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Annotated checklist of the vascular plants of Washington County, Utah

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University of Nevada,
Las Vegas

Annotated Checklist of the Vascular Plants
of Washington County, Utah

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science
in Biology

by

Susan Elizabeth Meyer

June 1976

STATEMENT BY AUTHOR

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ABSTRACT

This thesis is comprised of two parts, the annotated checklist of plants and the explanatory text which precedes it.

The checklist includes entries for the 1,207 vascular plant species known to occur in Washington County. Each entry consists of species name, floristic component classification, community type occurrence, range termination information, specimen citations, and in some cases notes and relevant synonymy.

The explanatory text includes a discussion of the methods used in the preparation of the checklist, a description of the study area, a conspectus of botanical research in the area, and a summary of the systematic and phytogeographic affiliations of the flora.

INTRODUCTION

Extreme southwestern Utah has held the interests of botanists for several reasons. The desert lowlands of the Virgin Drainage begin flowering well before the rest of the state, making Washington County an inviting destination for spring field trips. The floristic composition of the area is dramatically different from that of areas only a few miles north. The county is easily accessible, and has a congenial climate for fieldwork. Moreover it is a region of great scenic beauty. Consequently, it has been rather well collected by Utah standards, particularly its lowland areas. But to date no one has attempted to synthesize all of the information on the flora of the county into a coherent unity. This study represents such an effort.

It would be difficult for a botanist to travel from Cedar City, Utah, to Mesquite, Nevada, without noticing the abrupt shift in floristic composition. In fact this change, along with concomitant changes in physiography and climate, is apparent even to the casual observer. Viewing the landscapes of the county from one of the many vantage points, it is apparent that this is a complex environment, and it is not surprising that its flora is correspondingly complex.

The a priori explanation for this floristic complexity is that high species diversity is related to habitat diversity. The county

contains within its 40-mile by 60-mile confines an amazing array of diverse environments.

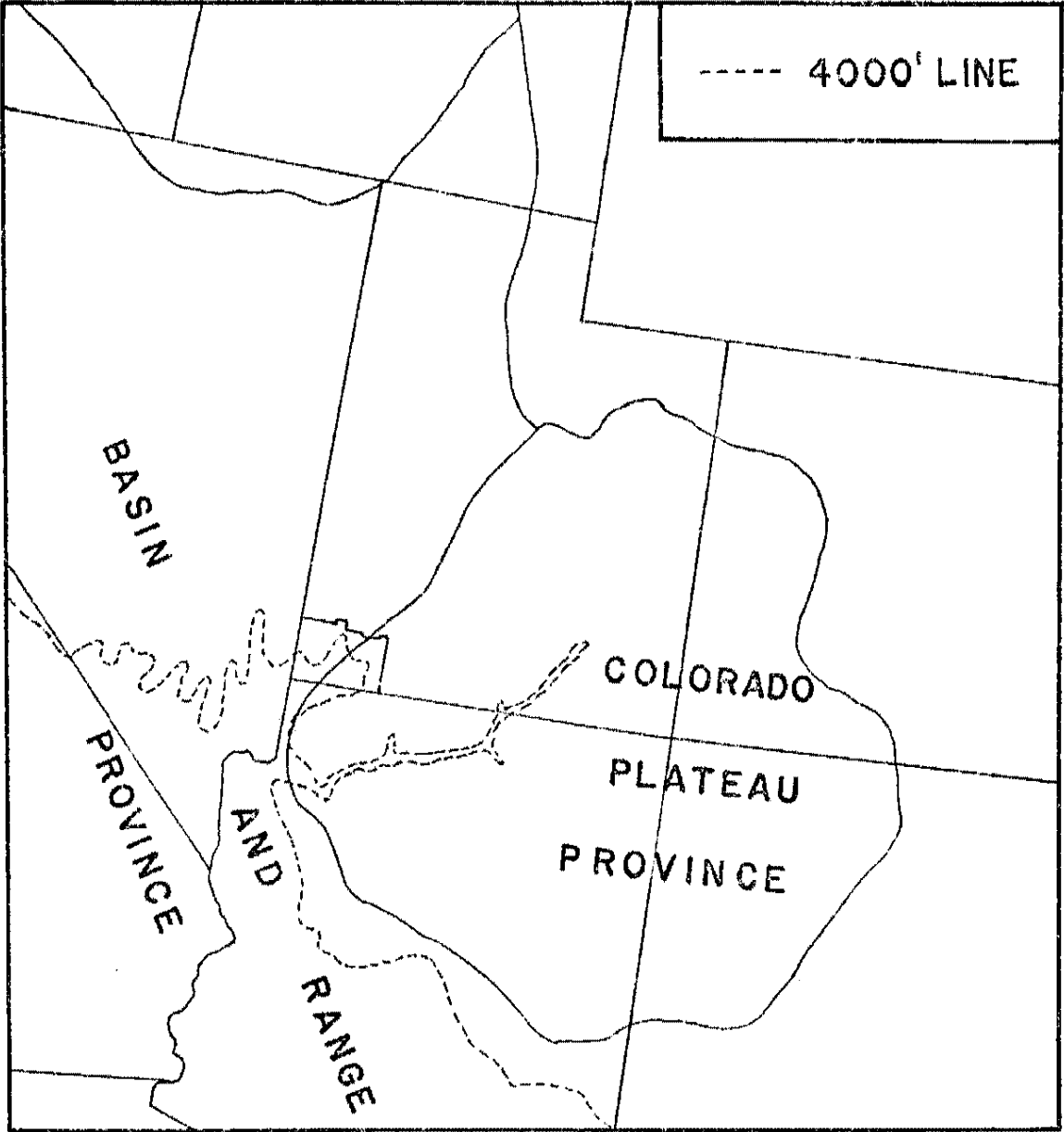
Perhaps more important than environmental diversity per se is the fact that these diverse environments are not arrayed in random mosaic fashion. The county represents the site of the juncture and interdigitation of geographically bounded environments which are themselves relatively homogeneous (Fenneman 1931).

The geographical location of Washington County relative to these bounded environments is mapped in Figure 1. The county straddles the physiographic boundary between the Colorado Plateau Province and the Basin and Range Province. These two provinces are lithologically, geomorphologically, and climatically very different, and the transition between the two takes place within the 60-mile east-west distance spanned by the county.

Superimposed on this essentially east-to-west environmental transition is a well-marked climatic transition that is oriented in a north-to-south direction. This transition is associated with a drop in elevation as one proceeds southwestward through the county along the Virgin Drainage and represents a trend that continues over a very large distance rather than a local pocket of low elevation in the midst of highlands.

Virtually all the major valley floors to the southwest of the county lie at elevations well below 4,000 feet; these valley floors have a relatively homogeneous climate characterized by extreme aridity, hot summers, and mild winters. The Virgin Drainage is an attenuation of these low valleys into the Colorado Plateau and Great Basin regions,

FIGURE 1. Geographic Location of the County



whose valley floors almost never drop below 4,000 feet and are consequently much colder and less arid.

As can be seen from Figure 1, the county lies almost squarely over the region in which these two pairs of bounded environments intersect each other. This accounts in large measure for the great environmental diversity in the area and sets the stage for the study of floristic interactions.

This thesis represents the first phase of more extensive studies of the factors mediating floristic complexity in this geographic area and in general. It is involved primarily with documenting the existence of the extant flora, and also with making first approximations regarding the ecological amplitude and patterns of distribution of the component species. In this way it will provide a source of primary data which may then be used to answer questions of phytogeographical import.

METHODS

Accrual of Data

Field and herbarium studies extending over the period from the spring of 1970 to the spring of 1976 have provided the primary data upon which this checklist is based. These include the collection and identification of over 4,000 numbered specimens from the county, each with accompanying data collected in standardized format to facilitate comparisons between species.

This fieldwork was supplemented by examination of an additional 7,000 herbarium specimens from the county, including the complete county holdings of the Garrett Herbarium (University of Utah), the Zion National Park Herbarium, the Dixie College Herbarium, and the University of Nevada, Las Vegas Herbarium. In addition, critical material was examined at the Brigham Young University Herbarium, the Pomona College Herbarium, and the Herbarium of the Rancho Santa Ana Botanic Garden.

Extensive review of the floristic and monographic literature provided additional information on the occurrence of plant species within the county.

Criteria for Inclusion of Taxa on the Checklist

A taxon is included on the checklist only if it meets one of the two following criteria.

- (1) A representative county collection was examined.
- (2) A specific county specimen citation was reported in the literature.

Taxa are not included on the basis of general distributional information as recorded in state and regional floras of adjacent areas. An effort has been made, however, to locate collections of those species whose presence is inferred on the basis of this sort of information. This tactic has resulted in the inclusion of relatively few additional species, and thus the practice of excluding species for which material cannot be located seems justified. It may result in a slightly less complete list, but that seems preferable to a list which includes plants which have probably never been collected in the county.

Taxonomic Policy

The taxonomic policy adopted in this work is essentially conservative. Working in an area of environmental and floristic transition provides an exceptional opportunity to observe the breakdown of the concept of species as narrow, static, and rigidly definable entities. Fortunately this seems to be the current trend in systematics, and many of the more recent monographic works corroborate observations made during the course of this study. Many of the more complex groups, however, have yet to be treated monographically, and it has been

necessary to append notes to some of the species which seem to vary in particularly confusing ways. Hopefully this information will be helpful to monographers in the future.

Some may criticize a decision made early in the study to spend little time and energy in attempting to assign county material to infraspecific taxa. In an area where so many of the species themselves are unstable, concern over the varietal or subspecific status of a plant seems inappropriate to a work of this nature. Consequently, infraspecific taxa are considered only when deemed to be of major phytogeographic interest. This decision has been arbitrary, and should not be interpreted to mean that county material necessarily belongs to the typical infraspecific taxon in those cases where none is mentioned.

A similarly pragmatic attitude has been adopted in the treatment of synonymy. It is obviously not exhaustive, nor is it intended to represent any contribution to taxonomic knowledge. Most of the synonyms cited are names by which the plants have been known either in previous works on the plants of the area or in floras of adjacent areas which are commonly used in identification.

The application of the synonym is not always rigorous. For example, it may be considered in most recent works as a synonym for a subspecies other than the one which actually occurs in the county, or other than the typical subspecies, and thus does not represent a synonym in the strictest sense. This practice has been followed in an effort to make the list more useful by making it possible to use it in conjunction with keys which are already available. This problem will be obviated with the publication of a modern flora which includes the county.

In general the taxonomic treatment of Holmgren and Reveal (1966) has been followed unless there was some specific reason to depart from it. This is the only modern work intended to be inclusive for the county, and it includes the vast majority of species known to occur there. It is relatively recent and incorporates most of the nomenclatural changes shown to be necessary in the years which have intervened since the publication of Tidestrom's flora (1925). More importantly, it presumably represents the basic taxonomic policy to be followed in the Intermountain Flora. The first volume of this work (Cronquist et al. 1972) has already been published, and another volume is reportedly in press.

Since the Intermountain Flora will be the first modern flora to treat Utah in its entirety, it seems reasonable to keep the taxonomic policies of this thesis in line with it whenever practical. This will certainly increase the long-term usefulness of the present checklist.

In a few cases the taxonomic treatment in a state or regional flora has described the situation in the county more accurately than Holmgren and Reveal. More frequently the treatment in a monographic work was followed.

It seemed presumptuous to set any taxonomic precedents on the basis of material from a single county examined only in the light of morphological and ecological criteria. Consequently no new precedents are set in this work. Ultimately the procedure followed was that of finding the taxonomic precedent which best described patterns of variation within the county. In those cases in which no precedent

seems to represent the situation very well, supplementary discussion is included.

Relevant works cited in the Selected Bibliography were consulted in the preparation of the checklist even in those cases where they are not specifically cited.

Specimen Citations

The function of the specimen citations is twofold: (1) to give some concept of distribution within the county and local phenological patterns for each species, and (2) to serve as documentation for the inclusion of species names on the list. New distributional records are substantiated with voucher material, and locations are given for populations whose study might clarify the complexities of certain groups.

Several compromises have been made in the interests of brevity in the preparation of the checklist citations. The location data have been much abbreviated. Ecological data for each citation are not included, but are summarized in the form of community type occurrences for the species as a whole, occasionally supplemented with additional notes on ecology. In many cases only representative material is cited. Choice of specimens cited is based on an attempt to represent the full range of possibilities in terms of phenology, ecology, and locations within the county. For example, material has been cited from Zion National Park when available in the interests of making the list more useful to workers in that area.

It should be noted that specimens are cited only when they have been physically examined by the author. Specimen citations extracted from the literature are not included. If a species is included on the basis of a reference in the literature alone, that fact is stated and the reference is given.

Floristic Component Classification

It is customary in floristic works to include a section on the general geographical distribution for each species. This information was included on the checklist data sheets from which the final checklist was typed. At the same time a distribution map for each species was prepared. This included a county-by-county or sector-by-sector mapping of the information contained in state and regional floras of adjacent areas. Monographic sources were consulted in the preparation of the maps whenever possible; otherwise the maps were compiled synthetically from a combination of floristic sources. There is one obvious loophole in this latter method, and that is that there is no floristic reference which gives county-by-county distributions in Utah. Consequently the accuracy of some of the maps is questionable, but represents the best approximation based on information available in the literature. The only other alternative was to map from herbarium material, a process roughly equivalent to monographing every group and thus logistically impossible for the purposes of this study.

The reason for the preparation of these distribution maps was to make it possible to compare the distributions of various species directly in order to make generalizations about types of distributions and to classify the flora on the basis of these types. These distribution types are designated as floristic components.

Ideally a floristic component is a group of species which have identical distributions. But this definition raises numerous problems. In the first place, no two species can have strictly identical distributions since that implies that the individuals of the two species are occupying the same space. But even if such a hyperbolic view is dismissed, and even if the precise distribution of each species were known and recorded in the literature, a classification based on placing only species whose distributions matched perfectly in a certain group would only result in a great proliferation of categories, each of which would contain very few species.

It seems much more useful to classify those species whose distributions fall within certain limits or meet certain criteria as members of the same floristic component. For example, not all endemic plants have the same distribution, but as long as the criteria for inclusion are made clear, it is meaningful to discuss endemic plants collectively.

Data on range termination were abstracted from the distribution maps which were prepared. This information will be the crux of any phytogeographical analysis of the flora; unfortunately it also represents the weakest link in the mapping process. Based on the information available, a decision was made as to whether the species appeared to

reach the limit of its distribution within the county. Again, many of these decisions represent first approximations only. The life of the phytogeographer will clearly be made much simpler when a modern flora for Utah is available.

The system of floristic component classification used in this work is outlined below. In order for a species to qualify as a member of a given component, it must be widely distributed in the designated area and its boundaries must not exceed the boundaries of the area to any degree. This leaves a great deal of latitude in the concept of a floristic component and makes it possible to generalize about groups of species which have a common type of distribution. It should be emphasized that this system is based entirely on modern distributions and makes no inferences regarding age or centers of origin.

WIDESPREAD

- Circumboreal: Northern Hemisphere
- Cosmopolitan: throughout the world
- New World: Western Hemisphere
- North American: North America
- Western: western North America
- Western-Plains: western and central North America

NON-NATIVE

- Introduced: not native, but growing without the aid of cultivation

NORTHERN

Boreal: northern North America

Intermountain: Great Basin and Colorado Plateau regions

Intermountain-Plains: western and central North America east
of the Sierra Divide and north of the Southwest deserts

Northern Mountain: northern part of western North America

WESTERN

Californian: coastal and cismontane region of western North
America and inland to some degree

Great Basin: Great Basin region

Great Basin-Mojavean: Great Basin and Mojave Desert regions

Mojave-Californian: coastal and cismontane region of western
North America and Mojave Desert region

Southern Great Basin-Mojavean: southern Great Basin and
Mojave Desert regions

SOUTHWESTERN

California-Mojave-Sonoran: Mojave and Sonoran Desert regions
and coastal and cismontane California

California-Southwestern: Mojave, Sonoran, and Chihuahuan Desert
regions and coastal and cismontane California

Mojavean: Mojave Desert region including the Colorado Desert

Mojave-Sonoran: Mojave and Sonoran Desert regions

SOUTHERN

Arizonan: almost completely restricted to Arizona

Austral: southern North America and sometimes southward

Chihuahuan: Chihuahuan and Sonoran Deserts

Mojave-Colorado Plateau: Mojave Desert and Colorado Plateau regions

Mojave-Colorado Plateau-Chihuahuan: Mojave, Sonoran, and Chihuahuan Desert regions and Colorado Plateau region

Southwestern: Mojave, Sonoran, and Chihuahuan Desert regions

EASTERN

Colorado Plateau: Colorado Plateau region

Colorado Plateau-Chihuahuan: Colorado Plateau and Sonoran and Chihuahuan Desert regions

Eastern: eastern and central North America

Plains: central North America

Rocky Mountain: Rocky Mountain region

NON-DIRECTIONAL

Anomalous: widely distributed, but not falling into any of the other components

Intermountain-Chihuahuan: Great Basin, Colorado Plateau, Sonoran Desert, and Chihuahuan Desert regions

Intermountain-Southwestern: western North America east of the Sierra Divide

Mojave-Intermountain: Mojave Desert, Great Basin, and Colorado Plateau regions

Southern Intermountain: Mojave Desert, southern Great Basin,
and Colorado Plateau regions

Southern Great Basin-Colorado Plateau: southern Great Basin
and Colorado Plateau regions

RESTRICTED

Endemic: any distribution more restricted than the ones
described above, but not necessarily restricted to
Washington County.

Community Type Classification

As was pointed out above, in the interests of brevity it was
decided to summarize the ecological information for each species in the
form of a community type classification rather than give complete
ecological data for each specimen citation. The advantages of this
system are numerous.

First, it makes it possible to include data from field
observations and uncited material in the overall information presented
for the species. Second, it reduces the information to a standard
format which facilitates comparisons between species. Third, it
provides a concise way of presenting a great deal of information
about each species.

But anyone who has worked in canyon ecosystems will recognize
that the classification used here must be the result of a large amount
of simplification. The advantages gained through making it possible
to compare and correlate information directly seem to more than

compensate for the loss of detail when data are reduced to a generalized form.

The particular scheme of vegetation classification used here is discussed at length later in the text, along with problems attendant to its application.

DESCRIPTION OF THE STUDY AREA

General Information

Washington County is located in the extreme southwestern corner of the state of Utah. It is bounded on the north by Iron County, Utah, on the south by Mojave County, Arizona, on the east by Kane County, Utah, and on the west by Lincoln County, Nevada.

One of the smaller of Utah's rural counties, it includes an area roughly 2,400 square miles in extent. Its northern boundary extends approximately 60 miles eastward from the Nevada state line, and its eastern boundary extends approximately 40 miles northward from the Arizona state line.

Elevations in the county range from about 2,200 feet on the Beaver Dam Wash in the extreme southwestern corner to 10,365 feet on Signal Peak at the top of the Pine Valley Mountains, an altitudinal span of over 8,000 feet. Climate and vegetation in the area are correspondingly diverse.

Physiography and Geology

Washington County is a region of great physiographic complexity. Much of this complexity stems from the fact that the county sits astride a major physiographic boundary. As previously

indicated (Figure 1), this boundary divides the county into two parts along a north-south axis. The situation is further complicated by the presence of the Pine Valley Mountains and associated areas to the west which are typical of neither of the two provinces. The following discussion of physiography and geology is drawn primarily from Cook (1960) and Gregory (1950), to whom the reader is referred for a more detailed account. Accessory information is drawn from published maps of the area and from personal field observations.

The physical features of the county are perhaps best examined by breaking it down into geographically contiguous subunits and discussion each subunit individually. Figure 2 shows the arrangement of the following subunits within the county:

- (1) Beaver Dam Mountains
- (2) Bull Valley Mountains
- (3) Pine Valley Mountains
- (4) Kolob Terrace
- (5) Big Plain-Little Creek Mountain
- (6) St. George Basin

In addition to lying on a major physiographic boundary, Washington County straddles a major drainage divide. Figure 3 shows the orientation of the county relative to this divide between the Great Basin and Colorado River drainage systems.

It is the differences in habitat generated by differences in topography, lithology, drainage, soils, and climate within and among these physiographic subunits to which the flora of the county represents a response. The boundaries used to demarcate these subsections in the

Figure 2. County Physiographic Subunits

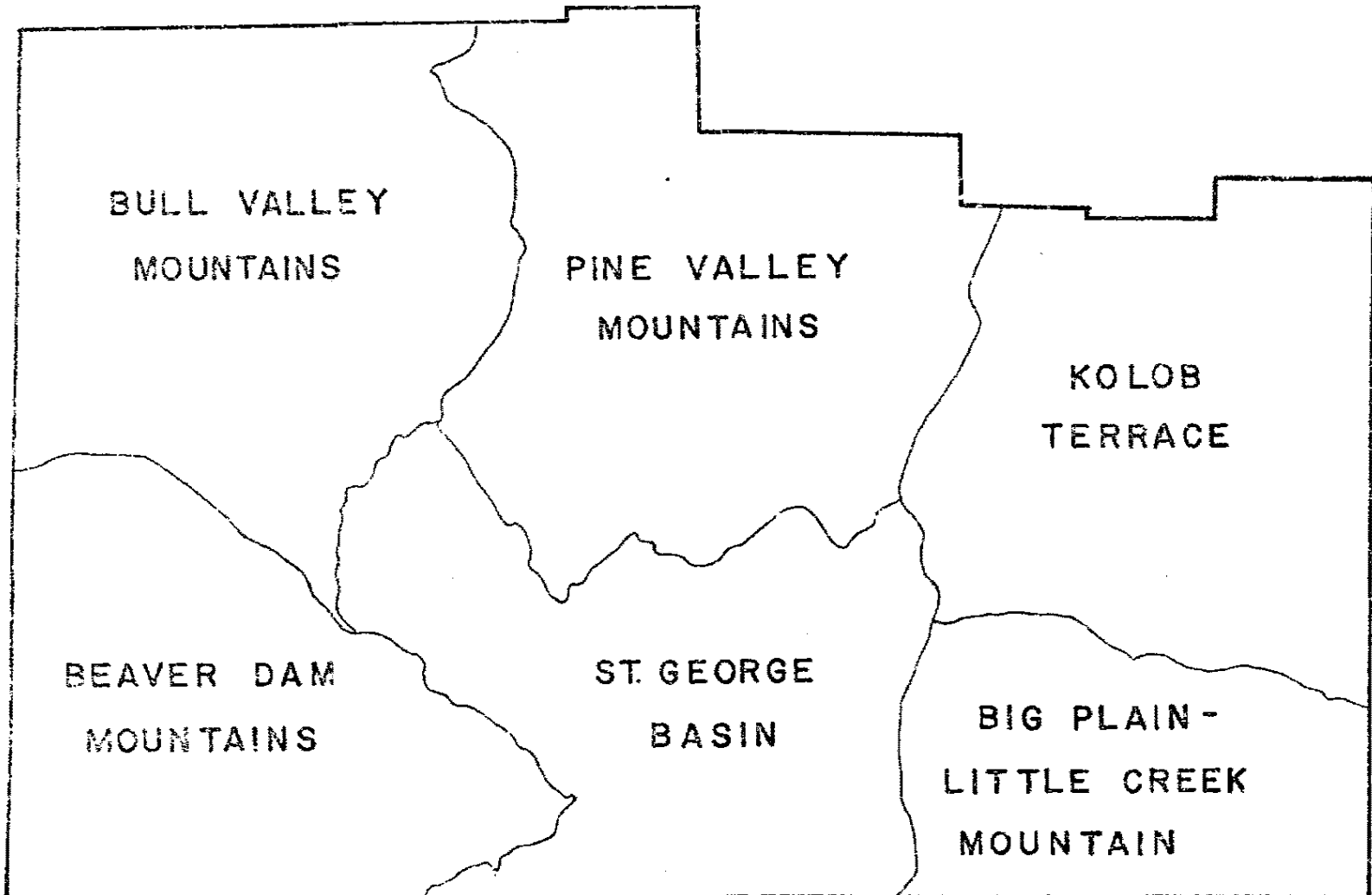


Figure 3. Location of the County Relative to Major Drainage Systems



field were selected pragmatically for use by a non-geologist and sometimes do not reflect structural boundaries very precisely.

BEAVER DAM MOUNTAINS

Located in the southwestern corner of the county, the Beaver Dam Mountains are a fault block mountain range comprised primarily of Paleozoic carbonate rocks and as such are quite representative of the Basin and Range Province as a whole.

For the purposes of this study, the mountains were taken to include all the land south of the road from Shivwits to Motoqua and all the land west of the Virgin and Santa Clara Rivers. In practice this includes two areas in addition to the mountain-range proper, which is aligned in a north-south direction through the center of the area circumscribed.

On the west flank of the range, an extensive system of alluvial fans slopes down to the Beaver Dam Wash, which runs in a north-south direction along the western edge of the county. On the east flank, to the east of the Cedar Pocket Canyon Fault, are the White Hills and Blake's Lambing Grounds, two areas of gently rolling topography which are intricately dissected by a wash system that drains into the Virgin River. This topography is developed in situ on rocks of the Moenkopi and Kaibab Formations respectively, in sharp contrast to the wash system on the west flank of the range, which is developed entirely on the deep alluvial sediments of a system of outwash fans.

The Beaver Dam Mountains themselves are comprised of a north and a south unit divided by a relatively high pass (4,775 feet) known as Utah Hill Summit. The highest peak in the range, 7,746-foot Beaver Dam Peak, is in the northern unit. The highest peak in the southern unit has an elevation of 6,820 feet. In general, the mountains have a rugged aspect, and are largely inaccessible even by jeep. The lack of water severely limits access on foot or horseback.

Most of the land on the west side of the mountains lies well below 4,000 feet and slopes down to 2,200 feet at the point where the Beaver Dam Wash crosses the Arizona state line north of Littlefield. The mountains themselves range mostly from 4,000 to 6,000 feet with only isolated peaks rising above the latter elevation. The elevations in the area to the east of the range average about 3,500 feet and range from about 2,600 feet along the Virgin River to about 4,500 feet at the point where the mountains begin to rise abruptly.

As mentioned before, the rocks of the Beaver Dam system are composed almost completely of Paleozoic carbonates and their derived sediments. Outcrops of schists and granites that date back to the Precambrian in age are also present. These rocks outcrop quite extensively in the Welcome Spring area on the southwestern face of the range.

The area is one of extreme aridity. There are no permanently flowing streams, and even actively flowing spring are very rare.

BULL VALLEY MOUNTAINS

The Bull Valley Mountains are not really a discrete range but rather a series of hills in the northwest corner of the county. The boundary between them and the Beaver Dam Mountains to the south is quite abrupt, and occurs roughly along the Shivwits-Motoqua Road which serves as a northern boundary for the latter range. Their eastern boundary is less clear, since the Bull Valley Mountains and the Pine Valley Mountains to the east are parts of essentially the same system of rocks. This boundary was arbitrarily set along Utah Highway 18 from the Iron County line south to Veyo and thence south along the Santa Clara River to Shivwits.

The contrasts between this area and the Beaver Dam Mountains are many and distinct. In the first place, the Bull Valley area is almost completely devoid of carbonate rocks. The vast bulk of the landscape is comprised of a bewilderingly complex array of volcanic formations which are primarily Tertiary in age. These tend to weather into rounded, undistinguished-looking hills covered with brush that often effectively conceals the nature of the underlying material.

Elevations in the Bull Valley area are higher on the average than those of the Beaver Dams, even though the highest peaks, Flat Top Mountain (7,313 feet), Big Mountain (7,233 feet), Pine Park Peak (7,312 feet) and Macfarlane Mountain (7,061), are not quite so high. The lowest elevations in the area are slightly under 4,000 feet and occur along the Beaver Dam Wash, which continues its course northward into the Bull Valley area, and along the Santa Clara River in the southwestern corner.

The land trends generally upward to the north until the divide into the Great Basin drainage is crossed, and then drops slightly downward. Most of the land lies between 5,000 feet and 6,500 feet, with numerous peaks rising to slightly greater heights.

The topography of the area is complex. Most of the access roads follow drainageways, which follow steep, V-shaped valleys, and these drainageways must provide the primary means of orientation.

Three separate systems drain the area. These are the Beaver Dam, the Santa Clara, and the Shoal Creek drainages.

The Beaver Dam drainage consists of the East and West Forks of the Beaver Dam Wash and Slaughter Creek, a major tributary of the latter. These drain the southwestern quarter of the Bull Valley area. The two forks join near Motoqua to become the main channel of the Beaver Dam Wash, which then runs southward to its ultimate confluence with the Virgin River near Littlefield.

The southeastern corner of the area is also drained ultimately into the Virgin River via another of its major tributaries, the Santa Clara River. The entire system of major washes on the southeast flank of the Bull Valley Mountains empties into this drainageway. This system includes (in order from north to south) Mogotsu Creek, Moody Wash and its tributaries Cove Wash and Racer Canyon Creek, Tobin Wash, Manganese Wash, and Pahcoon Spring Wash.

Approximately the northern third of the area is drained by a system of small washes which empties directly into Shoal Creek. This creek is oriented in an east-west direction along the northern edge of the county; it ultimately dwindles and disappears in the inland

basin called the Escalante Desert near Beryl Junction. The only permanent stream which enters Shoal Creek from the south is Enterprise Creek, which flows out of the northern end of Enterprise Reservoir.

The Bull Valley area is much less arid than the Beaver Dam area, with most of the major washes having at least areas of standing water at all times of the year.

As mentioned above, most of the Bull Valley area is surfaced by volcanic rocks of Tertiary age. These belong to no less than 14 named formations, the most extensive of which is "Undifferentiated Volcanics," which implies a situation even more complex than a map would indicate. Fortunately, plants appear to have just as much trouble distinguishing between these various formations as botanists do. A few of the tuffs outcrop spectacularly in the form of "hoo-doo's" and beautifully rounded pink boulder masses, but most present a monotonously uniform appearance to the untrained eye.

In addition to the volcanics, outcrops of sedimentary rocks Cretaceous or younger in age cover a sizable portion of the landscape. Most of these are fluvial deposits of the Tertiary Muddy Creek Formation. There are also small areas of more recent alluvium and of intrusive rocks similar to those which outcrop extensively in the Pine Valley Mountains to the east. A sequence of Jurassic and Triassic rocks which probably belongs more properly to the St. George Basin occupies the southeastern corner. Lastly, there is an isolated outcrop of Coconino Sandstone and underlying Callville Limestone which forms the bulk of Square Top Mountain, the only prominent landmark in the southern end of the area.

The general aspect of the landscape is gentle, by Cordilleran standards. Access is largely by means of a labyrinthine system of old mining roads which anastomose in a most confusing fashion. The area is poorly collected botanically, probably because of its relative drabness compared to adjacent areas.

PINE VALLEY MOUNTAINS

The scenery of Washington County is dominated by the majestic peaks of the Pine Valley Massif. These mountains rise from 3,500-foot southern foothills to an elevation of over 10,000 feet in less than 10 miles, and thus present a very impressive rampart when viewed from the south.

The mountains occupy a north-central position in the county. They are bounded on the east by a major structural feature, the Hurricane Fault, which closely parallels Interstate Highway 15 from its northern entry into the county to the Toquerville turnoff. The range is bounded on the west by Utah Highway 18, which runs southward from the Iron County line through Diamond Valley and on into St. George. Just north of the Snow's Canyon turnoff a dirt road takes off to the east. This road ultimately connects with the Oak Grove Road just north of Leeds and is arbitrarily selected as the southern boundary.

The Pine Valley Mountains are roughly horseshoe-shaped, with the mouth of the horseshoe opening in a northwest direction. A high ridge, with elevations consistently in excess of 8,000 feet, runs virtually the length of this horseshoe, a distance of about 20 miles. From this ridge elevations drop sharply in all directions, but most sharply to the south, east, and southwest, to the outside of the

horseshoe. The mountains drop ultimately to valley floors which are 5,000 feet or lower on these three sides, but slope much less abruptly to the northwest, to the inside of the horseshoe. The high valleys which lie in the interior of the horseshoe are Pine Valley and Grass Valley, which have elevations of between 6,000 and 7,000 feet.

Over a third of the Pine Valley Mountain area lies at elevations above 7,000 feet, making it one of the two extensive highland areas in the county. A considerable part of this highland, perhaps a fifth, is over 9,000 feet, and there are a number of peaks in addition to Signal Peak which exceed 10,000 feet. Most of the remaining land in the area lies between 5,000 and 7,000 feet in elevation. The moisture regime of the area as a whole is consequently very mesic, and perennial streams abound.

The largest of these streams is the Santa Clara River, which has its headwaters in canyons on the interior side of the horseshoe and drains the entire northwest flank of the mountains. It runs westward out of the horseshoe's mouth and then turns southward to its ultimate confluence with the Virgin River near St. George. A few washes on the outside of the west end of the horseshoe also drain into the Santa Clara, but none of these are permanent streams.

A second major drainage system is the Ash Creek system. Ash Creek is an essentially north-south running stream which has its headwaters in canyons on the northeast side of the horseshoe above New Harmony. In the course of the descent to its confluence with the Virgin near Hurricane, it is joined by several southeast-flowing tributaries which drain the outer or southeastern curve of the horseshoe.

These are (from northeast to southwest) Leap Creek, South Ash Creek and its tributary Mill Creek, and Wet Sandy Creek. All are permanent streams.

The next creek encountered as one proceeds southwestward is Leeds Creek, which is oriented similarly to the others but which drains directly into the Virgin. Leeds Creek and its tributaries, Cottonwood Creek, Bitter Creek, Three Pine Creek, and Quail Creek, drain most of the southwest face of the mountain. All of these are intermittent except Leeds Creek itself.

The outer flank of the northern arm of the horseshoe is drained by Pinto Creek, which meets its fate in the same fashion as Shoal Creek in the alluvium of the Beryl Desert. It is thus a part of the Great Basin drainage system.

Geologically the Pine Valley Mountains are very different from the fault block mountains so characteristic of the Basin and Range Province. Basically they consist of a massive intrusive body, the sedimentary overlay of which has since partly weathered away. Associated with this intrusion was extensive volcanic activity in the area immediately to the north and west. The intrusion and associated activity date from Tertiary times.

Consequently the rocks of the Pine Valleys consist of three series of types. The peaks themselves are granitic in composition and represent the original intrusion which has been exposed by erosion. The magnificent cliffs on the south face of the mountains are composed of this granitic material.

The rocks of the southern foothills represent older sedimentary strata which were pushed up by the intrusion and which have now been stripped from the top. These rocks are primarily Cretaceous in age. In the southwestern part of the area they are largely covered by basalt flows which are Tertiary or more frequently Quaternary in age.

To the west and northwest of the mountain massif is the array of volcanics already mentioned as being so confusing.

KOLOB TERRACE

The canyons of Zion National Park, located in the northeastern corner of the county, are the most famous scenic attractions in southern Utah. These canyons, which are incised into the edge of the tabular, flat-lying series of rock layers known as the Kolob Terrace, are characterized by sheer vertical cliffs thousands of feet high. The character of the landscape is contingent largely on the weathering characteristics of the predominant cliff-former of the area, the massive Navajo Sandstone.

The Kolob Terrace is the southwesternmost of the series of giant risers or stairsteps which give the Colorado Plateau Province its characteristic landscapes. The highlands of the area are with few exceptions plateaus rather than mountain ranges. The rocks are essentially tabular in arrangement and flat-lying in orientation and comprise a series of tiers of rock layers which become both higher and geologically younger as one proceeds northeastward. All are sedimentary and range from Triassic to Cretaceous in age, except for a few Quaternary basalt flows.

The western boundary of the Kolob Terrace is marked by the Hurricane Fault, a north-south trending fault which is upthrown sufficiently on the east side to expose Permian strata (Kaibab Limestone and Coconino Sandstone) along its scarp. The Hurricane Fault runs southward into Arizona where it continues to be a prominent structural feature as far south as the Grand Canyon. It would certainly be legitimate to consider all the land on the east side of the fault as comprising one physiographic county subunit. In practice it has been more useful to divide this area on an east-west plane, thus separating the Kolob high country and the canyons of Zion proper from the lower and drier lands to the south. A logical boundary between the two is the Virgin River itself as far east as Shunes Creek and thence east along Shunes Creek to the Kane County line.

In addition to the Kolob Terrace itself, the area thus circumscribed includes a tableland of medium elevation. Variouslly known as Pioneer, Hurricane, or Smith Mesa, it occupies the southwestern quarter of the area and represents a shortened half-step in the sequence of rocks which make up the first stairstep of the Colorado Plateau.

Elevations in the Kolob Terrace region range from a high of 8,740 feet on Horse Ranch Mountain near the Iron County line to lows near 3,500 feet along the Virgin River at the southern perimeter of the area. In general the elevations fall into three classes which correspond to levels of the staircase, with very little area falling into intermediate classes.

The valley floors which lie at the foot of the great cliffs range from 3,500 feet to 4,500 feet in elevation. The high plateau country which stretches northward in rolling hills from their tops ranges mostly from 7,000 to 9,000 feet. And the level tableland of Smith Mesa ranges from 5,000 to 6,000 feet. Most of the remaining interval is represented mainly by the sides of cliffs. But one should not gain from this the impression that the landscape is monotonously flat.

The Virgin River and its tributaries have dissected an incredible maze of canyons, buttes, towers, grottos, and spires into the sheer rock face of Navajo Sandstone that marks the edge of the Kolob Terrace. Looking at a topographical map of the area, one has trouble believing that it could ever have been surveyed from the ground. At first it is difficult to perceive any pattern at all in the jumble. But the rivers themselves are once again the key to understanding this complex landscape.

By the time the Virgin River reaches La Verkin at the southeastern edge of the area, it represents the combined flow of four tributary systems, the Parunuweap or East Fork of the Virgin, the Makuntuweap or North Fork of the Virgin, North Creek, and La Verkin Creek.

The first of these, the Parunuweap, drains extensive highland areas in Kane County to the east and thus contributes considerable water to the Virgin but is relatively unimportant as a drainage system in Washington County. The Makuntuweap, on the other hand, drains Zion Canyon itself and through its tributaries, Orderville Creek, Deep Creek, Crystal Creek, and Kolob Creek, it drains most of the high country above.

North Creek enters the Virgin near the town of Virgin, about 10 miles west of the Zion Park Boundary. It flows southward from its source on the southwest face of the Zion escarpment, a beautiful and little-known part of the park known as Great West Canyon, and passes through a lava-rimmed canyon between the Kolob Terrace on the east and the east side of Smith Mesa to the west.

La Verkin Creek enters the river near the town of La Verkin after flowing southward along a course which parallels almost exactly that of Ash Creek but which passes through a valley on the east side of the Hurricane Fault. These two drainages do not meet until their mutual confluence with the Virgin. Ash Creek receives tributaries from the Pine Valley Mountains to the west, while La Verkin Creek receives tributaries from the Finger Canyons of the Kolob on the east and drains the western third of the Kolob Terrace. The exception is Taylor Creek which drains the northern portion of the Finger Canyons and crosses over into the Ash Creek drainage. The main tributaries of La Verkin Creek are Willis Creek, Beartrap Canyon, Hop Valley Wash, and Timber Creek.

Due to the fact that the Kolob high country is contiguous with extensive tracts of even higher land to the north, it receives a great deal of snowfall and is consequently very mesic. Water is abundant on the terrace, and the walls of Zion Canyon are dampened by numerous springs and seeps. Most of the streams mentioned above are perennial.

The geological sequence of the Kolob Terrace is refreshingly straightforward. This is because the different formations are stacked up in an orderly progression from oldest to youngest. These formations

differ considerably in their lithology even though all are sedimentary with the exception of the basalt flows which provide a thin overlay in some areas. Each of these strata weathers in a characteristic fashion into a material which provides a medium for plant growth. Some of these materials are unusual in their mineralogical and textural qualities and support an interesting endemic flora.

In general the strata may be divided into those which are erosion resistant and those which are much less so. The former tend to form the caprock of the tablelands and mesas, with the softer underlying strata forming their sloping sides.

The oldest stratum, the Permian Kaibab Limestone, is exposed only along the Hurricane Fault. It is overlain by a sequence of Triassic rocks. The first in this sequence is the Moenkopi Formation, which is composed of soft shales. That formation is in turn overlain by the erosion-resistant Shinarump Formation, which forms the capstone of the southern end of Smith Mesa, with the Moenkopi forming its colorfully banded sides.

Overlying the Shinarump is another series of soft shales, the Chinle Formation, which is in turn overlain by another capstone-former, the Moenave Sandstone. These form another subriser at the north end of Smith Mesa.

This sequence of Triassic rocks is overlain by the relatively soft shales and siltstones of the Jurassic Kayenta Formation. These rocks form the steep sloping bases of the massive cliffs of the overlying Navajo Sandstone, which is Jurassic in age. Collectively,

these six strata form the first riser of the giant Colorado Plateau staircase.

On top of the terrace a sequence of younger sedimentary rocks, the beginnings of the next riser, makes its first appearance. None of these form cliffs in the grand manner of the Navajo, but tend to form brush-covered slopes with low relief.

Immediately overlying the Navajo is the Jurassic Carmel Limestone which surfaces much of the southern and western part of the plateau. It is in turn overlain by a series of undistinguished-looking sandstones, limestones, and shales of Cretaceous age. Some of the area is surfaced with a patina of lava.

BIG PLAIN-LITTLE CREEK MOUNTAIN

This area of the county is physiographically very much a part of the Zion country, and its lithological sequence is identical to the lower portion of the Kolob Terrace sequence. The major difference between the two lies in the relative proportion of high to low land and the resulting increase in aridity in the more southern area, which is located in the southeastern corner of the county.

With the exception of Smith Mesa, which might more logically be included in this section rather than the last, the Kolob Terrace area is essentially a mountain country dissected by deep canyons which are traversed by perennially flowing streams. The Big Plain-Little Creek Mountain country, on the other hand, lies mostly at elevations from 4,000 to 6,000 feet. Its canyons are dry washes with the exception of South Creek on the extreme eastern edge of the county.

This area is bounded on the west by the cliffs of the Hurricane Fault scarp and on the north by the Virgin River. It is divisible into four subsections.

The first of these subsections, Canaan Mountain, occupies the eastern third of the area. The peaks of Canaan Mountain exceed 7,000 feet in elevation, making them the highest points in this part of the county. But this highland is of very limited extent and does not provide headwaters for any perennial streams except perhaps South Creek.

At the foot of the Navajo Sandstone cliffs of Canaan Mountain the land stretches westward as a relatively level tableland which is broken into two units by the drainage of Gould Wash. The smaller northern unit is called Gooseberry Mesa; the larger southern unit is Little Creek Mountain. Both are capped by the Shinarump Formation and represent a southward extension of the same strata that make up Smith Mesa to the north. As such, they are part of the same half-stairstep, just as Canaan Mountain is the southward extension of the upper half of the stairstep.

The drainage of Gould Wash follows a broad valley which runs in a northwesterly direction, first between Little Creek Mountain and Canaan Mountain itself, and then between Little Creek Mountain and Gooseberry Mesa. This valley, deeply filled with alluvial sand weathered from the adjacent strata, is called Big Plain.

Big Plain lies at an elevation of about 4,500 feet, while the mesas to its north and south lie at elevations between 5,000 and 6,000 feet. The elevations north of Gooseberry Mesa drop off very

abruptly to the valley of the Virgin River, while those to the south decrease gradually toward Arizona. On the west the scarp of the Hurricane Fault marks the sudden descent to the lowlands of the St. George Basin.

As previously mentioned, the area is relatively arid in terms of surface water, though there are a few springs. It is drained primarily by Gould Wash, which empties into the Virgin near Hurricane. The northeast flank of Canaan Mountain is drained by washes which empty into the Parunuweap. And the south end of Big Plain is drained by Short Creek, which ultimately drains directly into the Colorado.

Geologically the area is extremely similar to the Smith Mesa area, except for the presence of more extensive basalt flows.

ST. GEORGE BASIN

The St. George Basin occupies a southcentral position in the county. It is bounded on the east by the Hurricane Fault scarp. On the west its boundary follows the Virgin River north to the Santa Clara River, and thence north along the Santa Clara to Veyo. From Veyo the boundary follows Utah Highway 18 south to Diamond Valley where it then turns east along the dirt road to Leeds. At Leeds it turns north along Interstate Highway 15 to the Toquerville turnoff and then south past Toquerville to La Verkin, where it intersects the fault. Obviously this boundary is highly artificial, but it does manage to delineate roughly the boundary between the St. George Basin and adjacent areas.

Geologically the St. George Basin is part of the same lithological sequence as areas on the east side of the fault. Due to the extreme downthrow on the west side of the fault, this sequence is repeated at a lower elevation in the St. George Basin area than the sequence on the east side. But the rock units involved are identical and were presumably continuous before faulting occurred.

Aside from the Kaibab Limestone cliffs of the fault scarp itself, the most conspicuous structural feature of the St. George Basin is the Virgin Anticline. This valley, which transects the basin in a southwest-northeast direction, was once a long dome overlain by a complete sequence of Triassic and Jurassic rocks. Differential erosion has scooped out a trench through the center of the anticline, exposing the softer strata of the interior, in some places all the way down to the Permian Kaibab. Since the strata were once continuous over the top of the anticline, the successive beds on the northwest and southeast sides of the valley match up rather precisely, with each successively younger stratum being peeled off a little farther back, revealing an outcrop of the next older stratum. The erosion-resistant Navajo Sandstone still covers the surface of most of the land in the areas away from the center of the anticline, except in places which are coated with lava flows or buried in alluvial or aeolian sand deposits.

The successive stripping away of younger strata to reveal older has also taken place in the southwestern part of the basin. As one proceeds southwestward, one passes across outcrops of the Navajo, Kayenta, Moenave, Chinle, Shinarump, and Moenkopi Formations, respectively. This trend continues on the west side of the Santa Clara River until the massive Paleozoic rocks of the Beaver Dam upwarp are encountered.

The entire St. George Basin is drained by the Virgin River and its major tributary, the Santa Clara River. The Virgin, which has already joined with tributaries draining the eastern half of the county, breaches the Hurricane Fault in a spectacular canyon near La Verkin. It runs westward until it intersects the anticline, which it then follows southwestward. It joins the Santa Clara River south of St. George and then runs southwestward through the lower Virgin Narrows in Arizona to its ultimate confluence with the Colorado at Lake Mead.

Several effects have combined to make the St. George Basin a lowland area, primarily its position on the edge of the plateau combined with the effective downcutting action of the Virgin River system. Elevations in the area average between 3,000 and 4,000 feet. The lowest elevations occur along the river and drop to about 2,600 feet. Higher elevations are found along the northern boundary where the foothills of the Pine Valleys begin. These average between 4,000 and 5,000 feet. The highest peak, 5,460 feet, is at the top of Red Mountain north of Ivins. The relief is generally quite high even though there are no cliffs on a scale with those of Zion. The general effect is of a series of level or slightly tilted tablelands dissected by numerous washes.

Other than the Virgin and the Santa Clara Rivers themselves, the drainageways of the St. George Basin are dry washes. There is a surprisingly large number of flowing springs, however, most of which surface at the base of the Navajo and find their ultimate source in the

snows of Pine Valley to the north. But the extreme aridity of the region is not much alleviated by these. The only more arid portion of the county is the lowland on the west flank of the Beaver Dams.

The area is the most intensively developed in the county, and almost all of it is easily accessible by car.

Climate

The climate of Washington County is characterized by extremes. Above all, it is extremely variable, both spatially and temporally. The spatial variation is loosely correlated with altitude, but many local influences act to modify this correlation. The temporal variation is expressed both by a seasonal cycle and by radical differences in values from year to year. The climatic data discussed below are drawn from publications of the U.S. Weather Bureau (1960a, 1960b, 1965).

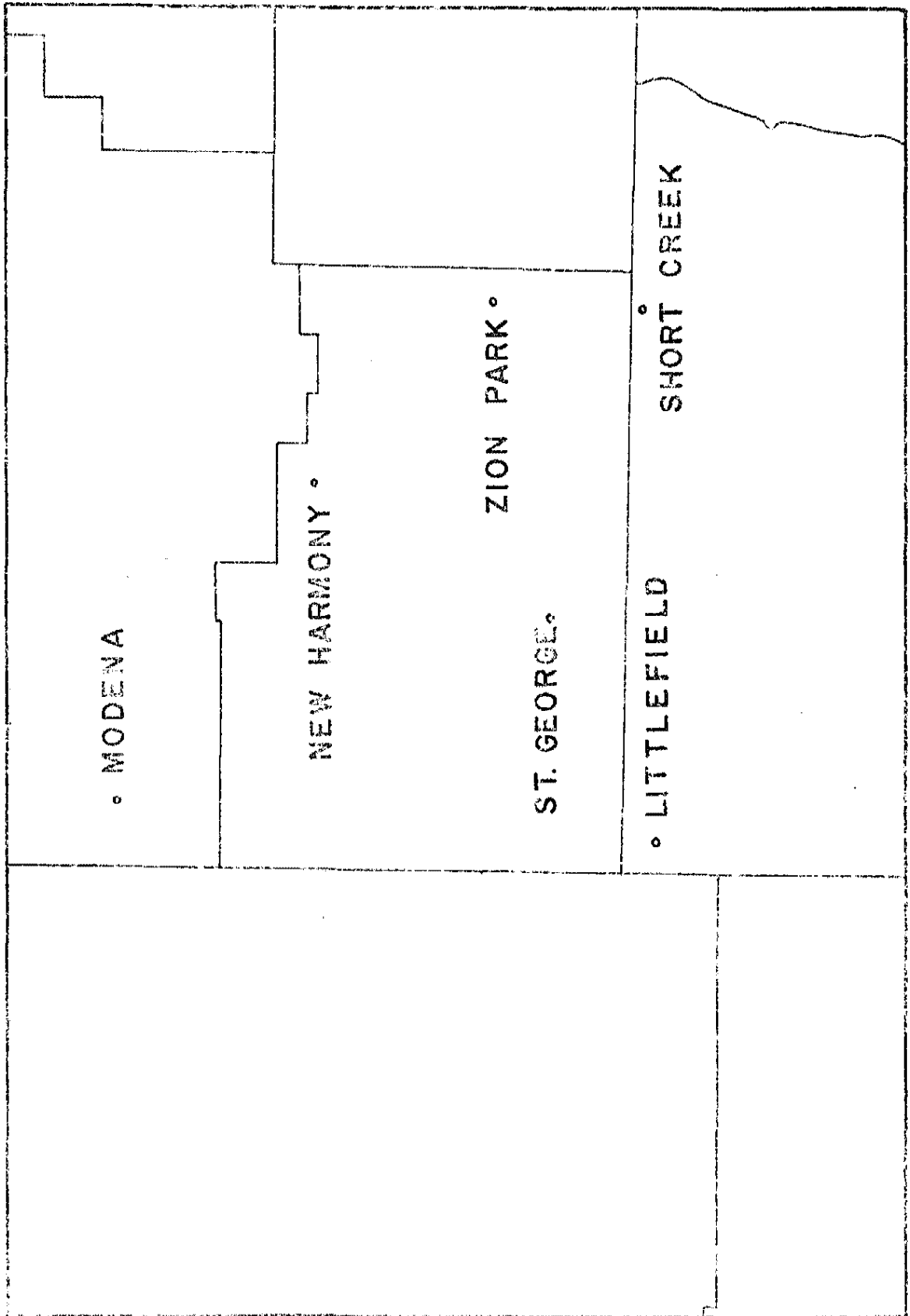
SPATIAL CLIMATIC VARIATION

Some climatic data for six weather stations located in and adjacent to the county are given in Table 1. The map locations of these stations are shown in Figure 4. Unfortunately, most of the towns and all of the weather stations are situated in valleys, so values will have to be extrapolated upward for the high mountain areas. Even so, general patterns emerge from the available data. The stations are ranked according to elevation, and the rough correlation between that variable and mean annual temperature is easily discerned.

TABLE 1. Annual Climatic Data for Six Weather Stations In and Adjacent to Washington County

| Station | Elevation (feet) | Temperature (°F) | | | | Precipitation (inches) | | | |
|-------------|---------------------|--------------------------------|--------------------------|--------------------------|------|--------------------------------|------------------------------|------------------------------|-------|
| | | Period of Record (years) | Mean Daily Minimum | Mean Daily Maximum | Mean | Period of Record (years) | Extreme Annual Minimum | Extreme Annual Maximum | Mean |
| Littlefield | 1,800 | 8 | 47.5 | 82.0 | 64.8 | 8 | 3.17 | 8.98 | 6.94 |
| St. George | 2,800 | 65 | 42.7 | 77.4 | 60.0 | 70 | 3.58 | 14.38 | 8.25 |
| Zion Park | 4,000 | 28 | 47.5 | 75.4 | 61.5 | 29 | 5.41 | 20.32 | 14.59 |
| Short Creek | 5,000 | 10 | 39.3 | 68.9 | 54.1 | 11 | 4.76 | 14.50 | 9.89 |
| New Harmony | 5,300 | 9 | 38.1 | 67.1 | 52.6 | 32 | 7.94 | 29.28 | 18.39 |
| Modena | 5,400 | 60 | 32.9 | 63.8 | 48.2 | 60 | 4.17 | 16.28 | 10.26 |

Figure 4. Location of Six Weather Stations in
and Adjacent to Washington County



The correlation between altitude and mean annual precipitation is not nearly so apparent, however. Association with adjacent extensive highland areas versus extensive lowland areas appears to be almost as important as elevation per se. For example, Zion Park receives almost twice as much rain as St. George, even though they differ only a thousand feet in elevation and have very similar temperature regimes. This is perhaps because of its more immediate association with the highland areas of the Kolob Terrace and the plateaus beyond, and its much less immediate association with the extensive lowlands of the Lower Virgin drainage in northwestern Arizona.

The climate of Littlefield is probably comparable to that of lowland areas on the west flank of the Beaver Dam Mountains. It is characterized by extreme aridity and a mean annual temperature considerably higher than those recorded for the remaining five stations. Frosts occur on the average only in December and January, and temperatures as high as 120° F have been recorded.

The climate of St. George typifies that of the St. George Basin in general. It is also decidedly xeric in character, though not so extreme as that of Littlefield. Summer temperatures are nearly as high, but the colder winters bring the annual mean down nearly five degrees. Frosts occur on the average from November through February, and the mean annual snowfall is 6 inches, compared to 1.5 inches in Las Vegas, Nevada, which otherwise has a climate comparable to that of Littlefield. The highest temperature ever recorded in St. George is 116° F, and the lowest, -11° F, which gives

some indication of the extreme nature of the climatic regime in the county.

The climate of Zion Park shows an interesting pattern. Its temperature regime is actually slightly warmer than that of St. George, even though it is approximately 1,000 feet higher. This may be due to its sheltered location on the floor of a narrow canyon. As previously mentioned, its mean annual precipitation is nearly twice that of St. George, and the same may be said of its annual snowfall, which averages 13.5 inches. Zion Park data may be taken as more or less representative of the Upper Virgin drainage in general.

The climate of Short Creek is probably quite representative of the Big Plain-Little Creek Mountain area. Its annual mean temperature is several degrees colder than that of Zion Park, but it is considerably more arid. Frosts occur on the average from November through March. No snowfall information is available.

The town of New Harmony has a climate which typifies that of the foothills of the Pine Valley Mountains. Values for the peaks and for the Kolob highlands would be correspondingly lower for temperature and higher for precipitation and snowfall. The town itself has the highest precipitation value of any weather station in the county; it is almost twice that of Short Creek, which lies at approximately the same elevation and has a similar temperature regime. Again, this may be due to the proximity of extensive highland areas. Snowfall at New Harmony averages 43 inches annually.

The climate of the Bull Valley region is reasonably well-typified by that of Modena. It is decidedly colder than stations at comparable elevations on the leeward side of the highlands, with a mean annual temperature about five degrees colder than those of New Harmony and Short Creek. It is also considerably more arid than New Harmony, with a higher proportion of the precipitation falling in the form of snow, an average of 31 inches annually. Frosts occur on the average from November through April. The coldest temperature ever recorded at any of the stations, -32° F, was recorded at Modena.

TEMPORAL CLIMATIC VARIATION

As is typical for temperate regions, the climate of Washington County is characterized by a marked seasonality. Table 2 shows monthly means for precipitation and temperature at the weather stations discussed above. It also shows extreme monthly maxima for precipitation. Extreme monthly minima are all zero or very close to it for all months at all stations.

Monthly mean temperatures oscillate from a low value in January to a high value in July at all six stations. The difference between these two mean values is about the same in all cases, indicating a similar degree of seasonal variation in temperature even though absolute values are different.

