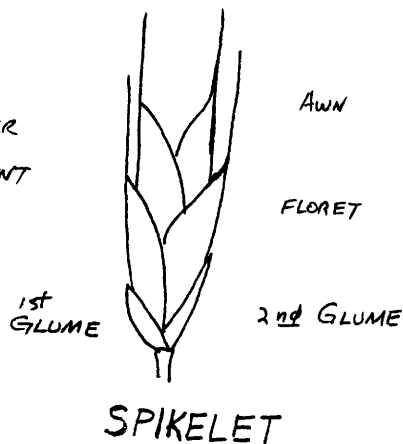
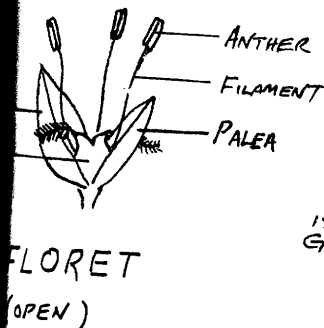
DISK FLOWER



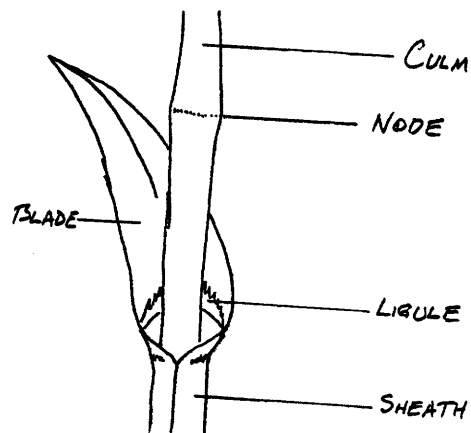
HEAD
COMPOSITE FAMILY



RAY FLOWER



GRASSES



MAP OF PLANT ASSOCIATIONS OF
EL MORRO NATIONAL MONUMENT,
NEW MEXICO

D. Archibald McCallum

May 27, 1981

INTRODUCTION

The notion of the "plant association" comes to us from the heyday of typological plant ecology just after the turn of the century. In those days people thought species of plants lived in communities, which had rather definite boundaries. Now we think that each species responds individually to its own ecological needs and that species that consistently occur together do so because of congruencies in these needs. For a pertinent example, in the hypothetical case illustrated in Fig. 1, the pinyon-juniper woodland, a familiar plant association in the El Morro area, results from the partial congruency in water needs (among others) of those two species.

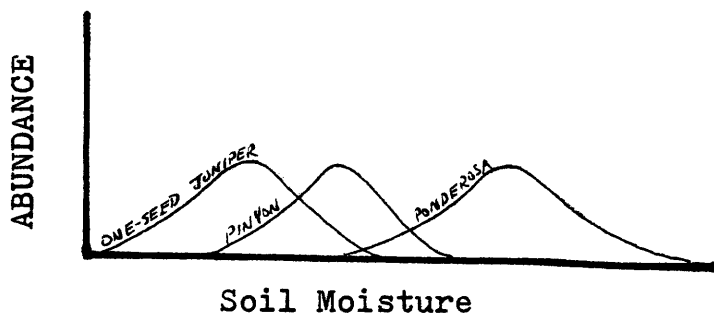


Fig. 1. Hypothetical plots of abundance of three species against usable soil moisture.

Note that although there is considerable overlap there are sites on which One-seed Junipers can flourish but Pinyons cannot. Likewise there are moister sites where Pinyons predominate, and even moister ones where Ponderosa Pines take over. The "vegetation continuum" portrayed by this graph is

the way species are really arrayed in nature. A rigorous study of the vegetation* of El Morro would seek patterns of the sort exemplified in Fig. 1 by assessing the abundance of different species along a resource continuum (e.g. soil moisture), in other words it would apply a scale to the axes on the graph.

But such a study is "beyond the scope of the current investigation" (science's favorite weasel-words), and for the purposes of the National Park Service may not be necessary at the current intensity of management activity (i.e. essentially non-manipulative stewardship). The association concept does help the observer name what he sees. In Fig. 1 the modes of pinyons and junipers are closer together than those of pinyons and ponderosas. Correspondingly, in this area most of us do discriminate pinyon-juniper woodland from Ponderosa Pine forest.

So, I have mapped some plant associations for El Morro National Monument. If the user keeps in mind the points made above, the map should be helpful in conceptualizing the arrangement of plants on the Monument without giving a false sense of definity. These plant associations grade into each other. The only definity is in the lines on the map, and they are definite only because lines tend to be that way. The lines were "eye-balled", albeit in the field. Their positions are therefore arbitrary, but no more so than the positions some mathematical formulation (e.g. the dominant species has a relative density of X%) would prescribe. The base photograph

*"Vegetation" is the arrangement of plant species in nature.
"Flora" is the species composition of the plants of an area.
The flora of El Morro has been studied rigorously.

was kindly provided by E. A. Swenson, State Biologist of the Soil Conservation Service.

MAJOR PLANT ASSOCIATIONS AND SUBDIVISIONS

Symbol

- PO I. Ponderosa Pine-Gambel Oak woodland. Occurs only contiguous to cliff faces, which collect and deliver water and provide shade that reduces evaporation. Other trees in this association are Alligator Juniper and Rocky Mountain Juniper (found only in it) and Colorado Pinyon and One-seed Juniper.
- PP I.a. Ponderosa Pine outliers. Open stands of a few trees occur in several places away from the cliffs. Scattered trees grow on the cliffs; they are not mapped.
- JP I.b. Alligator Juniper-Pinyon woodland. Dominated by large Alligator Junipers. Transitional between I and II but distinctive for the absence of ponderosas.
- PJ1 II. Colorado Pinyon-One-seed Juniper woodland.
II.a. Occurs only on top of Inscription Rock mesa, and appears to be a true "climatic climax", i.e. not dependent on features of the substrate to increase available soil moisture.
- PJ2 II.b. Occurs on slopes and appears to be an "edaphic climax", i.e. the rocky substrate collects water in the cracks between the rocks. The more open sections contain lowland shrubs (III).
- S II.c. Juniper savannah. Transitional between II and III. Contains occasional pinyons; the junipers are densely to sparsely distributed, the gaps among them usually filled by large shrubs of III.
- SH III. Horsebrush-Rabbitbrush shrubland. Occupies nearly all of the low sites and extends far up the slopes. Tetradymia canescens, Chrysothamnus nauseosus, and C. greenii are the dominant species. Many others are common but less conspicuous because of smaller size. The following occur in dense single-species stands.
- AT III.a. Four-wing Saltbush (Atriplex canescens). Recently excavated ruins and other disturbed sites.
- LY III.b. Wolfberry (Lycium pallidum).
- EU III.c. Winterfat (Eurotia lanata).
- AR III.d. Sand Sage (Artemisia filifolia). Site of an arroyo filled in the 1930's.

IV. Grassland.

- GR IV.a. Blue Grama (Bouteloua gracilis). Three small sites, all basins. Blue Grama grows in all associations but these are the only places it is dominant. I will speculate on the evolution of this situation in a separate paper on the history of the vegetation in the region.
- DR IV. b. Sand Dropseed (Sporobolus cryptandrus). An area of loose sand, to which this species is well-adapted. Chrysothamnus Greenei, a medium-sized shrub, is as common as the dropseed.
- CH Cheatgrass (Bromus tectorum). Hardly a grassland. The very loose sand gives evidence of severe disturbance. The combination of good moisture and severe disturbance is made to order for this annual. The canyon apparently was used as a corral in the nineteenth century. Parts of it have yet to heal.