The annual precipitation pattern is also quite similar from station to station. All show a period of heavier precipitation in late fall, winter, and early spring, followed by a drying trend which reaches its maximum expression in June. This is followed by a period of late summer storms, with another minor break in mid-autumn before

TABLE 2. Monthly Climatic Data for Six Weather Stations In and Adjacent to Washington County
(temperature in °F; precipitation in inches)

| Station | Parameter | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Littlefield | Mean daily temperature | 43.7 | 49.3 | 53.4 | 62.9 | 71.8 | 79.5 | 87.2 | 86.1 | 78.6 | 66.9 | 52.7 | 45.1 |
| | Mean monthly precipitation | 0.53 | 0.72 | 1.01 | 0.47 | 0.40 | 0.16 | 0.51 | 0.82 | 0.24 | 0.67 | 0.75 | 0.66 |
| | Maximum monthly precipitation | 1.25 | 2.09 | 2.86 | 1.20 | 1.35 | 0.98 | 1.13 | 2.19 | 0.76 | 2.14 | 1.10 | 1.93 |
| St. George | Mean daily temperature | 38.8 | 44.0 | 50.8 | 58.9 | 67.2 | 76.3 | 82.8 | 81.1 | 72.8 | 60.6 | 47.4 | 39.1 |
| | Mean monthly precipitation | 0.98 | 1.04 | 0.88 | 0.50 | 0.41 | 0.19 | 0.76 | 0.80 | 0.62 | 0.71 | 0.52 | 0.82 |
| | Maximum monthly precipitation | 2.71 | 3.61 | 3.61 | 1.59 | 1.60 | 1.75 | 1.73 | 2.22 | 4.16 | 3.07 | 2.55 | 2.84 |
| Zion Park | Mean daily temperature | 39.7 | 43.8 | 49.9 | 59.0 | 67.8 | 77.6 | 84.4 | 82.4 | 76.4 | 64.0 | 50.3 | 42.3 |
| | Mean monthly precipitation | 1.63 | 1.78 | 1.73 | 1.21 | 0.76 | 0.56 | 0.86 | 1.25 | 1.06 | 1.10 | 1.00 | 1.65 |
| | Maximum monthly precipitation | 4.03 | 4.95 | 5.01 | 4.37 | 2.78 | 3.61 | 3.59 | 2.87 | 6.70 | 3.30 | 3.22 | 3.39 |

TABLE 2. Monthly Climatic Data for Six Weather Stations In and Adjacent to Washington County (cont'd.)
(temperature in °F; precipitation in inches)

| Station | Parameter | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------------|-------------------------------|------|------|------|------|------|------|------|------|------|-------|------|------|
| Short Creek | Mean daily temperature | 34.8 | 37.4 | 41.4 | 52.2 | 59.7 | 68.7 | 76.1 | 74.1 | 67.8 | 57.3 | 43.4 | 36.8 |
| | Mean monthly precipitation | 1.17 | 0.78 | 0.94 | 0.81 | 0.48 | 0.47 | 1.33 | 1.35 | 0.41 | 0.60 | 0.73 | 0.82 |
| | Maximum monthly precipitation | 2.75 | 1.63 | 3.39 | 2.08 | 1.83 | 1.48 | 3.08 | 2.88 | 1.09 | 1.75 | 1.45 | 2.36 |
| New Harmony | Mean daily temperature | 35.3 | 35.9 | 40.8 | 49.3 | 56.8 | 67.3 | 74.2 | 71.9 | 66.2 | 56.2 | 41.6 | 36.2 |
| | Mean monthly precipitation | 2.41 | 1.84 | 2.28 | 1.46 | 0.74 | 0.66 | 1.38 | 1.46 | 0.90 | 2.03 | 1.25 | 1.98 |
| | Maximum monthly precipitation | 6.59 | 4.57 | 5.76 | 3.05 | 2.19 | 2.84 | 3.65 | 4.54 | 1.70 | 10.81 | 4.70 | 4.86 |
| Modena | Mean daily temperature | 26.7 | 31.6 | 38.4 | 46.5 | 54.4 | 63.8 | 71.4 | 69.6 | 61.1 | 49.4 | 37.3 | 28.7 |
| | Mean monthly precipitation | 0.83 | 0.84 | 1.03 | 0.79 | 0.75 | 0.40 | 1.12 | 1.45 | 0.77 | 0.98 | 0.60 | 0.70 |
| | Maximum monthly precipitation | 3.79 | 2.19 | 2.56 | 2.79 | 2.03 | 2.74 | 2.49 | 6.24 | 3.24 | 5.91 | 2.84 | 2.41 |

winter storms begin again. The relative amount of precipitation received during summer versus winter storm periods varies from station to station and even more radically from year to year.

In fact, year-to-year climatic variation within the county is so marked and so unpredictable as to minimize the significance of comparisons between means. After all, it is the stresses of climatic extremes rather than means which a plant species must withstand in order to maintain its current distributional pattern.

This year-to-year variation is particularly marked with regard to amount and seasonal patterning of rainfall. An examination of extreme annual maximum and minimum precipitation values in Table 1 will reveal the degree of variation in total precipitation from year to year, while comparison of mean versus extreme monthly precipitation values in Table 2 will give some idea of the degree of variation on a monthly basis. Keeping in mind the fact that extreme minimum monthly values drop to near zero in all cases, it becomes apparent that rainfall is irregular at best. This effect is accentuated at lower, more xeric stations and somewhat ameliorated at higher, more mesic stations, but it manifests itself throughout the county.

A similar effect is reported for temperature, though these data are not included here. Unseasonably warm or cold weather is as much a norm as an exception, and there are always years on record which show maxima and minima far removed from the mean. Damaging frosts occur occasionally at almost all times of the year except at the very lowest and warmest stations.

It should also be kept in mind that local conditions of exposure, slope, and topography may create very substantial differences in microclimate even in places which are immediately adjacent. This is particularly important to plants, which can only respond to climatic conditions in their immediate microenvironments during most of their life cycles.

Soils

Since soil is considered to be a natural body which develops genetically under the combined mediation of climate, parent material, topography, and vegetation, it is not surprising to find that the soils of Washington County reflect the extreme variation present in each of these mediating factors.

Particularly in more arid regions of the county, the chemical nature of the soil is directly related to the chemistry of the parent material. Some types of parent material support a characteristic endemic flora, the members of which presumably have narrow edaphic tolerances. For example, one small group of endemics is restricted to the Petrified Forest Member of the Chinle Formation (Howell 1942b). The relationship between soil chemistry and plant microdistribution in the county remains largely unexplored.

The discussion of soils which follows is based on a number of different publications of the U.S. Soil Conservation Service (USSCS). This synthetic approach is necessary because a complete soil survey for the St. George Soil Conservation District has not yet been published,

though it is complete in manuscript form (Potter, personal communication). Previously published reports on more arable portions of the county (USSCS 1942, 1960b) are based on the nomenclature in use before the adoption of the Seventh Approximation (USSCS 1960a) and are thus of limited usefulness. More recent publications on the new nomenclature (USSCS 1970) and its specific application to American soil series (USSCS 1972) have been much more useful, especially when applied in conjunction with the previously cited reports and unpublished material.

This treatment of the soils of the county is necessarily cursory. No primary data other than color, texture, and apparent moisture regime of the surface layer were taken in the course of this study. More emphasis was placed on the nature of the underlying parent material than on the structure of the soil itself.

Table 3 shows the described soils of the St. George Soil Conservation District arranged according to their classification in the modified system of nomenclature used in the 1970 taxonomy.

Soil may be defined as a natural medium for the growth of terrestrial plants. According to this definition a soil does not have to have readily discernible horizons, but it does have to present some condition intermediate between bare rock and permanent inundation. Soil grades gradually into "not-soil" at both ends of this continuum. This basic concept of soil is used in the Seventh Approximation and will be used here.

TABLE 3. Washington County Soils

ARIDISOLS

Argids:

Typic Haplargids
 Lithic Haplargids
 Ustollic Haplargids
 Lithic Ustollic Haplargids

Petrocalcic Paleargids
 Petrocalcic Ustollic Paleargids

Orthids:

Typic Calciorthids
 Lithic Calciorthids
 Ustollic Calciorthids

Typic Paleorthids
 Ustollic Paleorthids

ENTISOLS

Fluvents:

Typic Torrifluvents
 Ustic Torrifluvents

Orthents:

Typic Torriorthents
 Ustic Torriorthents
 Lithic Torriorthents
 Lithic Ustic Torriorthents

Typic Ustorthents

Psamments:

Typic Torripsamments
 Lithic Torripsamments
 Ustic Torripsamments

MOLLISOLS

Borolls:

Lithic Haploborolls

Typic Argiborolls
 Pachic Argiborolls

Pachic Paleborolls

Ustolls:

Typic Haplustolls
 Cumulic Haplustolls
 Lithic Haplustolls

Lithic Argiustolls
 Aridic Argiustolls

Petrocalcic Paleustolls

VERTISOLS

Usterts:

Typic Chromusterts

ALFISOLS

Boralfs:

Mollic Eutroboralfs

Even by this broad definition, a considerable portion of the surface of Washington County falls into the category of "not-soil." Most of this is bare rock which is exposed on surfaces so steep that no soil can accumulate. A much smaller proportion is that land which is permanently submerged.

All of the remaining land surface is considered to be covered with some sort of soil. Most of these soils fall into one of three orders. The first of these, the Entisol order, includes soils with a pale surface horizon low in organic matter (ochric epipedon) and little or no development of pedogenic horizons. The soils of the Aridisol order also have an ochric epipedon, but show the development of at least one diagnostic subsurface horizon. The soils of the Mollisol order have a dark, organically enriched surface horizon with high base saturation (mollic epipedon) as well as the development of at least one diagnostic subsurface horizon.

In general in Washington County the Entisols are developed on surfaces which are too recent, too sandy, or too unstable to show horizon development. They occur for the most part in the lower, more xeric parts of the county, where rainfall is insufficient to support the vegetation necessary for the development of a mollic epipedon.

The Aridisols are for the most part developed on ancient alluvial surfaces derived largely from carbonate rocks. This is particularly true of those which show petrocalcic (caliche) horizons. At least one horizon, either calcic, petrocalcic, or argillic, is present. As with the Entisols, these soils develop under arid conditions in Washington County.

The Mollisols, on the other hand, develop on those sites where rainfall is sufficiently abundant to support the relatively dense vegetation necessary for the development of a mollic epipedon. These are the soils of the mountainous parts of the county.

Soils of two additional orders are present in the county. Typic Chromusterts, which are members of the Vertisol order, are swelling clay soils which may develop locally on specific parent materials. Mollic Eutroboralfs develop under a frigid temperature regime under high montane coniferous forests. They lack the well-developed mollic epipedon of the Borolls, and are classified as Alfisols.

Soils commonly do not have sharply defined boundaries in the horizontal plane, but grade from one to another in continuum fashion. Thus soils which are intermediate in character between subgroups and even orders are frequently encountered.

ENTISOLS

The Entisols of the county fall into three suborders, the Fluvents, the Psamments, and the Orthents.

The Fluvents are soils which develop on recent water-deposited sediments which are relatively fine in texture. Most of those present in the county are considered to have a torric (dry) moisture regime, though some may have a ustic (summer moist) regime in areas which are subject to consistent flooding. The Fluvents are of relatively limited extent in Washington County.

The Psamments are soils which are comprised almost completely of sand, often aggregated to form dunes. Those in the county develop under a torric moisture regime. They may be either deep or shallow to bedrock. Some develop under slightly more mesic conditions. In view of the extensive outcrops of parent materials which weather to form sand, it is not surprising to learn that the Psamments cover a major proportion of the county, particularly in the eastern half.

The Orthents are fine-textured soils which develop on recent erosional surfaces. In Washington County almost all are residual soils developed on shales and mudstones. Most have a torric moisture regime, though some develop under a slightly more mesic regime. They may be deep or shallow to bedrock.

ARIDISOLS

The Aridisols fall into two categories, the Argids and the Orthids, characterized respectively by the presence and absence of an illuvial clay horizon (argillic horizon) below the epipedon.

Argids in Washington County may in turn be of two types, those with a petrocalcic (caliche) horizon in addition to the argillic horizon and those without. Some contain more moisture than the typical Argid, and some are shallow to bedrock. Most occur at middle elevations in the western half of the county.

The Orthids of Washington County are all characterized by the presence of one or more calcic or petrocalcic horizons. These are the calcareous and caliche soils so characteristic of the arid bajadas of the Basin and Range Province.

Calcic and especially petrocalcic horizons in the absence of other horizons are characteristic of soils developed on carbonate-rich substrates under climatic regimes too arid to permit leaching away of these carbonates. Thus most are developed under a very dry moisture regime at low elevations. These are virtually restricted to the Beaver Dam Mountains. Some occur at slightly higher elevations and contain sufficient organic matter to classify as intermediate to the Mollisols.

MOLLISOLS

The Mollisols of Washington County are the soils of mesic mountain regions and thus cover a large proportion of its northern half. Depending on their moisture and temperature regimes they are classified as Ustolls, Borolls, or Aquolls.

The Aquolls are the saturated soils of poorly drained mountain meadows. They are characterized by a frigid temperature regime and a high proportion of clay throughout the profile. They may or may not have calcic or argillic horizons.

The Borolls are the well-drained soils of the high mountains; they too have a frigid temperature regime. They may or may not have argillic, cambic, and/or calcic horizons.

The Ustolls are warmer than the Borolls and are less consistently moist. They have an argillic, calcic, and/or petrocaclic horizon. Ustolls as a group are characteristic of the higher foothills and lower mountain slopes.

Vegetation

Even though it has an extreme climate and soils which are for the most part rather poor by agricultural standards, most of the land in Washington County is occupied by living plants. Plant cover ranges from very dense to extremely sparse, but only in areas of bare rock, unstable shifting sand, or extreme overuse by domestic livestock are vascular plants completely absent.

The individuals which make up each species occupy particular sites by virtue of the fact that they possess genetic ranges of tolerance which permit them to grow and reproduce under the environmental conditions prevalent at those sites (Good 1931). The tolerance ranges and thus the limits of distribution for each species as a whole are directly contingent on the tolerance characteristics of the individual plants which make it up. There is no reason to assume that these ranges and limits should be the same for any two species (Gleason 1926). There is, however, a tendency for species with similar ranges of tolerance to be found growing in association with each other. In addition, the factors governing environmental conditions at a particular site may have a strong biotic component. That is, the plants themselves may modify the environment in which they grow in such a way as to create changed conditions, which may be favorable to the growth of a different group of species. This is the heart of the concept of succession, and it does come into play within the county, particularly in the more mesic environments. In the more xeric environments, plant distributions tend to be mediated more directly by abiotic factors.

While it is true that each species is distributed in a manner that is more or less independent of other species, the fact that groups of species tend to occur together repeatedly under similar environmental conditions at geographically separated sites makes it possible to classify the vegetation in terms of associations.

If a species is consistently associated with some other species whose tolerance limits are known, inferences about the tolerance limits of the former species may reasonably be made. This concept forms the basis for using a plant community type classification in this thesis. By recording the community types within which a species occurs, some idea may be gained of the ecological parameters governing its distribution. This is because the tolerance limits of the dominant or marker species for each community type are relatively well known and documented in the literature.

The scheme of vegetation classification used in this thesis represents a synthesis of several sources, including Merriam (1898), Shantz (1925), and Daubenmire (1943). It was developed pragmatically from qualitative observations made during the course of fieldwork. Quantitative observations on community structure would have been valuable but were beyond the scope of this study.

The distribution of plants may be considered to be under the primary control of climate. This refers to the microclimate at the site where the individual plant is actually growing, and not to some sort of mean zonal climate in its general vicinity. Climate in turn is under the primary control of latitude and altitude, but is subject to drastic modification by factors such as exposure and slope, which

may be extremely local in their effects. In an area as topographically diverse as Washington County, these local effects are of critical importance in determining the patterns of plant distribution.

Consequently even those communities and associations which do seem to occur consistently under a given set of climatic conditions do not necessarily occupy large contiguous areas which sort out neatly along altitudinal gradients. More often they are distributed in patches which form mosaics in response to the mosaic of variation in microclimate induced by local modifying factors.

Plant distribution is controlled secondarily by edaphic factors. As previously mentioned, in the arid climate of the county most of the land supports a relatively sparse covering of vegetation, and thus the soils are little modified by organic activity. Consequently their nature is very much dependent on the nature of the parent material upon which they are developed. Given the wide variety of parent material, it is not surprising that many of the plant associations in the county are characteristic of a certain substrate and are limited in their distributions by a narrow substrate tolerances. This species segregation along edaphic gradients has the effect of breaking the climate-induced vegetation mosaic into even smaller units.

Moreover, the use of the term gradient in relation to climatic and edaphic factors is well advised. The discontinuities along these gradients may be sharp and take place over short lateral distances, but more often they are gradual. The shifts in floristic composition along the gradients mirror the steepness or abruptness of the gradient.

Consequently large areas of the county are covered by vegetation that represents a mixture of two or more plant associations rather than a plant association that is near any one norm.

The basic plan of vegetation classification used in this study is outlined in Table 4. The vegetation of the county is divided into nine major community types, each of which is considered to be characteristic of a certain climatic and surface moisture regime. These are further broken down into a total of 20 plant associations, each of which occurs under conditions which embrace those of the community type under which it is subsumed, but which are in some way more restrictive. For example, the Sandsage Association occurs under a climatic and surface moisture regime which is characteristic of the Cold Desert Shrub community type, but it is restricted to deep, sandy soils.

Not all the known associations are listed for each community type. Only those of appreciable areal extent are included. For example, petrophile associations may occur in any community, and often have a unique floristic composition. Ruderal associations of extremely varied floristic composition may also occur throughout the spectrum of community types, but are most common in the Desert Riparian and Cold Desert Shrub types, which are the vegetation types most exploited by man.

The term community type as it is used in this study is defined by ecological parameters and makes no implications regarding the systematic affiliations of the dominants.

TABLE 4. Vegetation Classification System

HOT DESERT SHRUB COMMUNITY TYPE

Creosote Bush Association
Shadscale Association

COLD DESERT SHRUB COMMUNITY TYPE

Blackbrush Association
Sandsage Association
Big Sagebrush Association
Low Sagebrush Association

DESERT RIPARIAN COMMUNITY TYPE

Wash Association
Floodplain Association
Stream Riparian Association
Brook and Seep Association

FOOTHILL WOODLAND COMMUNITY TYPE

Utah Juniper Association

MOUNTAIN BRUSH COMMUNITY TYPE

Live Oak Association
Utah Serviceberry Association

TRANSITION FOREST COMMUNITY TYPE

Ponderosa Pine Association

MOUNTAIN FOREST COMMUNITY TYPE

Aspen Association
White Fir Association
Engelmann Spruce Association

MOUNTAIN MEADOW COMMUNITY TYPE

Snowberry Association
Grass-Sedge Association

MOUNTAIN RIPARIAN COMMUNITY TYPE

River Birch Association

The term plant association, on the other hand, indicates a particular group of species which tend to occur and to achieve dominant status together. These might be better designated as plant communities. Most of the plant associations in Table 4 are named after their most consistently present and most conspicuous dominant species. Often two or more codominants may be equally abundant and conspicuous, and the relative abundance of each may shift considerably from site to site within the association, even occasionally to the exclusion of the species which has provided the association name. This broadened concept of an association eliminates the necessity for generating hundreds of association names for all the different combinations that occur. It also seems to represent a closer approximation to the realities of species distribution.

The discussion which follows describes the approximate conditions under which each community type and its respective associations occur, and the manner and degree in which they overlap. Table 5 lists the composition of each association in terms of dominant species. In those instances in which the association is named for a species, that species is the first dominant listed.

HOT DESERT SHRUB COMMUNITY TYPE

This is the characteristic vegetation at lower elevations throughout the county on sites at which the water table does not come near the surface. Jones (1910) considered it to be representative of the Tropical vegetation type and estimated it to be restricted in occurrence to areas with a mean annual temperature of 60° F or higher.

TABLE 5. Dominant Species List for Major Plant Associations

| <u>COMMON CODOMINANTS</u> | <u>OCCASIONAL CODOMINANTS</u> |
|------------------------------------|--------------------------------------|
| CREOSOTE BUSH ASSOCIATION | |
| <u>Larrea divaricata</u> | <u>Krameria parvifolia</u> |
| <u>Ambrosia dumosa</u> | <u>Dalea fremontii</u> |
| <u>Hymenoclea salsola</u> | <u>Acamptopappus sphaerocephalus</u> |
| <u>Lepidium fremontii</u> | <u>Encelia frutescens</u> |
| <u>Lycium andersonii</u> | <u>Coleogyne ramosissima</u> |
| <u>Prunus fasciculata</u> | <u>Yucca brevifolia</u> |
| <u>Gutierrezia sarothrae</u> | <u>Salazaria mexicana</u> |
| <u>Grayia spinosa</u> | <u>Tetradymia axillaris</u> |
| <u>Ephedra nevadensis</u> | |
| SHADSCALE ASSOCIATION | |
| <u>Atriplex confertifolia</u> | <u>Grayia spinosa</u> |
| <u>Ambrosia dumosa</u> | <u>Tetradymia axillaris</u> |
| <u>Dalea fremontii</u> | <u>Coleogyne ramosissima</u> |
| <u>Eriogonum corymbosum</u> | |
| <u>Ephedra torreyana</u> | |
| <u>Lycium andersonii</u> | |
| BLACKBRUSH ASSOCIATION | |
| <u>Coleogyne ramosissima</u> | <u>Artemisia filifolia</u> |
| <u>Gutierrezia sarothrae</u> | <u>Yucca brevifolia</u> |
| <u>Eriogonum fasciculatum</u> | <u>Rhus trilobata</u> |
| <u>Chrysothamnus viscidiflorus</u> | <u>Tetradymia canescens</u> |
| <u>Prunus fasciculata</u> | <u>Ephedra viridis</u> |
| | <u>Thamnosma montana</u> |
| | <u>Salvia dorrii</u> |
| | <u>Fallugia paradoxa</u> |
| | <u>Eriogonum microthecum</u> |
| | <u>Purshia tridentata</u> |

TABLE 5. Dominant Species List for Major Plant Associations (cont'd.)

| <u>COMMON CODOMINANTS</u> | <u>OCCASIONAL CODOMINANTS</u> |
|--------------------------------|------------------------------------|
| BIG SAGEBRUSH ASSOCIATION | |
| <u>Artemisia tridentata</u> | <u>Tetradymia canescens</u> |
| <u>Gutierrezia sarothrae</u> | <u>Chrysothamnus viscidiflorus</u> |
| <u>Chrysothamnus nauseosus</u> | <u>Artemisia arbuscula</u> |
| | <u>Artemisia filifolia</u> |
| | <u>Rhus trilobata</u> |
| SANDSAGE ASSOCIATION | |
| <u>Artemisia filifolia</u> | <u>Artemisia tridentata</u> |
| <u>Gutierrezia sarothrae</u> | <u>Quercus turbinella</u> |
| <u>Coleogyne ramosissima</u> | <u>Rhus trilobata</u> |
| | <u>Prunus fasciculata</u> |
| LOW SAGEBRUSH ASSOCIATION | |
| <u>Artemisia arbuscula</u> | <u>Tetradymia canescens</u> |
| <u>Purshia tridentata</u> | <u>Eriogonum caespitosum</u> |
| WASH ASSOCIATION | |
| <u>Chilopsis linearis</u> | <u>Atriplex lentiformis</u> |
| <u>Brickellia longifolia</u> | <u>Chrysothamnus paniculatus</u> |
| <u>Hymenoclea salsola</u> | <u>Chrysothamnus nauseosus</u> |
| <u>Atriplex canescens</u> | <u>Baccharis glutinosa</u> |
| | <u>Populus fremontii</u> |
| FLOODPLAIN ASSOCIATION | |
| <u>Tamarix pentandra</u> | <u>Allenrolfea occidentalis</u> |
| <u>Suaeda torreyana</u> | <u>Typha dominguensis</u> |
| <u>Atriplex canescens</u> | <u>Typha latifolia</u> |
| <u>Atriplex lentiformis</u> | <u>Scirpus paludosus</u> |
| <u>Distichlis spicata</u> | <u>Scirpus acutus</u> |
| <u>Salix exigua</u> | <u>Juncus balticus</u> |
| <u>Phragmites communis</u> | <u>Pluchea sericea</u> |
| | <u>Anemopsis californica</u> |

TABLE 5. Dominant Species List for Major Plant Associations (cont'd.)

| <u>COMMON CODOMINANTS</u> | <u>OCCASIONAL CODOMINANTS</u> |
|------------------------------------|------------------------------------|
| STREAM RIPARIAN ASSOCIATION | |
| <u>Populus fremontii</u> | <u>Salix exigua</u> |
| <u>Salix nigra</u> | <u>Pluchea sericea</u> |
| <u>Acer negundo</u> | <u>Baccharis emoryi</u> |
| <u>Fraxinus velutina</u> | <u>Baccharis glutinosa</u> |
| | <u>Tamarix pentandra</u> |
| | <u>Celtis reticulata</u> |
| | <u>Vitis arizonica</u> |
| | <u>Ribes aureum</u> |
| BROOK AND SEEP ASSOCIATION | |
| <u>Nasturtium officinale</u> | <u>Juncus balticus</u> |
| <u>Ranunculus cymbalaria</u> | <u>Anemopsis californica</u> |
| <u>Adiantum capillis-veneris</u> | <u>Berula erecta</u> |
| <u>Eleocharis montevidensis</u> | <u>Scirpus americanus</u> |
| <u>Muhlenbergia asperifolia</u> | <u>Mimulus guttatus</u> |
| <u>Veronica americana</u> | <u>Calamagrostis scopulorum</u> |
| <u>Veronica anagallis-aquatica</u> | <u>Aquilegia chrysantha</u> |
| | <u>Aquilegia formosa</u> |
| | <u>Lobelia cardinalis</u> |
| | <u>Dodecatheon pulchellum</u> |
| | <u>Mimulus cardinalis</u> |
| UTAH JUNIPER ASSOCIATION | |
| <u>Juniperus osteosperma</u> | <u>Quercus turbinella</u> |
| <u>Pinus cembroides</u> | <u>Amelanchier utahensis</u> |
| <u>Artemisia tridentata</u> | <u>Haplopappus linearifolius</u> |
| <u>Coleogyne ramosissima</u> | <u>Ceanothus greggii</u> |
| | <u>Arctostaphylos patula</u> |
| | <u>Prunus fasciculata</u> |
| | <u>Quercus gambelii</u> |
| | <u>Chrysothamnus viscidiflorus</u> |
| | <u>Cowania mexicana</u> |
| | <u>Eriodictyon angustifolium</u> |
| | <u>Fraxinus anomala</u> |

TABLE 5. Dominant Species List for Major Plant Associations (cont'd.)

| <u>COMMON CODOMINANTS</u> | <u>OCCASIONAL CODOMINANTS</u> |
|----------------------------------|--------------------------------|
| LIVE OAK ASSOCIATION | |
| <u>Quercus turbinella</u> | <u>Amelanchier utahensis</u> |
| <u>Garrya flavescens</u> | <u>Quercus gambelii</u> |
| <u>Arctostaphylos patula</u> | <u>Cercocarpus ledifolius</u> |
| <u>Ceanothus greggii</u> | <u>Artemisia tridentata</u> |
| <u>Rhus trilobata</u> | <u>Coleogyne ramosissima</u> |
| <u>Fraxinus anomala</u> | |
| UTAH SERVICEBERRY ASSOCIATION | |
| <u>Amelanchier utahensis</u> | <u>Quercus turbinella</u> |
| <u>Quercus gambelii</u> | <u>Cercocarpus ledifolius</u> |
| | <u>Rhus trilobata</u> |
| PONDEROSA PINE ASSOCIATION | |
| <u>Pinus ponderosa</u> | <u>Cercocarpus intricatus</u> |
| <u>Quercus gambelii</u> | <u>Artemisia tridentata</u> |
| <u>Cercocarpus ledifolius</u> | <u>Chrysothamnus nauseosus</u> |
| | <u>Arctostaphylos patula</u> |
| | <u>Acer grandidentatum</u> |
| | <u>Quercus turbinella</u> |
| | <u>Amelanchier utahensis</u> |
| ASPEN ASSOCIATION | |
| <u>Populus tremuloides</u> | <u>Juniperus scopulorum</u> |
| <u>Acer grandidentatum</u> | <u>Ribes cereum</u> |
| <u>Rosa woodsii</u> | <u>Pseudotsuga menziesii</u> |
| <u>Symphoricarpos oreophilus</u> | <u>Abies concolor</u> |
| | <u>Quercus gambelii</u> |
| WHITE FIR ASSOCIATION | |
| <u>Abies concolor</u> | <u>Quercus gambelii</u> |
| <u>Pseudotsuga menziesii</u> | <u>Juniperus scopulorum</u> |
| <u>Acer grandidentatum</u> | <u>Populus tremuloides</u> |
| <u>Symphoricarpos oreophilus</u> | |

TABLE 5. Dominant Species List for Major Plant Associations (cont'd.)

| <u>COMMON CODOMINANTS</u> | <u>OCCASIONAL CODOMINANTS</u> |
|----------------------------------|----------------------------------|
| ENGELMANN SPRUCE ASSOCIATION | |
| <u>Picea engelmannii</u> | <u>Pseudotsuga menziesii</u> |
| <u>Abies lasiocarpa</u> | <u>Abies concolor</u> |
| <u>Pinus flexilis</u> | <u>Pinus longaeva</u> |
| <u>Ribes viscosissimum</u> | |
| <u>Ribes montigenum</u> | |
| GRASS-SEDGE ASSOCIATION | |
| <u>Agrostis alba</u> | <u>Catabrosa aquatica</u> |
| <u>Juncus saximontanus</u> | <u>Deschampsia caespitosa</u> |
| <u>Hordeum brachyantherum</u> | <u>Carex nebraskensis</u> |
| <u>Phleum alpinum</u> | <u>Poa pratensis</u> |
| <u>Carex athrostachya</u> | <u>Carex aquatilis</u> |
| <u>Carex microptera</u> | |
| <u>Carex festivella</u> | |
| SNOWBERRY ASSOCIATION | |
| <u>Symphoricarpos oreophilus</u> | <u>Sambucus coerulea</u> |
| <u>Rosa woodsii</u> | <u>Salix bebbiana</u> |
| RIVER BIRCH ASSOCIATION | |
| <u>Betula occidentalis</u> | <u>Acer grandidentatum</u> |
| <u>Cornus stolonifera</u> | <u>Populus tremuloides</u> |
| <u>Salix bebbiana</u> | <u>Juniperus scopulorum</u> |
| | <u>Acer negundo</u> |
| | <u>Fraxinus velutina</u> |
| | <u>Symphoricarpos oreophilus</u> |
| | <u>Rosa woodsii</u> |

This estimate has turned out to be very accurate. In Washington County the type is restricted to elevations below 4,000 feet, to the valleys of the Virgin and its lower tributaries, where rainfall averages 10 inches or less a year, surface moisture availability is minimal, summers are hot, and winters are mild.

Creosote Bush Association

This is the association which best typifies the Hot Desert Shrub type. It occupies virtually all the lowland country which has soil that is not too salty, too heavy, or too often water saturated. Its composition in terms of dominant species is quite mixed and variable, but Creosote Bush itself is almost always present.

At its upper limits the Creosote Bush Association overlaps very broadly with the Blackbrush Association, which occasionally descends to elevations as low as 3,000 feet. It is in this broad ecotonal range that the joshua tree (Yucca brevifolia) reaches its best development. The Creosote Bush Association also overlaps with the Sandsage Association in some areas.

Shadscale Association

Tidestrom (1925) mentions the fact that shadscale probably covers more acreage in the Great Basin than any other plant. This hardly qualifies it as a plant characteristic of a Hot Desert Shrub association. But in Washington County, edaphic conditions suitable for its growth are restricted to the lowland valleys, where it occurs for the most part with codominants which are highly characteristic of the Hot Desert Shrub type.

The Shadscale Association is restricted to heavy residual soils, usually of the Moenkopi or Chinle Formations. These soils are often highly charged with gypsum. The ecotone between this association and the Creosote Bush Association is usually abrupt and well defined, and is clearly correlated with a sharp break along an edaphic gradient.

COLD DESERT SHRUB COMMUNITY TYPE

This community type is found at higher elevations than the last, ranging from about 3,500 feet to as high as 7,500 feet. It is characterized by its tolerance for more severe winters than the Hot Desert Type, and usually occurs where moisture relations are more favorable and rainfall is higher.

Blackbrush Association

As mentioned above, the Blackbrush Association usually occurs just above the Creosote Bush Association and often has a broad zone of overlap with it. At its upper limit, it grades gradually into the Utah Juniper Association, and blackbrush itself is one of the major codominants of the latter association. Large areas of the county between 3,500 and 5,500 feet are covered with almost pure stands of blackbrush. It tends to occur on heavier residual soils but is occasionally found growing in sand as a codominant with sandsage.

Sandsage Association

This association is characteristic of deep sand, usually weathered from the Navajo Formation, at elevations from about 3,500 feet to as high as 6,000 feet. It is overwhelmingly dominated

by sandsage, but ecotones with the Creosote Bush Association and the Blackbrush Association are not uncommon.

Big Sagebrush Association

This association occurs at elevations from about 4,500 feet to about 6,500 feet and occasionally higher, especially on disturbed sites. It virtually never forms an ecotone with the Creosote Bush Association, as there is almost always at least a narrow buffer zone of blackbrush and its associated dominants between them. It does form a usually narrow ecotone with the Blackbrush and Sandsage Associations, and a broad one with the Utah Juniper Association. Sometimes it grades directly into Mountain Brush or Transition Forest community types.

Big sagebrush is best developed on the deeper soils derived from volcanics in the northwestern quarter of the county, where it is conspicuous as the dominant plant over tens of square miles. In the eastern half, it usually occupies only limited areas, as its status as a dominant is supplanted by blackbrush.

Low Sagebrush Association

The Low Sagebrush Association is of limited extent, occupying mostly tuff-derived soils in the northwestern corner of the county. It generally occupies those soils which are too shallow and rocky to support big sagebrush. Here it forms a distinctive and well-segregated association. Elsewhere in the county it occurs mostly as bits and pieces within the Blackbrush and Big Sagebrush Associations, with which it overlaps. It also overlaps to a degree with the Live Oak Association. It occurs at elevations from about 4,500 to about 6,500 feet.

DESERT RIPARIAN COMMUNITY TYPE

This community type occurs at elevations up to about 5,500 feet, wherever the water table comes close to or intersects the surface. It intergrades at its driest extreme with the Hot and Cold Desert Shrub community types, but for the most part these areas of overlap are not extensive. At its wettest and most mesic extreme it intergrades with the Mountain Riparian community type.

Wash Association

The Wash Association is made up mostly of phreatophytic plants which can grow in the gravelly, disturbed environment of washes that are only periodically flooded with water. Palustrine and hydrophyte species are absent, because free-flowing water is present only for brief periods, and the surface layer of the soil is dry most of the year. This association occurs along many of the periodic streambeds in lower parts of the county. The lower Beaver Dam Wash is a good example. It occurs mostly at elevations of 4,500 feet or lower.

Floodplain Association

This association is made up mostly of palustrine species and of halophytes which can tolerate the generally highly saline soil environment. The water table remains dependably at or near the surface year round, and virtually all of the plants are phreatophytes. Large trees are mostly absent. This is the predominant association along the banks of the larger permanent watercourses, such as the Virgin River itself, once they are out of the canyons and flowing at a shallow gradient. It interdigitates with both the Wash and the

Stream Riparian Associations. In Washington County it occurs at elevations below 4,000 feet.

Stream Riparian Association

This association occupies the banks of permanent streams from low to middle elevations and overlaps at its upper limit with the River Birch Association. It develops along streams with a steeper gradient of flow than the Floodplain Association, and thus in alluvium that is both coarser and much less salty. This is the dominant riparian association in Zion Canyon. It occurs mostly at elevations from 3,500 to 5,500 feet, commonly in canyons.

Brook and Seep Association

This is the vegetation that develops at seeps and springs and along the small and shallow but usually permanent brooks that emanate from them. Often these are flowing over almost bare rock, and there is neither enough soil nor water to support the growth of moisture-loving trees. Sometimes, as in the hanging gardens of Zion Canyon, this association occurs in close proximity to and interdigitates with the Stream Riparian Association. More often it is hemmed in by non-riparian associations, from which it is usually very sharply separated. This association supports a very characteristic flora. It occurs at elevations up to about 6,000 feet.

FOOTHILL WOODLAND COMMUNITY TYPE

This community type occupies extensive areas at elevations from about 4,500 to about 6,500 feet, mostly on soils which are steep, shallow to bedrock, and have poor water relations. It is

considered here to include only one association, but one which can vary considerably in species composition.

Utah Juniper Association

Utah juniper is the dominant tree in the lower range of this association, while at higher elevations the pinyon achieves codominant status. The shrub understory in the lower range is mostly of Cold Desert Shrub species, while in its upper range Mountain Brush species are more prominent. Broad ecotones with both these types are common, but in many areas the ground is virtually barren of any shrub understory at all. This open physiognomy is characteristic for the association as a whole, and separates it from the Mountain Brush associations.

MOUNTAIN BRUSH COMMUNITY TYPE

The Mountain Brush type occurs at slightly higher elevations on the average than the Foothill Woodland type. It usually occupies deeper soils with better water relations. Since it is characterized by a very dense, continuous growth of shrubs, it lacks the open aspect so characteristic of the Foothill Woodland. As mentioned above, however, these two types do exhibit a broad band of overlap. Mountain Brush has two phases in the county, an evergreen phase and a winter-deciduous phase.

Live Oak Association

The Live Oak Association occurs at elevations from about 4,000 to about 6,500 feet. Most of its dominants are broadleafed

sclerophyllous evergreen shrubs. It reaches its lower limit on sandstone-derived soils, where it often interdigitates with the Blackbrush and Sandsage Associations. At its upper limit it gives way either to the Utah Serviceberry Association or directly to the Ponderosa Pine Association. It has very broad areas of overlap particularly with the former association. It occupies the drier, more exposed slopes at the upper limit of its range.

Utah Serviceberry Association

This association represents the winter-deciduous phase of the Mountain Brush community type. It occupies extensive areas from 5,000 to 7,500 feet or even higher on dry ridges. Codominant with Utah serviceberry over much of this area is Gambel oak. This species occurs in two distinct growth forms, a brush form and a tree form. In its brush form it occupies drier, more exposed slopes, while in its tree form it occupies mesic canyons, often in company with ponderosa pine. The Utah Serviceberry Association and the Live Oak Association often grow completely intermixed, but in general the former occupies higher, cooler sites while the latter occupies lower, hotter sites.

TRANSITION FOREST COMMUNITY TYPE

This type, which occupies the drier sites in the higher mountains and the more mesic sites in the lower mountains, is here considered to consist of just one association.

Ponderosa Pine Association

The Ponderosa Pine Association ranges in elevation from about 5,000 feet in sheltered canyons to about 8,000 feet. Gambel oak in its tree form is the most common codominant, in some places supplanting ponderosa pine completely. Broad ecotones are formed on the one hand with Mountain Brush associations and on the other with the lower elevation associations of the Mountain Forest type.

MOUNTAIN FOREST COMMUNITY TYPE

Mountain Forest communities range from as low as 5,000 feet in sheltered canyons to the tops of the highest mountains in the county. In general they occur on cool, mesic sites with well-drained soils.

Aspen Association

This association occurs on mesic sites which may be as low as 6,000 feet in sheltered canyons or as high as 9,500 feet. The shrub understory is usually well-developed. Ecotones with the Ponderosa Pine Association, the White Fir Association, and the Engelmann Spruce Association are common. The Aspen Association may represent a seral stage in response to a natural disturbance such as a fire or landslide.

White Fir Association

White fir and its codominant Douglas fir form extensive stands on the Kolob Terrace and at middle elevations in the Pine Valley Mountains. This association shares many understory species with the Aspen Association, with which it forms extensive ecotones.

It ranges from elevations as low as 5,000 feet on shady north slopes in Zion Canyon up to about 8,500 feet. At its upper limit it may interdigitate with either the Engelmann Spruce Association or with Mountain Meadow associations.

Engelmann Spruce Association

This association is restricted to well-drained soils on the upper slopes of the Pine Valley Mountains, at elevations of 8,500 feet or more. Alpine Fir is codominant with Engelmann Spruce over much of this area. The shrub understory is characteristically very sparse. Ecotones with the White Fir, Aspen, and Mountain Meadow Associations are occasionally developed, but the area of overlap is usually very narrow.

MOUNTAIN MEADOW COMMUNITY TYPE

Washington County has no true alpine areas. The high meadows are treeless by virtue of their drainage rather than their climatic characteristics. These meadow soils are water saturated during a large portion of the growing season and have a very high clay content. They occupy the poorly drained depressions on the surface of the highland areas.

Snowberry Association

More or less transitional to the meadow association proper and usually occupying the more upland or better-drained sites, the Snowberry Association consists essentially of the White Fir and Aspen understory without the associated trees. This community is quite

extensive on the Kolob Terrace at elevations from about 8,000 to 9,000 feet.

Grass-Sedge Association

This association occupies the most poorly drained mountain meadows, and is dominated by moisture-loving graminoid species. It forms ecotones with the Snowberry Association, the River Birch Association, and the various Mountain Forest types, but except in the case of the riparian association, these zones of overlap are narrow.

MOUNTAIN RIPARIAN COMMUNITY TYPE

This association occupies streamside sites at elevations from about 6,000 to 9,500 feet. It is considered to consist of just one association.

River Birch Association

This association intergrades on the one hand with Mountain Forest and Mountain Meadow communities and on the other with the Stream Riparian Association. The area covered by the River Birch Association in its pure form is small, but many of its species exhibit a high degree of fidelity.

Human Impact

The Mormons began their settlement of Washington County in 1852. Prior to that time, human impact in the area, limited to that of a few Paiute bands and an occasional itinerant trapper, was probably very light. In the century and a quarter since then virtually none of the county has escaped modification at the hands of man and his domestic livestock. In many cases this modification has been severe and essentially irreversible.

There is no way of knowing what the vegetation of the county was like in its pristine state. That it was in some instances very different from the vegetation extant today is evidenced by the high percentage of introduced plants in the flora, and the fact that some of these plants are extremely common and widespread, often even to the point of dominance.

The distribution of introduced plants can only give the crudest concept of the modification that has ensued. Native species once noted as being relatively abundant, even in recent historic times, are now extremely scarce. No one knows how many of these were simply wiped out of the county flora before a botanist came along to document their existence. So many of the species in the county occur only marginally, at or near their limits of tolerance. Even a slight increase in stress could tip the scales against their survival. The relative abundance of various native species has doubtlessly also been changed.

One might ask how a handful of settlers or even a population of a few thousand could so profoundly affect the vegetation of such a large and rugged area as the county. The answer is very simple, and consists of two words - sheep and cattle.

GRAZING

The rangelands of Washington County have been ruthlessly and irresponsibly grazed since early settlement times. In the eyes of local stockmen all land, including that under National Park Service jurisdiction, qualifies as rangeland.

In all fairness, it should be stated that most of the ravages of overgrazing were committed during the late 1800's and early 1900's, and that considerable effort has been made since Depression times to restore the rangeland and to manage it more judiciously (Plummer 1959, 1968). Unfortunately, most of this management is directed toward fattening the most steers over the longest time (a laudable goal) rather than toward the restoration of the land to its previous, ungrazed condition. The short- and long-term effects of grazing in the area are well documented (Cottam 1928, Cottam and Stewart 1940).

One range management practice has been carried out on a considerable acreage in the county, and deserves special discussion. This is the practice of chaining. It is carried out under the auspices of several federal and state agencies, primarily the Forest Service and the Bureau of Land Management, which together administer over half of the land in the county.

Chaining consists of removing competition from undesirable species such as Utah juniper by means of a chain stretched between two bulldozers. This practice is carried out on overgrazed land prior to reseeding with palatable grasses and forbs. The program has met with mixed success in its efforts to restore rangeland to an equilibrium which includes continued grazing (Plummer 1959).

In any case, the extensive areas of dead, uprooted junipers in many parts of the county are a direct result of this management practice, which in itself has had considerable impact on the vegetation of the county, including the introduction and establishment of a number of exotic forbs and grasses.

FARMING

There is very little truly arable land in Washington County, most of it being too dry, too salty, too stony, too highly mineralized, or too cold to be worth any attempt at farming. Even with the aid of irrigation, farming is a difficult way to make a living, and the amount of water available for irrigation is strictly limited. Most of it comes from the Virgin River and is quite heavily laden with salts, making salt accumulation in the surface soil a serious long-term problem. The growing season is long, but unpredictable early and late frosts make even that relatively undependable. Pasture and feed for livestock are the most common crops, with some truck farming and fruit growing. Dairying is carried out on a limited scale. Cotton was grown commercially in the early days of settlement but turned out to be economically unfeasible.

Most of the agricultural activity is limited to the lowlands of the Virgin, where irrigation water is available. There is a limited amount of dry-farming in the Smith Mesa, Big Plain, and Enterprise areas, primarily wheat and potatoes.

All in all the population of the county remained small as long as agricultural concerns predominated, and would probably have remained so had the economic base not shifted in the direction of tourism.

MINING

Aside from the short-lived boom at the mining camp of Silver Reef (Cook 1960), mining interests have played a relatively minor role in the development of Washington County. Mining has been limited largely to the western third of the county, and its primary impact on the land has been in the form of the great proliferation of jeep roads in the Bull Valley and Beaver Dam Mountain areas. These old roads and a few abandoned buildings are the only testament of these mining activities today; few if any of the mines are still actively worked. But the roads have had the effect of opening the area to recreational "jeepers."

URBANIZATION

Even though the economy of the county has had an agrarian base throughout most of its history of settlement, arable land is so limited in extent and so restricted in occurrence that it has always been convenient for the people of the area to congregate into towns. Since the advent of tourism as a major industry and of the concept of the area as a retirement resort community, this tendency has become even

more pronounced. Washington County is one of the few counties in rural Utah to show an increase in population from the 1960 to the 1970 census (U.S. Dept. of Commerce, Bureau of the Census 1973). In addition, the local Chamber of Commerce is strongly encouraging the development of light industry and even the introduction of heavy industry (in the form of a coal-burning power plant) into the area. All of this is bound to affect the status of the natural vegetation in areas adjacent to centers of increasing population.

CONSPECTUS OF BOTANICAL RESEARCH

Because of its location on a well-travelled route to southern California, Washington County was explored and botanized by a number of early naturalists. The fact that the Mormons had settled the area in the early 1850's and were basically hospitable no doubt made the area attractive as a stopover place. In addition, as has been mentioned, it is the first place as one travels southwestward that true hot desert vegetation is encountered. Thus its novelty made it a rich source of new botanical records, and several plants which are widely distributed in the Southwest were first described from Washington County material.

Early collectors and observers in the area included Major William Powell (1873), John C. Fremont (1845), and C. Hart Merriam (1893). Both Christopher Parry (1875) and Edward Palmer (McVaugh 1956) spent considerable time collecting in the area. Most important of the early workers was Marcus E. Jones, who made several extended trips to the area in the late 1800's (Jones 1965).

During the first half of the twentieth century, several major collectors worked in Washington County, most of them affiliated with northern Utah academic institutions. Perhaps the one person who collected most extensively was Walter P. Cottam, first of Brigham Young University and later of the University of Utah. A. M. Woodbury of the University of Utah collected in Zion in connection with his

vegetation study there (Woodbury 1933), and also on the Beaver Dam slope. His student Ross Hardy, later of Dixie College, also made important contributions, as did B. F. Harrison of Brigham Young University and his student Desma Hall Galway.

Work in Zion during the 1930's by Kenneth Weight and others culminated in the preparation of a checklist (Weight 1937), later published in bulletin form (Presnell 1937). The northwestern quarter of the county was collected by Perry Plummer in connection with range reseeding operations (Plummer 1959).

Botanists with bases of operation outside of Utah who made significant collections included Alice Eastwood, J. T. Howell, Rupert Barneby, and Frank W. Gould.

In more recent times, several collections of major importance have been made. Larry Higgins collected the Beaver Dam Mountains in connection with his preparation of a flora for that range (Higgins 1967). R. W. Christian also made extensive collections in the Beaver Dams.

W. Glen Bradley and Kenneth S. Moor of the University of Nevada, Las Vegas made a sizable collection in the Zion area as a part of an environmental impact study conducted for the National Park Service. Ruth Nelson also made important Zion collections.

The county as a whole has been collected as part of two floristic projects which are currently being conducted. Noel Holmgren and others affiliated with the Intermountain Flora Project have made major collections. Stanley Welsh and others affiliated with the Utah Flora Project at Brigham Young University have also been carrying out

a major collection program.

The work of these various collectors coupled with that carried out for the present study has had the effect of making Washington County one of the floristically better known counties in Utah and has made the preparation of a county checklist feasible. This checklist represents the first such list prepared for any county in Utah.

ANNOTATED CHECKLIST OF PLANTS

Checklist Format

A letter code system is used in this checklist in order to facilitate the inclusion of a maximum amount of information in a minimum amount of space. Each species entry is followed on its right by a series of symbols. The two letters to the left of the slash mark indicate the floristic component to which the species belongs. An asterisk preceding these two letters indicates that the species terminates its range in Washington County. The letters to the right of the slash mark indicate the plant community types for which the species has been recorded. Collections from ecotonal areas are recorded as occurring in both community types. The community type distribution is based entirely on information obtained from Washington County records.

A key to these symbols is contained in Table 6, which also includes a key to the herbarium symbols used in the specimen citations. Specimen citations which are not followed by herbarium symbols may be assumed to refer to specimens on deposit at the herbarium of the University of Nevada, Las Vegas.

Within each of the four major plant groups, families, genera, and species are listed alphabetically. Each species is followed by

TABLE 6. Abbreviations Used in the Checklist

FLORISTIC COMPONENT CLASSIFICATION

| | |
|----|---------------------------------------|
| AN | Anomalous |
| AR | Arizonan |
| AU | Austral |
| BO | Boreal |
| CA | Californian |
| CB | Circumboreal |
| CC | Colorado-Chihuahuan |
| CD | California-Southwestern |
| CH | Chihuahuan |
| CM | California-Mojave-Sonoran |
| CP | Colorado Plateau |
| CS | Cosmopolitan |
| EA | Eastern |
| EN | Endemic |
| GB | Great Basin |
| GM | Great Basin-Mojavean |
| IC | Intermountain-Chihuahuan |
| ID | Intermountain-Southwestern |
| IM | Intermountain |
| IN | Introduced |
| IP | Intermountain-Plains |
| MC | Mojave-Californian |
| MH | Mojave-Colorado-Chihuahuan |
| MI | Mojave-Intermountain |
| MO | Mojavean |
| MP | Mojave-Colorado Plateau |
| MS | Mojave-Sonoran |
| NA | North American |
| NM | Northern Mountain |
| NW | New World |
| PL | Plains |
| RM | Rocky Mountain |
| SI | Southern Intermountain |
| SM | Southern Great Basin-Mojavean |
| SP | Southern Great Basin-Colorado Plateau |
| SW | Southwestern |
| WE | Western |
| WP | Western-Plains |

* Species range termination within Washington County

TABLE 6. Abbreviations Used in Checklist (cont'd.)

VEGETATION CLASSIFICATION

| | |
|----|----------------------------------|
| HD | Hot Desert Shrub Community Type |
| CD | Cold Desert Shrub Community Type |
| DR | Desert Riparian Community Type |
| FW | Foothill Woodland Community Type |
| MB | Mountain Brush Community Type |
| TF | Transition Forest Community Type |
| MF | Mountain Forest Community Type |
| MR | Mountain Riparian Community Type |
| MM | Mountain Meadow Community Type |

SPECIMEN CITATIONS-HERBARIA

| | |
|-----|--|
| BRY | Brigham Young University |
| DX | Dixie College Herbarium |
| POM | Pomona College Herbarium |
| RSA | Herbarium of Rancho Santa Ana Botanic Garden |
| UT | University of Utah Herbarium |
| Z | Zion National Park Herbarium |

indented synonyms when relevant. These are sometimes followed by discussion. At least one specimen citation or literature reference is included for each species.

Checklist Summary

The total number of families and species contained in the checklist is given in Table 7, which also includes a species breakdown by group. The 15 families which contain 20 or more species are ranked according to number of species in Table 8.

The species are tabulated according to floristic component in Table 9, which also includes the number of range-terminating species in each component. The components are grouped according to their general geographic orientation relative to the county.

Hopefully the information on this checklist has been arranged in a way that will be as useful to ecologists and phytogeographers as to taxonomists.

TABLE 7. Family and Species Totals Tabulated by Group

| GROUP | NUMBER OF FAMILIES | NUMBER OF SPECIES |
|---------------------|--------------------|-------------------|
| Vascular Cryptogams | 4 | 26 |
| Gymnosperms | 3 | 14 |
| Dicots | 77 | 959 |
| Monocots | 15 | 208 |
| TOTALS | 99 | 1,207 |

TABLE 8. Fifteen Largest Families Ranked by Species Number

| FAMILY | NUMBER OF SPECIES |
|------------------|-------------------|
| Compositae | 200 |
| Gramineae | 129 |
| Leguminosae | 81 |
| Cruciferae | 57 |
| Polygonaceae | 48 |
| Boraginaceae | 47 |
| Scrophulariaceae | 44 |
| Onagraceae | 32 |
| Polemoniaceae | 32 |
| Rosaceae | 30 |
| Chenopodiaceae | 30 |
| Cyperaceae | 28 |
| Ranunculaceae | 26 |
| Umbelliferae | 24 |
| Hydrophyllaceae | 23 |

TABLE 9. Species Tabulation by Floristic Component

| FLORISTIC COMPONENT AND SYMBOL | NUMBER OF SPECIES | NUMBER OF RANGE-TERMINATING SPECIES | |
|---------------------------------------|-------------------|-------------------------------------|----|
| <u>WIDESPREAD</u> | | | |
| Circumboreal | CB | 53 | 6 |
| Cosmopolitan | CS | 19 | 0 |
| New World | NW | 20 | 0 |
| North American | NA | 44 | 0 |
| Western | WE | 90 | 0 |
| Western-Plains | WP | 11 | 0 |
| <u>RESTRICTED</u> | | | |
| Endemic | EN | 83 | 80 |
| <u>NON-DIRECTIONAL</u> | | | |
| Anomalous | AN | 23 | 4 |
| Intermountain-Chihuahuan | IC | 13 | 0 |
| Intermountain-Southwestern | ID | 25 | 1 |
| Mojave-Intermountain | MI | 38 | 1 |
| Southern Intermountain | SI | 12 | 0 |
| Southern Great Basin-Colorado Plateau | SP | 9 | 6 |
| <u>NORTHERN</u> | | | |
| Boreal | BO | 36 | 19 |
| Intermountain | IM | 41 | 18 |
| Intermountain-Plains | IP | 29 | 9 |
| Northern Mountain | NM | 51 | 19 |
| <u>WESTERN</u> | | | |
| Californian | CA | 17 | 13 |
| Great Basin | GB | 31 | 24 |
| Great Basin-Mojavean | GM | 18 | 9 |
| Mojave-Californian | MC | 13 | 13 |
| Southern Great Basin-Mojavean | SM | 4 | 2 |
| <u>SOUTHWESTERN</u> | | | |
| California-Mojave-Sonoran | CM | 7 | 6 |
| California-Southwestern | CD | 14 | 14 |
| Mojavean | MO | 65 | 65 |
| Mojave-Sonoran | MS | 44 | 44 |

TABLE 9. Species Tabulation by Floristic Component (cont'd.)

| FLORISTIC COMPONENT AND SYMBOL | NUMBER OF SPECIES | NUMBER OF RANGE-TERMINATING SPECIES |
|------------------------------------|-------------------|-------------------------------------|
| <u>SOUTHERN</u> | | |
| Arizonan | AR 4 | 4 |
| Austral | AU 11 | 8 |
| Chihuahuan | CH 19 | 19 |
| Mojave-Colorado Plateau | MP 8 | 8 |
| Mojave-Colorado Plateau-Chihuahuan | MH 17 | 10 |
| Southwestern | SW 45 | 43 |
| <u>EASTERN</u> | | |
| Colorado Plateau | CP 35 | 30 |
| Colorado Plateau-Chihuahuan | CC 42 | 32 |
| Eastern | EA 6 | 6 |
| Plains | PL 25 | 18 |
| Rocky Mountain | RM 45 | 41 |
| <u>NON-NATIVE</u> | | |
| Introduced | IN 140 | --- |
| TOTALS | 1,207 | 572 |

VASCULAR CRYPTOGAMS

Equisetaceae

Equisetum arvense L.

CS/MR,MM

Meyer 2938, Kolob Road near county line, 21-VII-73; Moor Z756, Lava Point, 15-VII-70.

Equisetum hyemale L.

CB/MR

Meyer 1006, Pine Valley Campground, 29-VI-70; Meyer 3775, Kolob Arch Trail, 21-VII-74; Meyer 1853, Browse, 25-VII-71; Moor Z457, Narrows Trail, 2-VII-70; Moor Z754, East Fork of the Virgin, 16-VII-70.

Equisetum laevigatum A. Br.

WP/MB,MR,MM

(E. kansanum Schaffner)

(E. funstonii A. A. Eat.)

Meyer 2991, Kolob Reservoir, 22-VII-73; Meyer 1710, Oak Grove Road, 23-V-71; Meyer 751, Taylor Creek, 4-VI-70; Moor Z621, Oak Creek Canyon, 10-VII-70; Moor Z146, Narrows Trail, 12-VII-70; Cottam 6863, Mogotsu Creek, 10-V-36(UT); Cottam 8801, Washington Flat, 18-VI-41(UT); Cottam 3360, Mountain Meadows, 21-VI-28(UT).

Equisetum variegatum Schleich. ex Weber and Mohr

*CB/MR

(E. hyemale var. variegatum Newm.)

Meyer 2838, Kolob Road, 20-VII-73; Meyer 1273, Dan Springs, 2-VIII-70.

Marsileaceae

Marsilea mucronata A. Br.

WE/DR

Meyer 598, Ivins Reservoir, 27-V-70.

Polypodiaceae

Adiantum capillis-veneris L.

CS/DR,MR

Moor Z116, Temple of Sinawava, 31-VII-70; Moor Z280, Utah Highway 15, 3 miles west of Virgin, 24-VI-70; Cottam 3389, St. George, 21-VI-28(UT); Walsh s.n., Grotto Campground, 29-V-33(UT); Niles 421, East Rim Trail, 11-VII-64(UT); Harrison and Woodbury 1220, Beaver Dam Wash, 12-IX-25(UT).

Adiantum pedatum L.

CB/MR

Moor Z1264, Emerald Pool, 14-VIII-70; Hall s.n., Grotto, 19-VI-26(UT);
Woodbury s.n., Zion Narrows, 26-VIII-28(UT).

Asplenium adiantum-nigrum L.

CS/MR

The specimen cited below is annotated by Maxon.

Woodbury s.n., Zion Park, 20-IX-29(UT).

Athyrium filix-femina (L.) Roth

CB/TF,MF,MR

Cottam 8884, Pine Valley Mountain, 26-VI-41(UT); McMillan 420, Pine
Valley Campground, 13-IX-42(UT).

Cheilanthes covillei Maxon

*MS/HD,CD,FW

This rock fern is found in crevices on both limestone and sandstone.

Cottam 6893, Gunlock, 11-V-36(UT); Cottam 4103, Apex Mine, 5-VI-29(UT);
Flowers 3109, Beaver Dam Mountain, 16-VI-39(UT); Cottam 8773, west of
Santa Clara, 17-VI-41(UT); Flowers 3107, south of Zion Canyon,
28-VI-25(UT); Flowers 3111, St. George, 12-VII-33(UT).

Cheilanthes feei Moore

WP/MR

This is a strongly petrophile species.

Moor Z1100, Temple of Sinawava, 31-VII-70; Moor Z165, Narrows Trail,
12-VI-70.

Cystopteris bulbifera (L.) Bernh.

*EA/MR

Anon., Hidden Canyon, 15-VIII-30(UT).

Cystopteris fragilis (L.) Bernh.

CS/MF,MR

Meyer 1054, Pine Valley Campground, 30-VI-70; Meyer 3612, Deep Creek,
29-V-74; Moor Z1352, Kolob Canyon, 20-VIII-70; Moor Z1265, Emerald
Pool, 14-VIII-70; Moor Z1042, Potato Hollow, 24-VII-70; Cottam 6788,
Pine Valley Mountain, 9-V-36(UT); Cottam 14184, Santa Clara Canyon,
15-VIII-55(UT).

Dryopteris filix-mas (L.) Schott

*CB/MR

Meyer 3618, North Fork of the Virgin, 30-V-74; Moor Z1266, Emerald
Pool, 14-VIII-70; Weight 986Z, Hidden Canyon, 21-VI-35(UT);
Flowers 3188, Grotto, 27-VI-37(UT).

- Notholaena jonesii Maxon *MO/HD
(Pellaea jonesii Morton)
Meyer 3931, Hurricane Cliff Road, 6-IV-75.
- Notholaena parryi D. C. Eat. *MS/HD
(Cheilanthes parryi Domin.)
Meyer 3479, Joshua Tree National Landmark, 12-IV-74; Woodbury s.n., St. George, 5-III-28(UT); Cottam 10047, Santa Clara Creek, 23-III-38(UT); M. E. Jones s.n., St. George, 29-III-1880(UT); Flowers 3194, near Hurricane, 16-VI-39(UT).
- Pellaea glabella Mett. ex Kuhn *EA/MR
Meyer 3646, North Fork of the Virgin, 31-V-74; Pendleton s.n., Hidden Falls, 5-V-46(UT).
- Pellaea truncata Goodding *CC/HD,FW,MB,TF
(P. longimucronata Hook.)
Weight 869Z, Emerald Pool, 5-VI-35(UT); Cottam 8785, Washington Flat, 18-VI-41(UT); Cottam 8843A, Oak Grove, 14-VI-41(UT); Flowers 3221, Hurricane, 16-VII-33(UT); Cottam 5150, Diamond Valley, s.d.(UT); Cottam 12762, Santa Clara Canyon, 4-IX-51(UT).
- Pityrogramma triangularis (Kaulf.) Maxon *CA/DR
Cottam s.n., Camp Springs, 4-IV-40(UT); Cottam s.n., Santa Clara Creek, 17-VI-41(UT).
- Polypodium hesperium Maxon NM/MR
Meyer 3620, Kolob Creek, 30-V-74; Cottam 8842, Oak Grove, 19-VI-41(UT); Weight 983Z, Hidden Canyon, 21-VI-35(UT).
- Polystichum scopulinum (D. C. Eat.) Maxon *CA/MR
Cottam 5658, Zion Canyon, 4-IV-31(UT).
- Pteridium aquilinum (L.) Kuhn CS/TF,MF,MR
Meyer 891, Oak Grove, 15-VI-70; Moor Z562, Lava Point, 7-VII-70; Hall s.n., Pine Valley, 20-VI-36(UT).
- Woodsia oregana D. C. Eat. BO/MB,TF,MF,MR
Meyer 1053, Pine Valley Campground, 30-VI-70; Meyer 1300, Columbine Spring, 6-VIII-70; Moor Z1020, Potato Hollow, 24-VII-70; Moor Z729, Lava Point, 15-VII-70; Pendleton s.n., Pine Valley, 10-V-40(UT).

Selaginellaceae

Selaginella underwoodii Hieron.

*CC/MB,TF

Cottam 6943, West Rim of Zion, 14-V-36(UT); Flowers 3233, Mt. Carmel Canyon, 12-VI-39(UT); Weight 76Z, Hidden Canyon, 21-VI-35(UT).

Selaginella utahensis Flowers

*EN/MB,TF

Flowers 3249, Lady Mountain, 16-VI-51(UT); Flowers 3250, Emerald Pool Trail, 16-VI-51(UT); Cottam 8817, Washington Flat, 18-VI-41(UT).

Selaginella watsonii Underw.

*GB/MF

Cottam 8931, Pine Valley Mountain, 27-VI-41(UT).

GYMNOSPERMS

Cupressaceae

Juniperus communis L.

CB/MF

Harper and Eastmond s.n., Oak Grove, 21-V-71; Hafen s.n., Pine Valley Mountains, 10-V-40(DX).

Juniperus osteosperma (Torr.) Little

MI/HD,CD,FW,MB,TF

[J. utahensis (Engelm.) Lemmon]

Meyer 3198, Little Creek Mountain, 16-IX-73; Meyer 2633, Browse Road, 11-V-73; Meyer 2602, Gunlock Road, 3-V-73.

Juniperus scopulorum Sarg.

RM/MF,MR

Moor 2941, Kolob Road, 17-VII-70; Christian 480, Beaver Dam Peak, 5-VIII-61(UT).

Ephedraceae

Ephedra nevadensis S. Wats.

ID/HD,CD,DR,FW

(E. fasciculata A. Nels.)(E. aspera Engelm.)

Meyer 1485, Apex Mine Road, 13-IV-71; Meyer 2341, Warner Ridge, 24-IV-73; Meyer 2463, Red Cliff Campground, 29-IV-73; Harper 94, Castle Cliff, 17-V-64(UT).

Ephedra torreyana S. Wats.

CC/HD,CD

Meyer 780, Price Bench, 5-VI-70; Meyer 3996, Hurricane Cliff Road, 2-V-75; Paxman s.n., Beaver Dam Wash, 25-IV-41(UT).

Ephedra viridis Cov.

IM/HD,CD,DR,FW

(E. nevadensis var. viridis Jones)

Meyer 2592, Curly Hollow Wash, 3-V-73; Meyer 2404, Washington 26-IV-73; Meyer 4003, southeast of Hurricane, 8-V-75; Meyer 2635, Browse Road, 11-V-73.

Pinaceae

- Abies concolor (Gord. and Glend.) Lindl. WE/TF,MF,MR
Woodbury s.n., Grotto, 25-VI-28(Z); Christian 479, Beaver Dam Peak, 5-VIII-61(UT).
- Abies lasiocarpa (Hook.) Nutt. *RM/MF
Meyer 4175, Signal Peak, 27-VII-75.
- Picea engelmannii Parry *NM/MF
Meyer 4174, Signal Peak, 27-VII-75.
- Pinus cembroides Zucc. ID/FW,MB,TF
(Pinus edulis Engelm.)
(Pinus monophylla Torr. and Frem.)
Meyer 2636, Browse Road, 11-V-73; Weight 1047Z, Narrows Trail, 24-VI-35(UT).
- Pinus flexilis James WE/TF,MF
Meyer 4173, Signal Peak, 27-VII-75; Cottam 8924, Pine Valley Mountain, 26-VI-41(UT).
- Pinus longaeva Bailey GB/MF
The Great Basin population was formerly referred to P. aristata Engelm.
Cottam 8928, Pine Valley Summit, 27-VI-41(UT).
- Pinus ponderosa Laws. WE/MB,TF,MF
Meyer 2839, Kolob Road at top of Hop Valley, 20-VII-73; Cottam 6851, Pine Valley Gulch, 10-V-36(UT); Christian 478, Beaver Dam Peak, 5-VIII-61(UT).
- Pseudotsuga menziesii (Mirb.) Franco WE/MF
[P. taxifolia (Lamb.) Britt.]
[P. douglasii (Lindl.) Carr.]
Meyer 4176, Browns Point Trail, 28-VII-75; Palmer et al s.n., Death Point, 18-VII-66(Z).

DICOTS

Aceraceae

Acer glabrum Torr.

WE/MF

Cottam 8937, Pine Valley Mountain, 27-VI-41(UT).

Acer grandidentatum Nutt.

*AN/TF,MF,MR

Meyer 3006, Death Point, 22-VII-73; Moor Z1162, Lava Point, 6-VIII-70; Cottam 8939, Pine Valley Mountain, 27-VI-41(UT); Cottam 14451, Oak Grove, 15-VII-56(UT); Christian 502, Utah Hill, 5-VIII-61(UT).

Acer negundo L.

NA/DR,MR

Meyer 3215, New Harmony, 13-X-73; Moor Z1462, La Verkin Creek, 27-VIII-70; Moor Z433, Temple of Sinawava, 1-VII-70; Cottam 8825, Fuller's Ranch, 18-VI-41(UT).

Amaranthaceae

Amaranthus albus L.

IN/CD,DR

This plant grows on heavily disturbed sites.

Meyer 3812, north of Mountain Meadows, 6-IX-74; Meyer 1923, St. George, 6-VIII-701.

Amaranthus graecizans L.

NA/CD,DR,MR

This plant grows on heavily disturbed sites.

Meyer 1952, Mogotsu Wash, 21-VIII-71; Meyer 3064, Big Plain Junction, 1-VIII-73.

Amaranthus powellii S. Wats.

WE/CD,DR,FW,MR

Meyer 1932, St. George, 6-VIII-70; Meyer 2037, New Harmony, 24-VIII-71; Meyer 2003, Honeycomb Rocks, 21-VIII-71; Meyer 3827, Mountain Meadows, 6-IX-74.

Amaranthus retroflexus L.

IN/DR

Meyer 3122, south of Rockville, 3-VIII-73; Meyer 3236, Camp Springs Crossing, 16-IX-73; Meyer 2094, St. George, 21-X-71.

Tidestromia oblongifolia (Wats.) Standl.

*MO/HD

Higgins 1816, U.S. 91 near Arizona State Line, 29-XI-68(BRY).

Anacardiaceae

Rhus glabra L. BO/MB

Cottam 3455, Zion Canyon, 25-VI-28(UT).

Rhus radicans L. NA/DR,MR

[Toxicodendron radicans (L.) Kuntze]

This plant is not at all common in the county, and is frequently encountered only in Zion Canyon.

Cottam 8463, Berry Springs, 11-IV-41(UT); Harrison s.n., Weeping Rock Trail, 20-V-29(UT).

Rhus trilobata Nutt. WP/HD,CD,DR,FW,
MB,TF

This extremely variable plant has very broad ecological tolerances, and may be locally dominant on a variety of types of sites. It is especially common in dry, sandy washes.

Meyer 4002, southeast of Hurricane, 8-V-75; Meyer 3207, Cinder Hill, 16-IX-73; Meyer 975, north of New Harmony, 16-VI-70; Meyer 1985, south of Enterprise Reservoir, 21-VIII-71; Meyer 1120, Pine Park, 7-VII-70; Meyer 3706, Mill Canyon, 5-VII-74; Gould 1439, St. George, 19-III-42(UT); Christian 935, east of Santa Clara, 1-VI-63(UT).

Apocynaceae

Amsonia jonesii Woodson *CP/MB

(A. latifolia M. E. Jones)

A sterile specimen which may represent A. brevifolia Gray was collected on Wire Mesa, but the species is excluded pending examination of better material. It is known from Kanab and probably does occur within the county.

Christian 1063, Utah Hill, 14-VII-63(UT); Christian 1081, Apex Mine, 20-VII-63(UT).

Apocynum androsaemifolium L. NA/CD

Meyer 1062, Pine Valley Campground, 30-VI-70.

Apocynum cannabinum L. NA/DR

Meyer 2132, Gateway to the Narrows, 22-X-71; Weight 917Z, Oak Creek, 10-VI-35(UT); Weight 872Z, Emerald Pool Trail, 10-VI-35(UT); Christian s.n., 3 miles southeast of Santa Clara, 10-VI-63(UT).

Apocynum medium Greene

NA/DR

Meyer 3628, North Fork of the Virgin, 30-V-74.

Araliaceae

Aralia racemosa L.

*EA/MR

Cottam 12740, Grotto, 13-VI-51(UT); Hall s.n., Grotto, 19-VI-36(UT).

Asclepiadaceae

Asclepias asperula (Dcne.) Woodson

IC/FW,MB,TF

(A. capricornu Woodson)

Meyer 951, New Harmony, 16-VI-70; Cottam 8794, Washington Flat, 18-VI-41(UT); Moor Z1035, Potato Hollow, 24-VII-70; Moor Z566, Lava Point, 1-VII-70; Moor Z43, Smith Mesa, 11-VI-70.

Asclepias erosa Torr.

*MO/HD

Meyer 2801, Curly Hollow Wash, 19-VII-73; Meyer 2090, Snow's Canyon, 21-X-71; Cottam 7246, St. George, 25-V-37(UT); Christian 1098, Motoqua Road, 7-VIII-63(UT); Moor Z336, Utah Highway 15, 4 miles north of Hurricane, 24-VI-70.

Asclepias hallii A. Gray

SP/FW,TF

Reported for Washington County by Woodson (1954).

Asclepias rusbyi (Vail) Woodson

*CP/TF

Reported for Washington County by Woodson (1954).

Asclepias speciosa Torr.

WP/DR,MR

Meyer 774, Bloomington, 5-VI-70; Meyer 1805, Pinto, 23-VII-71; Christian s.n., south of Santa Clara, 10-VI-63(UT).

Asclepias subverticillata (Gray) Vail

CC/HD,DR,MB,TF

(A. verticillata var. subverticillata A. Gray)

This species is extremely closely related to A. fascicularis Dcne., which is found in the Pacific states, and intergrades may be encountered. It is also very close to A. verticillata L. of the eastern U.S. See Woodson (1954) for a complete discussion of taxonomic difficulties in this group.

Meyer 1879, Browse Road, 25-VII-71; Meyer 3722, La Verkin Creek Trail, 6-VII-74; Meyer 3587, Washington, 26-V-74; Meyer 3027, Utah Highway 59, 12 miles southeast of Hurricane, 1-VIII-73; Meyer 2016, New Harmony, 24-VIII-71; Moor Z613, Oak Creek Canyon, 10-VII-70; K. Weight 993Z, Coalpits Wash, 25-VI-35(UT); Moor Z955, Kolob Road, 17-VI-70.

Asclepias tuberosa L.

*EA/MB,TF

Meyer 3767, Hop Valley, 20-VII-74; Meyer 1851, Browse, 25-VII-71; Weight 874Z, Emerald Pool Trail, 5-VI-35(UT); Moor Z1137, East Fork of the Virgin, 7-VIII-70.

Astephanus utahensis Engelm.

*MO/HD

(Cynanchum utahense Woodson)

Harrison s.n., Ivins, 19-VI-27(DX).

Sarcostemma cynanchoides Dcne.

*SW/HD

[Funastrum cynanchoides (Dcne.) Schlechter]
(F. heterophyllum Schlechter)

Pendleton, s.n., Beaver Dam Slope, 7-X-39(DX); Hall s.n., Red Hill, 26-IX-34(DX).

Berberidaceae

Berberis fremontii Torr.

CP/HD,CD,FW

(Mahonia fremontii Fedde)

Meyer 3948, Hurricane Cliffs, 1-V-75; Meyer 3981, Hurricane Cliff Road at Arizona State Line, 2-V-75; Meyer 544, Veyo-Gunlock Road, 5-V-70; Meyer 1484, Apex Mine Road, 13-IV-71; Hall 58, Anderson's Ranch, 30-III-26(UT); Cottam 8430, Shivwits, 8-IV-41(UT); Howard s.n., Diamond Valley, 11-V-1899(UT).

Berberis repens Lindl.

NM/CD,MB,TF,MF

(Mahonia repens G. Don)

Meyer 4052, Ox Valley Road, 16-V-75; Meyer 1698, Oak Grove, 21-V-71; Meyer 1980, Enterprise Reservoir, 21-VIII-71; Moor Z1186, Lava Point, 6-VIII-70; Moor Z592, Upper Emerald Pool, 9-VII-70; Walsh s.n., Refrigerator Canyon, 27-V-33(UT).

Betulaceae

Betula occidentalis Hook.

NM/MF,MR

(B. fontinalis Sarg.)

Meyer 739, Taylor Creek, 4-VI-70; Meyer 3574, Mahogany Knoll, 19-V-74; Meyer 3793, Kolob Arch Trail, 21-VII-74.

Bignoniaceae

Chilopsis linearis (Cav.) Sweet

*SW/HD,DR

Meyer 2805, Curly Hollow Wash, 19-VII-73; Meyer 1959, Veyo-Gunlock Road at junction with Enterprise Reservoir Road, 21-VIII-71; Fisk s.n., Beaver Dam Wash, 21-IV-30(UT); Christian 259, Bloomington, 19-VI-61(UT); Cottam 5340, Mogotsu Wash, 10-VII-32(UT); Christian 1099, Pahcoon Spring Wash, 7-VIII-63(UT).

Boraginaceae

Amsinckia intermedia Fisch. and Mey.

*GM/HD,DR

Meyer 2459, Red Cliff Campground, 29-IV-73; Meyer 2261, north of St. George, 18-IV-73; Meyer 2352, Washington, 25-IV-73; Law s.n., St. George, 10-III-28(UT); Cottam 5659, south of St. George, 5-IV-31(UT).

Amsinckia tessellata A. Gray

*GM/HD,CD,DR

Meyer 3877, Beaver Dam Well, 5-IV-75; Meyer 3911, Curly Hollow Wash, 6-IV-75; Meyer 3455, West Mountain Wash, 12-IV-74; Meyer 1537, north of St. George, 13-IV-71; Meyer 2330, Warner Ridge, 24-IV-73; Jones s.n., St. George, 8-IV-1880(UT); Cottam 5093, Beaver Dam Wash, 14-IV-32(UT).

Coldenia canescens DC.

*SW/HD

This plant has a very strong preference for limestone.

Cited by Higgins (1972) as occurring on the west slope of the Beaver Dam Mountains.

Coldenia hispidissima (Torr. and Gray) Gray

*CP/HD

This plant is commonly found growing on dune sand.

Higgins 838, west flank, Beaver Dam Mountains, 19-VIII-66(BRY).

Coldenia nuttallii Hooker

GB/HD

This plant is usually found on silt or fine sand.

Higgins 649, Terry's Ranch, 26-V-66(BRY).

Cryptantha abata Johnst.

EN/FW

Meyer 4016, Smith Mesa, 10-V-75.

Cryptantha barbiger (Gray) Greene

*MS/HD

Meyer 3875, Beaver Dam Well, 5-IV-75; Meyer 2474-1, Red Cliff Campground, 29-IV-73; Meyer 2259, north of St. George, 18-IV-73; Meyer 2350, Washington, 25-IV-73; Meyer 3896, Lytle's Ranch, 5-IV-75; Meyer 2702, Castle Cliff, 13-V-73; Jones s.n., St. George, 2-IV-1880(UT); Cottam 5024, Leeds, 16-IV-32(UT); Weight 777Z, Coalpits Wash, 28-IV-35(UT).

Cryptantha circumscissa (Hook. and Arn.) Johnston

MI/HD,CD,FW

Meyer 3970, west of Hurricane, 1-V-75; Meyer 501, Motoqua, 30-IV-70; Meyer 1562, Terry's Ranch, 14-IV-70; Meyer 1113, Pine Park, 7-VII-70; Meyer 2608, Anderson Junction, 9-V-73; Meyer 1513, Ivins Reservoir, 13-IV-71; Gould s.n., Hurricane Fault Road, 2-V-42(UT); Jones s.n., St. George, 12-IV-1880(UT).

Cryptantha confertiflora (Greene) Payson

SM/HD,CD,DR,FW,MB

Meyer 3344, Ripple Arch, 8-IV-74; Meyer 3942, south of Hurricane, 1-V-75; Meyer 3980, Hurricane Fault Road, 2-V-75; Meyer 827, Oak Grove Road, 6-VI-70; Meyer 737, Taylor Creek, 4-VI-70; Moor Z47, La Verkin Creek, 11-VI-70; Cottam 5149, Diamond Valley, 19-IV-32(UT).

Cryptantha crassisepala (Torr. and Gray) Greene

*CC/HD,DR

Meyer 2313, Atkinville, 19-IV-73; Meyer 2237, Ft. Pierce Road, 17-IV-73.

Cryptantha decipiens (M. E. Jones) Heller

*MS/HD

Meyer 2474, Red Cliff Campground, 29-IV-73.

Cryptantha dumetorum Greene

*MO/HD

Both collections cited below are from dune sand.

Meyer 2678, Sand Mountain Road, 11-V-73; Meyer 2508, Ft. Pierce Road, 2-V-73.

Cryptantha fendleri (Gray) Greene PL/CD,FW,MB,TF

Meyer 2001, Honeycomb Rocks, 21-VIII-71; Meyer 1026, Pine Valley Campground, 30-VI-70; Moor Z1475, La Verkin Creek, 27-VIII-70; Meyer 1669, Central, 20-V-71.

Cryptantha flaccida (Dougl.) Greene *GB/HD

Higgins includes this plant only tentatively, on the basis of an immature specimen.

Reported for Washington County by Higgins (1972).

Cryptantha flavoculata (A. Nels.) Payson *SP/FW

Meyer 3343, Ripple Arch, 8-IV-74.

Cryptantha fulvocanescens (Wats.) Payson *CP/CD

Washington County material belongs to C. fulvocanescens var. echinoides (Jones) Higgins, which usually grows on heavily saline clay soils.

Cited by Higgins (1972) for Washington County.

Cryptantha gracilis Osterh. MI/HD,CD,FW,MB,TF

Meyer 3528, Cole Spring Road, 18-V-74; Meyer 3553, Mahogany Knoll, 19-V-74; Meyer 3482, Old Mormon Road, 12-IV-74; Meyer 2626, Browse Road, 11-V-73; Cottam 8469, Lava Creek, 10-IV-41(UT); Hall s.n., north of Enterprise, 27-V-35(UT).

Cryptantha humilis (Gray) Payson *GB/CD,FW

Meyer 3371, Cole Spring Road, 9-IV-74; Meyer 3399, Wire Mesa, 10-IV-74; Meyer 565, Black Canyon, 5-V-70; Cottam 5058, Gunlock, 17-IV-32(UT).

Cryptantha inaequata Johnston *MO/HD

Biology Field Class s.n., Black Hill, 30-III-26(UT).

Cryptantha jamesii (Torr.) Payson *MH/CD,FW

Meyer 1188, Honeycomb Rocks, 8-VII-70; Meyer 1112, Pine Park, 7-VII-70; Meyer 977, north of New Harmony, 16-VI-70; Weight 1027Z, West Rim Trail, 24-VI-35(UT).

Cryptantha micrantha (Torr.) Johnston AN/HD,CD,FW

This plant is commonly found in dune sand.

Meyer 3968, west of Hurricane, 1-V-75; Meyer 1629, Snow Spring Canyon, 20-V-71; Meyer 1573, Terry's Ranch, 14-IV-71; Meyer 1511,

Ivins Reservoir, 13-IV-71; Meyer 2530, Warner Valley, 2-V-73;
Meyer 2621, Browse Road, 11-V-73; Cottam 6883, Gunlock, 11-V-36(UT).

Cryptantha nevadensis Nels. and Kenn. *MS/HD

Meyer 3994-1, Hurricane Fault Road, 2-V-75; Meyer 2433, Shinab Kibe Hill, 27-IV-73; Meyer 2393, Washington, 26-IV-73; Meyer 3470, West Mountain Wash, 12-IV-74.

Cryptantha pterocarya (Torr.) Greene ID/HD,CD,FW

Meyer 2666, Sand Mountain Road, 11-V-73; Meyer 2734, Castle Cliff, 13-V-73; Meyer 2034, Shinab Kibe Hill, 27-IV-73; Meyer 2200, east of Washington, 15-IV-73; Meyer 2310, Atkinville, 19-IV-73; Meyer 3971, west of Hurricane, 1-V-75; Meyer 3923, Curly Hollow Wash, 6-IV-75; Meyer 2258, north of St. George, 18-IV-73; Cottam 8422, Santa Clara, 8-IV-41(UT); Gould 1705, Diamond Valley, 5-V-42(UT); Jones s.n., St. George, 1-IV-1880(UT).

Cryptantha racemosa (Wats.) Greene *MO/HD

Cited by Higgins (1972) for St. George.

Cryptantha recurvata Cov. SI/HD

Meyer 2357, Washington, 25-IV-73; Meyer 2295, Price City Hills, 19-IV-73; Meyer 2270, Red Hill, 18-IV-73; Meyer 3972, west of Hurricane, 1-V-75.

Cryptantha semiglabra Barneby *EN/FW

Cited by Higgins (1972) for Washington County.

Cryptantha setosissima (Gray) Payson *SP/TF

Cited by Higgins (1972) for Washington County.

Cryptantha torreyana (Gray) Greene *NM/TF

Cottam 8916, Pine Valley Mountain, 26-VI-41(UT).

Cryptantha utahensis (Gray) Greene *MO/HD

Meyer 3876, Beaver Dam Well, 5-IV-75; Meyer 2758, west of Castle Cliff, 12-V-73; Meyer 1543, Terry's Ranch, 14-IV-71.

Cryptantha virginensis (Jones) Payson *MO/HD,FW

Meyer 1506, Ivins Reservoir, 13-IV-71; Meyer 4038, Mountain Meadows Turnoff, 16-V-75; Hawkins s.n., Beaver Dam Mountains, 26-IV-41(UT); Christian 868, Whitmore Canyon Wash, 30-IV-63(UT).

Cynoglossum officinale L.

IN/MF

Cited by Higgins (1972) as occurring in Washington County.

Hackelia patens (Nutt.) Johnst.

*GB/TF,MF

Meyer 1834, Potato Hollow, 24-VII-71; Meyer 3655, Pine Valley Campground, 4-VII-74; Meyer 3712, Mill Canyon, 5-VII-74; Moor Z306, Taylor Creek, 24-VI-70.

Heliotropium convolvulaceum (Nutt.) Gray

*MH/HD,CD

Moor Z1136, East Fork of the Virgin, 7-VIII-70; Christian 1040, 3 Mile Wash, 22-VI-73(UT); Cottam 5391, Leeds, 16-VII-32(UT); Cottam 12752, Santa Clara Bench, 3-IX-51(UT); Cottam 5718, Gunlock, 4-IX-33(UT).

Heliotropium curassavicum L.

WP/DR

Washington County material belongs to H. curassavicum var. oculatum (Heller) Johnst. ex. Tidestr. which is widespread on the southwest deserts. The plant is found around alkaline springs and seeps.

Meyer 600, Ivins Reservoir, 27-V-70; Meyer 618, St. George, 28-V-70; Kelson s.n., Beaver Dam Wash, 8-V-41(UT); Christian 934, east of Santa Clara, 1-VI-63(UT); Cottam 3386, Watercress Spring, 21-VI-28(UT).

Lappula echinata Gilib.

IN/TF

Moor Z915, Kolob Reservoir Road ca. 6 miles southeast of Kolob Reservoir, 17-VII-70.

Lappula redowskii (Hornem.) Greene

CB/HD,CD,DR,FW,MB,
TF,MF,MR,MM

[Lappula occidentalis (Wats.) Greene]

Meyer 3988, Hurricane Cliff Road, 2-V-75; Meyer 1199, Honeycomb Rocks, 8-VII-70; Meyer 1035, Pine Valley Campground, 30-VI-70; Meyer 1479, Lava Point Spring, 23-VIII-70; Meyer 955, north of New Harmony, 16-VI-70; Moor Z128, Narrows Trail, 12-VI-70; Moor Z802, Kolob Reservoir, 17-VII-70; Moor Z1178, Sawmill Spring, 6-VIII-70.

Lithospermum incisum Lehm.

*PL/FW,MB,TF

Meyer 573, Tobin Bench, 5-V-70; Plummer 7425, Pinto, 9-V-39(UT); Cottam 6987, West Rim Trail, 14-V-36(UT); Walsh s.n., Grotto Campground, 27-V-33(UT); Cottam 8911, Pine Valley Mountain, 26-VI-41(UT).

Lithospermum multiflorum Torr. ex Gray

*CP/TF

Meyer 3592, North Fork of the Virgin, 29-V-74.

Mertensia arizonica Greene

*EN/MF,MR,MM

Meyer 3564, Mahogany Knoll, 19-V-74; Meyer 1014, Pine Valley Campground, 29-VI-70; Meyer 2897, Hornet Point Road, 21-VII-73; Moor Z94, Kolob Reservoir, 11-VI-70; Moor Z1163, Lava Point Spring, 6-VIII-70.

Mertensia fusiformis Greene

*CP/MF

Meyer 3600, North Fork of the Virgin, 29-V-74; Cottam 6984, West Rim Trail, 14-V-36(UT).

Pectocarya heterocarpa Johnst.

*CD/HD,DR

Meyer 1552, Terry's Ranch, 14-IV-71; Meyer 2239, Ft. Pierce Road, 17-IV-73; Meyer 3871, Beaver Dam Well, 5-IV-75; Meyer 3334, Sand Mountain, 7-IV-74.

Pectocarya platycarpa Munz and Johnst.

*MS/HD,DR

Meyer 1701, Snow Spring Canyon, 23-V-71; Meyer 2166, Washington, 14-IV-73.

Pectocarya setosa A. Gray

*GM/FW,MB

Meyer 2609, Anderson Junction, 9-V-73.

Plagiobothrys arizonicus (A. Gray) Greene

*CD/HD

Meyer 3888, Lytle's Ranch, 5-IV-75; Field Biology Class s.n., Black Hill, 30-III-26(UT); Cottam 7545, Beaver Dam Mountains, 5-IV-40(UT); Cottam 5165, east of La Verkin, 21-IV-32(UT).

Plagiobothrys jonesii A. Gray

*MS/HD

Meyer 2286, Old Middleton Road, 19-IV-73.

Plagiobothrys scouleri (Hook. and Arn.) Johnst.

WE/DR,MR

(P. scopulorum Johnst.)

(P. cognatus Johnst.)

(P. nelsonii Johnst.)

This treatment follows Holmgren and Reveal (1966) in considering all the forms cited as synonyms as part of a single, wide-ranging, polymorphic species.

Moor Z802b, Kolob Reservoir, 17-VII-70; Hall s.n., St. George, 19-IV-36 (UT).

Plagiobothrys tenellus (Nutt.) Gray

WE/FW

Meyer 4012, Smith Mesa, 9-V-75; Meyer 4022, Dry Creek, 10-V-75.

Cactaceae

- Coryphantha vivipara (Nutt.) Britt. and Rose AN/HD
 [Mammillaria vivipara (Nutt.) Haw.]
 Cited for Washington County by Parry (1875) and by Benson (1969).
- Echinocactus polycephalus Engelm. and Bigelow *MO/HD
 Meyer 3848-1, Beaver Dam Well, 5-IV-75.
- Echinocereus engelmannii (Parry) Lemaire AN/HD
 Higgins 479, Castle Cliff, 24-IV-66(BRY); Trapp 67-69, Zion Canyon,
 22-VII-67(Z).
- Echinocereus triglochidiatus Engelm. MH/CD,FW
 Meyer 4083, north of Mogotsu Creek, 17-V-75; Trapp 67-54, Watchman
 Trail, 19-VI-67(Z); Storer s.n., north of Shivwits, 20-IV-62(DX).
- Ferocactus acanthodes (Lemaire) Britt. and Rose *MS/HD
 Higgins 650, Terry's Ranch, 26-V-66(BRY).
- Mammillaria tetrancistra Engelm. *MS/HD
 Cited for Washington County by Benson (1969).
- Neolloydia johnsonii (Parry) Benson *MO/HD
 Higgins 480, Castle Cliff, 24-IV-66(BRY).
- Opuntia acanthocarpa Engelm. and Bigelow *MS/HD,CD,FW
 This species hybridizes rather freely with O. whipplei in Washington
 County.
 Moor Z334, Black Ridge Turnoff, 24-VI-70; Trapp 67-86, Dalton Mesa,
 30-IX-67(Z).
- Opuntia aurea Baxter *EN/FW,MB,TF
 [O. basilaris var. aurea (Baxter) Marshall]
 See note under O. phaeacantha.
 Moor Z522, Lava Point, 7-VII-70; Trapp 67-72, Mt. Carmel Highway,
 6-VIII-67(Z).

Opuntia basilaris Engelm. and Bigelow

*MO/HD

Carlston s.n., Terry's Ranch, 7-IV-61(DX); Welsh 5294, 5 miles west of Castle Cliff, 3-V-66(BRY).

Opuntia chlorotica Engelm. and Bigelow

*SW/MB

See note under O. phaeacantha.

Trapp 67-78, Zion Canyon, 4-IX-67(Z).

Opuntia echinocarpa Engelm. and Bigelow

*MO/HD

Higgins 613, Motoqua Turnoff, 15-V-66(BRY).

Opuntia erinacea Engelm. and Bigelow

MI/HD,CD,FW

This species intergrades with O. polyacantha in Washington County and may also contribute to hybrid swarms involving O. phaeacantha and O. aurea.

Meyer 4108, Diamond Valley, 21-VI-75; Christian 898, north of Bloomington, 9-V-63(UT); Goodrich 38, Middleton, 18-V-69(DX); Wilson s.n., Kolob Road, 24-IV-62(DX).

Opuntia phaeacantha Engelm.

MH/DR,FW,MB,TF

Hybrids involving O. littoralis (Engelm.) Cockerell are mentioned by Benson (1969) as occurring in northwestern Arizona and are probably present in Washington County as well. The species also hybridizes with O. erinacea, O. aurea, and O. chlorotica. Moor Z585 represents O. phaeacantha x aurea.

Moor Z29, Smith Mesa, 11-VI-70; Trapp 67-30, Oak Creek Canyon, 12-VI-67(Z); Higgins 614, Utah Hill, 15-V-66(BRY); Moor Z585, Potato Hollow Turnoff, 7-VII-70.

Opuntia polyacantha Haw.

IC/CD,FW

See note under O. erinacea.

Higgins 679, Utah Hill, 27-V-66(BRY); Atwood 4835, Danish Ranch, 14-V-73(BRY).

Opuntia whipplei Engelm. and Bigelow

CP/CD,FW

Meyer 4013, Smith Mesa, 9-V-75; Meyer 4110, Diamond Valley, 21-VI-75; Trapp 67-38, Rockville Bench, 27-IX-67(Z).

Pediocactus sileri (Engelm.) Benson

*EN/HD

(Utahia sileri Britt. and Rose)
(Echinocactus sileri Engelm.)

Welsh 12712, 4 miles southeast of St. George, 4-IV-75(BRY).

Campanulaceae

Lobelia cardinalis L..

NA/DR,MR

Washington County material belongs to L. cardinalis ssp. graminea (Lam.) McVaugh. This plant is quite common at springs and seeps in the sandstone country of Zion National Park.

Moor Z1236, Gateway to the Narrows, 11-VIII-70.

Nemacladus glanduliferus Jeps.

*MS/HD

Meyer 2413, Shinab Kibe Hill, 27-IV-73; Meyer 2569, Curly Hollow Wash, 3-V-73; Meyer 2735, Terry's Ranch Road, 12-V-73.

Capparidaceae

Cleome lutea Hook.

IP/CD,DR

This plant is usually found on heavily disturbed sites.

Meyer 2782, Apex Mine Turnoff, 19-VII-73; Meyer 881, Red Hill, 13-VI-70; Meyer 717, Gunlock, 3-VI-70; Moor Z1138, East Fork of the Virgin, 7-VIII-70; Moor Z243, South Campground, 18-VI-70; Selander 9, Washington Fields, 12-VIII-50(UT).

Cleome serrulata Pursh

IP/CD

Meyer 3043, Big Plain Junction, 1-VIII-73; Meyer 2021, New Harmony, 24-VIII-71; Meyer 1190, Honeycomb Rocks, 8-VII-70; Gould 2003, Pine Valley Campground, 5-VIII-42(UT).

Polanisia dodecandra (L.) DC.

*PL/DR

(P. trachysperma Torr. and Gray)

This plant was growing in a heavily disturbed dry stream bed in considerable abundance.

Meyer 1949, Mogotsu Wash, 21-VIII-71.

Caprifoliaceae

Sambucus caerulea Raf.

WE/TF,MF,MR,MM

Meyer 2904, Hornet Point Road, 21-VII-73; Meyer 1068, Pine Valley Campground, 30-VI-70; Moor Z518, Lava Point, 1-VII-70; Moor Z833, Kolob Reservoir, 17-VII-70; Cottam 8894, Pine Valley Mountain, 26-VI-41(UT).

Sambucus racemosa L.

CB/MR

(S. melanocarpa Gray)

Meyer 3684, Mill Canyon, 5-VII-74.

Symphoricarpos longiflorus Gray

MI/HD,CD,FW

This plant has a preference for limestone but is not confined to it.

Cottam 4099, Apex Mine, 4-VI-29(UT); Cottam 5162, La Verkin Black Ridge, 21-IV-32(UT); Cottam 8777, Santa Clara Creek, 17-VI-41(UT); Hall s.n., Shivwits, 3-V-21(DX).

Symphoricarpos oreophilus Gray

IP/MF,MR,MM

(S. utahensis Rydb.)(S. vaccinoides Rydb.)

The species as interpreted here is a very large continuously intergrading polymorphic complex. See note under S. parishii.

Meyer 1082, Pine Valley Campground, 1-VII-70; Meyer 3698, Mill Canyon, 5-VII-74; Moor Z699, Lava Point, 15-VII-70; Moor Z860, Kolob Reservoir, 17-VII-70.

Symphoricarpos parishii Rydb.

*CA/FW

Typical S. parishii is rare in Washington County, but there are many specimens of S. oreophilus that seem to show evidence of introgression with this species.

Meyer 2788, Apex Mine, 19-VII-73.

Caryophyllaceae

Arenaria congesta Nutt.

*IM/MB

Washington County material belongs to A. congesta var. subcongesta (S. Wats.) S. Wats.

Moor Z1566, Pine Creek Canyon above Mt. Carmel Tunnel, 29-VIII-70.

Arenaria fendleri A. Gray*CC/CD,DR,FW,MB,
TF,MF

Washington County material for the most part falls within the limits of variation for A. fendleri var. brevifolia (Maguire) Maguire. Some plants seem to represent introgression with the closely related species A. macradenia S. Wats.

Meyer 3500, Old Mormon Road, 18-V-74; Meyer 768, Taylor Creek, 4-VI-70; Meyer 650, Red Cliff Campground, 31-V-70; Nelson 9645, Canyon Overlook Trail, 12-VI-71; Moor Z609, Oak Creek Canyon, 10-VII-70; Moor Z557, Potato Hollow Turnoff, 7-VII-70.

Arenaria filiorum Maguire

CP/MB

Nelson 10177, Sand Bench Trail, 24-IV-73(Z); Nelson 9980, East Rim, 27-IV-72(Z).

Arenaria kingii (S. Wats.) M. E. Jones

*GB/FW

Wiens 3916, Motoqua Road, 20-V-66(UT).

Arenaria lanuginosa (Michx.) Rohrb.

*MH/TF,MF,MR

(A. confusa Rydb.)
(A. saxosa A. Gray)

Washington County material belongs to A. lanuginosa ssp. saxosa (A. Gray) Maguire.

Meyer 924, Oak Grove, 15-VI-70; Meyer 1861, Browse, 25-VII-71; Meyer 1023, Pine Valley Campground, 30-VI-70; Moor Z117, Gateway to the Narrows, 12-VI-70; Moor Z265, Grotto Campground, 23-VI-70.

Arenaria macradenia S. Wats.

*MO/HD,FW

Washington County material belongs primarily to the typical subspecies, which is strictly Mojavean in its distribution. Some intergradation, either with A. macradenia ssp. ferrisiae Abrams or with other closely related entities whose ranges overlap here, is evident.

Meyer 813, Danish Ranch, 6-VI-70; Meyer 877, Red Hill, 13-VI-70; Meyer 2715, Castle Cliff, 13-V-73; Meyer 3113, Wire Mesa, 3-VIII-73; Cottam 6881, Gunlock, 11-V-36(UT); Christian 971, Pahcoon Spring Wash, 10-VI-63(UT); Christian 1065, Utah Hill, 4-VII-63(UT).

Cerastium vulgatum L.

IN/MF,MR

Meyer 1080, Pine Valley Campground, 30-VI-70.

Sagina occidentalis S. Wats.

CA/MR

The collections cited below are consistently apetalous, but are pentamerous and otherwise fit the species description.

Meyer 1857, Browse, 25-VII-71; Meyer 3624, North Fork of the Virgin, 30-V-74.

Saponaria officinalis L.

IN/CD,DR

This plant is restricted to relatively mesic ruderal communities.

Meyer 1913, Utah Highway 18 near Iron County Line, 26-VII-71;
Meyer 2062, Leeds, 24-VIII-71.

Silene antirrhina L.

NA/HD,CD,DR

Meyer 2491, Red Cliff Campground, 29-IV-73; Meyer 2709, Castle Cliff, 13-V-73; Meyer 3922, Curly Hollow Wash, 6-IV-75.

Silene verecunda S. Wats.

*CA/MF

Washington County material belongs to S. verecunda ssp. andersonii (Clokey) Hitchcock and Maguire, which is essentially Mojavean in its distribution. It approaches the more eastern S. scouleri Hook. in some characters.

Meyer 3682, Mill Canyon, 5-VII-74; Meyer 4119, Whipple Valley, 26-VII-75.

Stellaria jamesiana Torr.

IC/MB,TF,MF,MR,MM

Meyer 3640, North Fork of the Virgin, 31-V-74; Meyer 2898, Hornet Point Road, 21-VII-73; Meyer 2876, Little Creek Valley, 20-VII-73; Moor Z856, Kolob Reservoir, 17-VII-70; Weight 1051Z, West Rim Trail, 26-VI-35(UT); Cottam 8871, Pine Valley, 26-VI-41(UT).

Stellaria longipes Goldie

CB/MR

Meyer 989, north of New Harmony, 16-VI-70.

Stellaria nitens Nutt.

WE/DR

Gould 1503, 4 miles east of Washington, 8-IV-42(DX).

Celastraceae

Glossopetalon nevadense A. Gray GB/CD

(Forsellesia nevadensis Greene)

This shrub is apparently restricted to limestone outcrops.

Meyer 3953, Hurricane Cliffs, 1-V-75; Meyer 1753, Welcome Spring, 23-V-71.

Mortonia scabrella A. Gray *CH/HD

[M. utahensis (Cov.) A. Nels.]

Washington County material belongs to M. scabrella var. utahensis Cov., which has a strictly Mojavean distribution. The plant is strongly petrophile, usually on limestone.

Cottam 7288, Black Hill, 7-IV-39(UT); Fisk s.n., Beaver Dam Wash, 15-V-27(UT).

Pachistima myrsinites (Pursh) Raf. NM/MF

Meyer 3693, Mill Creek Canyon, 5-VII-74; Cottam 6853, Pine Valley Gulch, 10-V-36(UT); Weight 971Z, Hidden Canyon, 21-VI-35(UT).

Chenopodiaceae

Allenrolfea occidentalis (Wats.) Kuntze AN/DR

This plant is strongly halophytic.

Meyer 3289, south of St. George, 14-X-73; Christian 1002, Bloomington, 17-VI-63(UT).

Atriplex canescens (Pursh) Nutt. WE/HD,CD,DR

Meyer 617, St. George, 28-V-70; Meyer 3166, Little Creek Mountain, 16-IX-73; Moor Z630, Oak Creek Canyon, 10-VII-70; Christian 1046, Old Mormon Road, 26-VI-73(UT).

Atriplex confertifolia (Torr. and Frem.) Wats. MI/HD,CD

This plant is largely confined to fine-textured but well-drained soils.

Meyer 605, St. George, 28-V-70; Meyer 3051, southeast of Hurricane, 1-VIII-73; Cottam 14643, Black Hill, 26-III-57(UT).

- Atriplex elegans (Moq.) D. Dietr. *SW/DR
(A. fasciculata Wats.)
Galway s.n., St. George, 2-IX-34(BRY).
- Atriplex hymenelytra (Torr.) Wats. *MO/HD
Hardy s.n., Beaver Dam Wash, 4-IV-41(DX).
- Atriplex lentiformis (Torr.) Wats. *MC/DR
Washington County material belongs to the type subspecies, which is restricted essentially to the Mojave Desert.
Meyer 2105, south of St. George, 21-X-71; Christian 1118, Bloomington, 10-VIII-63(UT).
- Atriplex patula L. CB/DR
Meyer 3288, south of St. George, 14-X-73.
- Atriplex rosea L. IN/DR,MR
This is a plant of mesic ruderal communities.
Meyer 2017, New Harmony, 24-VIII-71; Christian 1114, Bloomington, 10-VIII-63(UT).
- Atriplex semibaccata R. Br. IN/DR
Hall s.n., St. George, 25-VII-18(DX); Hall s.n., St. George, 28-IX-35(UT).
- Atriplex torreyi (Wats.) Wats. *GM/DR
Meyer 231, St. George, 16-VI-68; Meyer 3287, south of St. George, 14-X-73; Cottam 6910, East Spring, 18-V-36(UT).
- Bassia hyssopifolia (Pall.) Kuntze IN/DR
Meyer 3282, south of St. George, 14-X-73; Christian 1112, Bloomington, 9-VIII-63(UT).
- Chenopodium album L. IN/HD,DR,MR
This plant seems to be restricted to heavily disturbed sites.
Meyer 3257, New Harmony, 13-X-73; Meyer 2095, east of Washington, 21-X-71.

Chenopodium atrovirens Rydb.

*IM/CD

Moor Z1456, Hop Valley, 26-VIII-70.

Chenopodium berlandieri Moq.

NA/MR

This species is very close to C. album, and there is considerable nomenclatural confusion involving the pair. This treatment follows the criteria of Munz and Keck (1959).

Meyer 3252, New Harmony, 13-X-73.

Chenopodium botrys L.

IN/DR,TF,MF

Meyer 1941, Mogotsu Wash, 21-VIII-71; Meyer 3001, Death Point, 22-VII-73; Moor Z570, Kolob Road, 17-VII-70; Harrison and Woodbury s.n., Beaver Dam Wash, 12-IX-25(UT).

Chenopodium chenopodioides (L.) Aellen

IN/TF,MF

(C. rubrum L.)

Plants of this description have often been referred to the native circumboreal species C. capitatum (L.) Asch., but seem much more appropriately placed here.

Meyer 3000, Death Point, 22-VII-73.

Chenopodium dessicatum A. Nels.

NW/CD,DR

(C. praetericola Rydb.)

Meyer 2064, Leeds, 24-VIII-71; Meyer 1449, Lava Point, 23-VIII-70.

Chenopodium fremontii Wats.

WE/CD,DR,FW

[C. incanum (Wats.) Heller]

Most Washington County material belongs to C. fremontii var. incanum Wats., which is sometimes treated as a separate species.

Meyer 3033, Gould Wash, 1-VIII-73; Meyer 3191, Little Creek Mountain, 16-IX-73; Meyer 1280, Oak Grove, 4-VIII-70; Meyer 3084, Smithsonian Butte, 2-VIII-73; Christian 1045, Old Mormon Road, 26-VI-63(UT).

Chenopodium hians Wats.

*CP/MR

Meyer 1351, Kolob Reservoir, 21-VIII-70.

- Chenopodium leptophyllum Nutt. IC/MF
Meyer 2962, Home Valley Knoll, 22-VII-73.
- Eurotia lanata (Pursh) Moq. WE/HD,CD
Meyer 3451, West Mountain Wash, 12-IV-74; Meyer 682, Red Hill, 2-VI-70; Meyer 3855, Beaver Dam Well, 5-IV-75; Moor 2171, Rockville, 15-VI-70; Christian 868, Whitmore Canyon Wash, 30-IV-63(UT).
- Grayia spinosa (Hook.) Moq. MI/HD,CD
Meyer 3444, West Mountain Wash, 12-IV-74; Meyer 3954, Hurricane Cliff Road, 1-V-75; Cottam 5087, Terry's Ranch, 19-IV-32(UT); Cottam 8439, Black Hill, 9-IV-41(UT).
- Kochia scoparia (L.) Schrad. IN/HD,CD,DR
Meyer 1910, Utah Highway 18 near Iron County Line, 26-VII-71; Meyer 1938, Toquerville, 7-VIII-71; Meyer 3129, south of Rockville, 3-VIII-73; Meyer 3836, north of Mountain Meadows, 6-IX-74.
- Monolepis nuttalliana (Schult.) Greene CB/CD,DR,MR
Meyer 1204, Kolob Reservoir, 11-VII-70; Nelson 10224, Petrified Forest, 3-V-73(Z).
- Salicornia europaea L. CS/DR
(S. rubra Nels.)
Washington County material belongs to S. europaea ssp. rubra (Nels.) Breitung.
Meyer 3296, south of St. George, 14-X-73.
- Salsola kali L. IN/HD,CD,DR,FW
(S. pestifer A. Nels.)
There is considerable nomenclatural confusion in this group; more than one Old World species may be involved. No attempt is made to unravel this problem here.
Meyer 586, Ivins Reservoir, 27-V-70; Meyer 1782, Pinto, 23-VII-71; Meyer 2119, Springdale, 22-X-71; Cottam 12750, Santa Clara Bench, 3-IX-51(UT).

Sarcobatus vermiculatus (Hook.) Torr. IP/DR

Hall 564, St. George, 24-V-31(DX).

Suaeda depressa (Pursh) Wats. WE/DR

Meyer 3283, south of St. George, 14-X-73.

Suaeda fruticosa (L.) Forsk. CS/DR

This treatment of Suaeda follows Munz (1959).

Meyer 3299, Warner Valley Spring, 14-X-73.

Suaeda torreyana Wats. ID/DR

(S. ramosissima Johnst.)

Both the pubescent S. torreyana var. ramosissima (Standl.) Munz and the glabrous type variety are present in the county.

Meyer 1920, St. George, 6-VIII-71; Cottam 3379, Watercress Spring, 21-VI-28(UT).

Compositae

Acamptopappus sphaerocephalus (Harv. and Gray) Gray *MS/HD

Meyer 1730, Castle Cliff, 23-V-71; Meyer 590, Ivins Reservoir, 27-V-70; Meyer 784, Price Hills, 5-VI-70; Graff s.n., Virgin, V-31(UT); Cottam 4077, Diamond Valley, 2-VI-30(UT).

Achillea millefolium L. CB/CD,MB,TF,MF,
MR,MM

(A. lanulosa Nutt.)

Meyer 3762, Kolob Trail, 7-VII-74; Meyer 1175, Lower Enterprise Reservoir, 8-VII-70; Meyer 1831, Potato Hollow, 24-VII-71; Moor Z512, Lava Point, 7-VII-70.

Agoseris aurantiaca (Hook.) Greene NM/MM

(A. arizonica Greene)

Meyer 852, Kolob Reservoir, 11-VI-70; Meyer 4144, Whipple Valley, 26-VII-75.

Agoseris glauca (Pursh) Raf.

IM/CD,TF,MF,MM

[A. taraxacifolia (Nutt.) D. Dietr.]

Meyer 3549, Mahogany Knoll, 19-V-74; Meyer 1651, Central, 20-V-71;
Meyer 4076, Black Hills Reseeding Area, 17-V-75; Meyer 2920, Kolob Road
near Iron County Line, 21-VII-73; Cottam 6775, Mountain Meadows,
10-V-36(UT).

Agoseris retrorsa (Benth.) Greene

*CA/MB

Nelson 9728, Taylor Creek, 14-VI-71(Z); Nelson 10036, Sand Bench Trail,
6-V-72.

Ambrosia acanthicarpa Hook.

WE/HD,CD,DR

[Franseria acanthicarpa (Hook.) Cov.]

Meyer 3271, Leeds, 13-X-73; Moor Z1433, Hop Valley, 26-VIII-70;
Weight 1116Z, Oak Creek Canyon, 25-VIII-35(UT).

Ambrosia dumosa (Gray) Payne

*MS/HD

(Franseria dumosa Gray)

Meyer 1638, Snow Spring Canyon, 20-V-71; Meyer 1739, Castle Cliff,
23-V-71; Meyer 1516, Middleton, 13-IV-71; Gould 1690, Hurricane
Cliff Road, 2-V-42(UT).

Ambrosia eriocentra (Gray) Payne

*MO/HD,DR

(Franseria eriocentra Gray)

Meyer 1581, Terry's Ranch, 14-IV-71; Meyer 1727, Castle Cliff,
23-V-71; Meyer 3518, U.S. 91 near Arizona State Line, 18-V-74.

Amphipappus fremontii Torr. and Gray

*MO/HD

Meyer 3883, Beaver Dam Well, 5-IV-75; Meyer 1579, Terry's Ranch,
14-IV-71.

Anaphalis margaritacea (L.) Gray

CB/MB,MR

Meyer 1886, Pine Valley Campground, 26-VII-71; Moor Z1342, La Verkin
Creek, 20-VIII-70; Nelson 9066, Emerald Pool Trail, 6-IX-70(Z).

Antennaria dimorpha (Nutt.) Torr. and Gray

*IP/CD,FW,MB

Meyer 4055, Hardscrabble Hollow, 16-V-74; Meyer 4047, Mountain Meadows
Turnoff, 16-V-75; Meyer 550, Black Canyon, 5-V-70; Nelson 9953, Lava
Point, 20-IV-72(Z).

- Antennaria parvifolia Nutt. *RM/TF, MF, MR
(A. aprica Greene)
Meyer 4124, Whipple Valley, 26-VII-75; Cottam 6793, Pine Valley Mountain, 9-V-36(UT).
- Antennaria rosea Greene WE/MF, MM
(A. arida Nels.)
(A. microphylla Rydb.)
Meyer 3668, Mill Canyon, 4-VII-74; Meyer 4132, Whipple Valley 26-VII-75; Meyer 1056, Pine Valley Campground, 30-VI-70.
- Anthemis cotula L. IN/TF
Meyer 2824, Kolob Road at top of Hop Valley, 20-VII-73.
- Arctium minus (Hill) Bernh. IN/DR, MR
Meyer 2048, Ash Creek, 24-VIII-71; Christian 407, Santa Clara, 27-VII-61(UT).
- Arnica chamissonis Less. NM/MR
(A. foliosa Nutt.)
Meyer 1076, Pine Valley Campground, 30-VI-70; Moor Z648, Lava Point Spring, 13-VII-70.
- Arnica cordifolia Hook. NM/MF
Meyer 3669, Mill Canyon, 4-VII-74; Pendleton s.n., Pine Valley Campground, 12-V-40(UT); Cottam 6974, Refrigerator Canyon, 14-V-36(UT).
- Arnica longifolia D. C. Eaton *IM/MR
Meyer 3680, Mill Canyon, 5-VII-74; Gould 1905, Forsythe Canyon, 22-VII-42(UT).
- Arnica mollis Hook. *NM/MM
Meyer 4159, Further Water, 27-VII-75.
- Artemisia arbuscula Nutt. MI/CD, FW
(A. nova Nels.)
Meyer 1981, Enterprise Reservoir, 21-VIII-71; Meyer 2072, Utah Highway 18 at Snow's Canyon Turnoff, 21-X-71.

- Artemisia campestris L. CB/MB
(A. pacifica Nutt.)
Nelson 10075, East Zion Plateau, 10-IX-72.
- Artemisia cana Pursh *IP/MB
Nelson 10098, West Rim Trail below Refrigerator Canyon, 12-IX-72.
- Artemisia carruthii Wood *PL/TF
Meyer 3215, Little Creek Mountain, 16-IX-73; Meyer 1450, Lava Point, 23-VIII-70; Meyer 2019, New Harmony, 24-VIII-71.
- Artemisia dracunculus L. CB/CD,DR,FW,MB,TF
MF
(A. dracunculoides Pursh)
Meyer 3189, Little Creek Mountain, 16-IX-73; Meyer 1410, Kolob Reservoir, 21-VIII-70; Christian 1268, south of St. George, 27-XI-64(UT).
- Artemisia filifolia Torr. *CC/HD,CD
This plant is confined to deep sand.
Meyer 2074, Utah Highway 18 at Snow's Canyon Turnoff, 21-X-71; Barnhurst a.n., Watercress Spring, 6-V-41(UT); Cottam 12748, Santa Clara Bench, 3-IX-51(UT).
- Artemisia frigida Willd. CB/DR
Cottam 5723, Santa Clara, 4-IX-33(UT).
- Artemisia ludoviciana Nutt. NA/CD,DR,FW,MB,TF
MF,MR,MM
Meyer 1370, Kolob Reservoir, 21-VIII-70; Meyer 1996, Honeycomb Rocks, 21-VIII-71; Meyer 3187, Little Creek Mountain, 16-IX-73.
- Artemisia tridentata Nutt. NM/CD,DR,FW,MB,TF
Meyer 507, Motoqua, 30-IV-70; Meyer 3197, Little Creek Mountain, 16-IX-73; Christian 1121, Camp Spring, 5-X-63(UT).
- Aster chilensis Nees MI/CD,DR,MB,TF
(A. adscendens Lindl.)
Meyer 1437, Lava Point, 23-VIII-70; Meyer 3723, Kolob Trail, 6-VII-74; Meyer 3823, Mountain Meadows, 6-IX-74; Moor Z1081, Gateway to the Narrows, 21-VII-70; Gould 1398, St. George, 20-IX-41(DX).

Aster exilis Ell.

*AU/DR

Meyer 3293, Virgin River south of St. George, 14-X-73.

Aster foliaceus Lindl.

IM/MR

Moor Z112, Gateway to the Narrows, 12-VI-70; Meyer Z1086, Pine Valley Campground, 1-VII-70; Moor Z1340, La Verkin Creek, 20-VIII-70.

Aster glaucodes Blake

*CP/DR,FW,MB

Meyer 2129, Gateway to the Narrows, 22-X-71; Moor Z1236, Springdale, 5-VIII-70; Hall s.n., southeast of St. George, 5-X-35(DX).

Aster hesperius Gray

PL/DR,MR

This plant has been referred to A. coerulescens DC. in the past, as in Kearney and Peebles (1960).

Meyer 2050, Ash Creek, 24-VIII-71; Meyer 3248, New Harmony, 13-X-73; Meyer 2125, Springdale, 22-X-71; Hall s.n., Bloomington, 25-X-34(DX); Cottam 5681, Pine Valley, 4-IX-33(UT).

Aster pansus (Blake) Cronq.

WE/TF

Both Kearney and Peebles (1960) and Harrington (1954) place plants of this description under A. commutatus Gray, which Cronquist (1955) cites as a synonym for A. falcatus Lindl. This treatment follows Cronquist in referring to plants so described as A. pansus rather than A. falcatus, for which he gives several distinguishing characteristics.

Meyer 1436, Lava Point, 23-VIII-70.

Atrichoseris platyphylla Gray

*MO/HD

Meyer 1567, Terry's Ranch, 14-IV-71.

Baccharis emoryi Gray

*CD/DR

Meyer 3259, Leeds, 13-X-73; Weight 820Z, Zion Canyon, 28-V-35(UT); Cottam 3390, St. George, 21-VI-28(UT); Welsh et al s.n., Terry's Ranch, 5-X-69(UT).

Baccharis glutinosa Pers.

*SW/DR

This species is closely related to B. viminea and is not always clearly separable from it.

Meyer 1625, Snow Spring Canyon, 20-V-71; Weight 892Z, Coalpits Wash, 10-VI-35(UT); Cottam 8782, Gunlock, 17-VI-41(UT).

Baccharis sergiloides Gray

*MS/DR

Harrison and Woodbury 1211, Beaver Dam Wash, 12-IX-25(UT); Higgins 789, Beaver Dam Mountains, 3-VIII-66(BRY).

Baccharis viminea DC.

*MC/DR

See note under B. glutinosa.

Meyer 521, Moloqua, 30-IV-70; Meyer 1504, Ivins Reservoir, 13-IV-71; Moor Z107, Gateway to the Narrows, 12-VI-70; Cottam 5103, Beaver Dam Wash, 19-IV-32(UT).

Bahia dissecta (Gray) Britton

*CC/TF

Meyer 1295, Oak Grove Campground, 4-VIII-70; Cottam 5689, Pine Valley Mountain, 4-IX-33(UT).

Baileya multiradiata Harv. and Gray

*SW/HD,DR,FW

Meyer 1514, Middleton, 13-IV-71; Meyer 1587, Terry's Ranch Road, 14-IV-71; Meyer 3488, U.S. 91 near Arizona State Line, 12-IV-74; Sullivan s.n., Berry Springs, 26-III-41(UT); Milner s.n., north of Anderson's Ranch, 30-IV-46(UT); Cottam 6894, Gunlock, 11-V-36(UT).

Baileya pauciradiata Harv. and Gray

*MO/HD

Meyer 3301, Warner Valley Spring, 14-X-73.

Baileya pleniradiata Harv. and Gray

*SW/HD

[B. perennis (Nels.) Rydb.]

Meyer 2087, Snow's Canyon Campground, 21-X-71; Meyer 3964, west of Hurricane, 1-V-75; Cottam 5654, St. George, 3-IV-31(UT); Cottam 9866, Santa Clara Bench, 2-V-49(UT); Christian 239, Bloomington, 14-VI-61(UT).

Balsamorhiza hirsuta Nutt.

*GB/CD

Meyer 4066, Black Hills Reseeding Area, 17-V-75; Cottam 6799, Mountain Meadows, 10-V-36(UT); Hall s.n., north of Enterprise, 27-V-35(UT).

Balsamorhiza sagittata (Pursh) Nutt.

*IM/MB,TF

Meyer 2665 (cited below) appears to be a hybrid with Wyethia arizonica; it is intermediate in vegetative characteristics, and the heads are sterile.

Meyer 4062, Hardscrabble Hollow, 16-V-75; Meyer 4039, Mountain Meadows Turnoff, 16-V-75; Moor Z54, Kolob Road, 11-VI-70; Meyer 2665, Browse Road, 11-V-73.

- Bidens frondosa L. NA/DR
Meyer 3230, Camp Springs Crossing, 16-IX-73.
- Brickellia atractyloides Gray *MS/HD,DR
(B. arguta Rob.)
Meyer 1758, Welcome Spring, 23-V-71; Meyer 683, Red Hill, 2-VI-70;
Meyer 3515, Joshua Tree National Landmark, 18-V-74; Nelson 9798,
Watchman Trail, 18-VI-71(Z).
- Brickellia californica (Torr. and Gray) Gray AN/DR
Moor Z1470, La Verkin Creek, 27-VIII-70; Harrison and Woodbury 1225,
Beaver Dam Wash, 12-IX-25(UT).
- Brickellia grandiflora (Hook.) Nutt. WE/CD,MB,TF
Meyer 1283, Oak Grove, 4-VIII-70; Meyer 1992, Honeycomb Rocks,
21-VIII-71; Moor Z1471, La Verkin Creek, 27-VIII-70; Moor Z1354,
Kolob Canyon, 20-VIII-70.
- Brickellia longifolia Wats. *EN/DR
Meyer 2089, Snow Spring Canyon, 21-X-71.
- Brickellia microphylla (Nutt.) Gray MI/CD
(B. scabra Nels.)
Meyer 2081, Utah Highway 18 at Snow's Canyon Turnoff, 21-X-71.
- Brickellia oblongifolia Nutt. SI/CD,FW
Meyer 807, Danish Ranch, 6-VI-70; Christian 1012, Curly Hollow Wash,
19-VI-63(UT).
- Calycoseris wrightii Gray *SW/HD
Meyer 1551, Terry's Ranch, 14-IV-71; Meyer 2753, west of Castle Cliff,
12-V-73.
- Carduus nutans L. IN/CD
Meyer 1808, Pinto-Pine Valley Road, 23-VII-71.
- Centaurea melitensis L. IN/DR
Moor Z3, Utah Highway 15 north of Virgin, 11-VI-70.

- Centaurea solstitialis L. IN/CD
Welsh and Thorne 13037, Ash Creek, 27-IX-75(BRY).
- Chaenactis carphoclinia Gray *MS/HD
Meyer 3454, West Mountain Wash, 12-IV-74; Meyer 1642, Snow Spring Canyon, 20-V-71; Cottam 5655, St. George, 5-IV-31(UT).
- Chaenactis douglasii (Hook.) Hook. and Arn. NM/CD,FW,MB,TF
Meyer 3708, Mill Canyon, 5-VII-74; Meyer 3539, Manganese Wash, 18-V-74; Moor 21173, Lava Point, 6-VIII-70; Meyer 820, Oak Grove Road, 6-VI-70; Cottam 3358, Mountain Meadows, 21-VI-28(UT); Cottam 6966, West Rim, 13-V-36(UT).
- Chaenactis fremontii Gray *MS/HD
Meyer 3884, Beaver Dam Well, 5-IV-75; Meyer 2742, Terry's Ranch Road, 12-V-73; Cottam 6654, St. George, 19-VI-33(UT); Rencher s.n., Beaver Dam Wash, 5-IV-41(UT).
- Chaenactis macrantha D. C. Eaton GM/HD
Meyer 2446, Shinab Kibe Hill, 27-IV-73; Meyer 2744, Terry's Ranch Road, 12-V-73; Meyer 3864, Beaver Dam Well, 5-IV-75; Weight 821Z, Coalpits Wash, 28-IV-35(UT).
- Chrysothamnus depressus Nutt. MI/TF
Moor 21168, Lava Point, 6-VIII-70.
- Chrysothamnus nauseosus (Pall.) Britton WE/HD,CD,DR,FW
Meyer 2077, Utah Highway 18 at Snow's Canyon Turnoff, 21-X-71; Christian 1119, Camp Spring, 5-X-63(UT); Christian 495, Utah Hill, 5-VIII-61(UT).
- Chrysothamnus paniculatus (Gray) Hall *MO/HD,DR
Higgins 1805, U.S. 91 near Arizona State Line, 29-XI-68(BRY); Welsh et al. 9523, Terry's Ranch, 5-X-69(BRY).
- Chrysothamnus parryi (Gray) Greene WE/CD
Meyer 1195, Honeycomb Rocks, 8-VII-70; Cottam 1530, Pine Valley Mountain, 26-VIII-27(UT).

- Chrysothamnus viscidiflorus (Hook.) Nutt. MI/CD,DR,FW
 Meyer 3188, Little Creek Mountain, 16-IX-73; Meyer 3269, Leeds, 13-X-75; Meyer 1388, Kolob Reservoir, 21-VIII-70.
- Cichorium intybus L. IN/DR
 Christian 995, Bloomington, 17-VI-63(UT).
- Cirsium arizonicum (Gray) Petrak *AR/DR,MB,TF
 This species is closely related to C. nidulum, and intermediate plants are occasionally encountered.
 Meyer 3777, La Verkin Creek, 21-VII-74; Meyer 1413, Kolob Reservoir, 21-VIII-70; Moor 2414, Gateway to the Narrows, 1-VII-70; Moor 2296, Lee Pass, 24-VI-70.
- Cirsium eatonii (Gray) Robinson *RM/MR
 Leary 1386, Kolob Arch Trail, 14-IX-75.
- Cirsium neomexicanum Gray ID/HD,CD
 (C. utahense Petrak)
 Meyer 2264, north of St. George, 18-IV-73; Meyer 2724, Castle Cliff, 13-V-73; Meyer 3512, Joshua Tree National Landmark, 18-V-74; Meyer 3447, West Mountain Wash, 12-IV-74.
- Cirsium nidulum (Jones) Petrak *EN/TF
 See note under C. arizonicum.
 Meyer 2829, Kolob Road at the top of Hop Valley, 20-VII-73; Moor 21481, Kolob Reservoir, 28-VIII-70; Moor 2888, southeast of Kolob Reservoir, 17-VII-70.
- Cirsium undulatum (Nutt.) Spreng. IP/CD,FW,MB,TF
 Meyer 1891, Pine Valley Cemetery, 26-VII-71; Meyer 1847, Potato Hollow, 24-VII-71; Meyer 1804, west of Pinto, 23-VII-71; Meyer 3749, Kolob Trail, 7-VII-74; Meyer 3831, north of Mountain Meadows, 6-IX-74.
- Cnicus benedictus L. IN/DR
 Hall s.n., St. George, 15-IV-34(DX).

Conyza canadensis (L.) Cronq. NW/CD,DR,MB,TF,MR

(Erigeron canadensis L.)

Meyer 1323, Oak Grove, 9-VIII-70; Meyer 1957, Mogotsu Wash, 21-VIII-71;
Moor Z1093, Gateway to the Narrows, 31-VII-70; Cottam 5662, Veyo,
2-IX-33(UT).

Crepis intermedia Gray NM/MB,TF,MF,MM

Meyer 4114, Whipple Valley, 26-VII-75; Meyer 1052, Pine Valley Camp-
ground, 30-VI-70; Meyer 2900, Hornet Point Road, 21-VII-73; Weight 1007Z,
West Rim Trail, 26-VI-35(UT).

Crepis occidentalis Nutt. IM/CD

Cottam 6856, Central, 10-V-36(UT); Hall s.n., north of Enterprise,
27-V-35(UT); Plummer s.n., Pinto-Mountain Meadows Road, 19-V-40(UT).

Dicoria canescens Torr. and Gray *MS/HD

This plant is confined to dunes.

Meyer 2093, Warner Valley, 21-X-71; Meyer 2084, Snow's Canyon, 21-X-71.

Dyssodia acerosa DC. *CH/HD

The plants were growing in sandstone crevices.

Meyer 537, Red Cliff, Campground, 1-V-70.

Dyssodia thurberi (Gray) Nels. *CH/DR

Moor Z794, Watchman Campground, 16-VI-70.

Encelia frutescens (Gray) Gray *MS/HD,DR

(E. virginensis Nels.)

Meyer 625, Ivins Reservoir, 30-V-70; Meyer 680, Red Hill, 2-VI-70;
Meyer 3505, Joshua Tree National Landmark, 18-V-74; Cottam 5084,
Beaver Dam Wash, 19-IV-32(UT); Cottam 6889, Gunlock, 11-V-36(UT).

Erigeron aphanactis (A. Gray) Green MI/FW

(E. concinnus var. aphanactis Gray)

Cited for Washington County by Cronquist (1947).

Erigeron bellidiastrum Nutt. *PL/HD

Meyer 3966, west of Hurricane, 1-V-75; Cox s.n., St. George, 5-V-41(DX).

Erigeron divergens Torr. and GrayWE/HD,CD,DR,FW,MB,
TF,MF

Meyer 3639, Deep Creek, 31-V-74; Meyer 923, Oak Grove, 15-VI-70;
Meyer 971, New Harmony, 16-VI-70; Meyer 1114, Pine Park, 7-VII-70;
Meyer 3213, Little Creek Mountain, 16-IX-73; Meyer 3835, Mountain
Meadows, 6-IX-74; Bradley and Moor Z301, Taylor Creek, 24-VI-70;
Bradley and Moor Z514, Lava Point, 7-VII-70; Bradley and Moor Z1067,
Potato Hollow, 30-VII-70.

Erigeron eatonii Gray

*IM/CD,TF,MF,MR,MM

Plummer s.n., Pinto Canyon, 21-V-40(UT); Cottam 8951, Pine Valley
Peak, 27-VI-41(UT); Meyer 752, Taylor Creek, 4-VI-70; Meyer 1033,
Pine Valley Campground, 30-VI-70; Meyer 4121, Whipple Valley, 26-VII-75;
Barnum 1219, Hill Creek, 22-V-64(DX).

Erigeron flagellaris Gray

*RM/TF,MF,MR,MM

This species is sometimes difficult to distinguish from forms of
E. divergens with relatively appressed pubescence. See note under
E. sionis for information on that related species.

Cottam 8892, Pine Valley Mountain, 26-VI-42(UT); Meyer 3630, North
Fork of the Virgin, 30-V-74; Meyer 2984, Kolob Reservoir, 22-VII-73;
Meyer 2917, Kolob Road near Iron County Line, 21-VII-73; Bradley and
Moor Z797, Kolob Reservoir, 17-VII-70; Meyer 4115, Whipple Valley,
26-VII-75.

Erigeron jonesii Cronq.

*EN/CD,MB,TF

Meyer 3569, Mahogany Knoll, 19-V-74; Meyer 940, Oak Grove, 15-VI-70;
Plummer s.n., Mountain Meadows, 25-V-42(UT); Meyer 4102, Moody
Wash, 18-V-75.

Erigeron lonchophyllus Hook.

*BO/MM

Cited tentatively for Washington County by Cronquist (1947).

Erigeron nauseosus (Jones) A. Nels.

Cited for Washington County by Cronquist (1947).

Erigeron pumilus Nutt.

IP/HD,CD,FW,MB

(Erigeron concinnus Torr. and Gray)

Meyer 1764, Welcome Spring, 23-V-71; Meyer 1658, Central, 20-V-71;
Meyer 3531, Cole Spring Road, 18-V-74; Meyer 2710, Castle Cliff,
13-V-73; Meyer 515, Motoqua, 30-IV-70; Meyer 727, Taylor Creek,
4-VI-70; Meyer 808, Washington Flat, 6-VI-70; Bradley and Moor Z5,

Smith Mesa, 11-VI-70; Cottam 6866, Gunlock, 11-V-36(UT); Cottam 3990, Bellvue Canyon, 29-V-29(UT); Cottam 4094, Apex Mine, 2-VI-29; Cottam 6861, Mogotsu Wash, 10-V-36(UT).

Erigeron religiosus Cronq.

*EN/MF,MR

This species is very closely allied to both E. flagellaris and E. sionis. Meyer 3599 differs from the type description in having erect stems and slightly larger heads.

Meyer 3599, North Fork of the Virgin, 29-V-74; Bradley and Moor Z1442, Hop Valley, 26-VIII-70; Weight 1028Z, West Rim Trail, 24-VI-35(UT); Nelson 10072, East Rim, 10-IX-72(Z).

Erigeron sionis Cronq.

*EN/MR,MM

Meyer 3770 and Bradley and Moor Z1262 have the small heads, lax stems, pinnately dissected leaves, and stolons described in the type description. Meyer 1390 has entire leaves but small heads. Bradley and Moor Z452 has lobed leaves and is taller. It approaches E. flagellaris var. trilobatus Maguire ex Cronquist, known only from Coal Creek Canyon, Iron County, Utah.

Meyer 3770, Kolob Arch Trail, 21-VII-74; Bradley and Moor Z1262, Emerald Pool Trail, 14-VIII-70; Bradley and Moor Z452, Gateway to the Narrows, 2-VII-70; Meyer 1390, Kolob Reservoir, 21-VIII-70; Nelson 10145, East Rim, 5-X-72(Z); Woodbury s.n., West Rim Trail, 5-VIII-25(DX).

Erigeron speciosus (Lindl.) DC.

*RM/TF,MF

Meyer 3763, Upper La Verkin Creek Trail, 7-VII-74; Meyer 1435, Lava Point, 28-VIII-70; Meyer 3691, Mill Canyon, 5-VII-74; Meyer 1830, Potato Hollow, 24-VII-71; Meyer 1408, Kolob Reservoir, 21-VIII-70; Cottam 5690, Pine Valley Mountain, 4-IX-33(UT).

Erigeron ursinus D. C. Eat.

*RM/TF,MF,MM

Meyer 1453, Lava Point, 23-VIII-70; Meyer 2980, north of Lava Point Turnoff, 22-VII-73; Meyer 2871, Little Creek Valley, 20-VII-73; Meyer 2986, Kolob Reservoir, 22-VII-73; Bradley and Moor Z1012, Potato Hollow Road, 23-VII-70.

Erigeron utahensis Gray

*CP/HD,CD,FW

This species has a very strong tendency to grow on sandstone, usually of the Navajo Formation.

Meyer 3538, Manganese Wash, 18-V-74; Bradley and Moor Z302, Taylor Creek, 24-VI-70; Bradley and Moor Z4, Smith Mesa, 11-VI-70; Meyer 642, Red Cliffs, 31-V-70; Meyer 815, Washington Flats, 6-VI-70; Meyer 909, Oak Grove Road, 15-VI-70; Cottam 6880, Gunlock, 11-V-36(UT);

Cottam s.n., above Mt. Carmel Tunnel, 3-VI-30(UT); Weight 884Z, Coalpits Wash, 10-VI-35(UT); Cottam 7253, St. George, 23-VI-37(UT).

Eriophyllum lanosum (Gray) Gray *MS/HD

Meyer 2852, Beaver Dam Well, 5-IV-75; Meyer 2431, Shinab Kibe Hill, 27-IV-73; Meyer 1544, Terry's Ranch, 14-IV-71; Cottam 5680, St. George, 4-IV-31(UT).

Eriophyllum wallacei (Gray) Gray *MO/HD,FW

This plant has a strong preference for sand.

Meyer 3965, west of Hurricane, 1-V-75; Meyer 3894, Lytle's Ranch, 5-IV-75; Meyer 4031, north of Baker Dam Turnoff, 16-V-75; Meyer 2643, Browse Road, 11-V-73; Meyer 2161, Washington, 14-IV-73; Gould 1556, Diamond Valley, 15-IV-42(UT); Jones s.n., St. George, 5-IV-1880(UT).

Eupatorium herbaceum (Gray) Greene *CC/FW,MB

Meyer 3212, Little Creek Mountain, 16-IX-73; Nelson 10142, East Rim Trail, 5-X-72(Z).

Filago californica Nutt. *CM/CD

Atwood 4866, Danish Ranch, 14-V-73(BRY).

Gaillardia arizonica Gray *AR/HD

Nish 12, Beaver Dam Slope, 18-IV-63(USU).

Gaillardia parryi Greene *EN/FW

This specimen is from slightly outside the county proper, but its existence on suitable sites in adjacent in-county areas seems so probable as to justify inclusion. The plant is restricted to heavy clay soils.

Woodruff and Meyer s.n., Mt. Carmel Highway, 7-VIII-71(UT).

Gaillardia pinnatifida Torr. *CC/HD,CD,DR

(G. mearnsii Rydb.)

Material from the county often has completely entire leaves, but it seems best to retain it all in a polymorphically conceived G. pinnatifida pending critical revision of the group.

Meyer 3038, Big Plains, 1-VIII-73; Moor Z492, Gateway to the Narrows, 4-VII-70; Barnum 1130, Ft. Pierce, 1-V-61(DX); Gould 1684, Hurricane Cliff Road, 2-V-42(DX).

- Geraea canescens Torr. and Gray *MS/HD
Pendleton s.n., Beaver Dam Slope, 5-IV-40(UT).
- Glyptopleura setulosa Gray *MO/HD
Meyer 2501, Ft. Pierce Road, 2-V-73; Meyer 2548, Warner Ridge, 2-V-73; Cottam 5159, St. George, 20-IV-32(UT); Weight 890Z, Coalpits Wash, 10-VI-35(UT).
- Gnaphalium chilense Spreng. WE/FW,MB,TF
Moor Z1510, Kolob Road at Sunset Canyon Gate, 28-VIII-70; Moor Z453, Gateway to the Narrows, 2-VII-70; Moor Z1292, Hop Valley, 18-VIII-70.
- Gnaphalium grayi Nels. and Macbr. *RM/MM
Meyer 1357, Kolob Reservoir, 21-VIII-70.
- Gnaphalium palustre Nutt. WE/MR
This plant is found in mud in shallow drying depressions.
Meyer 1127, Pine Park, 7-VII-70; Meyer 3014, Death Point, 22-VII-73; Meyer 2807, Kolob Road at top of Hop Valley, 20-VII-73.
- Grindelia squarrosa (Pursh) Dunal IN/CD,DR,FW,MB
Meyer 3270, Leeds, 13-X-75; Moor Z1229, Springdale, 5-VIII-70; Meyer 3833, north of Mountain Meadows, 6-IX-74; Christian 1076, Apex Mine Turnoff, 10-VII-63(UT).
- Gutierrezia microcephala (DC.) Gray ID/HD,DR
(G. lucida Greene)
This treatment of Gutierrezia follows Munz and Keck (1959).
Meyer 3307, Warner Valley Spring, 14-X-73; Moor Z1104, Gateway to the Narrows, 31-VII-70.
- Gutierrezia sarothrae (Pursh) Britton and Rusby WE/HD,CD,DR,FW,MB,TF
Meyer 3178, Little Creek Mountain, 16-IX-73; Meyer 3834, north of Mountain Meadows, 6-IX-74; Moor Z1545, Smith Mesa, 29-VIII-70; Moor Z1567, Pine Creek above tunnel, 29-VIII-70; Harrison s.n., St. George, 5-IX-25(UT).

- Haplopappus clementis (Rydb.) Blake *RM/MR,MM
 This treatment follows that of Cronquist (1955).
 Meyer 1396, Kolob Reservoir, 21-VIII-70.
- Haplopappus gracilis (Nutt.) Gray *MH/HD,CD,DR,FW
 Meyer 3165, Wire Mesa, 16-IX-73; Meyer 1939, southwest of Rockville, 7-VIII-71; Meyer 2124, Springdale, 22-X-71; Cottam 8752, Ft. Pierce, 15-VI-41(UT).
- Haplopappus lanceolatus (Hook.) Torr. and Gray *IP/MM
 Meyer 4160, Further Water, 27-VII-75.
- Haplopappus linearifolius DC. *MC/HD,CD,FW
 Meyer 509, Motoqua, 30-IV-70; Meyer 1597, Terry's Ranch Road, 14-IV-71; Meyer 1498, Apex Mine Road, 13-IV-71; Gould 1672, Diamond Valley, 29-IV-42(UT); Cottam 5019, Leeds, 15-IV-32(UT).
- Haplopappus nanus (Nutt.) D. C. Eat. *GB/TF
 Holland 296, Bare Valley, 10-VIII-75.
- Haplopappus scopulorum (Jones) Blake *EN/MB
 The Jones collection cited below is the type collection.
 Nelson 9847, Emerald Pool Trail, 25-X-71(Z); Nelson 10122, Watchman Trail, 27-IX-72(Z); Jones 6074, above Springdale, 25-IX-1894(POM).
- Haplopappus suffruticosus (Nutt.) Gray *GB/MF
 Cottam 5669, Pine Valley Mountain, 2-IX-33(UT); Albee 2911a, top of Oak Grove Trail, 12-IX-75(UT).
- Helenium hoopsii Gray *IM/MM
 Meyer 3665, Mill Canyon, 4-VII-74; Meyer 4151, Whipple Valley, 26-VII-75.
- Helianthella microcephala (Gray) Gray *CP/FW,MB,TF
 Meyer 3214, Little Creek Mountain, 16-IX-73.
- Helianthella quinquenervis (Hook.) Gray AN/MF
 Moor Z285, Taylor Creek, 24-VI-70.

Helianthella uniflora (Nutt.) Torr. and Gray *RM/TF,MF,MM

Meyer 4116, Whipple Valley, 26-VII-75; Meyer 1061, Pine Valley Campground, 30-VI-70; Meyer 1234, Kolob Reservoir, 11-VII-70; Weight 1004Z, West Rim Trail, 26-VI-35(UT).

Helianthus annuus L. WP/CD,DR,FW

Meyer 3825, Mountain Meadows, 6-IX-74; Meyer 3832, north of Central, 6-IX-74; Moor Z757, East Fork of the Virgin, 16-VII-70; Moor Z507, Zion Visitor Center, 5-VII-70.

Helianthus ciliaris DC. *CH/CD

Moor Z1204, Potato Hollow Turnoff, 5-VIII-70.

Helianthus deserticola Heiser *EN/HD

According to Heiser (1969), Washington County material belongs not to H. anomalus Blake but to this very closely allied endemic species.

Cottam 5396, Leeds, 16-VII-32(UT); Cottam 6916, Hurricane, 12-V-36(UT).

Helianthus petiolaris Nutt. WE/CD,DR,FW,MB

Meyer 3041, Gould Wash, 22-VII-73; Meyer 3044, Big Plain Junction, 1-VIII-73; Christian 1008, Curly Hollow Wash, 19-VI-63(UT); Moor Z1272, Hop Valley, 18-VIII-70.

Heterotheca subaxillaris (Lam.) Britton and Rusby *AU/HD

The plants approach H. grandiflora Nutt. in having ray achenes slightly pubescent on the angles, but have the small heads, canescent phyllaries, and cordate-clasping upper stem leaves of H. subaxillaris.

Meyer 3843, Ivins Reservoir, 13-X-74.

Heterotheca villosa (Pursh) Shinnars WE/HD,CD,DR,FW,MB,
TF,MF

[Chrysopsis villosa (Pursh) Nutt.]
(Chrysopsis foliosa Nutt.)

This treatment follows that of Shinnars (1951) and of Harms (1965) in merging the genus Chrysopsis with Heterotheca.

Meyer 2834, Kolob Road at top of Hop Valley, 20-VII-73; Meyer 2083, Snow's Canyon Campground, 21-X-71; Meyer 2011, Taylor Creek, 24-VIII-71; Moor Z118, Gateway to the Narrows, 12-VI-70; Moor Z1558, Pine Creek above tunnel, 29-VIII-70; Meyer 1993, Pine Park, 21-VIII-71.

Hulsea heterochroma Gray

*CA/FW

Wiens s.n., Motoqua Road, 20-V-66(UT); Higgins 1410, Utah Hill, 28-V-68(BRY).

Hymenoclea salsola Torr. and Gray

*MO/HD,CD,DR

(H. fasciculata Nels.)

Meyer 2728, Castle Cliff, 13-V-73; Meyer 1502, Apex Mine Road, 13-IV-71; Meyer 592, Ivins Reservoir, 27-V-70; Gould 1676, Hurricane Cliff Road, 2-V-42(UT); Cottam 6874, Cunlock, 11-V-36(UT).

Hymenopappus filifolius Hook.

IP/FW,MB,TF

(H. lugens Greene)

Meyer 731, Taylor Creek, 4-VI-70; Meyer 906, Oak Grove Road, 15-VI-70; Meyer 806, Danish Ranch, 6-VI-70; Moor Z1299, Hop Valley, 18-VIII-70; Weight 1000Z, West Rim Trail, 26-VI-35(UT); Wiens 3905, Motoqua Road, 20-V-66(UT).

Hymenoxys acaulis (Pursh) Parker

IC/CD,FW

Some of the material cited below seems to approach H. scaposa (DC.) Parker in pappus characters.

Harrison s.n., Big Plains, 30-V-32(DX); Higgins 550, Utah Hill, 15-V-66(BRY); Cottam s.n., Mt. Carmel Highway, 3-VI-30(UT).

Hymenoxys cooperi (Gray) Cockerell

GM/CD,FW

Meyer 810, Danish Ranch, 6-VI-70; Moor Z37, Smith Mesa, 11-VI-70; Nelson 9925, Petrified Forest, 13-IV-72(Z); Plummer s.n., south of Pinto, 22-V-40(UT).

Hymenoxys richardsonii (Hook.) Cockerell

*PL/MM

Meyer 2918, Kolob Road near Iron County Line, 21-VII-73; Meyer 2905, Hornet Point Road, 21-VII-73.

Hymenoxys subintegra Cockerell

*EN/MF

Meyer 4113, Whipple Valley, 26-VII-75.

Iva axillaris Pursh

WE/FW,MB,TF,MR

Meyer 1087, Pine Valley Campground, 1-VII-70; Meyer 3675, Mill Canyon, 4-VII-74; Meyer 3522, Utah Hill Summit, 18-IV-74.

Lactuca canadensis L.

*BO/MR

Nelson 9808, Narrows Trail, 19-VI-71(Z).

- Lactuca pulchella (Pursh) DC. IP/MF,MR
(L. tatarica ssp. pulchella Stebbins)
Meyer 1405, Kolob Reservoir, 21-VIII-70; Meyer 2043, New Harmony, 24-VIII-71; Moor Z1209, Potato Hollow, 5-VIII-70.
- Lactuca serriola L. IN/CD,FW,MR
This plant is confined to ruderal communities.
Meyer 3830, Mountain Meadows, 6-IX-74; Meyer 2014, Lee Pass, 24-VIII-71; Meyer 1786, Pinto, 23-VII-71.
- Laphamia congesta Jones *EN/FW
Meyer 2786, Apex Mine, 19-VII-73.
- Laphamia palmeri Gray *EN/HD,DR
Meyer 651, Red Cliff Campground, 31-V-70; Moor Z1103, Gateway to the Narrows, 31-VII-70; Moor Z1556, Pine Creek above tunnel, 29-VIII-70.
- Layia glandulosa (Hook.) Hook. and Arn. AN/CD,FW,MB,TF
Meyer 4101, Goldstrike Turnoff, 18-V-75; Meyer 4091, Moody Wash, 17-V-75; Cottam 6835, Central, 9-V-36(UT); Hall s.n., north of Enterprise, 29-V-35(UT).
- Leucelene ericoides (Torr.) Greene ID/CD,FW
[Aster arenosus (Heller) Blake]
(A. leucelene Blake)
Meyer 797, Washington Flat, 6-VI-70; Meyer 818, Oak Grove Road, 6-VI-70; Meyer 2059, Ash Creek, 24-VIII-71; Cottam 6840, Central, 10-V-36(UT); Cottam 6775, Mountain Meadows, 10-V-36(UT).
- Lygodesmia dianthopsis (Eaton) Tomb *RM/CD,FW
Meyer 1111, Pine Park, 7-VII-70.
- Lygodesmia spinosa Nutt. GM/FW,MB
Atwood and Higgins 5900, south of Pinto, 18-VIII-73(BRY).
- Machaeranthera bigelovii (Gray) Greene *RM/MM
(Aster bigelovii Gray)

This species intergrades to a limited degree with M. linearis within the county, but the two seem amply distinct.

Meyer 2907, Hornet Point Road, 21-VII-73; Meyer 2930, Kolob Road near Iron County Line, 21-VII-73; Moor Z1479, Kolob Reservoir, 28-VIII-70.

Machaeranthera canescens (Pursh) Gray

MI/CD,FW,MB,TF

(Aster canescens Pursh)

Certain confusing collections such as Meyer 1341 cited below at first seemed to represent M. leucanthemifolia (Greene) Greene, a hot desert species of southern Nevada, but the ecology of the plants and the continuously variable nature of the pubescence characters involved make a hybrid origin involving M. linearis seem more probable.

Meyer 2787, Apex Mine, 19-VII-73; Meyer 1991, Honeycomb Rocks, 21-VIII-71; Gould 1383, southeast of Pine Valley, 13-IX-41(DX); Meyer 1341, Hop Valley, 16-VIII-70.

Machaeranthera linearis Greene

*CP/MB,MF

[Aster cichoriaceus (Greene) Blake]

See notes under M. bigelovii and M. canescens.

Meyer 1346, Hop Valley, 16-VIII-70; Meyer 1827, Potato Hollow, 24-VII-71; Moor Z1114, Gateway to the Narrows, 31-VII-70.

Machaeranthera tanacetifolia (HBK.) Nees

*PL/CD,DR,FW

(Aster tanacetifolius HBK.)

Meyer 3163, Wire Mesa, 16-IX-73; Meyer 3205, Little Creek Mountain, 16-IX-73; Meyer 1906, Enterprise, 26-VII-71; Moor Z1230, Springdale, 5-VIII-70.

Machaeranthera tortifolia (Torr. and Gray) Cronq.

*MO/HD

(Aster abatus Blake)

Meyer 2435, Shinab Kibe Hill, 27-IV-73; Meyer 1522, Middleton, 13-IV-71; Meyer 1583, Terry's Ranch, 14-IV-71; Meyer 3449, West Mountain Wash, 12-IV-74.

Madia glomerata Hook.

NM/MF,MR,MM

Meyer 2990, north of Kolob Reservoir, 22-VII-73; Meyer 3676, Mill Canyon, 4-VII-74; Moor Z991, Potato Hollow Road, 22-VII-70.

Malacothrix clevelandii Gray

*HC/MB,TF

The plants are white-rayed but otherwise conform rather precisely to typical M. clevelandii.

Nelson 10257, Emerald Pool Trail, 17-V-73(Z); Nelson 10300, White Arch area, 22-V-73(Z); Weight 826Z, Zion Canyon, 1935(UT).

Malacothrix coulteri Gray

*HC/HD

Galway s.n., Black Hill, 4-V-35(DX).

Malacothrix glabrata (Eaton ex Gray) Gray

*CM/HD

Meyer 1565, Terry's Ranch, 14-IV-71; Meyer 3868, Beaver Dam Well, 5-IV-75.

Malacothrix sonchoides (Nutt.) Torr. and Gray

IP/HD

Higgins 372, U.S. 91 near Arizona State Line, 8-IV-66(BRY).

Microseris lindleyi (DC.) Gray

AN/HD,FW,MB

[M. linearifolia (DC.) Schultz-Bip.]

Meyer 4000, Ivins Reservoir, 4-V-75; Meyer 2625, Browse Road, 11-V-73; Meyer 2757, Terry's Ranch Road, 12-V-73; De Mille s.n., Snow's Canyon, 10-V-41(DX); Nelson 10258, Emerald Pool Trail, 17-V-73(Z).

Monoptilon bellidiforme Torr. and Gray

*MO/HD

Meyer 3862, Beaver Dam Well, 5-IV-75; Parry 100, near St. George, 1874(POM).

Onopordum acanthium L.

IN/CD,DR,FW,MB,TF

Meyer 3745, Kolob Trail, 6-VII-74; Moor Z272, Grotto Campground, 23-VI-70; Moor Z325, Black Ridge, 30-VI-70; Christian 988, Motoqua Turnoff, 10-VI-63(UT).

Palafoxia linearis (Cav.) Lag.

*MO/HD

Meyer 582, Ivins Reservoir, 27-V-70; Meyer 671, Red Hill, 2-VI-70; Cottam 5389, Leed, 6-VI-32(UT); Cottam 12756, Santa Clara Bench, 3-IX-51(UT).

Parthenium incanum HBK.

*CH/HD

Meyer 519, Motoqua, 30-IV-70; Meyer 1732, Castle Cliff, 23-V-71.

- Pectis papposa Harv. and Gray *MS/HD,CD
 Plummer s.n., west of Santa Clara, 1-X-36(UT); Harrison 1232, Red Hill, 5-IX-25(UT); Cottam 5679, Pine Valley Fields, 4-IX-33(UT).
- Perezia wrightii Gray *CH/DR
 Meyer 1611, Snow Spring Canyon, 20-V-71.
- Perityle emoryi Torr. *MS/CD
 Tanner s.n., Anderson's Ranch, 27-IV-41(BRY).
- Petradoria pumila (Nutt.) Greene IC/FW,MB,TF
 Meyer 3067, Wire Mesa, 1-VIII-73; Meyer 3217, Little Creek Mountain, 16-IX-73; Meyer 2785, Apex Mine Road, 19-VII-73; Weight 10062, West Rim Trail, 25-VI-35(UT).
- Pluchea sericea (Nutt.) Cov. *CD/DR
 Meyer 1634, Snow Spring Canyon, 20-V-71; Meyer 645, Red Cliff Camp-ground, 31-V-70; Meyer 585, Ivins Reservoir, 27-V-70; Cottam 6909, St. George, 12-V-36(UT).
- Porophyllum gracile Benth. *MS/HD
 Cited by Cottam, Garrett, and Harrison (1940) for Washington County.
- Prenanthes exigua Rydb. SW/HD
 Hardy s.n., west of St. George, 17-V-41(DX).
- Psathyrotes annua (Nutt.) Gray *MO/HD
 Meyer 3311, Warner Valley Spring, 14-X-73; Christian 933, Bloomington, 31-V-63(UT); Cottam 4011, Harrisburg, 1-VI-29(UT).
- Psathyrotes pilifera Gray *EN/HD
 Meyer 3142, Wire Mesa, 4-VIII-73; Meyer 3304, Warner Valley Spring, 14-X-73.
- Psilostrophe cooperi (Gray) Greene *SW/HD
 Meyer 1772, Welcome Spring Turnoff, 23-V-71; Meyer 3517, U.S. 91 near Utah-Arizona line, 18-V-74; Meyer 331, Castle Cliff, 7-VI-69.
- Rafinesquia neomexicana Gray *SW/HD
 Meyer 3867, Beaver Dam Well, 5-IV-75; Cottam 5663, St. George, 4-IV-31(UT).

- Ratibida columnifera (Nutt.) Woot. and Standl. *PL/MF
 [R. columnaris (Pursh) D. Don]
 Moor Z997, Potato Hollow Road, 22-VII-70.
- Rudbeckia occidentalis Nutt. *GB/MR,MM
 Meyer 1462, Lava Point Spring, 23-VIII-70; Meyer 3759, Kolob Trail, 7-VII-74; Moor Z1379, Hop Valley, 21-VIII-70.
- Senecio douglasii DC. CA/HD,CD
 (S. monoensis Greene)
 Meyer 1557, Terry's Ranch, 14-IV-71; Meyer 1734, Castle Cliff, 23-V-71; Meyer 707, Snow's Canyon, 3-VI-70; Harrison s.n., Red Hill, 5-IX-25(UT); Cottam 1528, Santa Clara Bench, 29-VIII-27(UT).
- Senecio eremophilus Rich. *RM/TF
 (S. ambrosioides Rydb.)
 (S. macdougalii Heller.)
 Meyer 2864, Little Creek Valley, 20-VII-73; Meyer 3004, Death Point, 22-VII-73; Moor Z1411, Lava Point, 21-VIII-70; Moor Z1203, Potato Hollow Road, 5-VIII-70; Cottam 5670, Pine Valley Mountain, 2-IX-33(UT).
- Senecio integerrimus Nutt. *NM/MF,MM
 Meyer 840, Kolob Reservoir, 11-VI-70; Meyer 2931, Kolob Road near Iron County Line, 21-VII-73.
- Senecio longilobus Benth. CC/CD,FW,MB,TF
 Meyer 3192, Little Creek Mountain, 16-IX-73; Meyer 952, north of New Harmony, 16-VI-70; Meyer 1876, Browse, 25-VII-71; Moor Z1547, Smith Mesa, 29-VIII-70.
- Senecio multilobatus Torr. and Gray ID/HD,CD,DR,FW,MB,TF
 (S. lynceus Greene)
 As stated by Kearney and Peebles (1960), this species intergrades with S. millelobatus Rydb. (including S. uintahensis Greenm. and S. stygius Greene). Rather than attempt an artificial segregation on a series of continuously intergrading specimens, all county material has been referred here.

Meyer 558, Goldstrike, 5-V-70; Meyer 2642, Browse Road, 11-V-73;
Meyer 1107, Pine Park, 7-VII-70; Meyer 936, Oak Grove, 15-VI-70;
Meyer 720, Taylor Creek, 4-VI-70; Cottam 5037, Shem, 16-IV-32(UT);
Walsh s.n., Scout Overlook, 27-V-33(UT).

Senecio spartioides Torr. and Gray MI/CD,MB,TF

Meyer 1399, Kolob Reservoir, 21-VIII-70; Moor Z437, Gateway to the
Narrows, 1-VII-70.

Solidago canadensis L. BO/CD,DR,FW,MB,TF,
MF,MM

Meyer 2008, Taylor Creek, 24-VIII-70; Meyer 3721, Kolob Trail, 6-VII-74;
Moor Z1079, Gateway to the Narrows, 31-VII-70; Moor Z1147, East Fork of
the Virgin, 7-VII-70; Moor Z1482, Lava Point, 28-VIII-70.

Solidago nana Nutt. *RM/TF

Meyer 1434, Lava Point, 23-VIII-70; Lockhart s.n., Upper La Verkin
Creek, 31-VIII-74.

Solidago occidentalis (Nutt.) Torr. and Gray WE/DR

Meyer 2120, Springdale, 22-IX-71; Meyer 2092, Washington Fields,
21-X-71.

Sonchus asper (L.) Hill IN/DR

Meyer 1619, Middleton, 15-IV-71; Meyer 633, Ivins Reservoir, 30-V-70;
Moor Z1094, Gateway to the Narrows, 31-VII-70.

Sonchus oleraceus L. IN/DR

Christian 997, Bloomington, 17-VI-63(UT).

Stephanomeria exigua Nutt. AN/HD,CD,FW

Meyer 874, Red Hill, 13-VI-70; Meyer 3083, Smithsonian Butte,
2-VIII-73; Moor Z483, Angel's Landing Trail, 4-VII-70; Christian 1017,
Curly Hollow Wash, 19-VI-63(UT).

Stephanomeria pauciflora (Torr.) Nutt. ID/HD,CD,DR,FW

Meyer 3146, Wire Mesa, 4-VIII-73; Meyer 2793, Apex Mine, 19-VII-73;
Meyer 2802, Curly Hollow Wash, 19-VII-73; Cottam 5223, St. George,
8-VII-32(UT).

- Stephanomeria tenuifolia (Torr.) Hall IM/CD,MB,TF
Meyer 1978, Enterprise Reservoir, 21-VIII-71; Meyer 2010, Lee Pass, 24-VIII-70; Meyer 1347, Hop Valley, 16-VIII-70; Moor Z1241, Gateway to the Narrows, 12-VIII-70; Weight 1022Z, West Rim Trail, s.d.(UT).
- Stylocline micropoides Gray *MS/HD
Meyer 4024, west of Hurricane, 2-V-75; Meyer 3874, Beaver Dam Well, 5-IV-75; Galway s.n., Black Hill, 30-IV-35(DX).
- Syntrichopappus fremontii Gray *MO/HD,CD,FW
Meyer 1564, Terry's Ranch, 14-IV-71; Jones s.n., Leeds, IV-1880(UT); Gould 1704, Diamond Valley, 5-V-42(UT); Harrison 10196, south of Central, 7-V-41(BRY).
- Taraxacum officinale Weber IN/CD,DR,MB,MR,MM
Meyer 1680, Oak Grove, 21-V-71; Moor Z1166, Lava Point, 6-VIII-70; Moor Z85, Kolob Reservoir, 11-VI-70; Wilson s.n., St. George, 19-IV-62(DX).
- Tetradymia axillaris A. Nels. *MO/HD,CD
(T. spinosa var. longispina M. E. Jones)
Meyer 1488, Apex Mine Road, 13-IV-71; Meyer 674, Red Hill, 2-VI-70; Christian 867, Whitmore Canyon Wash, 30-IV-63(UT); Weight 746Z, Zion Canyon, 1-VI-35(UT); Graff s.n., Virgin, 31-V(UT).
- Tetradymia canescens DC. MI/CD,MB,TF
Meyer 1990, Honeycomb Rocks, 21-VIII-71; Meyer 1940, Pine Creek above tunnel, 7-VIII-71; Moor Z1050, Kolob Road, 24-VII-70.
- Thelesperma megapotamicum (Spreng.) Kuntze *CC/TF
Moor Z1171, Lava Point, 6-VIII-70.
- Thelesperma subnudum Gray *CP/HD,CD,FW
Meyer 3037, north of Big Plain Junction, 1-VIII-73; Cottam s.n., Leeds, 16-VII-32(UT).
- Townsendia incana Nutt. *CP/TF
(T. arizonica Gray)
Meyer 3594, North Fork of the Virgin, 29-V-74.

Townsendia minima Eastw.

*EN/FW

This plant is restricted to the clay soils of southcentral and southwestern Utah, mainly in Red Canyon near Bryce.

Meyer 4013, Smith Mesa, 1-V-75.

Tragopogon dubius Scop.

IN/CD,DR,FW,MB,TF

Meyer 803, Washington Flat, 6-VI-70; Meyer 964, north of New Harmony, 16-VI-70; Meyer 1097, Pine Valley Campground, 1-VII-70.

Tragopogon porrifolius L.

IN/CD,DR,TF

Moor Z231, South Campground, 18-VI-70; Moor Z858, Kolob Reservoir, 17-VII-70.

Verbesina encelioides (Car.) Benth. and Hook.

AN/CD

Welsh and Thorne 13039, Ash Creek, 27-IX-75(BRY).

Viguiera annua (Jones) Blake

*CH/HD

Welsh et al. 9512, Utah Highway 15 just south of Zion Park, 4-X-69(UT).

Viguiera multiflora (Nutt.) Blake

IP/CD,FW,MB,TF,MF,
MR,MM

Meyer 1903, Enterprise, 26-VII-71; Meyer 1432, Lava Point, 23-VIII-70; Meyer 1404, Kolob Reservoir, 21-VIII-70; Meyer 822, Oak Grove Road, 6-VI-70; Cottam 8790, Washington Flat, 18-VI-41(UT).

Wyethia arizonica Gray

*CP/TF,MF,MM

Meyer 2852, Little Creek Valley, 20-VII-73; Weight 1003Z, West Rim Trail, 26-VI-35(UT).

Xanthium strumarium L.

CS/CD,DR,FW,TF,MR

(X. saccharatum Wallr.)

Meyer 3227, Camp Springs Crossing, 16-IX-73; Meyer 2030, New Harmony, 24-VIII-71; Meyer 3821, Mountain Meadows, 6-IX-74; Moor Z1502, Kolob Road near Fire Pit Knoll, 28-VIII-70.

Convolvulaceae

Convolvulus arvensis L.

IN/CD,DR

This plant is often abundant along roadsides in irrigated areas and occasionally at higher elevations. It is restricted to ruderal sites.

Meyer 1483, Lava Point Spring, 23-VIII-70; Moor Z1122, Gateway to the Narrows, 31-VII-70; Moor Z203, Watchman Campground, 16-VI-70; Moor Z978, Cave Valley, 17-VII-70; Christian 994, Bloomington, 17-VI-73(UT).

Cressa truxillensis HBK.

AN/DR

This plant was abundant in a highly alkaline seep area.

Meyer 1918, St. George, 6-VIII-71.

Cornaceae

Cornus stolonifera Michx.

NA/MR

Meyer 901, Oak Grove, 15-VI-70; Cottam 8902, Pine Valley, 26-VI-41(UT).

Crassulaceae

Sedum debile S. Wats.

*GB/MF

Nelson 10311, Hidden Canyon, 23-V-73(Z).

Sedum stenopetalum Pursh

*IP/MB

This is a strongly petrophile plant, found in Zion growing on sandstone.

Weight 1023Z, West Rim Trail, 24-VI-35(UT); Nelson s.n., East Rim, 27-IV-72(Z).

Cruciferae

Arabis drummondii Gray

*BO/MF,MR,MM

Meyer 4139, Whipple Valley, 26-VII-75; Meyer 860, Kolob Reservoir, 11-VI-70; Meyer 1466, Lava Point, 23-VIII-70; Moor Z684, Lava Point, 14-VII-70; Meyer 3719, Mill Canyon, 5-VII-74.

Arabis fendleri (Watson) Greene

*RM/CD,DR,FW,MB,TF

A. fendleri is very closely related to A. perennans, differing mainly in the presence of biseriate almost wingless seeds and coarse setose hairs on the lower portions. The pubescence character particularly is a matter of degree and many intermediate plants are encountered.

Meyer 3560, Mahogany Knoll, 19-V-74; Meyer 3382, Harrisburg Creek, 9-IV-74; Meyer 3404, Wire Mesa, 10-IV-74; Meyer 3426, Enterprise Reservoir Road, 11-IV-74; Meyer 3342, Ripple Arch, 8-IV-74; Meyer 3617, North Fork of the Virgin, 30-V-74; Meyer 1673, Oak Grove, 21-V-71; Meyer 4007, Hurricane, 8-V-75; Meyer 4117, Whipple Valley, 26-VII-75; Meyer 3480, Apex Mine, 12-IV-74.

Arabis holboellii Hornem.

*BO/CD,FW,MB

Meyer 4027, Grass Valley, 16-V-75; Meyer 4019, Smith Mesa, 10-V-75; Meyer 4043, Mountain Meadows Turnoff, 16-V-75; Meyer 4058, Hardscrabble Hollow, 16-V-75; Meyer 552, Black Canyon, 5-V-70; Walsh s.n., Refrigerator Canyon, 27-V-33(UT); Cottam 7515, Shem, 4-IV-40(UT); Meyer 1654, Central, 20-V-71.

Arabis pendulina Greene

*EN/TF,MF

Meyer 2767, head of Hop Valley, 12-V-73; Cottam 8942, Pine Valley Mountain, 27-VI-41(UT).

Arabis perennans Watson

SI/HD,CD,FW,MF

See note under A. fendleri.

Nelson 9909, Oak Creek Canyon, 6-IV-72; Meyer 3694, Mill Canyon, 5-VII-74; Meyer 3477, Joshua Tree National Landmark, 12-IV-74; Meyer 3373, Cole Spring Road, 9-IV-74; Meyer 4020, Smith Mesa, 10-V-75; Meyer 3929, Hurricane Cliffs, 11-IV-75; Meyer 2339, Warner Ridge, 24-IV-73.

Arabis pulchra Jones ex Watson

MI/HD,CD,FW

Washington County material belongs to A. pulchra var. munciensis Jones.

Meyer 3367, Cole Spring Road, 9-IV-74; Meyer 513, Motoqua, 30-IV-70; Meyer 1600, Terry's Ranch Road, 14-IV-71; Rencher s.n., Silver Reef, 1-IV-41(UT).

Barbarea orthoceras Ledeb.

CB/MF,MR

Meyer 3717, Mill Canyon, 5-VII-74; Cottam 6803, Pine Valley Mountain, 9-V-36(UT).

- Brassica campestris L. IN/DR
Sullivan s.n., Leeds, 8-III-41(DX).
- Brassica juncea (L.) Coss. IN/DR
Meyer 2326, St. George, 19-IV-73.
- Capsella bursa-pastoris (L.) Medic. IN/CD,DR,TF
Meyer 2155, Washington, 14-IV-73; Meyer 2223, Purgatory Flat, 15-IV-73;
Meyer 3011, Death Point Road, 22-VII-73; Moor 2994, Potato Hollow Road,
22-VII-70.
- Cardamine cordifolia A. Gray *RM/MR
Meyer 1003, Pine Valley Campground, 29-VI-70.
- Cardaria draba (L.) Desv. IN/DR
(Lepidium draba L.)
This plant is locally abundant in irrigated fields.
Meyer 2148, Washington, 12-IV-73; Meyer 2325, St. George Fields,
19-IV-73.
- Caulanthus cooperi (S. Wats.) Payson *MO/HD
(Thelypodium cooperi S. Wats.)
The generic treatment of Al-Shehbaz (1973) is followed here.
Meyer 3866, Beaver Dam Well, 5-IV-75.
- Caulanthus glaber (Jones) Rydb. *EN/FW
(C. crassicaulis var. glaber Jones)
Hall s.n., north of Enterprise, 27-V-35(UT); Nelson 10210, Petrified
Forest, 3-V-73(Z).
- Caulanthus lasiophyllus Payson CA/HD,CD
[Thelypodium lasiophyllum (Hook. and Arn.) Greene]
Washington County material belongs to C. lasiophyllum var. utahensis
(Rydb.) Payson, which is confined to the Mojave and Colorado Deserts.
The generic treatment of Al-Shehbaz (1973) is followed in placing the
species in Caulanthus.

Meyer 2222, Purgatory Flat, 15-IV-73; Meyer 1601, Terry's Ranch Road, 14-IV-71; Meyer 2204, east of Washington, 15-IV-73; Meyer 3849, Lytle's Ranch, 5-IV-75; Meyer 3927, Carly Hollow Wash, 6-IV-75.

Chorispora tenella (Pall.) DC.

IN/DR,MF

This plant is exceedingly abundant along bottomlands, often coloring entire hayfields lavender in the spring. It is restricted to ruderal habitats near water, such as irrigated fields.

Meyer 2317, Atkinville, 19-IV-73; Meyer 1687, Oak Grove, 21-V-71; Meyer 3379, Harrisburg Creek, 9-IV-74; Meyer 4090, Cove Wash, 17-V-75; Meyer 3443, Moody Wash, 11-IV-74; Meyer 3555, Mahogany Knoll, 19-V-74.

Conringia orientalis (L.) Dumort

IN/CD

Galway s.n., Mountain Meadows, 3-V-36(BRY).

Descurainia californica (Gray) Schulz

MI/TF,MF,MR,MM

Meyer 1422, Kolob Reservoir, 21-VIII-70; Meyer 1431, Lava Point, 23-VIII-70; Moor Z1213, Potato Hollow, 6-VIII-70; Moor Z683, Gateway to the Narrows, 11-VII-70.

Descurainia pinnata (Walt.) Britt.

AN/HD,CD,DR,FW

Some Washington County material approaches D. obtusa (Greene) Schulz, which can be separated from D. pinnata var. halictorum (Cockerell) Peck only on vague vegetative characters. The conservative course has been followed here.

Meyer 2180, Black Hill, 15-IV-73; Meyer 3545, Manganese Wash, 18-V-74; Meyer 2385, Washington Fields, 25-IV-73; Meyer 3332, Sand Mountain, 7-IV-74; Meyer 508, Motoqua, 30-IV-70; Meyer 1605, Terry's Ranch Road, 14-IV-71; Meyer 3950, Hurricane Cliffs Road, 1-V-75; Meyer 3349, Ripple Arch, 8-IV-74; Christian 797, Utah Hill Summit, 12-IV-63(UT); Christian 781, Bloomington, 3-IV-63(UT); Moor Z1377, Hop Valley, 21-VIII-70.

Descurainia sophia (L.) Webb

IN/HD,CD,DR,FW

Meyer 2322, Atkinville, 19-IV-73; Meyer 2144, Washington, 12-IV-73; Meyer 1775, Welcome Spring Road, 23-V-71; Meyer 2002, Honeycomb Rocks, 21-VIII-71; Gould 1441, 4 miles south of St. George, 20-III-42(UT); Plummer s.n., Pinto, 23-V-40(UT); Christian 942, southeast of Santa Clara, 1-VI-63(UT).

Dithyrea wislizeni Engelm.

*CC/HD,CD,FW

This plant is replaced in the Mojave Desert by the closely related D. californica Harv., which is known from Clark County, Nevada and may be found in Washington County. Both species are obligate areno-philous.

Meyer 3963, west of Hurricane, 1-V-75; Meyer 2553, Ft. Pierce Road, 2-V-73; Meyer 2075, top of Snow's Canyon, 21-X-71; Meyer 2656, Browse Road, 11-V-73; Cottam s.n., Santa Clara Bench, 16-VIII-50(UT); Cottam 5148, Diamond Valley, 19-IV-32(UT); De Mille s.n., Snow's Canyon, 10-V-41(UT).

Draba cuneifolia Nutt. ex Torr. and Gray

ID/HD,CD,DR,FW,MB

Meyer 2314, Atkinville, 19-IV-73; Meyer 2255, Washington Flat Road, 18-IV-73; Meyer 2620, Browse Road, 11-V-73; Meyer 2698, north of Virgin, 13-V-73; Meyer 2230 Ft. Pierce Road, 17-IV-73; Meyer 549, Goldstrike, 5-V-70; Meyer 3362, Ripple Arch, 8-IV-74; Meyer 3895, Lytle's Ranch, 5-IV-75; Young s.n., Silver Reef, 30-III-41(UT); Cottam 7517, Shem, 4-IV-40(UT).

Draba reptans (Lam.) Fernald

NA/FW

Meyer 2610, Anderson Junction, 9-V-73.

Draba stenoloba Ledeb.

*NM/MF,MR,MM

Meyer 4157, Further Water, 27-VII-75; Meyer 4130, Whipple Valley, 26-VII-75; Cottam 6800, north slope of Pine Valley, 9-V-36(UT).

Draba zionensis C. L. Hitchcock

*EN/FW

This plant, found only on sandstone talus slopes in the Zion Park region, has its closest affinities with the more widely distributed D. asprella Greene.

Cited by Hitchcock (1941) for Washington County (Zion Park).

Erysimum capitatum (Dougl.) GreeneWE/CD,DR,FW,MB,TF,
MF,MR,MM

Washington County material has often been referred to the related but more northerly E. asperum (Nutt.) DC. These plants may be conspecific, but in any case the nomenclature is confused. The treatment here follows Holmgren and Reveal (1966).

Moor Z560, Potato Hollow Turnoff, 7-VII-70; Christian s.n., Utah Hill, 12-IV-63(UT); Harper 75, Oak Grove, 16-V-64(UT); Meyer 944, Oak Grove, 15-VI-70; Meyer 3401, Wire Mesa, 10-IV-74; Meyer 4042, Mountain Meadows Turnoff, 16-V-75; Meyer 3345, Ripple Arch, 8-IV-74; Meyer 571, Tobin Bench, 5-V-70; Meyer 733, Taylor Creek, 4-VI-70; Meyer 3537, Manganese Wash, 18-V-74; Meyer 3369, Cole Spring Road, 9-IV-74.

Erysimum inconspicuum (S. Wats.) Macmill. *BO/TF

Meyer 1810, Potato Hollow Road, 24-VII-71.

Erysimum repandum L. IN/FW

These plants were growing near a cattle watering trough in heavily trampled soil.

Meyer 4014, Smith Mesa, 10-V-75.

Hutchinsia procumbens (L.) Desv. CB/HD

Meyer 2176, Black Hill, 15-IV-73; Jones 1627, St. George, 3-IV-1880(UT).

Lepidium densiflorum Schrad. NA/CD,FW

This species is told with difficulty from L. virginicum L., differing mainly in the more erect, flattened pedicels and obovate silicles. Apparently intermediate plants have been encountered.

Meyer 1397, Kolob Reservoir, 21-VIII-70; Meyer 1792, Pinto, 23-VII-71; Moor Z123, Gateway to the Narrows, 12-VI-70.

Lepidium dictyotum A. Gray *GB/HD

Hitchcock (1936) cites extreme material of L. lasiocarpum Nutt. from the St. George Basin which approaches L. dictyotum, but the specimen below appears to fall well within the range of variation of L. dictyotum proper though it was collected southeast of its reported range.

Meyer 1524, Terry's Ranch, 13-IV-71.

Lepidium fremontii S. Wats. *MO/HD,CD

Meyer 3854, Beaver Dam Well, 5-IV-75; Meyer 3464, West Mountain Wash, 12-IV-74; Meyer 587, Ivins Reservoir, 27-V-70; Meyer 2730, Castle Cliff, 13-V-73; Meyer 1575, Terry's Ranch, 14-IV-71; Meyer 3544-1, Manganese Wash, 18-V-74; Meyer 3333, Sand Mountain, 7-IV-74; Meyer 2404, Washington, 26-IV-73.

Lepidium lasiocarpum Nutt. *MH/HD,CD,DR,FW

Meyer 3374, Cole Spring Road, 9-IV-74; Meyer 2349, Washington, 25-IV-73; Meyer 2443, Shinab Kibe Hill, 27-IV-73; Meyer 3851, Beaver Dam Well, 5-IV-75; Meyer 523, Motoqua, 30-IV-70; Meyer 3993, Hurricane Cliffs Road, 2-V-75; Meyer 3478, Joshua Tree National Landmark, 12-IV-74; Meyer 2320, Atkinville, 19-IV-73.

Lepidium montanum Nutt.

IC/HD,CD,DR,FW

This enormously variable species sometimes exhibits a surprising degree of xerophily, occupying barren gypsiferous soils at low elevations with Atriplex confertifolia. It can dependably be separated from L. fremontii on fruit and pubescence characters.

Meyer 779, Price Hills, 5-VI-70; Meyer 2212, Purgatory Flat, 15-IV-73; Meyer 3606, North Fork of the Virgin, 29-V-74; Meyer 3525, Utah Hill Summit, 18-IV-74; Moor Z195, Watchman Campground, 16-VI-70; Meyer 3544-2, Manganese Wash, 18-V-74.

Lepidium perfoliatum L.

IN/CD,DR

This plant is confined to ruderal communities near water.

Meyer 1781, Pinto, 23-VII-71; Meyer 2324, St. George, 19-IV-73.

Lepidium virginicum L.

NA/TF,MF

(L. medium Greene)

This plant is similar to L. densiflorum Schrad. but may usually be distinguished by the terete, spreading pedicels. It tends to occur on more mesic sites. The two species are often difficult to separate.

Meyer 1032, Pine Valley Campground, 30-VI-70; Meyer 2821, top of Hop Valley, 20-VII-73; Meyer 1842, Potato Hollow, 24-VII-71.

Lesquerella arizonica Wats.

*EN/FW

Cited for Washington County by Rollins and Shaw (1973).

Lesquerella intermedia (Wats.) Heller

*CP/FW

Plummer s.n., Cedar-Pinto Road, 19-V-40(UT).

Lesquerella kingii Wats.

*GB/CD,TF

Meyer 518, Motoqua Road, 30-IV-70; Meyer 551, Black Canyon, 5-V-70; Holmgren 1979, West Rim Trail, 22-VI-65(Z).

Lesquerella tenella Nels.

*MS/HD

Meyer 3892, Lytle's Ranch, 5-IV-75; Meyer 3857, Beaver Dam Well, 5-IV-75; Meyer 1591, Terry's Ranch Road, 14-IV-71.

Lesquerella wardii Wats.

*EN/MM

Meyer 2926, Kolob Road near Iron County Line, 21-VII-73.

Malcolmia africana (L.) R. Br.

IN/HD

This drought-tolerant weed has increased astronomically in abundance during the course of this six-year study.

Meyer 3943, Hurricane Cliffs, 1-V-75; Meyer 2146, Washington, 12-IV-73; Meyer 2213, Purgatory Flat, 15-IV-73; Christian 866, Whitmore Canyon Wash, 30-IV-63(UT).

Nasturtium officinale R. Br.

IN/DR,MR

(Rorippa nasturtium-aquaticum Schinz and Thell.)

Meyer 686, Veyo, 3-VI-70; Meyer 3234, Camp Springs Crossing, 16-IX-73; Meyer 1136, Pine Park, 7-VII-70; Meyer 887, Watercress Spring, 13-VI-70; Meyer 3828, Mountain Meadows, 6-IX-74; Meyer 3731, Willis Creek, 6-VII-74; Moor 2114, Gateway to the Narrows, 12-VI-70; Christian 1019, Santa Clara Creek, 22-VI-63(UT).

Physaria chambersii Roll.

GB/DR,FW,MB

This plant and the closely related P. newberryi are sympatric in Washington County, and plants intermediate in style length are often encountered. In the absence of mature fruits some of this material has been assigned somewhat provisionally to one or the other species.

Meyer 3427, Enterprise Reservoir Road, 11-IV-74; Meyer 767, Taylor Creek, 4-VI-70; Meyer 804, Washington Flat, 6-VI-70; Meyer 3380, Harrisburg Creek, 9-IV-74; Meyer 3605, North Fork of the Virgin, 29-V-74.

Physaria newberryi A. Gray

*CP/HD,CD,DR,FW

See note under P. chambersii.

Christian 792, Stucki Spring, 7-IV-63(UT); Cox s.n., Bloomington, 27-IV-41(UT); Weight 788Z, Zion Park, 28-IV-35(UT); Graff s.n., Virgin, V-31(UT); Meyer 3977, Hurricane Cliff Road, 2-V-75; Meyer 2291, Price Hills, 19-IV-73; Meyer 4021, Smith Mesa, 10-V-75; Meyer 563, Black Canyon, 5-V-70.

Rorippa curvipes Greene

WE/MR

Washington County material approaches R. sphaerocarpa (Gray) Britt. in fruit shape and R. truncata (Jepson) Stuckey in degree of leaf-lobing, as well as being somewhat intermediate in other regards. See Stuckey (1972) for a discussion of nomenclatural confusion in this group.

Meyer 1835, Potato Hollow, 24-VII-71; Meyer 1174, Lower Enterprise Reservoir, 8-VII-70; Meyer 1356, Kolob Reservoir, 21-VIII-70; Meyer 1796, Pinto, 23-VII-71.

Rorippa tenerrima Greene

WE/MF

This plant was growing in drainage depressions in heavy clay soil.

Meyer 3020, Death Point, 22-VII-73.

Sisymbrium altissimum L.

IN/CD,DR,FW,TF

Meyer 1900, Enterprise, 26-VII-71; Meyer 1789, Pinto, 23-VII-71; Meyer 2029, New Harmony, 24-VIII-71; Moor Z1024, Potato Hollow, 24-VII-70; Moor Z182, Watchman Campground, 16-VI-70; Moor Z14, Smith Mesa, 11-VI-70; Christian 1047, Apex Mine Road, 26-VI-63(UT); Sullivan s.n., Leeds, 27-IV-41(UT).

Sisymbrium irio L.

IN/DR

Meyer 609, St. George, 28-V-70; Meyer 1621, Middleton, 15-IV-71; Meyer 2152, Washington, 14-IV-73.

Stanleya pinnata (Pursh) Britton

IP/HD,CD,DR,FW

Meyer 823, Oak Grove Road, 6-VI-70; Meyer 3467, West Mountain Wash, 12-IV-74; Moor Z225, Watchman Campground, 16-VI-70; Moor 768, Shunesburg Road, 15-VII-70; Weight 784Z, Zion Canyon, 28-IV-35(UT); Christian 865, Whitmore Canyon Wash, 30-IV-63(UT); Pendleton s.n., Berry Springs, 7-V-40(UT); Christian 453, Curly Hollow Wash, 2-VIII-(UT); Meyer 652, Red Cliff Campground, 31-V-70.

Streptanthella longirostris (S. Wats.) Rydb.

ID/HD,CD,DR

Meyer 3974, west of Hurricane, 1-V-75; Meyer 3995, Hurricane Cliffs, 2-V-75; Meyer 2488, Red Cliff Campground, 29-IV-73; Meyer 3326, Warner Valley, 6-IV-74; Meyer 3383, Harrisburg Creek, 9-IV-74; De Mille s.n., Beaver Dam Wash, 5-IV-41(UT); Cottam 9859, Santa Clara Bench, 2-V-49(UT); Christian 876, Whitmore Canyon Wash, 3-V-63(UT); Harper 71, Oak Grove Creek, 16-V-64(UT).

Streptanthus cordatus Nutt.

IM/CD,FW,MB

Meyer 4082, Mogotsu Wash, 17-V-75; Meyer 2650, Browse Road, 11-V-73;
 Meyer 574, Tobin Bench, 5-V-70; Meyer 1756, Welcome Spring, 23-V-71;
 Meyer 1117, Pine Park, 7-VII-70; Meyer 3370, Cole Spring Road, 9-IV-74;
 Meyer 3354, Ripple Arch, 8-IV-74; Weight s.n., West Rim Trail,
 26-VI-35(UT); Cottam 5065, Shem, 17-IV-32(UT); Cottam 5013, Pintura,
 15-IV-32(UT); Hardy s.n., Jackson Springs, 10-IV-40(UT); Christian 985,
 Apex Mine Road, 10-VI-63(UT).

Thelypodium integrifolium (Nutt.) Endlich.

PL/HD

This plant was growing in very alkaline soil near a seep. Washington
 County material belongs to T. integrifolium ssp. affine (Greene)
 Al-Shehbaz, which is confined to the Mojave Desert.

Meyer 1919, St. George, 6-VIII-71.

Thelypodium laxiflorum Al-Shehbaz

*SP/TF,MF

(Thelypodium wrightii Gray var. tenellum Jones)
 [Stanleyella wrightii var. tenella (Jones) Payson]

This species is closely related to T. wrightii Gray which replaces it
 to the south and east.

Meyer 1430, Lava Point, 23-VIII-70; Moor Z1282, Hop Valley, 18-VIII-70;
 Moor Z1113, Gateway to the Narrows, 31-VII-70; Meyer 763, Taylor Creek,
 4-VI-70; Meyer 3667, Mill Canyon, 4-VII-74.

Thlaspi arvense L.

IN/MM

Meyer 1353, Kolob Reservoir, 21-VIII-70.

Thlaspi montanum L.

CB/CD,DR,TF

(T. fendleri A. Gray)

The treatment of Holmgren (1971), in which North American material is
 considered conspecific with Eurasian, is followed here.

Meyer 3433, Enterprise Reservoir Road near Goldstrike Turnoff, 11-IV-74;
 Meyer 834, Kolob Reservoir, 11-VI-70; Fisk s.n., Santa Clara, 22-IV-30.

Thysanocarpus curvipes Hook.

*CA/HD,FW,MB

Meyer 2614, Browse Road, 11-V-73; Meyer 3351, Ripple Arch, 8-IV-74;
 Cottam 7494, Shem, 4-VI-40(UT).

Cucurbitaceae

Cucurbita foetidissima HBK.

AU/DR

Meyer 718, Gunlock, 3-VI-70; Boyle Z320, Zion Lodge, 13-VII-38(Z);
Moor Z771, Shunesburg Road, 15-VII-70; Rencher s.n., Santa Clara,
19-V-41(UT).

Cuscutaceae

Cuscuta campestris Yuncker

CS/DR

(C. arvensis Hook.)

Host plants were Salix nigra and Melilotus alba.

Meyer 3229, Camp Springs Crossing, 16-IX-73; Galway s.n., St. George,
17-VII-34(BRY).

Cuscuta nevadensis Johnst.

*EN/DR

Host plant was Suaeda torreyana.

Galway s.n., St. George Ice Plant, 12-X-35(DX).

Eleagnaceae

Eleagnus angustifolia L.

IN/DR

This plant has become well-established in floodplain communities at
middle and lower elevations where water is continuously available.

Meyer 3128, south of Rockville, 3-VIII-73; Christian 399, south of
Santa Clara, 27-VII-61(UT).

Shepherdia rotundifolia Parry

*EN/FW

This plant is apparently confined to residual soils high in clay,
usually on the sides of steep and gullied slopes. It is common in the
Zion Park area.

Meyer 3396, Wire Mesa, 10-IV-74; MacMillan 599, Zion Arch Trail,
19-IV-47(UT); Weight 864Z, Emerald Pool Trail, 5-VI-35(UT).

Ericaceae

Arctostaphylos patula Greene AN/FW,MB,TF

[A. platyphylla (Gray) Kuntze]

Meyer 4104, Aspen Park Spring, 17-V-75; Meyer 3999, Smith Mesa, 3-V-75; Meyer 4057, Hardscrabble Hollow, 16-V-75; Moor Z598, East Rim Trail, 7-VII-70; Gould 1491, Diamond Valley, 5-IV-42(UT); Harper 72, Oak Grove, 16-V-64(UT).

Arctostaphylos pringlei Parry *MS/FW

Wiens 3901, Motoqua Road, 20-V-66(UT); Cottam 4089, Apex Mine, 4-VI-29(UT); Christian 483, Beaver Dam Peak, 5-VIII-61(UT).

Arctostaphylos pungens HBK. *CD/FW,MB

Meyer 3355, Ripple Arch, 8-IV-74; Cottam 3466, Pintura, 25-VI-28(UT); Christian 1083, Apex Mine, 20-VII-63(UT).

Ledum glandulosum Nutt. *BO/MF

Hall s.n., Pine Valley Mountain, 19-VI-36(UT).

Euphorbiaceae

Croton californicus Muell. Arg. *MC/HD,DR

This plant has a very strong preference for sandy soil, particularly dune deposits.

Meyer 1631, Snow Spring Canyon, 20-V-71; Meyer 593, Red Cliff Campground, 27-V-70; Meyer 2085, Snow's Canyon, 21-X-71; Cottam 8757, Santa Clara Bench, 17-VI-41(UT); Cottam 5384, Leeds, 14-VII-32(UT).

Euphorbia albomarginata Torr. and Gray *SW/HD,CD,DR,FW,MB

Meyer 2748, Terry's Ranch Road, 12-V-73; Meyer 502, Motoqua, 30-IV-70; Meyer 948, north of New Harmony, 16-VI-70; Meyer 3327, Warner Valley, 6-IV-74; Moor Z1548, Smith Mesa, 29-VIII-70; Moor Z328, Black Ridge, 24-VI-70; Jones s.n., St. George, 16-IV-1880(UT); Cottam 3343, Mountain Meadows, 21-VI-28(UT).

Euphorbia capitellata Engelm. *CH/DR

Hall s.n., St. George, 17-X-35(DX).

Euphorbia fendleri Torr. and Gray IC/HD,CD,FW

This plant is frequently found growing in abundance on otherwise barren heavy clay soils, but is by no means confined to them.

Meyer 2804, Curly Hollow Wash, 19-VII-73; Meyer 2080, Diamond Valley, 21-X-71; Meyer 3145, Wire Mesa, 4-VIII-73; Meyer 3061, Utah Highway 59 south of Hurricane, 1-VIII-73; Christian 1049, Apex Mine Road, 26-VI-63(UT); Nelson 10002, Coalpits Wash, 30-IV-72; Moor Z767, Shunesburg, 15-VII-70.

Euphorbia glyptosperma Engelm. *BO/CD,FW

Meyer 3107, Smithsonian Butte, 2-VIII-73; Moor Z1539, Kolob Road at North Creek Crossing, 29-VIII-70.

Euphorbia ocellata Dur. and Hilg. *GM/HD

Weight 902Z, Coalpits Wash, 10-V-35(UT); Hall s.n., Red Hill, 19-X-35(DX).

Euphorbia parryi Engelm. *CH/HD,CD,DR

This plant has a very strong preference for deep, sandy soils.

Meyer 873, Red Hill, 13-VI-70; Meyer 594, Red Cliff Campground, 27-V-70; Meyer 2076, above Snow's Canyon, 21-X-71; Christian 1026, near Shivwits, 22-VI-63; Moor Z639, East Fork of the Virgin, 10-VII-70; Moor Z1537, Kolob Road at North Creek Crossing, 29-VIII-70; Moor Z1245, Oak Creek Canyon, 12-VIII-70; Cottam 5394, Leeds, 17-VII-33(UT); Cottam 5677, Gunlock, 4-IX-37(UT).

Euphorbia robusta (Engelm.) Small *RM/TF

Meyer 3591, North Fork of the Virgin, 29-V-74.

Euphorbia serpyllifolia Pers. WE/CD,TF,MR

Meyer 3810, north of Central, 6-IX-74; Meyer 1182, Honeycomb Rocks, 8-VII-70; Meyer 1328, Oak Grove, 9-VIII-70; Meyer 1972, Maple Spring, 21-VIII-71; Moor Z663, Lava Point, 14-VII-70.

Euphorbia supina Raf. IN/DR

Meyer 1927, St. George, 6-VIII-71.

Tragia stylaris Muell. Arg. *CC/FW

Meyer 3184, Cinder Hill, 16-IX-73.

Fagaceae

Quercus gambelii Nutt.

IC/FW,MB,TF,MF

This plant varies greatly in habit, ranging from low clonal patches on drier sites to trees to 15 meters tall on shadier, more mesic sites. Plants formerly referred to Q. undulata Torr. seem to represent hybrids of Q. gambelii with Q. turbinella. A rather complete series of introgressed forms may be observed in the Zion Canyon area.

Meyer 3007, Death Point, 22-VII-73; Moor Z1446, Hop Valley, 26-VII-70; Moor Z239, South Campground, 18-VI-70; Cottam 14592, Oak Grove, 6-IX-56(UT); Cottam 14187, Central, 14-VIII-55(UT); Christian 1086, Apex Mine, 20-VII-63(UT).

Quercus turbinella Greene

*CC/CD,DR,FW,MB

(Q. dumosa var. turbinella Greene)

This plant is better able to invade more xeric sites on sandstone-derived soil, and forms a conspicuous part of the vegetation of sandstone areas at middle elevations. See also note under Q. gambelii.

Meyer 791, Washington Flat, 6-VI-70; Meyer 2476, Red Cliff Campground, 29-IV-73; Moor Z1148, East Fork of the Virgin, 7-VIII-70; Cottam 14147d, Grapevine Sands, 16-VIII-55(UT); Cottam 14194, Gunlock, 15-VIII-55(UT); Christian 1085, Apex Mine, 20-VII-63(UT).

Fumariaceae

Corydalis aurea Willd.

NA/HD,CD,DR

This plant is more or less restricted to ruderal sites but can withstand relatively xeric conditions.

Meyer 2311, Atkinville, 19-IV-73; Meyer 4098, Enterprise Reservoir Road at Goldstrike Turnoff, 18-V-75; Young s.n., St. George, 12-III-41(UT); Pendleton s.n., Oak Grove Road, 7-IV-40(UT).

Garryaceae

Garrya flavescens S. Wats.

*CD/MB

Moor Z1472, La Verkin Creek, 27-VIII-70; Pendleton s.n., Oak Grove Road, 7-IV-40(UT); Harper 70, Oak Grove, 16-V-64(UT); Weight s.n., Emerald Pool Trail, 5-VI-35(UT).

Gentianaceae

Centaurium calycosum (Buck.) Fern. *CC/DR

There seems to be some intergradation between this species and C. exaltatum in Washington County.

Moor Z1238, Gateway to the Narrows, 11-VIII-70; Cottam 8856, Red Hill, 20-VI-41.

Centaurium exaltatum (Griseb.) Wight *GM/DR

See note under C. calycosum.

Meyer 1946, Mogotsu Creek, 21-VIII-71.

Frasera albomarginata S. Wats. EN/CD,FW,MB

[Swertia albomarginata (Wats.) Kuntze]

Meyer 701, Diamond Valley, 3-VI-70; Meyer 790, Washington Flat, 6-VI-70; Meyer 2791, Apex Mine, 19-VII-73; Moor Z13, Smith Mesa, 11-VI-70; Christian 1057, Utah Hill, 3-VII-63(UT).

Frasera speciosa Dougl. WE/TF,MF,MR

[Swertia radiata (Kellogg) Kuntze]

Meyer 1854, Browse, 25-VII-71; Meyer 2856, Little Creek Valley, 20-VII-73; Moor Z565, Potato Hollow Turnoff, 7-VII-70.

Gentiana affinis Griseb. WE/MB

These plants were found growing in crevices in the sandstone.

Meyer 4177, West Rim Trail, 28-IX-75.

Gentiana amarella L. CB/MF

(Amarella heterosepala Greene)
(G. heterosepala Engelm.)

Meyer 1379, Kolob Reservoir, 21-VIII-70.

Geraniaceae

Erodium cicutarium (L.) L'her IN/HD,CD,DR,FW

Meyer 2159, Washington, 14-IV-73; Meyer 503, Motoqua, 30-IV-70; Christian 783, Bloomington, 3-IV-63(UT).

- Erodium texanum Gray *SW/HD
Bruhn s.n., Black Hill, 27-III-58(DX); Cottam 8455, St. George, 10-IV-41(UT).
- Geranium caespitosum James *CC/CD,TF
Meyer 1071, Pine Valley Campground, 30-VI-70.
- Geranium nervosum Rydb. *RM/TF, MF, MR, MM
Meyer 1852, Browse, 25-VII-71; Moor Z644, Lava Point Spring, 13-VII-70; Hardy s.n., Pine Valley Campground, 30-VII-44(DX).
- Geranium richardsonii Fisch. and Trautv. MI/MF, MR, MM
Meyer 1083, Pine Valley Campground, 1-VII-70; Meyer 2919, Kolob Road near Iron County Line, 21-VII-73.

Hydrophyllaceae

- Emmenanthe penduliflora Benth. *CM/HD
Christian 1009, Curly Hollow Wash, 19-VI-63(UT).
- Eucrypta micrantha (Torr.) Heller *SW/HD
This plant is found growing in the shade of rocks, often in limestone crevices.
Meyer 2421, Shinab Kibe Hill, 27-IV-73; Meyer 2197, east of Washington, 15-IV-73; Meyer 2256, north of St. George, 18-IV-73; Meyer 3958, Hurricane Cliff Road, 1-V-75; Meyer 3913, Curly Hollow Wash, 6-IV-75; Meyer 3905, Indian Spring Road, 5-IV-75; Jones s.n., St. George, 29-III-1880(UT); Gould 1469, St. George, 31-III-42(UT).
- Eriodictyon angustifolium Nutt. *MS/CD, DR, FW, MB
Meyer 704, Diamond Valley, 3-VI-70; Meyer 2797, Apex Mine Turnoff, 19-VII-73; Meyer 812, Danish Ranch, 6-VI-70; Moor Z297, Lee Pass, 24-VI-70; Field Biology Class S-18, St. George, 30-III-26(UT); Cottam 5070, Motoqua, 17-IV-32(UT); Pendleton s.n., Anderson's Ranch, 5-V-40(UT); Cottam 3984, Bellvue Canyon, 1-VI-29(UT); Cottam 8788, Washington Flat, 18-VI-41(UT); Cottam 3465, Pintura, 25-VI-28(UT).
- Hesperochiron pumilus (Griseb.) Porter *GB/CD, MB
The Meyer collection was growing in abundance on a slightly wet, seepy area in a Big Sagebrush Association.

Meyer 4048, Ox Valley Road, 16-V-75; Nelson 10352, Potato Hollow, 31-V-73(Z).

Hydrophyllum occidentale (S. Wats.) Gray AN/TF,MF,MR

Meyer 4105, Aspen Park Spring, 17-V-75; Meyer 4093, Goldstrike Turnoff, 18-V-75; Meyer 839, Kolob Reservoir, 11-VI-70; Meyer 3616, North Fork of the Virgin, 30-V-74; Moor Z90, Kolob Trail, 11-VI-70.

Nama demissum A. Gray *MS/HD

Meyer 1594, Terry's Ranch Road, 14-IV-71; Meyer 3861, Beaver Dam Well, 5-IV-75; Meyer 3891, Lytle's Ranch, 5-IV-75; Cottam 5670, St. George, 4-IV-31(UT); Jones s.n., St. George, 12-IV-1880(UT); Cottam 5057, Shem, 17-IV-32(UT).

Phacelia affinis A. Gray *AN/HD,CD,FW,MB

Meyer 1767, Welcome Spring, 23-V-71; Meyer 2623, Browse Road, 11-V-73; Eastwood and Howell s.n., Beaver Dam Mountains, 9-IV-41(UT); Cottam 9874, west of Hurricane, 2-V-49(UT).

Phacelia anelsoni Macbr. *EN/HD

Pendleton and Hardy s.n., Castle Cliff, 14-IV-40(DX).

Phacelia austromontana Howell *CA/TF

The Washington County station is disjunct by several hundred miles from the main center of distribution in the mountains of southern California.

Cottam 8831, Oak Grove Camp, 19-VI-41(UT).

Phacelia cephalotes A. Gray *EN/HD,CD

This rare plant is apparently restricted to the gumbo clay soils of the Chinle Formation.

Jones 1646, St. George, 9-IV-1880(UT); Ripley and Barneby 4306, north-east of Washington, 3-V-42(RSA).

Phacelia coerulea Greene *CH/HD

Atwood and Higgins 4472, 3 miles south of St. George on I-15, 21-IV-73(BRY).

Phacelia crenulata Torr. ID/HD,DR

(P. corrugata A. Nels.)

Meyer 1515, Old Middleton Road, 13-IV-71; Meyer 1643, Snow Spring Canyon,

20-V-71; Meyer 2551, Warner Ridge, 2-V-73; Meyer 2399, Washington, 26-IV-73; Meyer 3858, Beaver Dam Well, 5-IV-75; Meyer 3984, Hurricane Cliff Road, 2-V-75; Gould 1470, Black Hill, 31-III-42(UT); Barnhurst s.n., Beaver Dam Wash, 5-IV-41(UT); Weight s.n., Coalpits Wash, 28-V-35(UT).

Phacelia curvipes Torr.

*SM/CD,FW,MB

Meyer 3360, Ripple Arch, 8-IV-74; Meyer 1713, Welcome Spring, 23-V-71; Nelson 10169, Sand Bench Trail, 24-IV-73(Z).

Phacelia distans Benth.

*CD/HD

Meyer 3946, Hurricane Cliff Road, 1-V-75.

Phacelia fremontii Torr.

*MC/HD,CD,FW,MB

Meyer 3991, Hurricane Cliff Road, 2-V-75; Meyer 3879, Beaver Dam Well, 5-IV-75; Meyer 3889, Lytle's Ranch, 5-IV-75; Meyer 3483, Old Mormon Road, 12-IV-74; Meyer 3424, Cove Wash, 11-IV-74; Meyer 2218, Purgatory Flat, 15-IV-73; Meyer 2232, Ft. Pierce Road, 17-IV-73; Jones s.n., St. George, 29-III-1880(UT); Cottam 5051, Gunlock, 17-IV-32(UT); Weight 744Z, Coalpits Wash, 28-IV-35(UT); Gould 1702, Diamond Valley, 5-V-42(UT); Cottam 7502, Shem, 4-IV-40(UT).

Phacelia heterophylla Pursh

NM/CD,MB,MF,MR

Meyer 933, Oak Grove, 15-VI-70; Meyer 1389, Kolob Reservoir, 21-VIII-70; Meyer 762, Taylor Creek, 4-VI-70; Moor Z1215, Potato Hollow, 5-VIII-70; Moor Z688, Lava Point, 14-VII-70; Moor Z119, Narrows Trail, 12-VI-70; Cottam 6958, Zion Canyon, 13-V-36(UT).

Phacelia ivesiana Torr.

MI/HD,CD

This plant is frequently found on sand but is not restricted to it.

Meyer 2554, Warner Ridge, 2-V-73; Meyer 2355, Washington, 25-IV-73; Meyer 2448, Shinab Kibe Hill, 27-IV-73; Meyer 3973, west of Hurricane, 1-V-75; Meyer 3987, Hurricane Cliff Road, 2-V-75; Jones s.n., St. George, 3-IV-1880(UT).

Phacelia neomexicana Thurber

*CC/FW

Cottam 8563, Short Creek, 10-VI-41(UT).

Phacelia palmeri Torr.

*EN/HD,CD

This plant has a very strong preference for gypsum-bearing clay soils.

Meyer 2416, Shinab Kibe Mountain, 27-IV-73; Meyer 3536, Manganese Wash, 18-V-74; Meyer 3466, West Mountain Wash, 12-IV-74; Meyer 3983, Hurricane Cliff Road, 2-V-75; Moor Z167, Utah 15 near Rockville, 15-VI-70;

Gould 1681, 11 miles west of Hurricane, 2-V-42(UT); Gould 1422, Diamond Valley, 15-X-41(UT).

Phacelia pulchella A. Gray

*EN/HD

This plant has a very strong preference for gypsum-bearing clay soils.

Meyer 2560, Ft. Pierce Road, 2-V-73; Meyer 2575, Curly Hollow Wash, 3-V-73; Meyer 2414, Shinab Kibe Hill, 27-IV-73; Meyer 3906, Curly Hollow Wash, 6-IV-75; Hardy s.n., Bloomington, 26-III-41(UT); Weight 786Z, Coalpits Wash, 28-IV-35(UT); Hansen s.n., Harrisburg Bench, 5-V-41(UT); Cottam s.n., Gunlock, 11-V-36(UT); Cottam 7250, St. George, 25-VI-37(UT).

Phacelia rotundifolia Torr.

*MO/HD,CD

This plant is consistently found growing in limestone crevices.

Meyer 1768, Welcome Spring, 23-V-71; Meyer 3920, Curly Hollow Wash, 6-IV-75; Meyer 4005, east of Hurricane, 8-V-75; Jones s.n., St. George, 3-IV-1880(UT).

Phacelia vallis-mortae J. Voss

*MO/HD,DR

Meyer 2717, Castle Cliff, 13-V-73; Myer 2466, Red Cliff Campground, 29-IV-73; Squire s.n., east of La Verkin, 27-IV-40(UT); Young s.n., St. George, 10-V-41(UT); Croft 1091Z, Zion Park, 21-V-35(UT).

Tricardia watsonii Torr.

*MO/HD

Meyer 2304, Atkinville, 19-IV-73; Hall H16, Black Hill, 31-III-35(UT); Weight 1134Z, Coalpits Wash, 12-IV-36(UT).

Hypericaceae

Hypericum formosum HBK.

WE/TF,MF

Moor Z1044, Potato Hollow, 24-VII-70; Moor Z551, Potato Hollow Turnoff, 7-VII-70.

Labiatae

Agastache urticifolia (Benth.) Kuntze

*NM/MF,MM

Meyer 3760, La Verkin Creek Trail, 7-VII-74; Meyer 2902, Hornet Point Road, 21-VII-73; Meyer 2963, Home Valley Knoll, 22-VII-73; Meyer 1416, Kolob Reservoir, 21-VIII-70.

Hedeoma nanum (Torr.) Briq.

*SW/HD,MR

Meyer 3513 belongs to H. nanum ssp. californicum Stewart, which is restricted to the eastern Mojave Desert. Meyer 1037 seems to represent a form of the typical subspecies, though it resembles H. oblongifolium (Gray) Heller in many respects. Its status needs clarification.

Meyer 1307, Columbine Spring, 6-VIII-70; Meyer 3513, Joshua Tree National Landmark, 18-V-74; Weight 1069, Narrows Trail, 24-VI-34(UT).

Lamium amplexicaule L.

IN/DR

This plant was found growing in a well-trampled lawn.

Meyer 2412, Washington, 26-IV-73.

Leonurus cardiaca L.

IN/MR

This plant was found growing in mesic hedgerows of alfalfa fields.

Meyer 2049, New Harmony, 24-VIII-71.

Marrubium vulgare L.

IN/CD,DR,FW,MB

This plant is often abundant along roadsides in areas heavily used by livestock.

Meyer 1907, Enterprise, 26-VII-71; Meyer 792, Washington Flat, 6-VII-70; Meyer 976, north of New Harmony, 16-VI-70; Christian 1059, Utah Hill, 3-VII-63(UT); Weight 1067Z, Narrows Trail, 24-VI-35(UT).

Mentha arvensis L.

CB/DR,MR

Meyer 1150, Pine Park, 7-VII-70; Meyer 1364, Kolob Reservoir, 21-VIII-70; Meyer 1968, Mogotsu Wash, 21-VIII-71; Weight 1092Z, Zion Canyon, 10-VIII-35(UT).

Mentha piperita L.

IN/DR

Meyer 3266, Leeds, 13-X-73; Meyer 3123, south of Rockville, 3-VIII-73; Meyer 3233, Camp Springs Crossing, 16-IX-73.

Moldavica parviflora (Nutt.) Britt.

BO/CD,FW,TF,MF

Meyer 1791, Pinto, 23-VII-71; Meyer 1663, Central, 20-V-71; Meyer 1407, Kolob Reservoir, 21-VIII-70; Meyer 3069, Wire Mesa, 1-VIII-73; Meyer 2968, Home Valley Knoll, 22-VII-73; Meyer 2908, Hornet Point Road, 21-VII-73; Moor Z1408, Lava Point Spring, 21-VIII-70; Cottam 8838, Oak Grove, 19-VI-41(UT).

Molucella laevis L.

IN/DR

This bizarre-looking plant is surprisingly well-established in flood-plain communities of the Virgin drainage.

Meyer 789, south of St. George, 5-VI-70; Fisk s.n., Washington, 30-V-30(UT); Cottam 6913, west of Hurricane, 12-V-36(UT); Hall 33, Harrisburg, 16-V-36(UT); Weight 990Z, base of West Temple, 10-VI-35(UT).

Monardella odoratissima Benth.

WE/CD,MB

Meyer 1878, Browse Road, 25-VII-71; Meyer 1261, Oak Grove, 1-VIII-70; Meyer 1287, Oak Grove, 4-VIII-70; Moor Z1344, Kolob Canyon, 20-VIII-70.

Nepeta cataria L.

IN/DR,MR

This plant is a weed of mesic waste places.

Meyer 2025, New Harmony, 24-VIII-71; Cox s.n., St. George, 19-V-41(UT).

Prunella vulgaris L.

CB/MR,MM

Meyer 1469, Lava Point Spring, 23-VIII-70.

Salazaria mexicana Torr.

*SW/HD

Meyer 1714, Welcome Spring, 23-V-71; Meyer 333, Castle Cliff, 7-VI-69; Hall s.n., Black Hill, 19-IV-36(UT); Cottam 8759, Santa Clara Cemetery, 17-VI-41(UT).

Salvia columbariae Benth.

*CM/HD

Meyer 1548, Terry's Ranch, 14-IV-71; Meyer 3865, Beaver Dam Well, 5-IV-75; Cottam 8435, Black Hill, 9-IV-41(UT).

Salvia dorrii (Kellogg) Abrams

GM/HD,CD,FW

(S. carnosa Dougl.)

Meyer 1489, Apex Mine Road, 13-IV-71; Meyer 1703, Danish Ranch, 23-V-71; Meyer 1604, Terry's Ranch Road, 14-IV-71; Meyer 506, Motoqua, 30-IV-70; Meyer 2721, Castle Cliff, 13-IV-73; Meyer 3448, West Mountain Wash, 12-IV-74; Meyer 4084, Mogotsu Wash, 17-V-75; Vickery 1865, Pintura, 11-V-58(UT); Weight 857Z, Emerald Pool Trail, 5-VI-35(UT); Cottam 6838, Central, 10-V-36(UT); Cottam s.n., Harrisburg, 15-V-30(UT).

Scutellaria nana Gray

*GB/MR

This collection has deep blue flowers similar to those cited by Epling (1942) as occurring near Ely and not the yellowish ones typical for the species.

Meyer 1130, Pine Park, 7-VII-70.

Stachys albens Gray

*CA/DR

Higgins 755, Lytle's Ranch, 9-VII-66(BRY).

Leguminosae

Acacia greggii A. Gray

*SW/HD

Christian 508, Beaver Dam Wash, 6-VIII-61(UT).

Astragalus amphioxys GrayCC/HD,CD,DR,FW,MB,
TF

Meyer 546, near Goldstrike, 5-VI-70; Meyer 1038, Pine Valley Camp-ground, 30-VI-70; Meyer 3420, Enterprise Reservoir Road, 11-IV-74; Meyer 3437, Hoody Wash, 11-IV-74; Meyer 3363, Ripple Arch, 8-IV-74; Meyer 3403, Wire Mesa, 10-IV-74; Cottam 7295, Camp Springs, 11-IV-39(UT); Christian 796, Utah Hill Summit, 12-IV-63(UT); Cottam 5016A, Pintura, 16-IV-32(UT); Cottam 4645, La Verkin, 23-IV-31(UT); Jones s.n., St. George, 5-IV-1880(UT); Meyer 2514, Ft. Pierce, 2-V-73; Meyer 1695, Oak Grove, 21-V-71.

Astragalus ampullarius Wats.

*EN/CD

This extremely rare plant is restricted in its distribution to the clay hills ("gumbo-knolls") of the Chinle Formation.

Eastwood and Howell 9149, near Washington, 10-V-41(RSA).

Astragalus argophyllus Nutt. ex Torr. and Gray

*IM/TF,MF

This plant differs from A. zionis in having unmottled fruits. Washington County material belongs to A. argophyllus var. panguicensis (Jones) Jones.

R. Nelson 9735, Lava Point, 15-VI-71; Meyer 3603, Deep Creek, 29-V-74.

Astragalus bisulcatus (Hook.) Gray

*RM/HD,FW

This is one of the seleniferous astragali.

Cottam 5059A, Gunlock, 17-IV-32(UT); Meyer 3409, Smithsonian Butte, 10-IV-74; Jones s.n., Rockville, 15-V-1894(POM).

Astragalus calycosus Torr. ex Wats.

IM/CD,FW

Washington County material includes representatives of both A. calycosus var. scaposus (Gray) Jones and of the type variety, as well as intermediate plants.

Reported for Washington County by Barneby (1964).

Astragalus canadensis L.

*BO/CD

The two Washington County collections reported by Barneby are disjunct by 200 miles from the main area of distribution for the species, which is very widely distributed to the north and east. They belong to A. canadensis var. brevidens (Gand.) Barneby.

Reported for Washington County by Barneby (1964).

Astragalus ceramicus Sheld.

*PL/CD,FW

This plant is very strongly arenophile in its ecology. Its long, slender, diffuse stems from a deeply buried root crown break off easily and may make it appear annual.

Meyer 753, Taylor Creek, 4-VI-70; R. Nelson 9698, Taylor Creek, 14-VI-71.

Astragalus convallarius Greene

*RM/CD,FW

This plant is quite common on the northwest flank of the Pine Valley Mountains but is apparently restricted to that area of the county. Washington County material belongs to the geographically restricted A. convallarius var. finitimus Barneby.

Plummer s.n., Pinto, 19-V-40(UT); Plummer s.n., Mountain Meadows, 21-V-40(UT); Hall s.n., north of Enterprise, 27-V-35(UT); Meyer 1896, Pine Valley, 26-VII-71; Meyer 3582, Pine Park Road, 25-V-74.

Astragalus eremiticus Sheld.

*GB/FW

Ripley and Barneby 4298, Gunlock, 2-V-42(RSA).

Astragalus flavus Nutt. ex Torr. and Gray

*CP/HD,CD,DR

This is a plant of alkali bottomlands, often with A. praelongus. Washington County material belongs to A. flavus var. candicans Gray, which has white to lavender corollas.

Meyer 3590, Washington, 26-V-74; Weight 889Z, Coalpits Wash, 10-VI-35(UT); Cottam 4017, near Leeds, 1-VI-29(UT); Cottam 7296, Camp Springs, 11-IV-39(UT).

Astragalus humistratus Gray

AN/FW

Washington County material belongs to A. humistratus var. humivagens (Rydb.) Barneby.

Plummer 7376, north of Pinto, 9-V-39(UT); Meyer 3577, Pine Park Road, 25-V-74.

Astragalus lancearius Gray

*EN/HD,CD

This is an extremely rare plant.

Eastwood and Howell 9198, near Virgin, 10-V-41(RSA).

Astragalus lentuginosus Dougl.

ID/HD,CD,FW

This common and widely distributed plant occurs in a bewildering variety of forms. Several varieties occur within the county, including A. lentuginosus var. palans (Jones) Jones, var. stramineus (Rydb.) Barneby, var. vitreus Barneby, and var. fremontii (Gray) Wats. Intergrades are common.

Harrison s.n., Black Hill, 30-III-26(UT); Hall s.n., north of Enterprise, 27-V-35(UT); Meyer 516, Motoqua, 30-IV-70; Meyer 3476, Joshua Tree National Landmark, 12-IV-74; Meyer 2193, east of Washington, 15-IV-73; Meyer 3365, Motoqua Road, 8-IV-74; Meyer 3317, Hurricane Cliff Road, 6-IV-74.

Astragalus minthorniae (Rydb.) Jeps.

*EN/CD

Washington County material belongs to the endemic A. minthorniae var. gracilior (Barneby) Barneby.

Ripley and Barneby 4951, 5 miles south of Veyo, 11-VI-42(RSA).

Astragalus mollissimus Torr.

*CC/FW

Washington County material belongs to A. mollissimus var. thompsonae (S. Wats.) Barneby.

Jones 5224h, Rockville, 15-V-1894(POM).

Astragalus newberryi Gray

IM/CD,FW

Christian 771, Apex Mine Road, 21-III-63(UT); Meyer 3372, Cole Spring Road, 9-IV-74; Meyer 4079, north of Mogotsu Wash, 17-V-75.

Astragalus nuttallianus A. DC.

*MH/HD,CD,DR,FW

Washington County material belongs to A. nuttallianus var. imperfectus (Rydb.) Barneby.

Meyer 3390, Quail Creek, 9-IV-74; Meyer 2619, Browse Road, 11-V-73; Meyer 2141, Washington, 12-IV-73; Meyer 2238, Ft. Pierce Road, 17-IV-73; Meyer 2444, Shinab Kibe Mountain, 27-IV-73; Meyer 2593, Curly Hollow Wash, 3-V-73; Meyer 1735, Castle Cliff, 23-V-71; Meyer 1549, Terry's Ranch, 14-IV-71; Jones s.n., St. George, 2-IV-1880(UT); Cottam 4660, Pintura, 22-IV-30(UT); Christian 883, Bloomington, 3-V-63(UT).

Astragalus oophorus Wats.

IM/FW,MB,TF

Washington County material belongs to A. oophorus var. caulescens (Jones) Jones.

Meyer 3584, Pine Park Road, 25-V-74; Meyer 4065, Hardscrabble Hollow, 16-V-75; Meyer 4040, Mountain Meadows Turnoff, 16-V-75.

Astragalus praelongus Sheld.

*CC/HD,CD,DR

One of the seleniferous astragali, this rank plant has a nauseating odor. It grows in bottomlands, sometimes in considerable quantity.

Meyer 3588, Washington, 26-V-74; Meyer 3322, Warner Valley, 6-IV-74; Meyer 2118, Springdale, 22-X-71; Meyer 3152, Wire Mesa, 4-VIII-73; Cottam 4019, near Leeds, 1-VI-29(UT); Gould s.n., near St. George, 21-IV-42(UT); R. Nelson, Oak Creek Canyon, 13-VI-71.

Astragalus preussii Gray

*MP/HD,DR

This is one of the seleniferous astragali.

Reported for Washington County by Barneby (1964).

Astragalus straturensis Jones

*EN/FW,TF,MF

This plant is relatively common in the foothills of the Pine Valley Mountains.

Meyer 3681, Mill Canyon, 5-VII-74; Meyer 947, Oak Grove Road, 15-VI-70; Meyer 3576, Oak Grove Road, 25-V-74; Cottam 8898, Pine Valley, 26-VI-42(UT); Cottam 6781, Pine Valley South Slope, 10-V-36(UT).

Astragalus striatiflorus Jones

*EN/FW

This is a very rare plant, confined to a narrow belt of steeply hummocked dunes along the base of the Zion Escarpment.

Reported for Washington County by Barneby (1964).

Astragalus subcinereus Gray

*EN/TF

(A. sileranus Jones)

Meyer 3593, North Fork of the Virgin, 29-V-74.

Astragalus tephrodes Gray

*CH/FW

Washington County material belongs to A. tephrodes var. brachylobus (Gray) Barneby.

Meyer 3593, North Fork of the Virgin, 29-V-74; Jones s.n., Springdale, 16-V-1894(POM).

Astragalus tetraapterus Gray

*GB/CD

Reported for Washington County by Barneby (1964).

Astragalus zionis C. L. Hitchc.

*EN/CD,DR,FW

This relatively common milkvetch usually occurs in soils derived from Navajo sandstone.

Pendleton s.n., Oak Grove Road, 7-IV-40(UT); Cottam 4648, Pintura, 22-IV-30(UT); Cottam 4775, Zion Canyon, 24-IV-39(UT); Nelson 9426, Zion Canyon Overlook, 29-IV-71; Meyer 745, Taylor Creek, 4-VI-70; Meyer 3397, Wire Mesa, 10-IV-74; Meyer 3604, Deep Creek, 29-V-74.

Cercis occidentalis Torr.

AN/DR,FW

Meyer 2471, Red Cliff Campground, 29-IV-73; Cottam 5645, south of St. George, 4-IV-31(UT); Cottam 7497, Santa Clara Creek above Shem, 4-IV-31(UT); Harrison s.n., Gunlock, 15-IV-30(UT); Cottam 5014, Pintura, 15-IV-32(UT); Gould 1668, Diamond Valley, 29-IV-42(UT); Cottam 8808, Washington Flat, 18-VI-41(UT); Meyer 641, Red Cliffs, 31-V-70; Christian 311, Apex Mine, 23-VI-61(UT).

Dalea fremontii Torr.

*MO/HD

(D. amoena S. Wats.)

Meyer 2754, Terry's Ranch Road, 12-V-73; Meyer 637, Ivins Reservoir, 30-V-70; Meyer 781, Price City Hills, 5-VI-70; McMillan s.n., Leeds, 7-V-40(UT); Barnhurst s.n., Purgatory Flat, 11-V-41(UT); Cottam 6886, Gunlock, 11-V-36(UT); Weight 914Z, Coalpits Wash, 10-VI-35(UT); Cottam 7255, St. George, 23-VI-37(UT).

Dalea polyadenia Torr.

*MO/HD

Meyer 329, Castle Cliff, 7-VI-69.

Glycyrrhiza lepidota Pursh

NA/DR,MR

This plant is usually found growing in mesic ruderal communities.

Meyer 3119, south of Rockville, 3-VIII-73; Meyer 610, St. George, 28-V-70; Meyer 1153, Pine Park, 7-VII-70; Christian 530, lower Santa Clara Creek, 11-VIII-61(UT).

Krameria grayi Rose and Painter

*SW/HD

Higgins 593, Castle Cliff, 15-V-66(BRY); Welsh 1468, Terry's Ranch, 8-IV-61(BRY).

Krameria parvifolia Benth.

*SW/HD,DR

(K. glandulosa Rose and Painter)

Meyer 661, Red Hill, 1-VI-70; Meyer 1525, Old Middleton Road, 13-IV-71; Meyer 1644, Snow Spring Canyon, 20-V-71; Cottam 5099, Terry's Ranch, 19-IV-32(UT); Cottam 12747, Santa Clara Bench, 3-IX-51(UT).

Hedysarum boreale Nutt.

*PL/FW

Hafen s.n., Utah Hill, 13-IV-40(DX).

Lathyrus latifolius L.

IN/DR

This plant is found in mesic ruderal communities.

Meyer 265, La Verkin, 19-VI-69; Moor Z187, Watchman Campground, 16-VI-70.

Lathyrus leucanthus Rydb.

*CP/MB,TF,MF

Washington County material belongs to L. leucanthus var. laetivirens (Greene ex Rydb.) Hitchc.

Meyer 939, Oak Grove, 15-VI-70; Meyer 3565, Mahogany Knoll, 19-V-74; Nelson 9402, Emerald Pools, 27-IV-71; Nelson 9751, Potato Hollow, 16-VI-71; Moor Z86, Kolob Reservoir, 11-VI-70; Cottam 8954, Pine Valley Mountain, 27-VI-41(UT).

Lathyrus zionis C. L. Hitchc.

*EN/FW,MB

Meyer 3402, Wire Mesa, 10-IV-74; Meyer 734, Taylor Creek, 4-VI-70; Nelson 9889, Emerald Pools, 23-III-72; Weight 1083Z, Angel's Landing Trail, 16-IV-35(UT); Cottam 4661, Pintura, 22-IV-30(UT); Cottam s.n., base of Lady Mountain, 5-IV-31(UT).

Lotus corniculatus L.

IN/CD

This plant was found growing in a mesic ruderal community along an irrigation ditch.

Meyer 1912, Utah Highway 18 near Iron County Line, 26-VII-71.

Lotus humistratus Greene

AN/HD,CD,FW,MB

Some Washington County material seems to approach the California species L. subpinnatus Lag. in characters of the calyx.

Meyer 992, north of New Harmony, 16-VI-70; Meyer 766, Taylor Creek, 7-VI-70; Meyer 504, Motoqua, 30-IV-70.

Lotus rigidus (Benth.) Greene

*MS/HD

See note under L. utahensis.

Hall s.n., Red Hill, 12-IV-36(UT); Cottam 5042, Gunlock, 17-IV-32(UT);
Barnhurst, Zion National Park, 27-IV-41(UT).

Lotus utahensis Ottley

*EN/CD, DR, FW, MB, TF,
MF

(L. longibracteatus Rydb.)

Washington County material subsumed under this taxon is immensely variable. Much of it approaches L. wrightii (Gray) Greene in having shortened pedicels and sessile, palmate leaves with elongate, filiform leaflets. Other collections approach L. rigidus (Benth.) Greene in having clearly pinnate leaves with short, thick leaflets and much-elongated pedicels. Ottley (1944) mentions numerous hybrids from the area, including the type of L. longibracteatus Rydb. which she considers to represent L. rigidus x utahensis. Not only is it impossible to maintain L. longibracteatus as a species on the basis of Washington County material, but such a continuously intergrading population as that represented by L. utahensis itself could easily be considered as intermediate between the more eastern L. wrightii and the southwestern L. rigidus. These intermediate forms are only very loosely correlated with environmental factors.

Meyer 1661, Central, 20-V-71; Meyer 3543, Manganese Wash, 18-V-74;
Meyer 3381, Quail Creek, 9-IV-74; Meyer 3696, Mill Creek Canyon,
5-VI-74; Meyer 2841, top of Hop Valley on Kolob Road, 20-VII-73;
Meyer 946, Oak Grove Road, 15-VI-70; Moor Z656, Lava Point, 14-VII-70;
Moor Z346, Grotto Campground, 25-VI-70; Gould 1553, Diamond Valley,
15-IV-32(UT); Hall s.n., south of Enterprise, 27-V-35(UT); Cottam 3344,
Mountain Meadows, 20-VI-28(UT).

Lupinus argenteus Pursh

WE/CD, TF, MF, MR

Hybridization in this group is rampant, and intermediates between this species and L. holosericeus, L. alpestris Nels. and particularly L. caudatus are more the rule than the exception. Assignment to species has necessarily been somewhat arbitrary in some cases.

Meyer 3550, Mahogany Knoll, 19-V-74; Meyer 1036, Pine Valley Campground,
30-VI-70; Meyer 957, north of New Harmony, 16-VI-70; Meyer 942, Oak
Grove, 15-VI-70; Meyer 564, Goldstrike, 5-V-70; Meyer 2862, Little
Creek Valley, 20-VII-73; Meyer 1226, Kolob Reservoir, 11-VII-70;
Moor Z689, Lava Point, 14-VII-70; Meyer 1149, Pine Park, 7-VII-70.

Lupinus barbiger S. Wats.

*CP/TF

Meyer 913, Oak Grove Road, 15-VI-70; Meyer 1822, Potato Hollow, 24-VII-71; Moor 246, Kolob Trail, 11-VI-70; Cottam 8837, Oak Grove, 19-VI-41(UT).

Lupinus brevicaulis S. Wats.

IC/HD,CD

Meyer 3583, Pine Park Road, 25-V-74; Meyer 2540, Warner Ridge, 2-V-73; Weight s.n., Zion Park, 28-IV-35(UT); Cottam 6884, Gunlock, 11-V-36(UT); Hall s.n., north of Enterprise, 27-V-35(UT).

Lupinus caudatus Kellogg

IM/MB,TF,MF

See note under L. argenteus.

Meyer 3678, Hill Creek Canyon, 4-VII-74; Meyer 3750, La Verkin Creek Trail, 7-VII-74; Cottam 3985, Pintura, 31-V-29(UT).

Lupinus concinnus J.G. Agardh.

*CD/HD,CD,DR,FW,MB

Meyer 4087, Cove Wash, 17-V-75; Meyer 3392, Quail Creek, 9-IV-74; Meyer 2637, Browse Road, 11-V-73; Meyer 505, Motoqua, 30-IV-70; Milner 9258, Anderson's Ranch, 30-IV-46(UT).

Lupinus cusickii S. Wats.

*GB/MF

This species was reduced to synonymy under L. lepidus var. cusickii (S. Wats.) C. L. Hitchcock, along with L. volutans Greene, but the two plants are very different in aspect and ecology in Washington County and do not appear to intergrade at all. This treatment follows Dunn (1956). The collection cited below is from a Limber Pine-Bristlecone Pine Association above 10,000 feet.

Meyer 4170, Signal Peak, 27-VII-75.

Lupinus hillii Greene

*EN/CD

The Meyer collection has the very small flowers and spreading stem pubescence of L. hillii, but the banner is dorsally pubescent. The Plummer collection is annotated by David Dunn.

Meyer 1987, south of Enterprise Reservoir, 21-VIII-71; Cottam 6764, Mountain Meadows, 10-V-36(UT); Plummer s.n., Pinto-Mountain Meadows Divide, 19-V-40(UT).

Lupinus holosericeus Nutt.

*GB/CD

See note under L. argenteus.

Meyer 3808, Utah 18 north of Pine Valley Turnoff, 6-IX-74; Meyer 1193, Honeycomb Rocks, 8-VII-70.

Lupinus kingii S. Wats.

*CP/CD,TF

Meyer 3726, La Verkin Creek Trail, 6-VII-74; Meyer 3659, Mill Creek Canyon, 4-VII-74; Meyer 1838, Potato Hollow, 24-VII-71; Meyer 1391, Kolob Reservoir, 21-VIII-70; Moor Z871, 3 miles south of Kolob Reservoir, 17-VII-70; Hall s.n., north of Enterprise, 27-V-35(UT); Weight 933Z, Mt. Carmel Highway, 17-VI-35(UT).

Lupinus palmeri S. Wats.

*AR/TF

Meyer 920, Pig Creek, 15-VI-70.

Lupinus rubens Rydb.

*MP/HD,CD

(L. pusillus ssp. rubens Dunn)

Meyer 2679, Sand Mountain Road, 11-V-73; Graff s.n., Virgin, 1-V-31(UT); Cottam 9873, west of Hurricane, 2-V-49(UT); Barnhurst s.n., Harrisburg, 3-V-41(UT); Christian 884, 3-mile Wash, 3-V-63(UT); Pendleton s.n., Berry Springs, 7-V-40(UT).

Lupinus sparsiflorus Benth.

*CD/HD

Some of the material approaches L. arizonicus S. Wats. in the shape and degree of succulence of the leaves. The two may not be specifically distinct.

Meyer 3986, Hurricane Cliff Road, 2-V-75; Meyer 2732, Castle Cliff, 13-V-73; Meyer 1577, Terry's Ranch, 14-IV-71; Meyer 3880, Beaver Dam Well, 5-IV-75; Meyer 2441, Shinab Kibe Hill, 27-IV-73.

Lupinus volutans Greene

*GB/CD

See note under L. cusickii.

Meyer 1108, Pine Park, 7-VII-70; Meyer 3578, Pine Park Road near Iron County Line, 25-V-74.

Medicago lupulina L.

IN/DR,TF,MR

This plant has become established in wet-mesic ruderal communities.

Meyer 1482, Lava Point Spring, 23-VIII-70; Meyer 2848, top of Hop Valley on Kolob Road, 20-VII-73; Moor Z398, Gateway to the Narrows, 1-VII-70; Christian 1021, Shivwits, 22-VI-63(UT).

Medicago sativa L.

IN/DR

This widely grown plant is often found established as an escape in mesic ruderal communities.

Meyer 611, St. George, 28-V-70; Moor Z173, Watchman Campground, 16-VI-70.

Melilotus alba Desr.

IN/DR

This is a plant of mesic ruderal communities.

Moor Z1151, East Fork of the Virgin, 7-VIII-70; Weight 1033Z, Narrows Trail, 24-VI-35(UT); Christian 959, Bloomington, 8-VI-63(UT).

Melilotus indica (L.) All.

IN/DR

This is a plant of mesic ruderal communities.

Meyer 606, St. George, 28-V-70.

Melilotus officinalis (L.) Lam.

IN/DR,MR

This plant is frequently found growing in abundance on disturbed, mesic sites.

Meyer 1481, Lava Point Spring, 23-VIII-70; Meyer 831, Danish Ranch, 6-VI-70; Moor Z156, Gateway to the Narrows, 12-VI-70; Christian 960, Bloomington, 8-VI-63(UT).

Oxytropis oreophila A. Gray

SI/MM

Meyer 3720, Kolob Road near Iron County Line, 6-VII-74.

Petalostemon searlsiae A. Gray

SI/CD,FW,MB

Meyer 726, Taylor Creek, 4-VI-70; Meyer 814, Danish Ranch, 6-VI-70; Meyer 905, Oak Grove Road, 15-VI-70; Nelson 9684, Oak Creek, 13-VI-71; Weight 885Z, Coalpits Wash, 10-VI-35(UT); Moor Z292, Lee Pass, 24-VI-70; Moor Z10, Smith Mesa Road, 11-VI-70.

Peteria thompsonae S. Wats.

*EN/MB

Nelson 9686, Oak Creek, 13-VI-71; Nelson 9797, Watchman Trail, 18-VI-71.

Prosopis juliflora (Sw.) DC.

*SW/HD,DR

Meyer 578, Ivins Reservoir, 27-V-70; Weight 909Z, Coalpits Wash, 10-V-35(UT); Cottam 6907, St. George, 12-V-36(UT); Cottam 8762, Santa Clara Creek, 17-VI-41(UT); Plummer s.n., Gunlock, 14-V-39(UT); Cottam 4006, Harrisburg Junction, 1-VI-29(UT).

Prosopis pubescens Benth.

*SW/DR

Meyer 865, Red Hill, 13-VI-70; Cottam 8761, Santa Clara Creek, 17-VI-41(UT).

- Psoralea castorea S. Wats. *MO/HD
Hall s.n., Black Hill, s.d.(UT).
- Psoralea epipsila Barneby *EN/FW
Nelson 9941, Petrified Forest, 13-IV-72; Meyer 2615, Browse Road, 11-V-73.
- Psoralea lanceolata Pursh *PL/MB
Weight s.n., Oak Creek Canyon, 10-VI-35(Z).
- Psoralea tenuiflora Pursh *PL/FW,MB,TF
Meyer 1104, Pine Valley Campground, 1-VII-70; Meyer 3170, Little Creek Mountain, 16-IX-73; Nelson 9799, Watchman Trail, 18-VI-71.
- Robinea neomexicana A. Gray CC/DR,MR
Plummer 7323, Gunlock, 14-V-39(UT); Harrison s.n., Indian Farm, 4-V-30(UT); Cottam 9382, Zion Canyon, 31-V-44(UT).
- Sophora sericea Nutt. *CC/CD
Meyer 2690, Sand Mountain Road, 13-V-73; Hall EN26, Enterprise, 30-V-35(UT).
- Sophora stenophylla A. Gray *CP/HD
This plant is found in dune environments.
Cottam 7621, Santa Clara Bench, 25-IV-40(UT); Harrison s.n., 8 miles south of Santa Clara, 11-V-30(UT).
- Thermopsis montana Nutt. *RM/MF,MR

(T. pinetorum Greene)

The concept of T. montana used here includes T. pinetorum, since Washington County material shows complete and uncorrelated inter-gradation in stipule shape and degree of appression of the fruit, the two characters which supposedly distinguish the two species.

Meyer 1013, Pine Valley Campground, 29-VI-70; Meyer 897, Oak Grove Road, 15-VI-70; Meyer 941, Oak Grove, 15-VI-70; Meyer 3562, Mahogany Knoll, 19-V-74; Moor Z70; Kolob Trail near reservoir, 11-VI-70; Woodbury s.n., Zion Park, 1927(UT).

Trifolium fragiferum L.

IN/CD,DR,MR

Meyer 3815, Mountain Meadows, 6-IX-74; Meyer 3130, south of Rockville, 3-VIII-73; Meyer 3774, Kolob Arch Trail, 21-VII-74.

Trifolium gymnocarpon Nutt.

IM/CD

(T. subcaulescens Gray)

Meyer 4099, Goldstrike Turnoff, 18-V-75; Meyer 4030, Grass Valley, 16-V-75.

Trifolium kingii S. Wats.

*EN/MF,MR

(T. macilentum Greene)

Washington County material belongs to T. kingii ssp. macilentum (Greene) Gillett, which is endemic to the Pine Valley Mountains.

Meyer 3561, Mahogany Knoll, 19-V-74; Meyer 4050, Ox Valley Road, 16-V-75; Meyer 4136, Whipple Valley, 26-VII-75; Cottam 6807, Pine Valley, 9-V-36(UT).

Trifolium longipes Nutt.

WE/TF,MF,MM

(T. rusbyi Greene)

Most Washington County material represents T. longipes ssp. pygmaeum (Gray) Gillett, which has relatively pale reflexed flowers. Meyer 4129, with very deep purple, erect flowers, may represent T. longipes ssp. atorrubens (Greene) Gillett. It was growing in association with the more usual subspecies, and presented a very different aspect.

Meyer 4129, Whipple Valley, 26-VII-75; Meyer 2929, Kolob Road near Iron County Line, 21-VII-73; Meyer 2894, Hornet Point Road, 21-VII-73; Meyer 841, Kolob Reservoir, 11-VI-70; Meyer 4138, Whipple Valley, 26-VII-75; Moor Z80, Kolob Trail, 11-VI-70.

Trifolium pratense L.

IN/DR

This is a plant of mesic ruderal communities.

Meyer 3120, south of Rockville, 3-VIII-73.

Trifolium repens L.

IN/MR

This plant is commonly found growing along undisturbed mountain streams, where it presents the aspect of a native plant rather than an introduced weed.

Meyer 3679, Mill Canyon, 5-VII-74; Meyer 1802, Pinto, 23-VII-73; Meyer 990, north of New Harmony, 16-VI-70; Weight 1060Z, Narrows Trail, 24-VI-35(UT).

Trifolium willdenovii Spreng.

NM/MR

(T. wormskjoldii Lehm.)
(T. arizonicum Greene)

Washington County material keys out to T. arizonicum Greene in Kearney and Peebles (1960), which is stated as being "perhaps too closely related" to T. wormskjoldii Lehm. The latter has since been reduced to synonymy under T. willdenovii Spreng. (Holmgren and Reveal 1966).

Meyer 1161, Lower Enterprise Reservoir, 8-VII-70.

Vicia americana Muhl.

NA/FW,MB,TF,MF,MR
MM

Meyer 3755, La Verkin Creek Trail, 7-VII-74; Meyer 896, Oak Grove Road, 15-VI-70; Meyer 855, Kolob Reservoir, 11-VI-70; Meyer 961, north of New Harmony, 16-VI-70; Moor Z672, Lava Point, 14-VII-70; Cottam 6819, Pine Valley, 10-V-36(UT); Plummer 110, Mountain Meadows, 19-V-40(UT); Hall EN10, Alger's Ranch, 30-V-35(UT).

Vicia exigua Nutt.

*CD/HD

Meyer 2262, north of St. George, 18-IV-73; Meyer 2484, Red Cliff Campground, 29-IV-73; Jones s.n., St. George, 1-IV-1880(UT); Hall H22, Black Hill, 19-IV-36(UT).

Linaceae

Linum perenne L.

CB/CD,FW,MB,TF,MF,
MM

(L. lewisii Pursh)

L. lewisii is often considered as specifically distinct from L. perenne, but the treatment of Hitchcock et al. (1955), which considers European and North American material to be conspecific, is followed here.

Meyer 1051, Pine Valley Campground, 30-VI-70; Meyer 817, Oak Grove Road, 6-VI-70; Meyer 1238, Kolob Reservoir, 11-VII-70; Meyer 1983, south of Enterprise Reservoir, 21-VIII-71; Moor Z1107, Gateway to the Narrows, 31-VII-70; Wiens 3909, Motoqua Road, 20-V-66(UT); Cottam 6818, Central, 10-V-36(UT).

Linum subteres (Trel.) Winkl.

*EN/MB

(L. aristatum var. subteres Trel.)

Nelson 9646, above Mt. Carmel Tunnel, 12-VI-71; Moor Z1141, East Fork of the Virgin, 7-VII-70.

Loasaceae

Mentzelia albicaulis Dougl.

WE/HD,CD,DR

See note under M. dispersa.

Meyer 3458, West Mountain Wash, 12-IV-74; Meyer 3869, Beaver Dam Well, 5-IV-75; Meyer 2437, Shinab Kibe Hill, 27-IV-73; Weight 767Z, Coal-pits Wash, 28-IV-35(UT).

Mentzelia dispersa Wats.

WE/TF

This species is difficult to distinguish from M. albicaulis in the absence of mature seeds.

Cottam 4050, Pine Valley, 2-VI-29(BRY).

Mentzelia laevicaulis (Dougl.) Torr. and Gray

*CA/HD,CD,DR,FW

Meyer 1191, Honeycomb Rocks, 8-VII-70; Meyer 3869, Beaver Dam Well, 5-IV-75.

Mentzelia pterosperma Eastw.

*CP/HD

Squire s.n., northeast of La Verkin, 27-IV-40(UT); Barnhurst s.n., Harrisburg, 20-V-41(UT).

Mentzelia pumila (Nutt.) Torr. and Gray

ID/HD,CD,DR,FW,MB

[M. multiflora (Nutt.) Gray]
 (M. integra Tidest.)

This treatment follows that of Kearney and Peebles (1960) in considering M. multiflora as a variety of M. pumila. It intergrades with the typical variety within the county. Material of this description was annotated as M. lobata sp. n. by Thompson and Zavortnik in 1968, but evidently this name has not yet been published, and its status is unclear.

Meyer 709, Snow's Canyon, 3-VI-70; Meyer 656, Red Hill, 1-VI-70; Meyer 639, Ivins Reservoir, 30-V-70; Meyer 1956, Mogotsu Wash, 21-VIII-71; Meyer 2012, Taylor Creek, 24-VIII-71; Meyer 3586, Washington, 26-V-74; Moor Z1184, Lava Point, 6-VIII-70; Christian 862, Whitmore Canyon Wash, 30-IV-63(UT).

Mentzelia tricuspidis Gray

*MO/HD

Hardy s.n., Beaver Dam Slope, 7-IV-40(UT).

Mentzelia veatchiana Kellogg

*ID/CD

[M. albicaulis var. veatchiana (Kell.) Urban and Gilg.]

Meyer 4096, Goldstrike Turnoff, 18-V-75.

Petalonyx nitidus S. Wats.

*MO/HD

[P. thurberi var. nitidus (S. Wats.) M. E. Jones]

Cottam 5366, Gunlock, 11-VII-32(UT).

Petalonyx parryi A. Gray

*EN/HD

[P. nitidus ssp. parryi (A. Gray) Urban and Gilg.]

This plant is restricted to gypsiferous clay soils.

Cottam s.n., St. George, 25-VI-37(UT); Cottam 8745, south of St. George, 15-VI-41(UT).

Loganiaceae

Buddleja utahensis Cov.

*EN/HD,CD

This plant is strongly calcicole, usually growing on bare rock.

Meyer 1720, Welcome Spring, 23-V-71; Meyer 3514, Joshua Tree National Landmark, 18-V-74; Harper 90, Castle Cliff, 17-V-64(UT); Cottam 7243, St. George, 23-VI-37(UT).

Lythraceae

Lythrum californicum Torr. and Gray

*CD/DR

This is a plant of springs and seeps at low elevations.

Hall s.n., Red Hill, 16-IX-35(UT); Moor Z1238, Oak Creek Canyon, 12-VIII-70.

Malvaceae

Abutilon parvulum Gray

*CH/CD,DR

Meyer 4111, Veyo Resort, 21-VI-75.

Abutilon theophrasti Medic.

IN/DR

This plant is confined to ruderal communities.

Hall s.n., St. George, 10-IX-17(DX); Webb s.n., Hurricane, 26-VII-46(UT).

Iliamna rivularis (Dougl.) Greene

*RM/MF

This material approaches I. grandiflora (Rydb.) Wiggins, which may itself not be specifically distinct.

Meyer 1381, Kolob Reservoir, 21-VIII-70; Moor Z654, south of Lava Point Turnoff, 13-VII-70.

Malva neglecta Wallr.

IN/CD,DR

Meyer 522, Motoqua, 30-IV-70; Moor Z183, Watchman Campground, 16-VI-70; Rencher s.n., St. George, 2-IV-41(UT).

Malvastrum exile Gray

*MS/HD

Hall s.n., St. George, 26-IV-35(DX).

Sidalcea candida Gray

*RM/MR

The petals are very pale rose when fresh, but dry to a bright lemon yellow.

Meyer 1372, Kolob Reservoir, 21-VIII-70.

Sphaeralcea ambigua Gray

*MS/HD,CD,DR

This species is very closely related to S. parvifolia Nels., a more northern species normally found at higher elevations, and intermediate plants in this area of sympatry are frequently encountered. See also note under S. grossulariaefolia.

Meyer 695, Veyo Resort, 3-VI-70; Meyer 778, Price Bench, 5-VI-70; Meyer 3074, southeast of Hurricane, 1-VIII-73.

Sphaeralcea grossulariaefolia (Hook. and Arn.) Rydb. IM/HD,CD,DR,FW,MB,
TF

This plant is normally found in the foothills but occasionally strays to the valley floors where it appears to intergrade to some extent with S. ambigua. Plants which may be intermediate to S. munroana have also been collected; see note under that species. Some of the material has exceptionally narrow, thin carpels and could conceivably be referred to other taxa reported from northern Arizona, but there is little to be

gained by this in view of the continuously variable nature of the characteristic.

Meyer 915, Oak Grove Road, 15-VI-70; Meyer 1718, Welcome Spring, 23-V-71; Meyer 3463, West Mountain Wash, 12-IV-74; Meyer 795, Washington Flat, 6-VI-70.

Sphaeralcea parvifolia Nels.

IM/HD,CD,FW,MB

See note under S. ambigua.

Meyer 3526, Cole Spring Road, 18-V-74; Meyer 1192, Honeycomb Rocks, 8-VII-70; Meyer 657, Red Hill, 1-VI-70; Moor Z589, East Fork of the Virgin, 8-VII-70.

Sphaeralcea munroana (Dougl.) Spach

*IM/DR,FW,MB,TF

The last three specimens cited below seem to represent plants intermediate between S. munroana and S. grossulariaefolia.

Nelson 9088, Sawmill, 7-IX-70; Moor Z1182, Sawmill Spring, 6-VIII-70; Hall s.n., north of Enterprise, 27-V-35(UT); Meyer 1821, Potato Hollow Road, 24-VII-71; Meyer 2126, Springdale, 22-X-71; Moor Z540, Potato Hollow Turnoff, 7-VII-70.

Martyniaceae

Proboscidia parviflora (Woot.) Woot. and Standl.

*SW/DR

(Martynia parviflora Woot.)

Welsh s.n., Beaver Dam Wash, 5-X-69(UT); Hall s.n., Red Hill, 19-X-35(UT); Christian 1105, Shivwits, 7-VIII-63(UT); Cottam 5339, Santa Clara Fields, 10-VII-32(UT).

Moraceae

Humulus americanus Nutt.

*RM/MR

Woodbury and Hansen s.n., Pine Valley Mountain, 8-VIII-35(UT).

Nyctaginaceae

Abronia elliptica Nels.

RM/HD,CD,DR,MB,TF

(A. pumila Rydb.)(A. salsa Rydb.)(A. fragrans var. elliptica Heimerl)

This treatment of the A. elliptica complex follows Galloway (1975). According to his concept, A. fragrans is a species of the western Great Plains, and all the UBH material except in the extreme southeastern corner of the state falls into A. elliptica. The plants are strongly arenophile.

Meyer 1627, Snow Spring Canyon, 20-V-71; Meyer 3585, Pine Park Road, 25-V-74; Meyer 542, Red Cliff Campground, 1-V-70; Moor Z1145, East Fork of the Virgin, 7-VIII-70; Meyer 735, Taylor Creek, 4-VI-70; Christian 877, Whitmore Canyon, 3-V-63(UT).

Abronia nana S. Wats.

*MO/FW

Unlike most members of this genus, this plant is found primarily on rocky soils.

Cited by Higgins (1967) for the Beaver Dam Mountains.

Abronia villosa S. Wats.

*MO/HD

Hardy s.n., Beaver Dam Slope, 26-IV-41(UT).

Allionia incarnata L.

*MH/HD

Meyer 1936, Toquerville, 7-VIII-71; Meyer 1560, Terry's Ranch, 14-IV-71; Cottam 5327, Motoqua, 19-IV-32(UT); Weight Z878, Coalpits Wash, 19-VI-35(UT).

Mirabilis bigelovii A. Gray

*MO/HD,CD

Meyer 3465, West Mountain Wash, 12-IV-74; Pendleton s.n., south of St. George, 20-IV-40(UT); Christian s.n., Bloomington, 9-V-63(UT).

Mirabilis froebelii (Behr) Greene

*MO/HD,CD,DR,FW

(Quamoclidion froebelii Standl.)

This species and the very closely related M. multiflora are sympatric in the county, and plants intermediate in pubescence and fruit characters are not infrequent. The value of the pubescence character is lessened by the fact that both species are known in glandular and eglandular forms in some part of their range.

Meyer 2700, Castle Cliff, 13-V-73; Meyer 3521, Utah Hill, 18-IV-74;
Meyer 1754, Welcome Spring, 23-V-71.

Mirabilis multiflora (Torr.) Gray *CC/CD,FW

(Quamoclidion multiflora Torr.)

See note under M. froebelii.

Meyer 824, Oak Grove Road, 6-VI-70; Meyer 3042, Big Plain Junction,
1-VIII-73.

Oxybaphus linearis (Pursh) Robins. *PL/CD,FW

(Allionia linearis Pursh)

Meyer 2060, Ash Creek, 24-VIII-71; Meyer 1895, Pine Valley Cemetery,
26-VII-71; Meyer 1997, Honeycomb Rocks, 21-VIII-71; Moor Z1191, Kolob
Road at Sunset Canyon Ranch, 5-VIII-70; McMillan 418, Pine Valley
Campground, 13-IX-42(UT).

Selinocarpus diffusus A. Gray *CH/HD

Cottam 8753, Santa Clara Bench, 17-VI-41(UT).

Tripterocalyx micranthus Hook. PL/HD

(Abronia micranthus Torr.)

(T. pedunculatus Standl.)

Meyer 2687, Sand Mountain Road, 11-V-73; Woodbury s.n., Shivwits,
31-V-1899(UT); Cottam 5388, Leeds, 16-VII-32(UT).

Oleaceae

Fraxinus anomala Torr. *MP/CD,FW,MB

Meyer 1495, Apex Mine Road, 13-IV-71; Meyer 2498, Red Cliff Campground,
29-IV-73; Meyer 3114, Wire Mesa, 3-VIII-73; Meyer 3941, Hurricane
Cliffs, 1-V-75; Moor Z357, Grotto Campground, 25-VI-70; Christian 793,
Whitmore Canyon, 9-IV-63(UT); Cottam 8452, Diamond Valley, 9-IV-41(UT);
Plummer 7332, Gunlock, 14-V-39(UT); Cottam 8814, Washington Flat,
18-VI-41(UT); Cottam s.n., Pintura, 19-VI-30(UT).

Fraxinus velutina Torr.

*SW/DR

(F. pennsylvanica ssp. velutina G. N. Miller)

Meyer 3802, Kolob Arch Trail, 21-VII-74; Meyer 628, Ivins Reservoir, 30-V-70; Moor Z1144, East Fork of the Virgin, 7-VIII-70; Moor Z631, Oak Creek Canyon, 10-VII-70; Brooks s.n., St. George, 20-V-41(UT); Moor Z139, Narrows Trail, 12-VI-70.

Menodora scabra Gray

*CC/TF

Atwood and Higgins 5494, Pine Valley Campground, 21-VII-73(BRY).

Onagraceae

Calylophus lavandulaefolia (Torr. and Gray) Raven

CC/FW

Higgins 543, Utah Hill, 15-V-66(BRY).

Camissonia boothii (Dougl.) Raven

GM/HD

[Oenothera decorticans (Hook. and Arn.) Greene]

Most Washington County material belongs to C. boothii ssp. condensata (Munz) Raven, which is confined to the Mojave and Colorado Deserts.

Meyer 1589, Terry's Ranch Road, 14-IV-71; Meyer 2229, Ft. Pierce Road, 17-IV-73.

Camissonia brevipes (A. Gray) Raven

*MO/HD

(Oenothera brevipes A. Gray)

Raven (1969) reports that this species sometimes hybridizes with C. multijuga. Meyer 2458 seems to represent such hybrid plants.

Meyer 2429, Shinab Kibe Hill, 27-IV-73; Meyer 2755, Terry's Ranch Road, 12-V-73; Meyer 2458, Shinab Kibe Hill, 27-IV-73; Cottam 8441, St. George, 9-IV-41(UT).

Camissonia chamaenerioides (A. Gray) Raven

*SW/HD

Maguire and Blood 4888, 2 miles west of Rockville, 2-IV-34(POM); Gould 1473, Black Hill, 31-III-42(POM).

Camissonia gouldii Raven

*EN/CD

This plant is restricted to volcanic soils. The type is cited below.

Gould 1423, Diamond Valley, 15-X-41(POM).

Camissonia multijuga (Wats.) Raven

*EN/HD,FW

(Oenothera multijuga Wats.)

See note under C. brevipes.

Meyer 1576, Terry's Ranch, 14-IV-71; Meyer 2598, Curly Hollow Wash, 3-V-73; Meyer 1519, Middleton, 13-IV-71; Meyer 3848, Beaver Dam Well, 5-IV-75; Moor 2163, Rockville, 15-VI-70; Howard s.n., Snow Spring Canyon, 24-V-1899(UT); Raven s.n., Zion Canyon, 11-VI-58(UT).

Camissonia parryi (Wats.) Raven

*EN/HD,CD

(Oenothera parryi Wats.)

This species is strongly gypsophile.

Meyer 3062, southeast of Hurricane, 1-VIII-73; Meyer 3144, Wire Mesa, 4-VIII-73; Weight s.n., Coalpits Wash, 10-VI-35(UT); Church s.n., Purgatory Flat, 5-V-41(UT); Christian 931, Bloomington, 31-V-63(UT).

Camissonia parvula (Nutt. ex Torr. and Gray) Raven *IM/HD,CD

(Oenothera parvula Nutt. ex Torr. and Gray)

Meyer 1542, Terry's Ranch, 14-IV-71.

Camissonia pusilla Raven

*GB/CD

Maguire and Blood 1459, Anderson's Ranch, 3-V-32(POM).

Camissonia refracta (S. Wats.) Raven

*MO/HD

Meyer 3860, Beaver Dam Well, 5-IV-75.

Camissonia walkeri (Nels.) Raven

SI/HD

[Oenothera walkeri (Nels.) Raven]

Raven 13169, Black Hill, 11-VI-58(RSA).

- Epilobium adenocaulon Hausskn. NA/DR,MR
 (E. californicum Hausskn.)
 Meyer 3819, Mountain Meadows, 6-IX-74; Meyer 3699, Mill Canyon, 5-VII-74; Meyer 3737, Kolob Trail, 6-VII-74; Meyer 1476, Lava Point Spring, 23-VIII-70; Meyer 1141, Pine Park, 7-VII-70; Moor Z1088, Gateway to the Narrows, 31-VII-70; Moor Z1181, Sawmill Spring, 6-VIII-70.
- Epilobium angustifolium L. CB/MR
 Gould 1928, Forsyth Canyon, 22-VII-42(POM).
- Epilobium glaberrimum Barbey *NM/MR
 Meyer 3783, Kolob Arch Trail, 21-VII-74; Meyer 1862, Browse, 25-VII-71.
- Epilobium glandulosum Lehm. CB/MM
 (E. saximontanum Hausskn.)
 (E. halleanum Hausskn.)
 Meyer 2924, Kolob Road near Iron County Line, 21-VII-73; Meyer 4165, Further Water, 27-VII-75.
- Epilobium paniculatum Nutt. WE/CD,MF,MR,MM
 Meyer 1350, Kolob Reservoir, 21-VIII-70; Meyer 3838, north of Mountain Meadows, 6-IX-74; Meyer 3732, Kolob Trail, 6-VII-74.
- Gaura coccinea Nutt. PL/HD,CD,FW
 Meyer 529, Red Cliff Campground, 1-V-70; Meyer 3589, Washington, 26-V-74; Moor Z1188, Sunset Canyon Ranch, 5-VIII-70; Christian 1073, Utah Hill, 10-VII-63(UT).
- Gaura parviflora Dougl. NW/CD,DR
 This plant is found in mesic ruderal communities.
 Meyer 3267, Leeds, 13-X-73; Meyer 1909, Utah Highway 18 near Iron County Line, 26-VII-71.
- Gayophytum nuttallii Torr. and Gray NW/CD,FW,TF
 (G. diffusum Torr. and Gray)
 Meyer 1109, Pine Park, 7-VII-70; Meyer 1869, Browse, 25-VII-71; Meyer 1329, Oak Grove, 9-VIII-70; Meyer 3657, Pine Valley Campground, 4-VII-74; Moor Z988, Lava Point, 22-VII-70.

Gayophytum racemosum Torr. and Gray

*NM/TF, MF

(G. caesium Nutt.)

Moor Z529, Lava Point, 7-VII-70.

Gayophytum ramosissimum Nutt.

*IM/MF

Meyer 3552, Mahogany Knoll, 19-V-74.

Oenothera brachycarpa A. Gray

IC/FW

Cited by Higgins (1967) for the Beaver Dam Mountains.

Oenothera caespitosa Nutt.

IP/HD, CD, DR, FW, MB,
TF

Meyer 4037, Mountain Meadows Turnoff, 16-V-75; Meyer 543, northeast of Gunlock, 5-V-70; Moor Z19, Smith Mesa, 11-VI-70; Meyer 3631, North Fork of the Virgin, 30-V-74; Wilson s.n., Ivins Reservoir, 13-IV-40(UT).

Oenothera californica Watson

*AN/CD, FW, MB

The type of O. californica ssp. avita Klein, published in 1962 (Klein 1962), is from Washington County. Its status relative to the closely related species O. pallida and O. trichocalyx is not clear. It differs from the former in being ashy-pubescent rather than essentially glabrous, and from the latter in having running rootstocks rather than a taproot. Specimens often lack adequate root material, making identification difficult, and the situation is highly ambiguous at present. A fourth species, O. runcinata (Engelm.) Munz, may be involved.

Cited by Klein (1962) for Washington County.

Oenothera deltoides Torr. and Frem.

GM/HD

This plant is strongly arenophile. Washington County material belongs to O. deltoides var. decumbens (Wats.) Munz, which is essentially Mojavean in its distribution.

Meyer 3962, west of Hurricane, 1-V-75.

Oenothera flava (Nels.) Garrett

WE/MR

This is a plant of drying mudflats at middle and high elevations.

Meyer 3546, Mahogany Knoll, 19-V-74; Moor Z101, Kolob Reservoir, 11-VI-70.

Oenothera hookeri Torr. and Gray

WE/DR,MR

This species is closely related to O. longissima, and plants intermediate in hypanthium length are occasionally encountered.

Meyer 1795, Pinto, 23-VII-71; Meyer 1251, Oak Grove Road, 1-VIII-70.

Oenothera longissima Rydb.

*MP/DR,MR

See note under O. hookeri.

Moor Z506, Zion Visitor Center, 5-VII-70; Moor Z680, south of Rockville, 14-VII-70; Moor Z1259, Oak Creek Canyon, 14-VIII-70; Bleak s.n., Washington Flat, 27-VII-35(DX).

Oenothera pallida Lindl.

*RM/HD,CD,DR,FW,MB,
TF

See note under O. californica.

Meyer 2481, Red Cliff Campground, 29-IV-73; Meyer 825, Oak Grove Road, 6-VI-70; Meyer 1194, Honeycomb Rocks, 8-VII-70; Meyer 1626, Snow Spring Canyon, 20-V-71; Moor Z1531, North Creek, 29-VIII-70.

Oenothera primiveris A. Gray

*SW/HD

Some of the Washington County material appears to be perennial (short-lived) but otherwise fits the facies of O. primiveris.

Meyer 3859, Beaver Dam Well, 5-IV-75; Meyer 3890, Lytle's Ranch, 5-IV-75; Meyer 2160, north of Washington, 14-IV-73; Christian 780, Bloomington, 3-IV-63(UT).

Oenothera trichocalyx Nutt.

*CP/CD,FW,MB

See note under O. californica.

Meyer 945, Oak Grove Road, 15-VI-70; Moor Z300, Taylor Creek, 24-VI-70.

Zauschneria garrettii Nels.

*EN/FW,MB,TF

This plant usually grows in sandstone or granite crevices.

Meyer 2820, Kolob Road at top of Hop Valley, 20-VII-73; Meyer 3182, Little Creek Mountain, 16-IX-73; Moor Z1563, Pine Creek above tunnel, 29-VIII-70.

Orobanchaceae

Orobanche fasciculata Nutt.

WE/CD,FW

This plant is most often parasitic on the roots of species of Artemisia.

Hall s.n., north of Enterprise, 27-V-35(UT); Harper 87, west of St. George, 17-V-64(UT); Plummer s.n., Central, 21-V-40(UT).

Orobanche ludoviciana Nutt.

*SW/HD

(Aphyllon cooperi A. Gray)

Washington County material belongs to O. ludoviciana var. cooperi (A. Gray) G. Beck. The Meyer collection was parasitic on Gutierrezia sarothrae.

Meyer 2775, Castle Cliff, 12-V-73; Woodbury s.n., Zion Canyon, VIII-25(UT).

Oxalidaceae

Oxalis corniculata L.

IN/DR

Blake s.n., St. George, 6-IV-65(DX).

Papaveraceae

Arctomecon humilis Cov.

*EN/HD

This plant is restricted to gypsiferous clay soils.

Meyer 779, Price City Hills, 5-VI-70; Meyer 3468, West Mountain Wash, 12-IV-74; Harrison 32-124, 5 miles southwest of Santa Clara, 1932(UT); Hardy s.n., Bloomington, 27-IV-41(UT).

Argemone munita Dur. and Hilg.

MH/CD,DR,FW,MB,TF

This treatment follows Holmgren and Reveal (1966) in referring to the plant as A. munita rather than A. platyceras Link and Otto.

Meyer 2823, Kolob Road at top of Hop Valley, 20-VII-73; Meyer 950, north of New Harmony, 16-VI-70; Meyer 700, Diamond Valley, 3-VI-70; Young s.n., Leeds, 14-V-41(UT).

Eschscholzia glyptosperma Greene

*MO/HD

Meyer 2558, Warner Ridge, 2-V-73; Meyer 2572, Curly Hollow Wash, 3-V-73; Young s.n., Beaver Dam Wash, 5-IV-41(UT); Harrison s.n., Black Hill, 1-V-30(UT); Weight 948Z, Coalpits Wash, 28-V-35(UT).

Eschscholzia mexicana Greene

*SW/HD

Wilson s.n., Bloomington Caves, 6-IV-40(DX); Snow s.n., Bloomington, 17-IV-32(UT).

Eschscholzia minutiflora S. Wats.

*MS/HD

Meyer 3850, Beaver Dam Well, 5-IV-75; Meyer 4023, west of Hurricane, 2-V-75; Cottam 5047, Gunlock, 17-IV-32(UT); Weight s.n., Coalpits Wash, 28-IV-35(UT).

Platystemon californicus Benth.

*MC/HD,CD,FW

Jones s.n., Santa Clara Valley, 30-IV-1894(POM); Jones s.n., Diamond Valley, 28-IV-1894(POM); Atwood 5031, Bitter Creek, 19-V-73(BRY).

Plantaginaceae

Plantago eriopoda Torr.

BO/MR

Meyer 1856, Browse, 25-VII-71.

Plantago insularis Eastw.

*MO/HD

(P. fastigiata Morris)

(P. scariosa Morris)

Meyer 2419, Shinab Kibe Hill, 27-IV-73; Meyer 2274, Red Hill, 18-IV-73; Meyer 2185, Middleton, 15-IV-73; Meyer 1580, Terry's Ranch, 14-IV-71.

Plantago lanceolata L.

IN/DR,TF

This plant is occasional found on mesic ruderal sites.

Moor Z175, Watchman Campground, 16-VI-70; Moor Z969, top of Hop Valley on Kolob Road, 17-VII-70; Meyer 769, south of St. George, 5-VI-70.

Plantago major L.

IN/DR,MR

This is a relatively common plant in mesic ruderal communities and is very tolerant of trampling by cattle.

Meyer 1157, Pine Park, 7-VII-70; Meyer 1475, Lava Point Spring, 23-VIII-70; Meyer 3290, south of St. George, 14-X-73.

Plantago patagonica Jacq.

WE/HD,CD,DR,FW,MB

(P. purshii Roem. and Schult.)

(P. ignota Morris)

Meyer 2236, Ft. Pierce Road, 17-IV-73; Meyer 2708, Castle Cliff, 13-V-73; Meyer 3376, Cole Spring Road, 9-IV-74; Meyer 2396, Washington, 26-IV-73; Meyer 2673, Sand Mountain Road, 11-V-73.

Polemoniaceae

Collomia grandiflora Dougl.

NM/TF,MF,MR

Meyer 3727, Kolob Trail, 6-VII-74; Moor Z824, Kolob Reservoir, 17-VII-70; Moor Z553, Lava Point, 7-VII-70; Cottam 8893, Pine Valley, 26-VI-41(UT); Weight 846Z, Emerald Pool Trail, 5-VI-35(UT).

Collomia linearis Nutt.

BO/MF,MR,MM

Meyer 3765, Kolob Trail, 7-VII-74; Meyer 3660, Mill Canyon, 4-VII-74; Moor Z648, Lava Point Spring, 13-VII-70; Gould 1800, Pine Valley Campground, 5-VI-42(UT).

Eriastrum diffusum (A. Gray) Mason

*SW/HD,DR,FW

(Welwitschia diffusa Rydb.)

Meyer 3155, Grafton, 3-VIII-73; Meyer 1773, Terry's Ranch Road, 23-V-71; Meyer 3088, Smithsonian Butte, 2-VIII-73.

Eriastrum eremicum (Jeps.) Mason

*MO/HD,DR,FW

Meyer 646, Red Cliff Campground, 31-V-70; Meyer 2794, Apex Mine, 19-VII-73; Moor Z614, Oak Creek Canyon, 10-VII-70; Moor Z341, Grotto Campground, 25-VI-70.

Gilia clokeyi Mason

*MP/HD

(G. ophthalmoides ssp. clokeyi A. and V. Grant)

(G. ochroleuca ssp. clokeyi Mason and Grant)

According to Day (1955) this is one of the diploid progenitors of G. transmontana (Mason and Grant) Grant and Grant. They are sometimes difficult to distinguish without supporting karyological information. The Meyer collection is doubtfully referred. Day (op. cit.) reports that this species is strongly calciphile.

Meyer 2576, Curly Hollow Wash, 3-V-73; Gould 1687, 11 miles south of Hurricane, 2-V-42(RSA); Craig 1411, Zion Canyon, 19-VI-28(POM).

- Gilia filiformis Parry *MO/HD
Higgins 401, Terry's Ranch, 9-IV-66(BRY); Galway 8498, Black Hill, 4-V-35(BRY).
- Gilia hutchinsifolia Rydb. *EN/HD
(G. leptomeria ssp. rubella Mason and A. Grant)
Meyer 2742, Terry's Ranch Road, 12-V-73.
- Gilia inconspicua (Smith) Sweet MI/HD,DR
Meyer 2164, north of Washington, 14-IV-73; Meyer 2315, Atkinville, 19-IV-73; Meyer 3893, Lytle's Ranch, 5-IV-75; Meyer 3391, Harrisburg, 9-IV-74; Meyer 3856-2, Beaver Dam Well, 5-IV-75.
- Gilia latifolia S. Wats. *MO/HD
Hardy s.n., Price Bench, 27-IV-41(DX).
- Gilia leptomeria A. Gray MI/HD
(G. micromeria Gray)
Washington County material examined belongs to G. leptomeria var. micromeria (Gray) Cronq.
Meyer 2733, Castle Cliff, 13-V-73.
- Gilia ophthalmoides Brand MI/HD,FW
Meyer 2646-1, Browse Road, 11-V-73; Meyer 4034, Baker Dam Turnoff, 16-V-75.
- Gilia scopulorum M. E. Jones *MS/HD
Meyer 2451, Shinab Kibe Hill, 27-IV-73; Meyer 3856-1, Beaver Dam Well, 5-IV-75; Meyer 3925, Curly Hollow Wash, 6-IV-75.
- Gilia sinuata Dougl. MI/CD,FW,MB,TF
Meyer 4095, Goldstrike Turnoff, 18-V-75; Meyer 4077, Black Hills Reseeding Area, 17-V-75; Meyer 2617, Browse Road, 11-V-73; Meyer 2768, Kolob Road at top of Hop Valley, 12-V-73.
- Gilia stellata Heller *MO/HD
Meyer 2192, Middleton, 15-IV-73; Meyer 1554, Terry's Ranch, 14-IV-71.

Gilia transmontana (Mason and A. Grant)
A. and V. Grant

*MO/HD

See note under G. clokeyi.

Meyer 2432, Shinab Kibe Hill, 27-IV-73; Meyer 1546, Terry's Ranch,
14-IV-71; Meyer 2541, Warner Ridge, 2-V-73; Meyer 3985, Hurricane
Cliff Road, 2-V-75.

Ipomopsis aggregata V. Grant

WE/CD,FW,MB,TF,MF,
MM

[Gilia aggregata (Pursh) Spreng.]
(Gilia arizonica Rydb.)

Meyer 1118, Pine Park, 7-VII-70; Meyer 3181, Cinder Hill, 16-IX-73;
Moor Z8, Smith Mesa, 11-VI-70; Moor Z816, Kolob Reservoir, 17-VII-70;
Wiens 3902, Motoqua Road, 20-V-66(UT); Cottam 8958, Pine Valley,
27-VI-41(UT).

Ipomopsis congesta V. Grant

*IP/FW,MB,TF,MF,MR

(Gilia congesta Hook.)

Meyer 1349, Hop Valley, 16-VIII-70; Meyer 1829, Potato Hollow,
24-VII-71; Meyer 3782, Kolob Arch Trail, 21-VII-74; Moor Z1240, Oak
Creek Canyon, 12-VIII-70.

Ipomopsis longiflora V. Grant

*CC/FW

[Gilia longiflora (Torr.) G. Don]

Moor Z1246, Sunset Canyon Ranch, 13-VIII-70.

Ipomopsis polycladon V. Grant

ID/HD

(Gilia polycladon Torr.)

Meyer 2426, Shinab Kibe Hill, 27-IV-73; Meyer 2392, Washington,
26-IV-73; Meyer 3969, west of Hurricane, 1-V-75; Weight 774Z, Coalpits
Wash, 28-IV-35(UT); Galway s.n., St. George, 27-IV-34(UT).

Langloisia schottii (Torr.) Greene

*MC/HD

Higgins 340, U.S. 91 near Arizona State Line, 8-IV-66(BRY); Higgins 939,
Snow's Canyon, 13-V-67.

Langloisia setosissima (Torr. and Gray) Greene

*GM/HD

Meyer 2739, Terry's Ranch Road, 12-V-73.

- Leptodactylon pungens (Torr.) Nutt. NM/MB,TF
Nelson 9668, east of White Arch, 12-VI-71(Z); Nelson 9641, Zion Overlook, 12-VI-71(Z).
- Linanthastrum nuttallii (A. Gray) Ewan WE/MB,TF,MR
(Leptodactylon nuttallii Rydb.)
(Linanthus nuttalli Greene)
Meyer 3643, North Fork of the Virgin, 31-V-74; Meyer 2836, Kolob Road at top of Hop Valley, 20-VII-73; Moor Z126, Gateway to the Narrows, 12-VI-70; Nelson 9681, Oak Creek Canyon, 12-VI-71(Z).
- Linanthus bigelovii (A. Gray) Greene *CD/HD,CD
Some of the material approaches L. jonesii (Gray) Greene in having glandular pedicels and occasionally glandular calyces.
Meyer 3886, Beaver Dam Well, 5-IV-75; Nelson 10204, Zion Visitor Center, 2-V-73(Z).
- Linanthus demissus (A. Gray) Greene *MO/HD
Meyer 2570, Curly Hollow Wash, 3-V-73; Meyer 2228, Ft. Pierce Road, 17-IV-73; Meyer 2740, Terry's Ranch Road, 12-V-73.
- Microsteris gracilis (Hook.) Greene NW/CD,FW,MB,TF,MF
Meyer 3442, Moody Wash, 11-IV-74; Meyer 3352, Ripple Arch, 8-IV-74; Meyer 2664, Browse, 11-V-73; Meyer 3556, Mahogany Knoll, 19-V-74.
- Naverretia breweri (A. Gray) Greene *IM/MF,MR
Moor Z658, Lava Point, 14-VII-70; Meyer 3017, Death Point, 22-VII-73; Meyer 3763, Mill Canyon, 4-VII-74.
- Naverretia propinqua Suksd. *IP/MF,MR
[N. intertexta var. propinqua (Suksd.) Brand]
Meyer 3705, Mill Canyon, 5-VII-74; Hardy s.n., Rock Spring, 18-VII-41(DX).
- Phlox austromontana Cov. MI/CD,FW,MB,TF
(P. diffusa ssp. subcarinata Wherry)
(P. jonesii Wherry)
The lax form found in Zion which Wherry named P. jonesii is referable to P. austromontana var. prostrata Nels. The more caespitose type

variety is the most common Phlox throughout the county.

Meyer 4033, Baker Dam Turnoff, 16-V-75; Meyer 4086, Enterprise Reservoir Road, 17-V-75; Meyer 4060, Hardscrabble Hollow, 16-V-75; Meyer 568, Tobin Bench, 5-V-70; Moor 251, Kolob Road, 11-VI-70; Harper 69, Oak Grove, 16-V-64(UT); Cottam 6981, West Rim, 14-V-36(UT).

Phlox longifolia Nutt.

MI/CD,FW,MB

Washington County material seems for the most part midway between P. longifolia and P. grayi Woot. and Standl. It seems best to retain it under P. longifolia at least until the status of P. grayi is clarified. It has been referred to P. stansburyi (Torr.) Heller by Holmgren and Reveal (1966), but lacks the very long corolla tube of that species.

Meyer 4068, Black Hills Reseeding Area, 17-V-75; Cottam 6820, Pine Valley, 10-V-36(UT); Cottam 6989, West Rim, 14-V-36(UT); Hall s.n., Enterprise, 28-V-35(UT).

Phlox pulvinata (Wherry) Cronq.

IM

Woodbury s.n., Zion Park, 20-VI-28(UT).

Polemonium pulcherrimum Hook.

NM/MF

(P. delicatum Rydb.)

Cottam 8940, Pine Valley, 27-VI-41(UT); Pendleton s.n., Pine Valley Campground, 10-V-40(DX).

Polygalaceae

Polygala subspinoso S. Wats.

IM/FW

Hall s.n., north of Enterprise, 27-V-35(UT).

Polygonaceae

Chorizanthe brevicornu Torr.

*MS/HD

Meyer 2400, Washington, 26-IV-73; Meyer 2475, Red Cliff Campground, 29-IV-73.

Chorizanthe rigida (Torr.) Torr. and Gray

*MS/HD

Meyer 2550, Warner Ridge, 2-V-73; Meyer 2425, Shinab Kibe Hill, 27-IV-73.

Chorizanthe thurberi (Gray) Wats. *CM/HD,CD,FW

Meyer 3099, Smithsonian Butte, 2-VIII-73; Meyer 1699, Snow Spring Canyon, 23-V-71; Nelson 9649, East Rim, 12-VI-71(Z).

Eriogonum alatum Torr. in Sitgr. *CC/FW,TF

Weight 1002Z, West Rim Trail, 26-VI-30(UT); Meyer 3179, Little Creek Mountain, 16-IX-73.

Eriogonum brachypodum Torr. and Gray *MO/HD

(E. parryi A. Gray)

[E. deflexum var. brachypodum (Torr. and Gray) Stokes]

Meyer 2738, Terry's Ranch Road, 12-V-73; Meyer 219, Red Hill, 8-VI-70; Cottam 5664, St. George, 4-IV-31(UT); Cottam s.n., Castle Cliff, 6-IX-53(UT); Meyer 3849, Beaver Dam Well, 5-IV-75.

Eriogonum caespitosum Nutt. *IM/CD,FW

Meyer 3579, Manganese Wash, 25-V-74; Hall s.n., 7 miles west of Enterprise, 30-V-35(UT); Cottam 6772, Mountain Meadows, 10-V-36(UT); Meyer 4054, Hardscrabble Hollow, 16-V-75; Meyer 4069, Black Hills Reseeding Area, 17-V-75.

Eriogonum cernuum Nutt. PL/CD,FW,MB

Meyer 1998, Enterprise Reservoir, 21-VIII-71; Meyer 1335, Hop Valley, 16-VIII-70; Meyer 1395, Kolob Reservoir, 21-VIII-70; Meyer 1324, Oak Grove, 9-VIII-70; Meyer 1865, Browse, 25-VII-71; Moor Z1506, Firepit Knoll, 28-VIII-70; Fisher Z1320, Lower La Verkin Creek Trail, 20-VIII-70.

Eriogonum corymbosum Benth. in DC. *CP/HD,CD

(E. aureum Jones)

This plant has a very strong tendency to grow on heavy residual soils, often high in gypsum. The white-flowered type variety and the yellow-flowered E. corymbosum var. glutinosum (Jones) Jones are about equally common and frequently grow together.

Meyer 3151, Wire Mesa, 4-VIII-73; Meyer 3306, Warner Valley Spring, 14-X-73; Meyer 3305, Warner Valley Spring, 14-X-73; Moor Z1000, Potato Hollow Road, 22-VII-70; Christian s.n., Shivwits, 9-VIII-63(UT); Welsh 4509, Utah 15 west of Zion, 4-X-69(UT); Cottam 8771, west of Santa Clara, 17-VI-41(UT); Cottam 5358, Gunlock, 11-VII-32(UT).

Eriogonum davidsonii Greene

SI/FW,MB,TF

(E. vimineum Dougl. ex Benth.)

Meyer 3277, Browse Road, 13-X-73; Meyer 979, north of New Harmony, 16-VI-70; Weight 865Z, Emerald Pool Trail, 5-VI-35(UT); Christian 1011, Curly Hollow Wash, 19-VI-63(UT); Holmgren 2008, Mt. Carmel Highway, 23-VI-65(UT); Fisher Z1311, Hop Valley, 18-VIII-70.

Eriogonum deflexum Torr. in Ives.

*MC/HD,CD,DR

This plant is often extremely abundant along roadsides in summer. It usually grows on heavy residual soils such as those of the Moenkopi Formation, often in the company of E. corymbosum.

Meyer 3058, 5 miles southeast of Hurricane, 1-VIII-73; Meyer 3147, Wire Mesa, 4-VIII-73; Meyer 2780, Apex Mine Turnoff, 19-VII-73; Meyer 2111, Price City Hills, 21-X-71; Meyer 3303, Warner Valley Spring, 14-X-73; Meyer 1953, south of Veyo, 21-VIII-71; Fisher Z1137, Kolob Road near Sunset Ranch, 5-VIII-70; Reveal 701, Harrisburg Junction, 6-IX-64(UT); Reveal 702, U.S. 91 8 miles northeast of Arizona State line, 6-IX-64(UT).

Eriogonum fasciculatum Benth.

*MC/HD,CD,DR,FW

County material belongs to E. fasciculatum var. polifolium (Benth. in DC.) Torr. and Gray, which is restricted to the inland deserts.

Meyer 3516, Joshua Tree National Landmark, 18-V-74; Meyer 3450, West Mountain Wash Road, 12-IV-74; Meyer 579, Ivins Reservoir, 27-V-70; Meyer 681, Red Hill, 2-VI-70; Meyer 332, Utah Hill, 7-VI-69; Pendleton s.n., Berry Springs, 7-V-40(UT); Plummer 7325, Gunlock, 14-V-39(UT); Harper 93, Castle Cliff, 17-V-64(UT); Christian 1048, Apex Mine Road, 26-VI-63(UT).

Eriogonum heermanni Dur. and Hilg.

*MO/HD,CD,FW

(E. sulcatum S. Wats.)

This is a strongly petrophile species, usually found on limestone but occasionally on sandstone. Washington County material belongs to E. heermanni var. sulcatum (S. Wats.) Munz and Reveal, which is confined to the Mojave Desert.

Meyer 2496, Red Cliff Recreation Area, 29-IV-73; Meyer 2079, top of Snow's Canyon, 21-X-71; Meyer 1755, Welcome Spring, 23-V-71; Harper 92, Castle Cliff, 17-V-64(UT); Cottam 4040, Diamond Valley, 2-VI-29(UT); Howard s.n., between La Verkin and Toquerville, 16-VI-1898(UT).

Eriogonum inflatum Torr. and Frem.

MI/HD,CD,DR

This is an extremely common and conspicuous plant along roadsides at low elevations in summer.

Meyer 2543, Warner Ridge, 2-V-73; Meyer 623, Ivins Reservoir, 30-V-70; Meyer 868, Red Hill, 13-VI-70; Meyer 540, Red Cliffs Recreation Area, 1-V-70; Meyer 1559, Terry's Ranch, 14-IV-71; Meyer 1728, Castle Cliff, 23-V-71; Cottam 5035, Leeds, 16-IV-32(UT).

Eriogonum insigne S. Wats.

*MO/HD

[E. deflexum var. insigne (S. Wats.) M. E. Jones]

Reported for Washington County by Reveal (1969).

Eriogonum jamesii Benth. in DC.

*CC/MB

This plant is found growing as a petrophile on Navajo sandstone.

Moor Z1565, Mt. Carmel Highway, 29-VIII-70; King Z482, Angel's Landing Trail, 4-VII-70.

Eriogonum kearneyi Tidest.

*MO/HD

(E. nodosum Small)

Holmgren and Reveal s.n., near Virgin, 11-VIII-66(UT); Meyer 3052, 5 miles southeast of Hurricane, 1-VIII-73.

Eriogonum maculatum Heller

*GM/HD,CD

[E. angulatum var. maculatum (Heller) Jeps.]

Meyer 580, Ivins Reservoir, 27-V-70; Meyer 1641, Snow Spring Canyon, 20-V-71; Meyer 1774, Welcome Spring, 23-V-71; Meyer 2737, near Castle Cliff, 12-V-73; Cottam 5541, south of St. George, s.d.(UT); Meyer 3967, west of Hurricane, 1-V-75.

Eriogonum microthecum Nutt.

MI/HD,CD,FW,MB

Meyer 3097, Smithsonian Butte, 2-VIII-73; Meyer 1976, south of Enterprise Reservoir, 21-VIII-71; Meyer 3177, Cinder Hill, 16-IX-73; Moor Z769, East Fork of the Virgin, 16-VII-70; Moor Z1546, Smith Mesa, 29-VIII-70; Cottam 1048; Leeds, 17-VIII-32(UT).

Eriogonum nidularium Cov.

*GM/HD,CD,FW

[E. vimineum ssp. nidularium (Cov.) S. Stokes]

Washington County material has occasionally been misidentified as the closely related E. densum Greene, a narrow endemic of New Mexico. It is also very close to and often difficult to distinguish from E. palmerianum Reveal in Munz.

Meyer 2729, Castle Cliff, 13-V-73; Meyer 3203, Cinder Hill, 16-IX-73; Meyer 1752, Welcome Spring, 23-V-71; Christian 1010, Curly Hollow Wash, 19-VI-63(UT); Christian 980, Apex Mine Road, 10-VI-63(UT).

Eriogonum ovalifolium Nutt.

MI/CD,FW,MB

Meyer 714, near Veyo, 3-VI-70; Cottam 8793, Washington Flat, 18-VI-41(UT); Hall s.n., north of Enterprise, 27-V-35(UT); Cottam 6823, near Central, 10-V-36(UT); Plummer 7334, Gunlock, 14-V-39(UT); Plummer s.n., Pinto, 19-V-40(UT); Meyer 4085, Enterprise Reservoir Road, 17-V-75.

Eriogonum palmerianum Reveal in Munz

SI/DR,FW,MB

This plant is very closely related to E. nidularium and is sometimes difficult to distinguish from it.

Moor Z345, Grotto Campground, 25-VI-70; Meyer 3087, Smithsonian Butte, 2-VIII-73; Meyer 3204, Cinder Hill, 16-IX-73.

Eriogonum panguicense (Jones) Reveal

*EN/CD,FW

This is a plant of clay slopes.

Reported for Washington County by Reveal (1969).

Eriogonum pharnaceoides Torr. in Sitgr.

*SP/CD,FW

This collection belongs to E. pharnaceoides var. odoacoideum Reveal, a yellow-flowered variety endemic to southwestern Utah and adjacent Arizona.

Holland 251, Water Canyon Road, 10-VIII-74.

Eriogonum plumatella Dur. and Hilg.

*MO/HD

Reported tentatively for Washington County by Reveal (1969).

Eriogonum puberulum S. Wats.

*EN/CD

Reported for Washington County by Reveal (1969).

Eriogonum pusillum Torr. and Gray

*GB/HD

[E. reniforme ssp. pusillum (Torr. and Gray) S. Stokes]

Meyer 1572, Terry's Ranch, 14-IV-71; Meyer 2725, Castle Cliff, 13-V-73.

Eriogonum racemosum Nutt.

IM/CD,FW,MB,TF,MF,
MR,MM

This plant is very common at higher elevations.

Meyer 1826, Potato Hollow, 24-VII-71; Meyer 1975, Enterprise Reservoir, 21-VIII-71; Meyer 2007, New Harmony, 24-VIII-71; Meyer 3218, Little Creek Mountain, 16-IX-73; Meyer 1235, Kolob Reservoir, 11-VII-70; Meyer 1447, Lava Point, 23-VIII-70; Moor 21551, Smith Mesa, 29-VIII-70; McMillan 419, Pine Valley Campground, 13-IX-42(UT).

Eriogonum subreniforme S. Wats.

*EN/HD

This plant is locally abundant on exposed outcrops of the Chinle Formation, to which it is apparently confined.

Meyer 2186, Middleton, 15-IV-73; Meyer 3325, Warner Valley, 6-IV-73; Welsh, Matthews, and Moore 9511, south of Zion, 4-IX-69(UT).

Eriogonum thomasii Torr.

*MS/HD

Meyer 1523, Middleton, 13-IV-71; Field Class s.n., St. George, 9-III-26(UT); Cottam 5639, south of St. George, 4-IV-31(UT); Pendleton s.n., Bloomington, 26-IV-40(UT); Christian 913, west of Bloomington, 17-V-63(UT); Meyer 3863, Beaver Dam Well, 5-IV-75.

Eriogonum thompsonae S. Wats.

*EN/HD,DR

Washington County material belongs to the white-flowered E. thompsonae var. albiflorum Reveal.

Stuart s.n., Watchman Trail, 5-X-70(Z).

Eriogonum trichopes Torr. in Frem.

*SW/HD,DR

This plant is often sufficiently abundant in early summer to color the ground yellow-green.

Meyer 1636, Snow Spring Canyon, 20-V-71; Meyer 2523, near Ft. Pierce, 2-V-73; Meyer 2670, Sand Mountain, 11-V-73; Meyer 2779, Apex Mine Turnoff, 19-VII-73; Meyer 872, Red Hill, 13-VI-70.

Eriogonum umbellatum Torr.

WE/CD,FW,TF,MF,MR

Washington County material belongs to E. umbellatum var. subaridum S. Stokes.

Meyer 1398, Enterprise Reservoir, 21-VIII-70; Meyer 1456, Lava Point, 23-VIII-70; Meyer 1874, Browse, 25-VII-71; Meyer 1047, Pine Valley Campground, 30-VI-70; Meyer 1988, south of Enterprise Reservoir, 21-VIII-71; Meyer 3186, Cinder Hill, 16-IX-73; Moor Z1038, Potato Hollow, 24-VII-70; Fisher Z1305, Hop Valley, 18-VIII-70; Moor Z507, near Zion Visitor's Center, 5-VII-70; Weight 1011Z, West Rim Trail, 26-VI-35(UT); Christian 1082, Apex Mine, 20-VII-63(UT).

Eriogonum zionis J. T. Howell

*EN/MB,MR

Washington County material belongs to the type variety, which is white-flowered and is also found near Flagstaff. The red-flowered E. zionis var. coccineum Howell is endemic to the Grand Canyon.

Moor Z380, Gateway to the Narrows, 30-VI-70; Moor Z1560, Mt. Carmel Highway, 29-VIII-70; Woodbury s.n., West Rim, 5-VIII-75(Z).

Oxytheca perfoliata Torr. and Gray

*SM/HD

Meyer 2741, Terry's Ranch Road, 12-V-73.

Polygonum aviculare L.

IN/CD,MB,TF,MR

This plant grows in disturbed, trampled areas.

Meyer 3818, Mountain Meadows, 6-IX-74; Meyer 2042, New Harmony, 24-VIII-71; Meyer 1973, Maple Spring, 21-VIII-71; Meyer 3744, La Verkin Creek Trail, 6-VII-74.

Polygonum bistortoides Pursh

BO/MM

Meyer 4143, Whipple Valley, 26-VII-75; Meyer 1219, Kolob Reservoir, 11-VII-70.

Polygonum convolvulus L.

IN/DR,TF

This is a plant of ruderal communities.

Meyer 1850, Browse, 25-VII-71; Meyer 2061, Leeds, 24-VIII-71; Meyer 2044, New Harmony, 24-VIII-71.

Polygonum douglasii GreeneWE/CD,FW,MB,TF,MF,
MR,MM(P. sawatchense Small)

The large-flowered form with reflexed fruits (P. douglasii type variety) is present in the county, but the small-flowered form (P. douglasii var. johnstonii Munz) is much more common. This latter material was formerly referred to P. sawatchense.

Meyer 3674, Mill Canyon, 4-VII-74; Meyer 1841, Potato Hollow, 24-VII-71; Moor Z1450, Hop Valley, 26-VIII-70; Meyer 3840, north of Mountain Meadows, 6-IX-74.

Polygonum lapathifolium L.

IN/DR

Meyer 3242, Camp Springs Crossing, 16-IX-73.

Polygonum persicaria L.

IN/DR

Meyer 1943, Mogotsu Wash, 21-VIII-71; Moor Z1053, Kolob Road, 24-VII-70.

Pterostegia drymarioides Fisch. and Meyer

*MC/HD

Meyer 3903, Indian Spring Road, 5-IV-75; Meyer 1535, north of St. George, 13-IV-71; Hall s.n., Black Hill, s.d.(UT).

Rumex acetosella L.

IN/TF,MR,MM

Meyer 4150, Whipple Valley, 26-VII-75; Meyer 2828, Kolob Road at head of Hop Valley, 20-VII-73; Meyer 1092, Pine Valley Campground, 1-VII-70.

Rumex californicus Rech. f.

*CA/MR

This species is very closely related to R. utahensis Rech. f. Washington County material is variable and appears to be intermediate; it may be better referred to R. utahensis. See also note under R. triangulivalvis.

Meyer 2996, north of Kolob Reservoir, 22-VII-73; Moor Z137, Narrows Trail, 12-VI-70; Meyer 3009, Death Point, 22-VII-73.

Rumex crispus L.

IN/DR,MR

Meyer 1139, Pine Park, 7-VII-70; Moor Z1523, Lava Point Spring, 28-VIII-70; Meyer 770, north of Bloomington, 5-VI-70.

Rumex hymenosepalus Torr.

ID/HD,CD,FW

This plant is confined to deep sand.

Meyer 3975, west of Hurricane, 1-V-75; Meyer 2384, Washington Fields, 25-IV-73; Meyer 528, Red Cliff Campground, 1-V-70; Meyer 3405, Wire Mesa, 10-IV-74; Jones s.n., St. George, 9-IV-1880(UT).

Rumex mexicanus Meisn.

*CH/TF

The plant cited below has fruit valves to 6 mm in length and seems best referred to this species even though the callosities are developed only in some fruits. See also the note under R. triangulivalvis.

Moor Z1200, Potato Hollow Road, 5-VIII-70.

Rumex triangulivalvis (Danser) Rech. f.

NA/MF

This species is very closely related to R. mexicanus, R. californicus, and R. utahensis Rech. f. The distinctions between these species are not always discernable in Washington County material, particularly with regard to the presence or absence of callosities on the fruits. The specimen cited below has some fruits with well-developed callosities and others with none at all. It appears to be intermediate to R. utahensis, to which it might better be referred.

Meyer 3677, Mill Canyon, 4-VII-74.

Rumex venosus Pursh

*PL/DR

This specimen, stated as growing in "wet, sandy places," has well-developed fruits and is definitely referable to this species.

Woodbury s.n., St. George, s.d.(UT).

Portulacaceae

Calyptridium monandrum Nutt.

*CM/HD

Meyer 1712, Welcome Spring, 23-V-71.

Claytonia lanceolata Pursh

WE/TF,MF

Meyer 4024, Pine Valley Campground, 16-V-75; Meyer 3609, North Fork of the Virgin, 29-V-74; Meyer 2762, Kolob Road 5 miles south of Lava Point Turnoff, 12-V-73; McMillan, Glauser, and McNulty 576, Pine Creek, 19-IV-47(UT); Walsh s.n., Refrigerator Canyon, 27-V-33(UT).

- Lewisia brachycalyx Engelm. SI/CD,MR,MM
Meyer 4049, Ox Valley Road, 16-V-75; Holmgren 2005, Lava Point, 23-VI-65(Z); Higgins s.n., Enterprise, 8-V-61(DX).
- Lewisia pygmaea (Gray) Robins. NM/MM
(L. nevadensis Robins.)
Meyer 859, Kolob Reservoir, 11-VI-70; Meyer 4161, Further Water, 27-VII-75.
- Lewisia rediviva Pursh NM/FW
Atwood 5155, Little Creek Mountain, 26-V-73(BRY).
- Montia chamissoi (Ledeb.) Dur. and Jacks. NM/MF
Meyer 861, Kolob Reservoir, 11-VI-70.
- Montia perfoliata (D. Donn) Howell WE/CD,DR,FW,MB,TF
Meyer 3936, Hurricane Cliff Road, 11-IV-75; Meyer 3350, Ripple Arch, 8-IV-74; Meyer 554, Goldstrike, 5-V-70; Walsh s.n., West Rim Trail, 27-V-33(UT); Cottam 8839, Oak Grove, 19-VI-41(UT).
- Portulaca oleracea L. IN/CD,DR,MR
Meyer 1934, St. George, 6-VIII-71.
- Portulaca retusa Engelm. *AU/DR,FW,MB
Meyer 3208, Little Creek Mountain, 16-IX-73; Meyer 1960, Mogotsu Creek, 21-VIII-71.
- Talinum parviflorum Nutt. *PL/MB,TF
Moor Z1564, Pine Creek above tunnel, 29-VIII-70; Moor Z1503, Kolob Road at top of Hop Valley, 28-VIII-70; Nelson 10294, East Rim, 22-V-73(Z).

Primulaceae

- Androsace septentrionalis L. CB/TF,MF,MR,MM
(A. diffusa Small)
(A. puberulenta Rydb.)
Meyer 844, Kolob Reservoir, 11-VI-70; Meyer 3558, Mahogany Knoll, 19-V-74; Meyer 4128, Whipple Valley, 26-VII-75; Cottam 6813, Pine Valley Mountain, 9-V-36(UT).

- Dodecatheon alpinum (Gray) Greene IM/MR,MM
Meyer 4127, Whipple Valley, 26-VII-75.
- Dodecatheon pulchellum (Raf.) Merrill WP/DR
(D. pauciflorum Greene)
(D. radicum Greene)
- This is a common component of seep face communities in Zion Canyon.
- Meyer 3645, North Fork of the Virgin, 31-V-74; Moor Z108, Gateway to the Narrows, 12-VI-70.
- Samolus floribundus HBK. NW/DR
Moor Z467, Gateway to the Narrows, 2-VII-70; Cottam 4070, St. George, 2-VI-30(UT).

Pyrolaceae

- Chimaphila umbellata (L.) Barton CB/MF
Meyer 4155, Summit Trail at Middle Fork Crossing, 26-VII-75; Cottam 8932, Pine Valley Mountain, 27-VI-41(UT).
- Pterospora andromedea Nutt. NA/MF
Meyer 1833, Potato Hollow, 24-VII-71; Cottam 5661, Pine Valley Mountain, 2-IX-33(UT).
- Pyrola asarifolia Michx. *CB/MF,MR
Meyer 4112, Whipple Trail, 26-VII-75; Meyer 1001, Pine Valley Campground, 29-VI-70; Cottam s.n., Pine Valley Mountain, 10-VII-32(UT).
- Pyrola minor L. *CB/TF,MF
Cottam s.n., Pine Valley, 26-VI-41(UT); Cottam s.n., Pine Valley Mountain, 11-VII-32(UT).
- Pyrola secunda L. CB/MF
[Ramischia secunda (L.) Garcke]
Meyer 3686, Mill Canyon, 5-VII-74.

Ranunculaceae

Aconitum columbianum Nutt.

WE/MF,MR,MM

Meyer 2910, Kolob Road near Iron County Line, 21-VII-73.

Actaea rubra (Ait.) Willd.

NA/MF,MR

(A. arguta Nutt.)

Meyer 1084, Pine Valley Campground, 1-VII-70; Meyer 3610, North Fork of the Virgin, 29-V-74.

Anemone multifida Poir.

NW/MF

(A. stylosa Nels.)(A. tetonensis Porter)

Woodbury s.n., Black Mountain - Zion Park, s.d.(UT).

Anemone tuberosa Rydb.

*SW/HD

This plant grows in rock crevices, usually on limestone, occasionally basalt.

Meyer 4006, southeast of Hurricane, 8-V-75; Meyer 3945, Hurricane Cliff Road, 1-V-75; Meyer 3907, Curly Hollow Wash, 6-IV-75; Meyer 3902, Indian Spring Road, 5-IV-75; Hall s.n., Black Hill, 22-III-36(UT); Weight 1127Z, Coalpits Wash, 12-IV-35(UT); Cottam 5036, Shem, 16-IV-32(UT).

Aquilegia caerulea James

*RM/MF

Cottam 8868, Pine Valley Mountain, 26-VI-41(UT).

Aquilegia chrysantha Gray

*CC/MR

(A. thalictrifolia Rydb.)

This species and the two which follow intergrade rather freely within the county, particularly in the Zion Canyon area, and intermediate plants are very frequently encountered.

Meyer 3635, North Fork of the Virgin, 31-V-74; Moor Z111, Gateway to the Narrows, 12-VI-70; Hall s.n., Grotto, 19-VI-36(UT).

Aquilegia formosa Fisch.

*NM/DR,MR

Most Washington County material is intermediate to A. shockleyi Eastw. of the eastern Mojave Desert, which itself may not be specifically distinct. See also note under A. chrysantha.

Meyer 3651, Pine Valley Campground, 4-VII-74; Meyer 3769, Kolob Arch Trail, 21-VII-74; Meyer 1147, Pine Park, 7-VII-70; Meyer 900, Oak Grove Road, 15-VI-70; Cottam 5346, Pine Valley Mountain, 10-VII-32(UT).

Aquilegia micrantha Eastw.

*CP/MR

(A. rubicunda Tidest.)

See note under A. chrysantha.

Meyer 3670, Mill Canyon, 4-VII-74; Meyer 3800, Kolob Arch Trail, 21-VII-74; Meyer 3607, North Fork of the Virgin, 29-V-74; Moor Z412, Gateway to the Narrows, 1-VII-70; Moor Z550, Potato Hollow Turnoff, 7-VII-70; Cottam 8899, Pine Valley Mountain, 26-VI-41(UT).

Clematis ligusticifolia Nutt.WE/CD,DR,FW,MB,TF,
MR

Meyer 1151, Pine Park, 7-VII-70; Moor Z1528, Virgin, 28-VIII-70; Moor Z1004, Sawmill Springs Trailhead, 23-VII-70; Moor Z1099, Gateway to the Narrows, 31-VII-70; Christian 1062, Utah Hill, 4-VII-63(UT).

Clematis pseudoalpina (Kuntze) Nels.

*RM/MF

Meyer 1809, Oak Canyon Cabin Area, 24-VII-71; Cottam 6983, West Rim, 14-V-36(UT); Cottam 8948, Pine Valley Mountain, 27-VI-41(UT).

Delphinium nuttallianum Pritz.

IM/TF,MF,MM

(D. nelsoni Greene)

This treatment follows that of Hitchcock et al. (1964) in considering D. nelsonii to be conspecific with D. nuttallianum.

Meyer 850, Kolob Reservoir, 11-VI-70; Meyer 3559, Mahogany Knoll, 19-V-74; Meyer 4064, Hardscrabble Hollow, 16-V-75; Meyer 4094, Goldstrike Turnoff, 18-V-75; Pendleton s.n., Pine Valley Campground, 12-V-40(UT).

Delphinium occidentale (Wats.) Wats.

*RM/MF

Meyer 3758, Kolob Trail, 7-VII-74; Moor Z788, Kolob Reservoir, 17-VII-70.

Delphinium parishii A. Gray

*MS/HD

(D. amabile Tidest.)

Meyer 2689, Red Cliffs Campground, 12-V-73; Meyer 2701, Castle Cliff, 13-V-73; Davis s.n., Red Hill, 17-IV-65(DX); Weight 11Z, Coalpits Wash, 28-IV-35(UT).

Delphinium scaposum Greene

SP/HD,CD,FW

Moor Z40, Smith Mesa, 11-VI-70; Squire s.n., north of Hurricane, 3-V-40(DX); Cottam 5089, Terry's Ranch, 19-IV-32(UT); Weight 81Z, Zion Park, 28-IV-35(UT); Cottam 6765, Mountain Meadows, 10-V-36(UT); Wiens 3911, Motoqua Road, 20-V-66(UT).

Myosurus cupulatus S. Wats.

*AR/HD,CD

Meyer 2338, Warner Ridge, 24-IV-73.

Myosurus nitidus Eastw.

*EN/FW

(M. eglestonii Wooton and Standley)

This species is known only from three previous widely disjunct collections, according to Campbell (1952).

Meyer 4017, Smith Mesa, 10-V-75.

Ranunculus alismaefolius Geyer

*MI/MM

Meyer 4149, Whipple Valley, 26-VII-75.

Ranunculus aquatilis L.

CS

(Batrachium aquatilis Wimm.)

Meyer 1158, Lower Enterprise Reservoir, 8-VII-70; Cottam 14178, Santa Clara Gorge, 15-VIII-55(UT).

Ranunculus cymbalaria Pursh

WE/DR,MR

Meyer 3015, Death Point, 22-VIII-73; Meyer 3733, Kolob Trail, 6-VII-74; Meyer 3700, Mill Canyon, 5-VII-74; Meyer 894, Oak Grove Road, 15-VI-70; Moor Z1177, Sawmill Springs, 6-VIII-70; Moor Z1121, Lava Point Spring, 31-VII-70; Moor Z303, Taylor Creek, 24-VI-70.

Ranunculus inamoenus Greene

*RM/MR,MM

Meyer 4148, Whipple Valley, 26-VII-75; Meyer 4164, Further Water, 27-VII-75; Meyer 1079, Pine Valley Campground, 30-VI-70; Cottam 6797, Pine Valley Mountain, 9-V-36(UT).

Ranunculus juniperinus Jones

*EN/FW

(Beckwithia juniperinus Heller)

Meyer 3347, Ripple Arch, 18-IV-74; Meyer 4103, top of Racer Canyon, 17-V-75; Christian 769, West Mountain Canyon, 14-III-63(UT); Young s.n., north of Leeds, 24-III-41(UT); Christian 798, Utah Hill, 12-IV-63(UT).

Ranunculus macounii Britt.

*BO/MR

Meyer 1088, Pine Valley Campground, 1-VII-70.

Ranunculus oreogenes Greene

*EN/TF

This species closely resembles R. glaberrimus Hook., a species to which county material has occasionally been referred in the past.

Meyer 2664, Browse, 11-V-73; Rencher s.n., Pine Valley Campground, 10-V-41(DX); Nelson 9956, Lava Point, 20-IV-72(Z).

Ranunculus scleratus L.

CB/MM

Moor Z827, Kolob Reservoir, 17-VII-70.

Ranunculus testiculatus Crantz

IN/CD,FW,MR

Meyer 4089, Cove Wash, 17-V-75.

Thalictrum fendleri Engelm.

WE/TF,MF,MR

Meyer 1004, Pine Valley Campground, 29-VI-70; Cottam 6864, Mogotsu, 10-V-36(UT); Walsh s.n., Refrigerator Canyon, 29-V-33(UT).

Rhamnaceae

Ceanothus fendleri A. Gray

*CC/MB,TF,MF

Meyer 1065, Pine Valley Campground, 30-VI-70; Meyer 2853, Little Creek Knoll, 20-VII-73; Meyer 3690, Mill Canyon, 5-VII-74; Weight 996Z, West Rim Trail, 26-VII-35(UT).

Ceanothus greggii A. Gray

*SW/FW,MB

Meyer 570, Tobin Bench, 5-V-70; Meyer 953, north of New Harmony, 16-VI-70; Meyer 4072, Black Hills Reseeding Area, 17-V-75; Cottam 8509, Pintura, 13-IV-41(UT); Christian 1071, Utah Hill, 8-VII-63(UT).

Rhamnus betulaeifolia Greene

*CH/MB

Cottam 8815, Washington Flat, 18-VI-41(UT); Harper 74, Leeds Creek, 16-V-64(UT).

Rosaceae

Amelanchier utahensis KoehneMI/HD,CD,DR,FW,MB,
TF,MF(A. bakeri Greene)
(A. oreophila Nels.)
(A. mormonica Schneider)Some Washington County material approaches A. alnifolia (Nutt.) Nutt., which may itself not be specifically distinct. Moor Z48, cited below, is exceptional in having petals to 17 mm in length.

Meyer 3572, Mahogany Knoll, 19-V-74; Meyer 2651, Browse Road, 11-V-73; Meyer 1045, Pine Valley Campground, 30-VI-70; Meyer 4041, Mountain Meadows Turnoff, 16-V-75; Meyer 3944, Hurricane Cliff Road, 1-V-75; Moor Z48, Kolob Road, 11-VI-70; Moor Z1174, Lava Point, 6-VIII-70; Weight 970Z, Hidden Canyon, 21-VI-35(UT).

Cercocarpus intricatus S. Wats.

SI/FW,MB,TF

[C. ledifolius var. intricatus (S. Wats.) M. E. Jones]This plant is habitably and ecologically quite distinct from the closely related C. ledifolius, and intermediate plants are not known to occur in the county.

Meyer 2770, Kolob Road at head of Hop Valley, 12-V-73.

Cercocarpus ledifolius Nutt.

MI/FW,MB,TF

See note under C. intricatus.

Meyer 1041, Pine Valley Campground, 30-VI-70; Cottam 8845, Oak Grove, 19-VI-41(UT).

Cercocarpus montanus Raf.

IP/FW,MB,TF

(C. betuloides Nutt.)

Moor Z1172, Lava Point, 6-VIII-70; Moor Z332, Black Ridge, 24-VI-70.

Chamaebatia millefolium (Torr.) Maxim.

GB/FW,MB

Christian 1067, Utah Hill, 4-VII-63(UT); Cottam 14191, Santa Clara Creek Canyon, 15-VIII-55(UT).

Coleogyne ramosissima Torr.

*MP/HD,CD,FW

This plant seems to have a preference for residual soils, at least at higher elevations.

Meyer 2555, Warner Ridge, 2-V-73; Meyer 2500, Red Cliff Campground, 29-IV-73; Meyer 3460, West Mountain Wash, 12-IV-74; Howard s.n., Santa Clara, 31-V-1899(UT).

Cowania mexicana D. Don

ID/HD,CD,DR,FW,MB

[C. stansburiana (Torr.) Jeps.]

Meyer 801, Taylor Creek, 4-VI-70; Meyer 535, Red Cliff Campground, 1-V-70; Meyer 747, Washington Flat, 6-VI-70; Meyer 1496, Apex Mine Road, 13-IV-71; Milner 9226, Anderson's Ranch, 30-IV-46(UT).

Fallugia paradoxa (D. Don) Endl.

MH/HD,CD,DR,FW,MB

Meyer 719, Taylor Creek, 4-VI-70; Meyer 640, Ivins Reservoir, 30-V-70; Meyer 878, Red Hill, 13-VI-70; Meyer 1724, south of Motoqua Turnoff, 23-V-71; Moor Z326, Black Ridge, 24-VI-70; Cottam 6875, Gunlock, 11-V-36(UT).

Fragaria virginiana Duchn.

NA/MM

[F. ovalis (Lem.) Rydb.]

(F. glauca Rydb.)

This species is distinguished with difficulty from F. vesca L. except when in fruit. According to Harrington (1954) the two species intergrade in Colorado. Both may be present in Washington County.

Meyer 4158, Further Water, 27-VII-75.

Geum macrophyllum Willd.

CB/MM

Meyer 2927, Kolob Road near Iron County Line, 21-VII-73; Meyer 1089, Pine Valley Campground, 1-VII-70.

Holodiscus dumosus (Hook.) Heller

ID/MB,TF,MF

(H. microphyllum Rydb.)

Meyer 3689, Mill Canyon, 5-VII-74; Moor Z604, East Rim Trail, 7-VII-70; Moor Z1018, Potato Hollow, 24-VII-70; Moor Z1560, Pine Creek above tunnel, 29-VIII-70; Cottam 8812, Washington Flat, 18-VI-41(UT).

Ivesia sabulosa (Jones) Keck

*EN/MB,TF

(I. mutabilis Rydb.)

Meyer 1440, Lava Point, 23-VIII-70; Moor Z1367, La Verkin Creek, 20-VIII-70.

Peraphyllum ramosissimum Nutt.

*IM/CD,FW,MB

Meyer 3073, Black Hills Reseeding Area, 17-V-75.

Petrophytum caespitosum (Nutt.) Rydb.

IC/CD,FW

(Spirea caespitosum Nutt.)

This is a very strongly petrophile species, most commonly found on limestone but by no means restricted to it.

Meyer 1751, Welcome Spring, 23-V-71; Moor Z597, East Rim Trail, 7-VII-70.

Physocarpus alternans (Jones) Howell

*GB/MB

Higgins 712, Utah Hill Relay Tower, 18-VI-66(BRY).

Potentilla arguta Pursh

*BO/MM

Meyer 4118, Whipple Valley, 26-VII-75; Cottam s.n., Pine Valley Mountain, 30-VI-36(UT).

Potentilla biennis Greene

NM/MR

This plant occurs on moist, unstable sites such as sandbars.

Meyer 984, north of New Harmony, 16-VI-70; Meyer 1291, Oak Grove, 4-VIII-70; Meyer 1074, Pine Valley Campground, 30-VI-70; Meyer 1165, Lower Enterprise Reservoir, 8-VII-70.

Potentilla glandulosa Lindl.

NM/TF,MF,MM

Moor Z807, Kolob Reservoir, 17-VII-70; Cottam 8941, Pine Valley Mountain 27-VI-41(UT).

Potentilla gracilis Dougl.

NM/MF,MR,MM

(P. pulcherrima Lehm.)

Meyer 3661, Mill Canyon, 4-VII-74; Meyer 4135, Whipple Valley, 26-VII-75; Meyer 2922, Kolob Road near Iron County Line, 21-VII-73; Moor Z1015, Lava Point, 23-VII-70.

Potentilla hippiana Lehm.

RM/MF

(P. leucophylla Torr.)

Moor Z548, Potato Hollow Turnoff, 7-VII-70; Moor Z790, Kolob Reservoir, 17-VII-70.

Prunus fasciculata (Torr.) Gray

*MO/HD,CD,DR,FW

(Emplectocladus fasciculatus Torr.)

Meyer 1487, Apex Mine Road, 13-IV-71; Meyer 3337, Sand Mountain, 7-IV-74; Meyer 3881, Beaver Dam Well, 5-IV-75; Cottam 5015, Pintura, 16-IV-32(UT); Cottam 4039, Diamond Valley, 2-VI-29(UT).

Prunus virginiana L.

NA/MF,MR,MM

(P. melanocarpa Rydb.)

Moor Z49, Kolob Road, 11-VI-70; Moor Z681, Lava Point, 14-VII-70; Rencher s.n., New Harmony, 18-V-41(UT); Cottam 8933, Pine Valley Mountain, 27-VI-40(UT).

Purpusia saxosa Brandeg.

*EN/MM

(P. osterhoutii A. Nels.)

(Potentilla osterhoutii J. T. Howell)

Meyer 1415, Kolob Reservoir, 21-VIII-70.

Purshia glandulosa Curran.

*MO/CD,FW

(P. tridentata var. glandulosa M. E. Jones)

Meyer 1603, Terry's Ranch Road, 14-IV-71; Meyer 510, Motoqua, 30-IV-70; Cottam 14656, Mineral Wash, 26-III-57(UT).

Purshia tridentata (Pursh) DC.

*IM/CD,FW,MB

Meyer 978, north of New Harmony, 16-VI-70; Meyer 3523, Utah Hill Summit, 18-IV-74; Meyer 4074, Black Hills Reseeding Area, 17-V-75; Cottam 6845, Pine Valley, 10-IV-36(UT).

Rosa woodsii Lindl.

WE/CD,DR,FW,MB,TF,
MF,MR,MM

(R. arizonica Rydb.)

(R. granulifera Rydb.)

(R. ultramontana Heller)

Some of the Washington County material approaches R. nutkana Presl., but does not seem to be sufficiently distinct from R. woodsii to warrant recognition as a separate species.

Meyer 1101, Pine Valley Campground, 1-VII-70; Meyer 759, Taylor Creek, 4-VI-70; Meyer 805, Washington Flat, 6-VI-70; Meyer 1439, Lava Point, 23-VIII-70; Moor Z559, Potato Hollow Turnoff, 7-VII-70; Weight 1017Z, West Rim Trail, 26-VI-35(UT); Cottam 5336, Watercress Spring, 8-VII-32(UT).

Rubus idaeus L. CB/MF

(R. melanolasius Focke)
(R. strigosus Michx.)

Meyer 3711, Mill Canyon, 5-VII-74; Cottam 8901, Pine Valley, 26-VI-41(UT).

Rubus leucodermis Dougl. WE/MR

Meyer 3608, North Fork of the Virgin, 29-V-74; Meyer 1246, Oak Grove, 1-VIII-70.

Rubus procerus Muell. IN/DR

This plant was well-established as an escape from cultivation.

Meyer 3264, Leeds, 13-X-73.

Sorbus scopulina Greene *NM/MR

Cottam 8934, Pine Valley Mountain, 27-VI-41(UT).

Rubiaceae

Galium aparine L. IN/HD,DR,MF

Meyer 2263, north of St. George, 18-IV-73; Meyer 2485, Red Cliff Campground, 29-IV-73; Meyer 1685, Oak Grove, 21-V-71; Meyer 3523, North Fork of the Virgin, 30-V-74.

Galium bifolium S. Wats. NM/TF,MF,MR

Meyer 3554, Mahogany Knoll, 19-V-74; Meyer 1676, Oak Grove, 21-V-71.

Galium desereticum Dempst. and Ehrend. *EN/MB,TF

Meyer 1290 cited below is doubtfully referred to this species.

Meyer 1290, Oak Grove, 4-VIII-70; Moor Z307, Lee Pass, 24-VI-70.

Galium magnifolium (Dempster) Dempster *EN/HD

Meyer 3949, Hurricane Cliff Road, 1-V-75; Meyer 2493, Red Cliff Campground, 29-IV-73.

Galium munzii Hilend and Howell

*EN/DR

Meyer 3622, North Fork of the Virgin, 30-V-74; Moor Z409, Gateway to the Narrows, 1-VII-70; Woodbury s.n., Zion Canyon, 13-VII-25(DX).

Galium proliferum Gray

*CH/HD

Meyer 2706, Castle Cliff, 13-V-73; Meyer 3921, Curly Hollow Wash, 6-IV-75; Galway s.n., Black Hill, 19-IV-36(UT).

Galium stellatum Kellogg

*MS/HD

Gould 1577, Black Hill, 16-IV-42(UT).

Galium triflorum Michx.

CB/MF,MR

Meyer 3771, Kolob Arch Trail, 21-VII-74; Meyer 3652, Pine Valley Campground, 4-VII-74; U. Expedition s.n., Grotto Campground, 19-VI-36(UT).

Galium wrightii Gray

*CC/MB

Cited for Washington County by Dempster (1973).

Kelloggia galioides Torr.

NM/MF

Meyer 2959, Home Valley Knoll, 22-VII-73; Meyer 3692, Mill Canyon, 5-VII-74; Moor Z906, Kolob Road 6 miles southeast of reservoir, 17-VII-70.

Rubia tinctorum L.

IN/DR,MR

This cultivated dye plant has escaped and become well-established and abundant in mesic ruderal communities.

Meyer 788, south of St. George, 5-VI-70; Meyer 3134, south of Rockville, 3-VIII-73; Moor Z196, Watchman Campground, 16-VI-70; Cottam 1525, Santa Clara, 29-VIII-27(UT).

Rutaceae

Thamnosma montana Torr. and Frem.

*MS/HD,CD

Meyer 3882, Beaver Dam Well, 5-IV-75; Meyer 2726, Castle Cliff, 13-V-73; Meyer 3487, Old Mormon Road, 12-IV-74; Cottam 7291, Camp Springs, 11-IV-39(UT); Cottam 5080, Beaver Dam Wash, 17-IV-32(UT); Treshow s.n., Santa Clara, 3-V-63(UT).

Salicaceae

- Populus angustifolia James RM/MR
Cottam 8964, Pine Valley, 27-VI-41(UT).
- Populus fremontii Wats. AN/DR
Meyer 668, Red Hill, 1-VI-70; Meyer 1622, Middleton, 15-IV-71.
- Populus tremuloides Michx. NA/TF, MF, MR
Wilson s.n., Pine Valley, 11-V-40(DX).
- Salix bebbiana Sarg. *RM/MR
Meyer 3801, La Verkin Creek Trail, 21-VII-74; Gould 1780, Pine Valley Campground, 26-V-42(DX).
- Salix exigua Nutt. WE/DR, MR
Meyer 669, Red Hill, 1-VI-70; Woodbury s.n., Zion Canyon, 3-VI-29(UT); Cottam 8804, Washington Flat, 18-VI-41(UT).
- Salix geyeriana Anders. NM/MR
Meyer 3662, Mill Canyon, 4-VII-74.
- Salix laevigata Bebb CM/DR
Meyer 4109, Diamond Valley, 21-VI-75; Gould 1605, 7 miles south of Gunlock, 19-IV-42(DX).
- Salix lasiandra Benth. WE/MR
[S. caudata (Nutt.) Heller]
Meyer 1078, Pine Valley Campground, 30-VI-70.
- Salix lasiolepis Benth. ID/MR
Cited for Washington County by Erdman (1970).
- Salix nigra Marsh NA/DR
(S. gooddingii Ball)
Cottam 4234, St. George, 5-VI-29(UT); Weight 1039Z, Narrows Trail, 24-VI-35(UT).

Salix scouleriana Barratt

WE/MR

Cited for Washington County by Erdman (1970).

Santalaceae

Comandra pallida A. DC.

WP/CD,DR,FW,MB,TF

This plant has been referred by western authors in the past to C. umbellata (L.) Nutt. The treatment of Holmgren and Reveal (1966) is followed here.

Meyer 1618, Middleton, 15-IV-71; Meyer 811, Danish Ranch, 6-VI-70; Moor Z721, Lava Point, 15-VII-70; Cottam 6827, Central, 10-V-36(UT).

Saururaceae

Anemopsis californica Hook.

*CD/DR

This plant is a prominent component of the vegetation at alkaline seeps and springs, often forming dense populations.

Meyer 3268, Leeds, 13-X-73; Meyer 664, Red Hill, 1-VI-70; Cottam 6902, Santa Clara, 11-V-36(UT); Church s.n., La Verkin, 20-V-40(UT); Christian 1001, Bloomington, 17-VI-63(UT); Cottam 4026, Washington, 1-VI-29(UT).

Saxifragaceae

Fendlerella utahensis (Wats.) Heller

SI/FW,MB,TF,MF

This plant is usually found on limestone.

Holmgren 1992, West Rim Trail, 22-VI-65(Z); Moor Z1026, Potato Hollow, 24-VII-70; Weight 1049Z, Narrows Trail, 24-VI-35(UT); Christian 1043, Apex Mine, 26-VI-63(UT).

Heuchera parvifolia Nutt.

*RM/MF

Meyer 4120, Whipple Valley, 26-VII-75; Cottam 8950, Pine Valley Mountain, 27-VI-41(UT).

Heuchera rubescens Torr.

GB/MB,TF,MF,MR

(H. lithophila Heller)

Moor Z728, Lava Point, 15-VII-70; Moor Z112, Gateway to the Narrows, 12-VI-70; Cottam 8813, Washington Flat, 18-VI-41(UT); Cottam 14180, Santa Clara Gorge, 15-VIII-55(UT).

Heuchera versicolor Greene

*SW/MF

(H. leptomeria Greene)

Meyer 3687, Mill Canyon, 5-VII-74; Cottam 8841, Oak Grove, 19-VI-41(UT).

Jamesia americana Torr. and Gray

AN/MF,MR

(Edwinia americana Heller)

Washington County material belongs to J. americana var. californica (Small) Jeps., which is found from southeastern California to southwestern Utah.

Woodbury s.n., Zion Park, 9-IX-25(DX); Weight 1054Z, Narrows Trail, 24-VI-35(UT).

Lithophragma bulbifera Rydb.

*NM/CD

Meyer 4059, Hardscrabble Hollow, 16-V-75.

Lithophragma tenella Nutt.

*IM/CD,FW,TF,MF,MM

Meyer 3563, Mahogany Knoll, 19-V-74; Meyer 2771, Kolob Road at head of Hop Valley, 12-V-73; Meyer 845, Kolob Reservoir, 11-VI-70; Meyer 4053, Hardscrabble Hollow, 16-V-75; Meyer 4067, Black Hills Reseeding Area, 17-V-75; Meyer 4010, Smith Mesa, 9-V-75; Cottam 6798, Pine Valley Mountain, 9-V-36(UT).

Parnassia parviflora DC.

*BO/MF

Woodbury s.n., West Rim Trail, 5-VIII-25(DX).

Philadelphus microphyllus Gray

ID/MB

Weight 1046Z, Narrows Trail, 24-VI-35(UT); Weight 966Z, East Rim Trail, 21-VI-35(UT).

Ribes aureum Pursh

WE/DR,MR

Meyer 4051, Ox Valley Road, 16-V-75; Meyer 1806, west of Pinto, 23-VII-71; Meyer 1164, Lower Enterprise Reservoir, 18-VII-70; Rencher s.n., Watercress Spring, 22-IV-41(UT).

Ribes cereum Dougl.

WE/CD,TF,MF

Meyer 3571, Mahogany Knoll, 19-V-74; Meyer 1319, Oak Grove, 9-VIII-70; Meyer 1066, Pine Valley Campground, 30-VI-70.

Ribes montigenum McClatchie

WE/MF

Meyer 4162, Summit Trail at Middle Fork Crossing, 27-VII-75;
Cottam 8951, Pine Valley Mountain, 27-VI-41(UT).

Ribes velutinum Greene

GB/CD,FW

Meyer 4001, Gould Wash, 9-V-75; Meyer 3426, Moody Wash, 11-IV-74.

Ribes viscosissimum Pursh

IM/MF

Meyer 4154, Summit Trail at Middle Fork Crossing, 26-VII-75; Moor Z1198,
Potato Hollow Road, 5-VIII-70.

Saxifraga rhomboidea Greene

*RM/MB,MF

Nelson 9975, East Rim Trail, 27-IV-72(Z); Cottam 8943, Pine Valley
Mountain, 27-VI-41(UT).

Scrophulariaceae

Antirrhinum filipes A. Gray

*MS/HD

(Asarina filipes Pennell)

Cottam 5650, south of St. George, 4-IV-31(UT); Rencher s.n., Beaver
Dam Wash, 5-IV-41(UT).

Castilleja chromosa A. Nels.

MI/HD,CD,FW,MB,TF

This is an extremely variable and widely distributed taxon. Some
Washington County material has been referred to C. angustifolia
(Nutt.) G. Don, but the treatment of Hitchcock et al. (1959) in
considering this a restricted northwestern species is followed here.

Meyer 553, Black Canyon, 5-V-70; Meyer 514, Motoqua, 30-IV-70;
Meyer 732, Taylor Creek, 4-VI-70; Meyer 4036, Baker Dam Turnoff,
16-V-75; Meyer 1494, Apex Mine Road, 13-IV-71; Meyer 1598, Terry's
Ranch Road, 14-IV-71; Meyer 3548, Mahogany Knoll, 19-V-74; Meyer 3408,
Smithsonian Butte, 10-IV-74; Moor Z81, Kolob Trail, 11-VI-70;
Jones s.n., St. George, 5-IV-1880(UT); Cottam 6767, Mountain Meadows,
10-V-36(UT); Cottam 5060, Shem, 17-VI-32(UT).

Castilleja exilis A. Nels.

IM/DR

This is a plant of usually alkaline springs and seeps.

Meyer 3241, Camp Springs Crossing, 16-IX-73; Meyer 830, Danish Ranch,
6-VI-70; Moor Z1535, Sunset Canyon Ranch Pond, 29-VIII-70; Cottam 5334,
Red Hill, 8-VII-32(UT).

Castilleja linariaefolia Benth.

MI/CD,DR,FW,MB

Meyer 1060, Pine Valley Campground, 30-VI-70; Meyer 1817, Lava Point, 24-VII-71; Meyer 3776, Kolob Arch Trail, 21-VII-74; Cottam 8811, Washington Flat, 18-VI-41(UT); Christian 1056, Utah Hill, 3-VII-63(UT); Meyer 1977, south of Enterprise Reservoir, 21-VIII-70.

Castilleja miniata Dougl.

NM/TF,MF,MR,MM

(C. confusa Greene)

Meyer 1418, Kolob Reservoir, 21-VIII-70; Meyer 2923, Kolob Road near Iron County Line, 21-VII-73; Meyer 1100, Pine Valley Campground, 1-VII-70; Moor Z538, Lava Point, 7-VII-70; Cottam 8833, Fuller's Ranch, 19-VI-41(UT); Weight 1019Z, West Rim Trail, 26-VI-35(UT).

Castilleja zionis Eastw.

*EN/TF

This plant is found growing in sandstone crevices at middle elevations. It might be better reduced to synonymy under C. scabrida Eastw.

Meyer 3596, North Fork of the Virgin, 29-V-74; Meyer 2766, top of Hop Valley on Kolob Road, 12-V-73; Walsh 92, West Rim Trail, 27-V-33(UT).

Collinsia parviflora Dougl.BO/CD,DR,FW,MB,TF,
MF,MR,MM

Meyer 3557, Mahogany Knoll, 19-V-74; Meyer 556, Goldstrike, 5-V-70; Meyer 2774, top of Hop Valley on Kolob Road, 12-V-73; Meyer 4011, Smith Mesa, 9-V-75; Meyer 3441, Moody Wash, 11-IV-74.

Cordylanthus kingii S. Wats.

*SP/CD,TF

Meyer 1400, Kolob Reservoir, 21-VIII-70; Meyer 1433, Lava Point, 23-VIII-70.

Cordylanthus maritimus Nutt. ex Benth.

*CA/DR

(C. canescens A. Gray)

Washington County material belongs to the Great Basin subspecies, C. maritimus ssp. canescens (Gray) Chuang and Heckard, traditionally considered as specifically distinct. This treatment follows Chuang and Heckard (1973). The other subspecies are coastal.

Meyer 3293, south of St. George, 14-X-73.

Cordylanthus parviflorus (Ferris) Wiggins

*EN/FW

This species is very closely related to C. glandulosus Pennell and Clokey, endemic to the Spring Mountains of southern Nevada, from which it may be distinguished by the open-paniculate rather than capitate inflorescences.

Meyer 3202, Cinder Hill, 16-IX-73; Meyer 2792, Apex Mine, 19-VII-73; Meyer 3111, Wire Mesa, 3-VIII-73; Meyer 3094, Smithsonian Butte, 2-VIII-73.

Mimulus cardinalis Dougl.

CA/DR

(M. verbenaceus Greene)

Meyer 3635, North Fork of the Virgin, 31-V-74; Moor Z382, Emerald Pools, 30-VI-70; Moor Z109, Gateway to the Narrows, 12-VI-70; Hardy s.n., Berry Spring, 7-V-40(UT); Cottam 3418, Narrows at Zion, 25-VI-28(UT).

Mimulus floribundus Dougl.

WE/MR

This is a plant of sandy, periodically moist streambottoms at middle elevations.

Meyer 1279, Oak Grove, 4-VIII-70; Meyer 1132, Pine Park, 7-VII-70; Meyer 2806, Kolob Road at head of Hop Valley, 20-VII-73; Meyer 3702-2, Mill Canyon, 5-VII-74.

Mimulus guttatus DC.

WE/DR,MR

Meyer 1005, Pine Valley Campground, 28-VI-70; Meyer 898, south of Oak Grove, 15-VI-70; Meyer 985, north of New Harmony, 16-VI-70; Moor Z142, Gateway to the Narrows, 12-VI-70; Moor Z552, Lava Point Spring, 7-VII-70; Paxman s.n., Washington, 9-V-41(UT); Weight 838Z, Emerald Pool, 5-VI-35(UT).

Mimulus parryi A. Gray

*EN/HD,CD,FW

This plant occurs in two corolla color forms, yellow and pink. They are about equally common and are usually found growing intermixed. The plants are otherwise identical.

Meyer 2691, north of Virgin, 13-V-73; Meyer 2778, Terry's Ranch Road, 12-V-73; Meyer 2415, Shinab Kibe Hill, 27-IV-73; Cottam 5048, Shem, 12-IV-32(UT); Weight 1088Z, Coalpits Wash, 20-IV-35(UT); Christian 975, Apex Mine Turnoff, 10-VI-63(UT); Cottam 5072, Motoqua, 18-VI-32(UT); Cottam 5048, Gunlock, 17-IV-32(UT); Cottam s.n., La Verkin, 21-IV-32(UT).

- Mimulus pilosus (Benth.) S. Wats. *AN/DR,MR
 This is a plant of periodically moist streambottoms.
 Meyer 1131, Pine Park, 7-VII-70; Meyer 1964, Mogotsu Creek, 21-VIII-71.
- Mimulus primuloides Benth. *IM/MM
 Meinke s.n., Bare Valley, 8-VIII-74.
- Mimulus rubellus A. Gray ID/DR,FW,MB
 Meyer 2639, Browse Road, 11-V-73; Cottam 8468, Hurricane Bench, 10-IV-41(UT); Cottam 5050, Gunlock, 17-IV-32(UT).
- Mimulus suksdorfii A. Gray MI/MR
 Nelson s.n., East Rim, 25-IV-73(Z); Nelson 9743, Lava Point, 15-VI-71(Z).
- Orthocarpus luteus Nutt. IP/MM
 Meyer 1375, Kolob Reservoir, 21-VIII-70.
- Pedicularis centranthera A. Gray *RM/MF
 Woodbury s.n., Zion Park, V-1927(UT).
- Penstemon ambiguus Torr. CC/HD,CD,FW
 This plant seems to be confined to aeolian sand derived from the Navajo Formation.
 Meyer 335, west of Santa Clara, 7-VI-69; Meyer 712, Snow's Canyon, 3-VI-70; Meyer 904, Oak Grove Road, 15-VI-70; Harrison s.n., Santa Clara Bench, 20-V-30(UT); Cottam 4002, Harrisburg, 31-V-29(UT); Pennell and Schaeffer 21658, Toquerville, 12-VI-38(UT); Cottam 5386, Leeds, 16-VII-32(UT).
- Penstemon barbatus (Cav.) Roth *CC/DR,FW
 This plant is found growing in crevices in Navajo sandstone.
 Meyer 3768, Kolob Arch Trail, 21-VII-74; Moor Z1295, Hop Valley, 18-VIII-70; Weight s.n., West Rim Trail, 26-VI-35(UT).
- Penstemon bridgesii A. Gray MI/FW,MB,TF
 Meyer 1169, Lower Enterprise Reservoir, 8-VII-70; Moor Z720, Lava Point, 15-VII-70; Meyer 1285, Oak Grove, 4-VIII-70; Cottam 8959, Pine Valley, 27-VI-41(UT); Christian 1061, Utah Hill, 4-VII-63(UT).

Penstemon comarrhenus A. Gray

*CP/CD,FW,TF

Meyer 1803, Pinto-Pine Valley Road, 23-VII-71; Moor Z1032, Potato Hollow, 24-VII-74; Weight 955Z, Mt. Carmel Road, 17-VI-35(UT); Plummer s.n., Pinto Canyon, 12-VII-41(UT).

Penstemon confusus M. E. Jones

*EN/CD,DR,FW

See note under P. utahensis.

Meyer 2477, Red Cliff Campground, 29-IV-73; Meyer 4078, Motgotsu Creek, 17-V-75; Meyer 567, Tobin Bench, 5-V-70; Meyer 1704, Danish Ranch, 23-V-71; Cottam 5061, Shem, 17-IV-32(UT); Cottam 5071, Motoqua, 18-IV-32(UT); Cottam 4569, Pintura, 22-IV-30(UT); Plummer 7317, Pinto, 9-V-39(UT); Cottam 6762, Mountain Meadows, 10-V-36(UT); Young s.n., Oak Grove, 14-V-41(UT); Pendleton s.n., Gunlock, 28-IV-40(UT).

Penstemon eatonii A. Gray

SI/CD,FW,MB,TF

Meyer 757, Taylor Creek, 4-VI-70; Meyer 911, Oak Grove Road, 15-VI-70; Meyer 954, north of New Harmony, 16-VI-70; Moor Z7, Smith Mesa, 11-VI-70; Moor Z563, Potato Hollow Turnoff, 7-VII-70; Rencher s.n., Watercress Spring, 17-IV-41(UT); Gould 1667, Diamond Valley, 29-IV-42(UT); Cottam 6756, Mountain Meadows, 10-V-35(UT); Walsh 79, West Rim Trail, 27-V-33(UT); Pendleton s.n., Gunlock, 28-V-40(UT).

Penstemon humilis Nutt.

*GB/MF

Washington County material belongs to P. humilis ssp. obtusifolius (Penn.) Keck, which is restricted to southwestern Utah.

Moor Z66, Kolob Trail, 11-VI-70.

Penstemon laevis Pennell

*EN/TF

This plant is restricted to sandstone derived soils in the Zion Park region. Crosswhite (1967) mentions hybrids with P. eatonii ssp. undosus (Jones) Keck as "common in Zion National Park."

Meyer 3626, North Fork of the Virgin, 30-V-74; Woodbury s.n., West Rim Trail, 6-VI-29(UT); Cottam 3438, East Rim Trail, 25-VI-28(UT).

Penstemon leiophyllus Pennell

*EN/TF,MF,MR,MM

Meyer 3747, La Verkin Creek Trail, 7-VII-74; Meyer 2945, north of Kolob Reservoir, 22-VII-73; Meyer 2854, Little Creek Valley 20-VII-73; Meyer 2916, Kolob Road near Iron County Line, 21-VII-73; Meyer 1016, Pine Valley Campground, 29-VI-70; Moor Z508, Lava Point, 7-VII-70; Moor Z826, Kolob Reservoir, 17-VII-70; Pennell and Schaeffer 21756, Pine Valley Forest Camp, 15-VI-38(UT).

Penstemon leonardii Rydb. *EN/CD,MB,TF,MF

Meyer 728, Taylor Creek, 4-VI-70; Meyer 4122, Whipple Valley, 26-VII-75; Meyer 2972, Lava Point Turnoff, 22-VII-73; Meyer 2868, Little Creek Valley, 20-VII-73; Meyer 1099, Pine Valley Campground, 1-VII-70; Meyer 3688, Mill Canyon, 5-VII-74; Moor Z682, Lava Point, 14-VII-70; Henriques s.n., Pine Valley, 20-VI-36(UT).

Penstemon linarioides A. Gray CP/CD,FW,MB,TF

Meyer 267, above Mt. Carmel Tunnel, 19-VI-68; Meyer 1072, Pine Valley Campground, 30-VI-70; Meyer 980, north of New Harmony, 16-VI-70; Meyer 1893, Pine Valley Cemetery, 26-VII-71; Meyer 3666, Mill Canyon, 4-VII-74; Meyer 3725, La Verkin Creek Trail, 6-VII-74; Plummer s.n., Pinto, 13-VII-41(UT).

Penstemon pachyphyllus A. Gray *SP/MB,TF

Holmgren et al. 2014, Clear Creek, 23-VI-65(BRY).

Penstemon palmeri A. Gray SM/HD,CD,FW,MB

Meyer 3504, Old Mormon Road, 18-V-74; Meyer 956, north of New Harmony, 16-VI-70; Meyer 819, Oak Grove Road, 6-VI-70; Moor Z324, Taylor Creek, 24-VI-70; Pendleton s.n., southeast of Gunlock, 28-IV-40(UT); Harper 89, Castle Cliff, 17-V-64(UT); Pennell and Schaeffer 21699, west of Santa Clara, 14-VI-38(UT); Cottam 8823, Fuller's Ranch, 18-VI-41(UT).

Penstemon petiolatus T. S. Brandeg. *EN/HD,CD

This species is strongly calcicole and is confined to rock crevices.

Meyer 330, Terry's Ranch Road, 7-VI-69; Meyer 1758, Welcome Spring, 23-V-71; Meyer 3506, Joshua Tree National Landmark, 18-V-74; Pennell and Schaeffer 21723, U.S. 91, Beaver Dam Mountains, 15-VI-38(UT); Christian 1068, Utah Hill, 8-VII-63(UT).

Penstemon rydbergii A. Nels. *RM/MR,MM

Meyer 2911, Kolob Road near Iron County Line, 21-VII-73; Meyer 4134, Whipple Valley, 26-VII-75; Moor Z1009, Lava Point Spring, 23-VII-70.

Penstemon thompsoniae (Gray) Rydb. EN/FW

Meyer 3171, Cinder Hill, 16-IX-73.

Penstemon utahensis Eastw.

*MP/HD,CD,FW

This species is very closely related to P. confusus, and some inter-gradation, especially on staminode characteristics, does occur. The difference in corolla color is very apparent in fresh material. Barnhurst s.n. (see below) is annotated as a hybrid by F. Crosswhite.

Barnhurst s.n., New Harmony, 20-V-41(UT); Meyer 3940, Hurricane Cliff Road, 1-V-75; Meyer 3976, Hurricane Cliff Road near Arizona State Line, 2-V-75; Cottam 4669, Pintura, 22-IV-30(UT); Johnson s.n., Emerald Pool, 27-IV-41(UT).

Scrophularia lanceolata Pursh

*BO/MF,MM

Meyer 1085, Pine Valley Campground, 1-VII-70; Meyer 1209, Kolob Reservoir, 11-VII-70.

Verbascum thapsus L.

IN/CD,DR

This plant is especially common along roadsides and in heavily grazed areas.

Meyer 1138, Pine Park, 7-VII-70; Meyer 1327, Oak Grove, 9-VIII-70; Moor 21164, Lava Point, 6-VIII-70; Cottam 8767, west of Santa Clara, 17-VI-41(UT); Christian 408, Santa Clara Creek, 27-VII-61(UT).

Veronica americana Schw.

NA/DR,MR,MM

Meyer 3601, North Fork of the Virgin, 29-V-74; Meyer 2925, Kolob Road near Iron County Line, 21-VII-73; Meyer 982, north of New Harmony, 16-VI-70; Meyer 1090, Pine Valley Campground, 1-VII-70; Meyer 3738, La Verkin Creek Trail, 6-VII-74; Meyer 902, south of Oak Grove, 15-VI-70; Weight 1016Z, West Rim Trail, 26-VI-35(UT).

Veronica anagallis-aquatica L.

CB/DR,MR

Meyer 3820, Mountain Meadows, 6-IX-74; Meyer 903, Oak Grove Road, 15-VI-70; Meyer 3226, Camp Springs Crossing, 16-IX-73; Meyer 981, north of New Harmony, 16-VI-70; Meyer 1156, Pine Park, 7-VII-70; Cottam 6871, Gunlock, 10-V-36(UT); Cottam 3377, Veyo, 29-VI-28(UT); Harrison and Woodbury 1201, Beaver Dam Wash, 12-IX-25(UT).

Veronica peregrina L.

NW/MF,MR,MM

Meyer 3702-1, Mill Canyon, 5-VII-74; Meyer 1128, Pine Park, 7-VII-70; Meyer 1354, Kolob Reservoir, 21-VIII-70; Meyer 3016, Death Point, 22-VII-73.

Veronica persica Poir.

IN/DR

This plant is common in lawns, but scarce elsewhere.

Meyer 2151, Washington, 14-IV-73; Cottam s.n., St. George, V-27(UT).

Veronica serpyllifolia L.

CB/MF,MR,MM

Meyer 4156, Further Water, 27-VII-75; Meyer 1055, Pine Valley Campground, 30-VI-70.

Solanaceae

Datura meteloides DC.

MH/HD,DR,FW

Meyer 3098, Smithsonian Butte, 2-VIII-73; Meyer 711, Snow's Canyon, 3-VI-70; Meyer 1954, Mogotsu Wash, 21-VIII-71; Iverson s.n., east of St. George, 10-V-40(UT).

Datura stramonium L.

IN/DR

Cottam 12758, Washington, 3-IX-51(UT).

Lycium andersonii Gray

SW/HD,DR

See note under L. torreyi.

Meyer 2202, east of Washington, 15-IV-73; Meyer 1492, Apex Mine Road, 13-IV-71; Meyer 3494, Sand Mountain, 7-IV-74; Meyer 3323, Warner Valley, 6-IV-74; Meyer 3997, Hurricane Cliff Road, 2-V-75; Cottam 7286, Bloomington, 7-IV-39(UT); Cottam 7294, Camp Springs, 11-IV-39(UT).

Lycium cooperi Gray

*MO/HD,DR

Meyer 1556, Terry's Ranch, 14-IV-71; Snow s.n., St. George, 5-V-35(UT).

Lycium halimifolium Mill.

IN/MR

Meyer 2034, New Harmony, 24-VIII-71.

Lycium pallidum Miers

*MH/HD,DR

Meyer 696, Veyo Resort, 3-VI-70; Moor Z232, South Campground, 18-VI-70; Cottam 4795, Virgin, 24-IV-30(UT); Howard s.n., Shivwits, 5-VI-1899(UT); Cottam 5372, Gunlock, 11-VII-32(UT).

Lycium torreyi A. Gray

*SW/DR

Intermediates between this species and L. andersonii Gray are occasionally encountered, as mentioned by Hitchcock (1932).

Meyer 1624, Middleton, 20-V-71; Meyer 2365, Washington, 25-IV-73; Plummer 7333, Gunlock, 14-V-39(UT); Hall 10, St. George, 12-IV-35(UT); Cottam 5153, Hurricane, 20-IV-32(UT).

Nicotiana attenuata Torr.

WE/HD,CD,DR,FW

Meyer 1148, Pine Park, 7-VII-70; Meyer 1303, Oak Grove, 4-VIII-70; Meyer 1951, Mogotsu Wash, 21-VIII-71; Meyer 3096, Smithsonian Butte, 2-VIII-73; Meyer 2783, Apex Mine Road, 19-VII-73; Moor Z640, East Fork of the Virgin, 10-VII-70; Moor Z1552, Smith Mesa, 29-VIII-70; Christian 970, Camp Springs Crossing, 10-VI-63(UT); Cottam 5332, St. George, 8-VII-32(UT).

Nicotiana palmeri Gray

*EN/HD,CD

(N. trigonophylla var. palmeri M. E. Jones)

This species is undoubtedly very closely related to N. trigonophylla, and intermediate plants have been mentioned by Goodspeed (1954) as occurring in the county. He does, however, maintain N. palmeri as a species, and his treatment is followed here.

Meyer 1721, Welcome Spring, 23-V-71; Galway s.n., St. George, 26-IV-35(UT); Harrison 10204, Veyo, 7-V-41(UT).

Nicotiana trigonophylla Dunal

*SW/HD

Several of the plants cited below appear to be close to N. palmeri. See note under that species.

Meyer 3453, West Mountain Wash, 12-IV-74; Meyer 3909, Curly Hollow Wash, 6-IV-75; Cottam s.n., Terry's Ranch, 18-IV-32(UT); Weight 757Z, Coalpits Wash, 28-IV-35(UT); Christian 910, west of Bloomington, 17-V-63(UT); Cottam 7281, Black Hill, 17-IV-39(UT).

Physalis fendleri Gray

CC/CD,FW

Meyer 3809, north of Central, 6-IX-74; Meyer 3030, 12 miles southeast of Hurricane, 1-VIII-73; Meyer 3090, Smithsonian Butte, 2-VIII-73; Meyer 1994, Honeycomb Rocks, 21-VIII-71.

Physalis hederifolia Gray

ID/CD,TF,MR

Meyer 2047, Ash Creek near New Harmony, 24-VIII-71; Moor Z957, Kolob Road at head of Hop Valley, 17-VII-70; Cottam 6890, Gunlock, 11-V-36(UT); Weight 929Z, Oak Creek, 10-VI-35(UT); Cottam 5665, Mountain Meadows, 2-IX-33(UT).

Physalis longifolia Nutt.

*PL/CD

Meyer 1911, Utah Highway 18 near Iron County Line, 26-VII-71.

Solanum eleagnifolium Cav.

*AU/HD,CD,DR,FW

Munz (1968) regards this plant as introduced in southern California and it may be introduced in southwestern Utah as well.

Meyer 1915, St. George, 6-VIII-71; Meyer 1105, Sand Cover Turnoff, 1-VII-70; Moor Z1, north of Virgin, 11-VI-70.

Solanum nigrum L.

IN/DR

(S. americanum Mill.)
(S. nodiflorum Jacq.)This treatment follows that of Holmgren and Reveal (1966) in considering S. nodiflorum Jacq. to be conspecific with S. nigrum var. virginicum L.

Meyer 3232, Camp Springs Crossing, 16-IX-73; Meyer 3281, south of St. George, 14-X-73; Meyer 2133, Gateway to the Narrows, 22-X-71; Moor Z1108, Weeping Rock, 31-VII-70; Moor Z1325, La Verkin Creek, 20-VIII-70; Woodbury and Harrison 1221, Beaver Dam Wash, 12-IX-25(UT); Abers s.n., Shivwits, 13-VI-1899(UT).

Solanum rostratum Dunal

IN/DR

Barnum 1314, St. George, 8-VII-64(DX).

Solanum triflorum Nutt.

WE/CD,DR,FW,TF

Meyer 3210, Little Creek Mountain, 16-IX-73; Meyer 3086, Smithsonian Butte, 2-VIII-73; Meyer 1813, Oak Canyon Cabin Area, 24-VII-71; Meyer 1950, Mogotsu Wash, 21-VIII-71; Meyer 3837, north of Mountain Meadows Turnoff, 6-IX-74; Weight 907Z, Coalpits Wash, 10-VI-35(UT).

Tamaricaceae

Tamarix pentandra Pall.

IN/DR

Washington County material has occasionally been referred to other taxa, but until the complex nomenclature of this introduced group has been worked out, it seems best to retain it all under one species. T. aphylla Karst is grown as a cultigen in the county, but as far as is known it has not become established.

Meyer 602, Ivins Reservoir, 27-V-70; Meyer 3161, Grafton, 3-VIII-73; Moor Z763, East Fork of the Virgin, 16-VII-70; Cottam 8765, Santa Clara Creek, 17-VI-41(UT).

Ulmaceae

Celtis reticulata Torr.

IP/CD,DR

(C. douglasii Planch.)

Moor Z1109, Temple of Sinawava, 31-VII-70; Moor Z240, South Campground, 18-VI-70; Cottam 5041, Gunlock, 16-IV-32(UT); Galway s.n., north of St. George, 11-V-35(UT); Cottam 8768, Santa Clara Creek, 17-VI-41(UT).

Umbelliferae

Angelica pinnata Wats.

*RM/TF,MR

Meyer 1461, Lava Point Spring, 23-VIII-70.

Apium graveolens L.

IN/DR

Meyer 882, Watercress Spring, 13-VI-70.

Berula erecta (Huds.) Cov.

CB/DR

Meyer 3258, Leeds, 13-X-73.

Caucalis microcarpa Hook. and Arn.

GM/HD

Meyer 3947, Hurricane Cliff Road, 1-V-75.

Conium maculatum L.

IN/TF,MR

This is a plant of mesic ruderal communities.

Meyer 3746, La Verkin Creek Trail, 6-VII-74; Meyer 3247, New Harmony, 13-X-73.

Cymopterus jonesii Coult. and Rose

*EN/CD,FW,MB

Meyer 1668, east of Central, 20-V-71; Meyer 3435, Enterprise Reservoir Road, 1-IV-74; Meyer 4045, Mountain Meadows Turnoff, 16-V-75.

Cymopterus multinervatus (Coult. and Rose) Tides. *SW/HD

Sullivan s.n., Leeds, 30-III-41(DX); Hall s.n., south of Rockville, 4-IV-34(DX).

Cymopterus newberryi (Wats.) Jones

*CP/HD

This plant is confined to sandy soil.

Meyer 2682, Sand Mountain Road, 11-V-73; Meyer 2423, Shinab Kibe Hill, 27-IV-73; Hall s.n., Red Hill, 21-IV-35(DX); Cottam 5170, Hurricane, 20-IV-32(UT); Hansen s.n., Harrisburg Bench, 9-V-41(UT).

Cymopterus purpurascens (Gray) Jones

MI/CD,FW

Rencher s.n., Grass Valley, 27-IV-41(DX); Plummer 7424, east of Pinto, 9-V-39(UT).

Cymopterus purpureus Wats.

*CP/HD,CD,FW

Meyer 3456, West Mountain Wash, 12-IV-74; Meyer 3908, Curly Hollow Wash, 6-IV-75; Meyer 4081, Enterprise Reservoir Road, 17-V-74; Meyer 4015, Smith Mesa, 10-V-75; Weight 855Z, Emerald Pool Trail, 5-VI-35(UT); Hardy s.n., Jackson Spring, 10-IV-40(UT).

Cymopterus rosei Jones

*EN/MB

Weight 999Z, West Rim Trail, 26-VI-35(UT).

Hydrocotyle verticillata Thunb.

*AU/DR

(H. prolifera Kellogg)

Galway s.n., St. George, 1-IX-34(DX); Cottam 8822, Fuller's Ranch, 18-VI-41(UT); Cottam 8479, Berry Spring, 10-IV-41(UT).

Ligusticum porteri Coult. and Rose

*CC/MR,MM

Meyer 2892, Hornet Point Road, 21-VII-73; Moor Z572, Lava Point Spring, 7-VII-70.

Lomatium dissectum (Nutt.) Math. and Cons.

NM/MB,TF,MF

Meyer 4016, Aspen Park Spring, 17-V-75; Meyer 4063, Hardscrabble Hollow, 16-V-75; Meyer 2660, Browse Road, 11-V-73.

Lomatium nevadense (Wats.) Coult. and Rose

GM/CD,FW,MB,MF

Meyer 3438, Moody Wash, 11-IV-74; Meyer 1653, east of Central, 20-V-71; Meyer 4100, Goldstrike Turnoff, 18-V-75; Meyer 4061, Hardscrabble Hollow, 16-V-75; Meyer 4009, Smith Mesa, 9-V-75.

Lomatium nuttallii (Gray) Macbr.

*GB/TF

Weight 1001Z, West Rim Trail, 26-VI-35(UT).

Lomatium parryi (Wats.) Macbr.

*MO/HD,FW,MB

Meyer 2467, Red Cliff Campground, 29-IV-73; Meyer 3340, Ripple Arch, 8-IV-74; Cottam 8809, Washington Flat, 18-VI-41(UT); Cottam 4098, Apex Mine, 4-VI-29(UT).

Lomatium scabrum (Coul. and Rose) Math. and Cons.

*EN/HD,FW

Meyer 536, Red Cliff Campground, 1-V-70; Meyer 3475, Joshua Tree National Landmark, 12-IV-74; Meyer 3364, Motoqua Road, 8-IV-74; Howard s.n., Sand Rock Cove, 22-V-1899(UT); Cottam 5056, Gunlock, 17-IV-32(UT).

Orogenia linearifolia Wats.

*RM/TF

Meyer 2761, Kolob Road, 12-V-73; Meyer 4025, Pine Valley Campground, 16-V-75.

Osmorhiza chilensis Hook. and Arn.

NW/TF

(O. nuda Torr.)

Meyer 3650, Pine Valley Campground, 4-VII-74.

Osmorhiza depauperata Phil.

NW/TF,MF

[O. obtusa (Coul. and Rose) Fern.]

Meyer 3697, Mill Canyon, 5-VII-74.

Osmorhiza occidentalis (Nutt.) Torr.

*NM/MF,MR,MM

Meyer 3761, La Verkin Creek Trail, 7-VII-74; Meyer 2893, Hornet Point Road, 21-VII-73; Weight 987Z, Hidden Canyon, 21-VI-35(UT).

Pastinaca sativa L.

IN/CD,MR

This is a plant of mesic ruderal communities.

Meyer 1780, Pinto, 23-VII-71; Meyer 2046, Ash Creek, 24-VIII-71.

Torilis arvensis (Huds.) Link.

IN/DR

This plant grows in hedgerows of fields.

Meyer 3141, south of Rockville, 3-VIII-73; Barnum 1316, La Verkin, 9-VII-64(DX).

Urticaceae

Parietaria floridana Nutt.

*AU/HD

(P. obtusa Rydb.)

This plant is found exclusively in rock recesses in the shade, often with Pterostegia and Eucrypta. All share the weak, vinelike habit.

Meyer 1533, north of St. George, 13-IV-71; Meyer 4004, south of Hurricane, 8-V-75; Meyer 3917, Curly Hollow Wash, 6-IV-75; Meyer 3904, Indian Spring Road, 5-IV-75.

Urtica dioica L.

CB/MR

(U. gracilis Ait.)

(U. holosericea Nutt.)

(U. serra Blume)

The treatment of Hitchcock et al. (1964), which considers North American material conspecific with the European U. dioica L., is followed here.

Meyer 1256, Oak Grove, 1-VIII-70.

Valerianaceae

Valeriana acutiloba Rydb.

WE/MF

(V. capitata ssp. acutiloba F. G. Meyer)

Cottam 6975, West Rim Trail, 14-V-36(UT).

Valeriana arizonica A. Gray

*CH/FW

Meyer 3629, North Fork of the Virgin, 30-V-74.

Valeriana edulis Nutt.

WE/MF

Meyer 1374, Kolob Reservoir, 21-VIII-70; Moor Z1014, Potato Hollow Road, 23-VII-70.

Valeriana occidentalis Heller

*RM/MF

Meyer 849, Kolob Reservoir, 11-VI-70; Meyer 4125, Whipple Valley, 26-VII-75.

Verbenaceae

Lippia wrightii A. Gray

*SW/HD

(Aloysia wrightii Heller)

This plant is apparently restricted to limestone.

Olsen s.n., east of Hurricane, 13-X-30(UT).

Verbena bracteata Lag. and Rodr.NA/HD,CD,DR,FW,MB,
TF,MR

This weedy plant is very resistant to trampling and even to being run over by cars. It is restricted to disturbed sites.

Meyer 1836, Potato Hollow, 24-VII-71; Meyer 925, Oak Grove, 15-VI-70; Meyer 949, north of New Harmony, 16-VI-70; Meyer 703, Diamond Valley, 3-VI-70.

Verbena gooddingii Briq.

ID/HD,CD,FW

Meyer 559, Black Canyon, 5-V-70; Meyer 560, Tobin Bench, 5-V-70; Meyer 517, Motoqua Road, 30-IV-70; Meyer 3180, Cinder Hill, 16-IX-73; Gould 1730, Grass Valley, 10-V-42(UT); Cottam 6824, Central, 10-V-36(UT).

Violaceae

Viola canadensis L.

*BO/MF,MR

Meyer 4126, Whipple Valley, 26-VII-75; Meyer 3613, North Fork of the Virgin, 29-V-74; Meyer 3695, Mill Canyon, 5-VII-74; Walsh s.n., Zion Park, 27-V-33(UT).

Viola charlestonensis Baker and Clausen

*EN/FW,MB,TF

Nelson 9776, West Rim, 16-VI-71(Z); Cottam 6996, West Rim, 14-V-36(UT).

Viola nephrophylla Greene

NA/MF,MR

Meyer 3551, Mahogany Knoll, 19-V-74; Meyer 3637, North Fork of the Virgin, 31-V-74; Meyer 999, Pine Valley Campground, 29-VI-70; Meyer 1689, Oak Grove, 21-V-71; Weight 959Z, Weeping Rock, 21-VI-35(UT).

Viola nuttallii Pursh

*RM/MF

Meyer 837, Kolob Reservoir, 11-V-70.

Viscaceae

Arceuthobium campylopodum Engelm.

WE/FW

(A. divaricatum Engelm)Host plant was Pinus cembroides.

Wiens 3913, Motoqua Road, 20-V-66(UT).

Arceuthobium vaginatum (HBK.) Eichler

*CC/TF

Host plant was Pinus ponderosa.

Palmer s.n., Horse Pasture Plateau, 1-VIII-65(Z).

Phoradendron californicum Nutt.

*MS/HD,DR

Host plants were Acacia greggii and Prosopis juliflora.

Christian 509, Beaver Dam Wash, 6-VIII-61(UT); Cottam s.n., St. George, 13-VII-33(UT); White 39, Terry's Ranch, 13-IV-62(BRY).

Phoradendron juniperinum Engelm.

*CC/FW,TF,MF

Host plants were Juniperus osteosperma and Juniperus scopulorum.

Atwood 4879, Oak Grove Road, 14-V-73(BRY); Bruhn s.n., Anderson's Junction, 4-IV-58(DX); Higgins 671, Utah Hill, 27-V-66(BRY).

Vitaceae

Vitis arizonica Engelm.

CC/DR,MB

Meyer 643, Red Cliff Campground, 31-V-70; Meyer 914, Oak Grove Road, 15-VI-70; Cottam 8462, Berry Springs, 10-IV-41(UT); Barnhurst s.n., Watercress Spring, 6-IV-41(UT); Cottam 3385, Veyo, 21-VI-28(UT).

Zygophyllaceae

Larrea divaricata Cov.

*SW/HD,DR

(L. tridentata Cov.)

Meyer 1637, Snow Spring Canyon, 20-V-71; Meyer 1574, Terry's Ranch, 14-IV-71; Meyer 653, Red Hill, 1-VI-70; Cottam 9858, Santa Clara Bench, 2-V-49(UT); Harper 80, Castle Cliffs, 17-V-64(UT); Weight 992Z, near Virgin, 25-VI-35(UT).

Tribulus terrestris L.

IN/HD,CD,DR

This plant is abundant in ruderal communities, particularly in heavily trampled areas.

Meyer 3276, Leeds, 13-X-73; Meyer 3814, north of Central, 6-IX-74;
Moor Z1498, Sunset Canyon Ranch Turnoff, 28-VIII-70.

MONOCOTS

Agavaceae

Agave utahensis Engelm.

*EN/HD,CD

This is a strongly petrophile species, found most commonly but not exclusively on limestone.

Meyer 1740, Castle Cliff, 23-V-71; Cottam 4043, Diamond Valley, 2-VI-30(UT).

Nolina bigelovii (Torr.) Wats.

*MO/MB

This species is doubtfully included on the strength of the specimen cited below. The population has not been relocated, but the plants are apparently similar to northern Arizona individuals referred to N. parryi Wats. by Kearney and Peebles (1960).

Cottam 5368, dry rim of canyon, Washington County, 13-VII-32(BRY).

Yucca angustissima Engelm.

*CP/HD,CD,FW,MB

Some Washington County plants tend to be more arborescent than is typical for the species, and they seem to represent introgression with Y. elata Engelm. McKelvey (1947) referred these plants to a new species, Y. utahensis, while Webber (1953) tentatively referred them to Y. elata. Since all the intermediate forms connecting this plants to "good" Y. angustissima are present as well in the county, it seems best to retain the extreme forms in that species rather than separating them as a new species or postulating the existence of a widely disjunct population of Y. elata.

Moor Z59, Cave Valley, 11-VI-70; Hall s.n., Red Hill, 17-V-18(DX); Atwood 5411, Oak Grove, 15-VII-73(BRY).

Yucca baccata Torr.

CC/HD,CD,FW

Higgins 994, Dixie State Park, 13-V-67(BRY); Higgins 432, Terry's Ranch, 9-IV-66(BRY); Atwood 5385, Oak Grove Road, 15-VII-73(BRY).

Yucca brevifolia Engelm.

*MO/HD,CD,FW

Higgins 433, Terry's Ranch, 9-IV-66(BRY).

Alismataceae

Alisma triviale Pursh

NA/MR

The North American plant is sometimes referred to the Old World species A. plantago-aquatica L., but the treatment of Holmgren and Reveal (1966), which considers American material specifically distinct, is followed here.

Moor Z1118, Lava Point Spring, 31-VII-70; Moor Z998, Potato Hollow Road, 22-VII-70; Meyer 3756, La Verkin Creek Trail, 7-VII-74; Meyer 1473, Lava Point Spring, 23-VIII-70.

Amaryllidaceae

Allium acuminatum Hook.NM/CD,DR,FW,MB,TF,
MF

Meyer 966, north of New Harmony, 16-VI-70; Meyer 2877, Little Creek Valley, 20-VII-73; Moor Z579, Potato Hollow Turnoff, 7-VII-70; Cottam 8818, Washington Flat, 18-VI-41(UT); Weight 1031Z, West Rim Trail, 24-VI-35(UT).

Allium nevadense S. Wats.

GM/HD,CD

Meyer 3459, West Mountain Wash, 12-IV-74; Meyer 1761, Welcome Spring, 23-V-71; Orton and Blake s.n., Snow's Canyon, 24-IV-65(DX); Seegmiller s.n., north of St. George, 3-V-65(DX).

Allium palmeri S. Wats.

SP/MF,MR,MM

Meyer 3641, North Fork of the Virgin, 31-V-74; Meyer 3019, Death Point, 22-VII-73; Barnum 1399, Kolob, 30-VII-65(DX).

Androstephium breviflorum S. Wats.

CP/HD,CD

Meyer 2227, Ft. Pierce Road, 17-IV-73; Meyer 3580, Pine Park Road near Iron County Line, 25-V-74.

Dichelostemma pulchellum (Salisb.) Heller

*CD/HD,CD,FW,MB,TF

[Brodiaea pulchella (Salisb.) Greene]

This treatment follows that of Niehaus (1971) in separating this species into the genus Dichelostemma rather than maintaining it in Brodiaea.

Meyer 2375, Washington, 24-IV-73; Meyer 922, Oak Grove, 15-VI-70; Meyer 1656, Central, 20-V-71; Meyer 1588, Terry's Ranch Road, 14-IV-71.

Commelinaceae

Tradescantia occidentalis (Britton) Smyth *PL/CD,MB,TF

This strongly arenophile species is abundant in the uplands of Zion National Park on sand derived from Navajo sandstone. It is not known from the western half of the county.

Meyer 2766, top of Hop Valley, 12-V-70; Hall s.n., Grotto, 19-VI-36(UT); Walsh s.n., West Rim Trail, 27-V-33(UT); Moor Z1373, Hop Valley, 20-VIII-70; Moor Z632, Mt. Carmel Highway, 10-VII-70; Moor Z235, Grotto, 18-VI-70; Moor Z141, Narrows Trail, 12-VI-70.

Cyperaceae

Carex alma L. H. Bailey *MS/MR

The material cited below is doubtfully referred to this species.

Moor Z1132, Lava Point Spring, 31-VII-70; Moor Z1073, Potato Hollow, 30-VII-70.

Carex aquatilis Wahl. *CB/MM

Meyer 4137, Whipple Valley, 26-VII-75.

Carex athrostachya Olney NM/MR,MM

Meyer 3714, Mill Canyon, 5-VII-74; Meyer 1474, Lava Point Spring, 23-VIII-70; Moor Z840, Kolob Reservoir, 17-VII-70; Hardy s.n., Pine Valley, 29-VII-41(DX).

Carex aurea Nutt. BO/MR

Holmgren 1993, West Rim Spring, 22-VI-65(Z).

Carex bella L. H. Bailey *RM/MF

Meyer 4153, Summit Trail at Upper Hop Creek, 26-VII-75.

Carex epapillosa Mke. *IM/MR,MM

Meyer 4166, Further Water, 27-VII-75.

Carex festivella Mke. WE/MR,MM

See note under C. microptera.

Meyer 741, Taylor Creek, 4-VI-70; Meyer 3633, North Fork of the Virgin, 30-V-74; Meyer 2940, Kolob Road near Iron County Line, 21-VII-70; Moor Z525, Lava Point, 7-VII-70.

Carex hassei L. H. Bailey

BO/MR

Meyer 893, Oak Grove Road, 15-VI-70; Meyer 1860, Browse, 25-VII-71; Nelson 10256, Emerald Pool, 17-V-73(Z); Moor Z490, Gateway to the Narrows, 4-VII-70.

Carex hystericina Muhl.

*BO/DR

Moor Z746, East Fork of the Virgin, 16-VII-70; Moor Z778, Utah Highway 15 just south of Zion Boundary, 17-VII-70; Nelson 10043, Birch Creek, 6-V-72(Z).

Carex lanuginosa Michx.

BO/MR,MM

Meyer 2176, Pig Creek, 2-VIII-70; Meyer 1467, Lava Point Spring, 23-VIII-70; Moor Z150a, Narrows Trail, 12-VI-70.

Carex microptera Mkeze.

NM/MR,MM

This species is very difficult to distinguish from C. festivella when immature, and some material referred to that species may more properly belong here.

Cited by Lewis (1958) for Pine Valley Mountains.

Carex nebraskensis Dewey

NM/DR,MR,MM

Meyer 3740, Kolob Trail, 6-VII-74; Meyer 1176, Enterprise Reservoir, 8-VII-70; Meyer 3701, Mill Canyon, 5-VII-74; Meyer 884, Watercress Spring, 13-VI-70; Moor Z1415, Lava Point Spring, 21-VIII-70; Moor Z150b, Gateway to the Narrows, 12-VI-70; Cottam 14182, Santa Clara Gorge, 15-VIII-55(UT).

Carex occidentalis L. H. Bailey

*RM/TF,MF,MR,MM

Meyer 3719, Mill Canyon, 5-VII-74; Meyer 1011, Pine Valley Campground, 29-VI-70; Woodbury s.n., Zion Park, 5-VIII-25(DX).

Carex petasata Dewey

*IP/MR

Moor 1211, Potato Hollow, 5-VIII-70.

Carex praegracilis W. Boott

WE/DR

Meyer 2346, Washington, 25-IV-73; Meyer 692, Veyo Resort, 3-VI-70; Moor Z152, Narrows Trail, 12-VI-70; Hall s.n., St. George, 1-IV-35(DX).

Carex rostrata Stokes

BO/DR

Moor Z1089, Gateway to the Narrows, 31-VII-70.

Carex simulata Mkze. *NM/MM
Meyer 3741, Kolob Trail, 6-VII-74; Moor Z577, Lava Point, 7-VII-70.

Carex vallicola Dewey IM/DR,FW,MB,TF
(C. rusbyi Mkze.)

Holmgren 1981, West Rim Trail, 22-VI-65(Z); Meyer 934, Oak Grove, 15-VI-70; Meyer 3575, Mahogany Knoll, 19-V-74; Meyer 3634, North Fork of the Virgin, 30-V-74.

Cyperus aristatus Rottb. CS/DR

Meyer 3239, Camp Springs Crossing, 16-IX-73.

Eleocharis acicularis (L.) Roem. and Schult. CB/DR,MR

This treatment of Eleocharis follows Munz and Keck (1959).

Atwood and Higgins 5901, Ox Valley, 18-VIII-73(BRY).

Eleocharis montevidensis Kunth NW/DR,MR,MM

(E. parishii Britton)

See note under E. acicularis.

Meyer 3824, Mountain Meadows, 6-IX-74; Meyer 3788, Kolob Arch Trail, 21-VII-74; Meyer 2172, Pig Creek, 2-VIII-70; Meyer 862, Kolob Reservoir, 11-VI-70; Moor Z743, East Fork of the Virgin, 16-VII-70; Christian 967, Bloomington, 8-VI-63.

Eleocharis palustris (L.) Roem. and Schult. CB/DR,MR

(E. macrostachya Britton)

See note under E. acicularis.

Meyer 599, Ivins Reservoir, 27-V-70; Meyer 1178, Enterprise Reservoir, 8-VII-70; Meyer 3742, Kolob Trail, 6-VII-74; Moor Z574, Lava Point, 7-VII-70.

Scirpus acutus Muhl. NA/DR

Moor Z1257, Oak Creek Canyon, 14-VIII-70; Moor Z1218, Sunset Ranch Pond, 5-VIII-70; Moor Z779, Utah Highway 15 just south of Zion Boundary, 17-VII-70; Nyberg s.n., Virgin River south of St. George, 23-V-60(DX).

Scirpus americanus Pers.

NW/DR,MR

Meyer 2098, Ft. Pierce, 21-X-71; Meyer 1799, Pinto, 23-VII-71;
 Meyer 631, Ivins Reservoir, 30-V-70; Meyer 687, Veyo Resort, 3-VI-70;
 Moor Z723, Lava Point, 15-VII-70; Moor Z450, Narrows Trail, 2-VII-70;
 Storer s.n., Watercress Spring, 16-V-62(DX).

Scirpus microcarpus Presl.

WE/DR,TF,MF,MR

Meyer 994, Pine Valley Campground, 29-VI-70; Meyer 1275, Pig Creek,
 2-VIII-70; Moor Z1263, Upper Emerald Pool, 14-VIII-70; Moor Z386,
 Gateway to the Narrows, 1-VII-70.

Scirpus olneyi A. Gray

NW/DR

Meyer 1612, Middleton, 15-IV-71.

Scirpus paludosus A. Nels.

NW/DR

Meyer 885, Watercress Spring, 13-VI-70; Meyer 2102, Virgin River south
 of St. George, 21-X-71.

Scirpus validus Vahl

CS/DR

Moor Z764, East Fork of the Virgin, 16-VII-70; Christian 966,
 Bloomington, 8-VI-63(UT).

Gramineae

Agropyron caninum (L.) Beauv.NA/CD,DR,TF,MF,MR,
MM

(A. subsecundum Link)
 (A. trachycaulum Malte)

The treatment of this and other species of Agropyron follows
 Hitchcock et al. (1969).

Meyer 2913, Kolob Road at Iron County Line, 21-VII-73; Meyer 1443,
 Lava Point, 23-VIII-70; Meyer 1777, Pinto, 23-VII-71; Meyer 1031,
 Pine Valley Campground, 30-VI-70; Moor Z426, Gateway to the Narrows,
 1-VII-70; Palmer s.n., Horse Ranch Mountain, 29-VII-66(Z).

Agropyron cristatum (L.) Gaertn.IN/HD,CD,FW,MB,TF,
MF

(A. desortorum Schult.)

Meyer 1667, Central, 20-V-71; Meyer 1442, Lava Point, 23-VIII-70;
 Meyer 1172, Lower Enterprise Reservoir, 8-VII-70; Christian 1013,
 Curly Hollow Wash, 19-VI-63(UT).

Agropyron dasystachyum (Hook.) Scribn.

*IP/CD,TF

(A. riparium Scribn. and Smith)

Some of the material is only weakly rhizomatous and seems to suggest intergradation with A. caninum in other respects as well. See the discussion in Hitchcock et al. (1969).

Meyer 1119, Pine Park, 7-VII-70; Meyer 926, Oak Grove, 15-VI-70;
Meyer 1901, Enterprise, 26-VII-71; Moor Z692, Lava Point, 14-VII-70.

Agropyron elongatum Host

IN/DR

Higgins 621, Terry's Ranch, 26-V-66(BRY).

Agropyron intermedium (Host) Beauv.

IN/CD,DR

Meyer 2101, south of St. George, 21-X-71; Meyer 2055, Ash Creek,
24-VIII-71.

Agropyron repens (L.) Beauv.

IN/TF

Meyer 1883, Pine Valley Campground, 26-VII-71.

Agropyron smithii Rydb.

WE/CD,FW,MB,TF

Meyer 3039, Gould Wash, 22-VII-73; Meyer 2039, New Harmony, 24-VIII-71;
Meyer 1171, Lower Enterprise Reservoir, 8-VII-70; Meyer 1897, Pine
Valley Campground, 26-VII-71; Moor Z920, Kolob Road, 17-VII-70;
Plummer s.n., Pinto Canyon, 12-VII-41(UT).

Agropyron spicatum (Pursh) Scribn. and Smith

*IP/CD

(A. inerme Rydb.)

Meyer 3079, Gould Wash, 1-VIII-73; Palmer et al., Horse Ranch Mountain,
15-VI-66(Z).

Agrostis alba L.

IN/DR,MR,MM

Meyer 1470, Lava Point, 23-VIII-70; Meyer 1800, Pinto, 23-VII-71;
Meyer 3817, Mountain Meadows, 6-IX-74; Meyer 3784, Kolob Arch Trail,
21-VII-74; Weight 1063Z, Narrows Trail, 24-VI-35(UT).

Agrostis exarata Trin.

WE/MR

Meyer 1154, Pine Park, 7-VII-70; Meyer 1294, Oak Grove, 4-VIII-70;
Meyer 3789, Kolob Arch Trail, 21-VII-74.

Agrostis palustris Huds.

IN/MM

Meyer 3730, La Verkin Creek Trail, 6-VII-74.

Agrostis scabra Willd.

NA/MF,MR

This species does not seem to be clearly separable from A. idahoensis Nash in the county.

Meyer 3796, Kolob Arch Trail, 21-VII-74; Meyer 1382, Kolob Reservoir, 21-VIII-70; Meyer 1077, Pine Valley Campground, 30-VI-70; Palmer s.n., Horse Ranch Mountain, 18-VIII-66(Z).

Agrostis semiverticillata (Forsk.) C. Christ.

IN/DR,MR

Meyer 634, Ivins Reservoir, 30-V-70; Meyer 663, Watercress Spring, 1-VI-70; Meyer 3729, La Verkin Creek Trail, 6-VII-74; Meyer 1277, Pig Creek, 2-VIII-70; Weight 957Z, Weeping Rock, 21-VI-35(UT).

Alopecurus aequalis Sobol.

CB/MR

Meyer 1075, Pine Valley Campground, 30-VI-70; Meyer 1363, Kolob Reservoir, 21-VIII-70; Meyer 1471, Lava Point Spring, 23-VIII-70.

Andropogon barbinodis Lag.

*MH/HD,CD,DR,FW

The specimens cited below are somewhat intermediate to A. saccharoides Swartz in spikelet length, but have the inflorescence shape and vegetative characters of A. barbinodis.

Meyer 3844, Snow's Canyon, 8-X-74; Moor Z268, Watchman Campground, 23-VI-70; Moor Z1157, East Fork of the Virgin, 7-VIII-70; Gould 1359, Diamond Valley, 7-VIII-41(DX).

Andropogon scoparius Michx.

*EA/MB

Meyer 2135, Utah Highway 15 above Mt. Carmel Tunnel, 22-X-71.

Aristida fendleriana Steud.

WE/HD,CD,DR

(A. longiseta Steud.)

This species intergrades freely with A. glauca within the county; the two may not be specifically distinct.

Meyer 3274, Leeds, 13-X-75; Meyer 3489, U.S. 91 near Arizona State Line, 12-IV-74; Meyer 963, north of New Harmony, 16-VI-70; Weight 868Z, Emerald Pool Trail, 5-VI-35(UT).

- Aristida glauca (Nees) Walp. *SW/HD,CD
 See note under A. fendleriana.
 Meyer 3501, Old Mormon Road, 18-V-74; Meyer 636, Ivins Reservoir, 30-V-70; Meyer 870, Red Hill, 13-VI-70; Meyer 2714, Castle Cliff, 13-V-73; Hall s.n., Black Hill, 26-V-35(UT).
- Arundo donax L. IN/DR
 Meyer 2091, St. George Fields, 21-X-71.
- Avena fatua L. IN/DR
 Meyer 2327, south of St. George, 19-IV-73.
- Bouteloua aristidoides (HBK.) Griseb. *CH/CD,FW
 Moor Z1497, Kolob Road, 28-VIII-70.
- Bouteloua barbata Lag. *SW/HD,CD,DR,FW
 Meyer 2068, Diamond Valley, 21-X-71; Moor Z1496, Kolob Road, 28-VIII-70; Nelson 10082, Zion Visitor Center, 11-IX-72(Z); Cottam s.n., Santa Clara Bench, 3-IX-51(UT).
- Bouteloua curtipendula (Michx.) Torr. NW/CD,DR,MB
 Meyer 2108, south of St. George, 21-X-71; Moor Z1569, Utah Highway 15 above Mt. Carmel Tunnel, 29-VIII-70; Weight 1048Z, Narrows Trail, 24-VI-35(UT).
- Bouteloua gracilis (HBK.) Lag. PL/CD,DR,FW,MB,TF
 Meyer 1995, Honeycomb Rocks, 21-VIII-71; Meyer 1402, Kolob Reservoir, 21-VIII-70; Meyer 1332, Hop Valley, 16-VIII-70; Moor Z1125, Lava Point, 31-VII-70.
- Bouteloua trifida Thurb. *SW/HD
 Meyer 1731, Castle Cliff, 23-V-71; Stanton s.n., Beaver Dam Mountain, 15-III-35(BRY).
- Bromus anomalus Rupr. WE/TF
 Moor Z907, Kolob Road 6 miles southeast of reservoir, 17-VII-70.

- Bromus carinatus Hook. and Arn. WE/CD,MB,TF,MF
(B. marginatus Nees)
Meyer 1020, Pine Valley Campground, 29-VI-70; Meyer 2955, Home Valley Knoll, 22-VII-73; Meyer 3754, La Verkin Creek Trail, 7-VII-74.
- Bromus ciliatus L. NA/MR
Meyer 3798, Kolob Arch Trail, 21-VII-74; Meyer 1420, Kolob Reservoir, 21-VIII-70; Meyer 1259, Oak Grove, 1-VIII-70; Moor Z703, Lava Point, 15-VII-70.
- Bromus commutatus Schrad. IN/DR,MR
Meyer 773, south of St. George, 5-VI-70; Meyer 3816, Mountain Meadows, 6-IX-74; Moor Z176, Watchman Campground, 16-VI-70.
- Bromus inermis Leyss. IN/CD,TF,MF,MR,MM
(B. pumpellianus Scribn.)
Meyer 3654, Pine Valley Campground, 4-VII-74; Meyer 1790, Pinto, 23-VII-71; Meyer 2053, Ash Creek, 24-VIII-71; Moor Z1521, Lava Point Spring, 28-VIII-70; Moor Z420, Gateway to the Narrows, 1-VII-70.
- Bromus japonicus Thunb. IN/DR
The specimen cited below is quite immature and is doubtfully referred to this species.
Meyer 691, Veyo Resort, 3-VI-70.
- Bromus rigidus Roth IN/DR,FW
Meyer 2157, Washington, 14-IV-73; Meyer 1726, Motoqua Turnoff, 23-V-71; Meyer 1614, Old Middleton, 15-IV-71.
- Bromus rubens L. IN/HD,CD,DR
Meyer 2153, Washington, 14-IV-73; Meyer 2189, Middleton, 15-IV-73; Harrison 10202, Veyo, 7-V-41(UT); Cottam 5076, Beaver Dam Wash, 17-IV-32(UT).
- Bromus tectorum L. IN/HD,CD,FW,TF,MF,MR
Meyer 1253, Oak Grove, 1-VIII-70; Meyer 3008, Death Point, 22-VII-73; Moor Z98, Kolob Reservoir, 11-VI-70; Moor Z25, Smith Mesa, 11-VI-70.

Bromus trinitii Desv. IN/HD,CD

Meyer 3916, Curly Hollow Wash, 6-IV-75; Hall s.n., Black Hill, 30-IV-35(UT); Harrison 10213, Veyo, VIII-40(UT).

Bromus willdenowii Kunth IN/DR,MR

(B. catharticus Vahl.)

Meyer 1613, Middleton, 15-IV-71; Meyer 2038, New Harmony, 24-VIII-71; Meyer 2158, Washington, 14-IV-73; De Mille s.n., St. George, 17-III-41(UT).

Calamagrostis scopulorum Jones *CP/DR

This species is a prominent component of hanging gardens in Zion Canyon.

Moor Z1554, Gateway to the Narrows, 29-VIII-70; Harrison 11097, Weeping Rock, 29-VIII-46(BRY); Weight s.n., Zion Canyon, 10-VIII-35(Z).

Catabrosa aquatica (L.) Beauv. CB/MR,MM

Meyer 1224, Kolob Reservoir, 11-VII-70; Meyer 2912, Kolob Road near Iron County Line, 21-VII-73.

Cenchrus longispinus (Hack.) Fern. NW/DR

This material was formerly referred to C. pauciflorus Benth., which is stated by Hitchcock et al. (1969) to be of more tropical distribution.

Meyer 1926, St. George, 6-VIII-71; Moor Z1553, Gateway to the Narrows, 29-VIII-70.

Chloris virgata Swartz IN/DR

Meyer 3275, Leeds, 13-X-73; Meyer 1930, St. George, 6-VIII-71.

Cynodon dactylon (L.) Pers. IN/DR

Meyer 1571, Terry's Ranch, 14-IV-71; Hall s.n., St. George, 21-IX-35(UT).

Dactylis glomerata L. IN/TF,MF,MR

Meyer 1027, Pine Valley Campground, 30-VI-70; Meyer 2028, New Harmony, 24-VIII-71; Meyer 1464, Lava Point, 23-VIII-70; Moor Z181, Watchman Campground, 16-VI-70; Weight 956Z, Weeping Rock, 21-VI-35(UT).

- Deschampsia caespitosa (L.) Beauv. CB/MR,MM
Meyer 2941, Kolob Road near Iron County Line, 21-VII-73; Meyer 4142, Whipple Valley, 26-VII-75.
- Digitaria sanguinalis (L.) Scop. IN/DR
Meyer 3806, Hurricane, 22-VII-74; Meyer 1925, St. George, 6-VIII-71.
- Distichlis spicata (L.) Greene NW/CD,DR
(D. stricta Torr.)
This is a strongly halophytic plant. County material belongs to D. spicata var. stricta (Torr.) Beetle, which is the inland form.
Meyer 3065, Wire Mesa, 1-VIII-73; Meyer 614, St. George, 28-V-70; Cottam 6903, Santa Clara, 12-V-36(UT).
- Echinochloa crus-galli (L.) Beauv. CS/DR
Meyer 3246, Camp Springs Crossing, 16-IX-73; Meyer 3137, south of Rockville, 3-VIII-73; Moor Z1219, Sunset Canyon Ranch, 5-VIII-70.
- Eleusine indica (L.) Gaertn. IN/DR
Galway s.n., St. George, 10-VIII-34(BRY).
- Elymus canadensis L. NA/MR
See note under Sitanion hystrix.
Meyer 3797, Kolob Arch Trail, 21-VII-74; Meyer 2036, New Harmony, 24-VIII-71; Moor Z269, Watchman Campground, 23-VI-70; Weight 927Z, Oak Creek Canyon, 10-VI-35(UT).
- Elymus cinereus Scribn. and Merr. IP/HD,CD,DR,FW
Meyer 3524, Utah Hill, 18-IV-74; Meyer 3532, Cole Spring Road, 18-V-74; Meyer 1778, Pinto, 23-VII-75; Meyer 1184, Honeycomb Rocks, 8-VII-70; Christian 992, south of Santa Clara, 10-VI-63(UT).
- Elymus glaucus Buckl. WP/TF
Meyer 1019, Pine Valley Campground, 29-VI-70.
- Eragrostis barrelieri Daveau IN/DR
Meyer 2121, Springdale, 22-X-71.

- Eragrostis diffusa Buckl. ID/DR,MR
 Meyer 1928, St. George, 6-VIII-71; Meyer 2031, New Harmony, 24-VIII-71;
 Meyer 3231, Camp Springs Crossing, 16-IX-73.
- Eragrostis megastachya (Koe1.) Link IN/CD,DR
 This plant was formerly referred to E. cilianensis (All.) Kutati.
 Meyer 3804, Hurricane, 22-VII-74; Meyer 1924, St. George, 6-VIII-71;
 Meyer 1899, Enterprise, 26-VII-71.
- Erianthus ravennae (L.) Beauv. IN/DR
 Moor Z1530, Utah Highway 15 near Virgin, 28-VIII-70.
- Festuca arundinacea Schreb. IN/CD,DR
 Meyer 2348, Washington, 25-IV-73; Moor Z28, Smith Mesa, 11-VI-70;
 Moor Z134, Gateway to the Narrows, 12-VI-70.
- Festuca microstachys Nutt. WE/DR
 (F. pacifica Piper)
 Weight s.n., Emerald Pool Trail, 5-VI-35(Z).
- Festuca octoflora Walt. NA/HD,DR,FW
 Meyer 3872, Beaver Dam Well, 5-IV-75; Meyer 3990, east of Hurricane,
 2-V-75; Meyer 1545, Terry's Ranch, 14-IV-71; Meyer 2445, Shinab Kibe
 Hill, 27-IV-73; Weight 1123Z, Coalpits Wash, 12-IV-36(UT).
- Festuca ovina L. CB/DR
 This species is used in lawn mix, and this collection, which has
 atypically broad leaves, probably represents an escape from culti-
 vation.
 Meyer 616, St. George, 28-V-70.
- Festuca pratensis Huds. IN/MR
 (F. elatior L.)
 Meyer 1480, Lava Point Spring, 23-VIII-70.

Glyceria elata (Nash) A. S. Hitchc.

WE/MR,MM

Some Washington County material is intermediate to G. striata (Lam.) A. S. Hitchc. in floral part dimensions.

Meyer 2942, Kolob Road near Iron County Line, 21-VII-73; Moor Z651, Lava Point Spring, 13-VII-70; Cottam 8900, Pine Valley Mountain, 26-VI-41(BRY); Weight 849Z, Emerald Pool Trail, 5-VI-35(UT).

Hilaria jamesii (Torr.) Benth.

IC/CD,FW

Meyer 3533, Cole Spring Road, 18-V-74; Plummer 7344, Gunlock, 14-V-39(UT).

Hilaria rigida (Thurb.) Benth.

*MS/HD,DR

Meyer 3462, West Mountain Wash, 12-IV-74; Meyer 581, Ivins Reservoir, 27-V-70; Cottam 5321, St. George, 8-VII-32(UT); Anderson 389, Harrisburg Junction, 3-IX-59(UT).

Holcus lanatus L.

IN/TF

Atwood 5403, Oak Grove, 15-VII-73(BRY).

Hordeum brachyantherum Nevski

BO/MM

Meyer 1361, Kolob Reservoir, 21-VIII-70; Meyer 2909, Hornet Point Road, 21-VII-73.

Hordeum glaucum Steud.

IN/CD,DR,TF

(H. stebbinsi Covas)

See note under H. leporinum.

Meyer 1617, Middleton, 15-IV-71; Meyer 2143, Washington, 12-IV-73; Meyer 520, Motoqua, 30-IV-70.

Hordeum jubatum L.

BO/CD,DR,FW,MB,TF

Meyer 744, Lee Pass, 4-VI-70; Meyer 1427, Kolob Reservoir, 21-VIII-70; Meyer 1098, Pine Valley Campground, 1-VII-70; Weight 1064Z, Narrows Trail, 24-VI-35(UT); Moor Z581, Lava Point, 7-VII-70.

Hordeum leporinum Link

IN/CD

The treatment of this species and the closely related H. glaucum follows Hitchcock et al. (1969).

Meyer 2023, New Harmony, 24-VIII-71.

Hordeum vulgare L.

IN/DR

Meyer 2147, Washington, 12-IV-73; Meyer 2328, south of St. George, 19-IV-73.

Koeleria cristata (L.) Pers.

CB/CD

Meyer 1067, Pine Valley Campground, 30-VI-70; Meyer 1652, Central, 20-V-71; Moor Z511, Lava Point, 7-VII-70.

Leptochloa fascicularis (Lam.) Gray

NW/DR

Meyer 2100, south of St. George, 21-X-71; Meyer 2099, Washington Fields, 21-X-71.

Leptochloa filiformis (Lam.) Beauv.

*AU/DR

Higgins 823, Camp Springs, 19-VIII-66(BRY).

Lolium multiflorum Lam.

IN/DR

This species and L. perenne intergrade rather freely, and intermediate plants are common.

Meyer 777, south of St. George, 5-VI-70; Meyer 889, Watercress Spring, 13-VI-70.

Lolium perenne L.

IN/DR

See note under L. multiflorum.

Meyer 3139, south of Rockville, 3-VIII-73; Moor Z628, Oak Creek Canyon, 10-VII-70.

Lolium temulentum L.

IN/DR

The collection belongs to the awnless phase of the species, which Munz (1959) calls L. temulentum var. leptochaeton R. Br.

Meyer 613, St. George, 28-V-70.

Lycurus phleoides HBK.

*CC/MB

Moor Z1570, Utah Highway 15 above Mt. Carmel Tunnel, 29-VIII-70.

Muhlenbergia andina (Nutt.) A. S. Hitchc.

WE/MR

Meyer 1301, Oak Grove, 4-VIII-70; Meyer 3790, La Verkin Creek Trail, 21-VII-74; Moor Z1078, Gateway to the Narrows, 31-VII-70.

Muhlenbergia asperifolia (Nees and Meyer) Parodi NW/DR

Meyer 238, St. George, 16-VI-68; Anderson 394, east of Virgin, 3-IX-59(UT).

Muhlenbergia curtifolia Scribn. *EN/MB

Both collections cited below have much longer awns (to 7 mm) than is typical for the species. They may represent intergradation with the closely related species M. arsenei A. S. Hitchc.

Weight 1101Z, Zion Canyon, 10-VIII-35(Z); Moor Z1559, Pine Canyon above tunnel, 29-VIII-70.

Muhlenbergia porteri Scribn. *SW/HD,FW

Albee 224, Red Cliff Campground, 8-X-72; Cottam 5318, Red Hill, 8-VII-32(UT); Christian 1092, Utah Hill, 25-VII-63(UT); Hall s.n., St. George, 8-IX-35(UT).

Muhlenbergia racemosa (Michx.) BSP. *BO/DR

Bradbury and Norris s.n., Temple of Sinawava, 20-VII-62(Z); Weight s.n., Zion Canyon, 10-VIII-35(Z).

Muhlenbergia richardsonis (Trin.) Rydb. BO/DR,MR

Meyer 1352, Kolob Reservoir, 21-VIII-70.

Munroa squarrosa (Nutt.) Torr. *PL/CD

This plant grows in very heavily trampled areas.

Meyer 3811, north of Central, 6-IX-74; Meyer 2057, Ash Creek, 24-VIII-71; Moor Z1505, Kolob Road, 28-VIII-70.

Oryzopsis hymenoides (Roem. and Schult.) Ricker WE/HD,CD,DR,FW,MB,TF

Meyer 2874, Little Creek Valley, 20-VII-73; Meyer 736, Taylor Creek, 4-VI-70; Meyer 930, Oak Grove, 15-VI-70; Meyer 2750, Terry's Ranch Road, 12-V-73; Cottam 9857, Santa Clara Bench, 2-V-49(UT).

Oryzopsis micrantha (Trin. and Rupr.) Thurb. IP/MF

Meyer 3714-2, Mill Canyon, 5-VII-74; Moor Z726, Lava Point, 15-VII-70.

- Panicum capillare L. NA/CD,DR,MB
Meyer 3240, Camp Springs Crossing, 16-IX-73; Meyer 2032, New Harmony, 24-VIII-71; Moor Z1425, Zion Visitor Center, 25-VIII-70; Moor Z1291, Hop Valley, 18-VIII-70.
- Panicum huachucae Ashe NA/MR
Meyer 3785, Kolob Arch Trail, 21-VII-74.
- Panicum obtusum HBK. *AU/DR
Meyer 2096, Washington Fields, 21-X-71; Anderson 384, west of Hurricane, 3-IX-59(UT).
- Panicum scribnerianum Nash NA/DR,MR
Moor Z484, Gateway to the Narrows, 2-VII-70; Moor Z950, Kolob Road at top of Hop Valley, 17-VII-70; Moor Z343, Grotto, 25-VI-70.
- Paspalum distichum L. CS/DR
Meyer 3227, Camp Springs Crossing, 16-IX-73; Meyer 3803, Hurricane, 22-VII-74; Stanton 613, St. George, 17-VIII-31(UT).
- Phleum alpinum L. CS/MF,MM
Meyer 4147, Whipple Valley, 26-VII-75; Meyer 1383, Kolob Reservoir, 21-VIII-70.
- Phleum pratense L. IN/MR
Meyer 2994, Kolob Reservoir, 22-VII-73; Moor Z1526, Lava Point Spring, 28-VIII-70; Weight s.n., Narrows Trail, 24-VI-35(UT).
- Phragmites communis Trin. CS/DR
Meyer 2097, Washington Fields, 21-X-71; Bradbury s.n., Grotto, IX-62(Z).
- Poa annua L. IN/MF
Meyer 3573, Mahogany Knoll, 19-V-74.
- Poa bigelovii Vasey and Scribn. *SW/HD,DR,FW
Meyer 2336, Warner Ridge, 24-IV-73; Meyer 2302, Price Bench, 19-IV-73; Meyer 2309, Atkinville, 19-IV-73; Meyer 3361, Ripple Arch, 8-IV-74; Harrison 10259, Zion Canyon, 10-V-41(BRY).

- Poa bulbosa L. IN/DR,TF
Meyer 3998, Gateway to the Narrows, 2-V-75; Meyer 4088, Cove Wash, 17-V-75.
- Poa compressa L. IN/TF,MF
Meyer 1458, Lava Point, 23-VIII-70; Moor Z863, Kolob Road 3 miles south of reservoir, 17-VII-70.
- Poa fendleriana (Steud.) Vasey WE/HD,CD,FW,MB,TF,
MF
(P. longiligula Scribn. and Williams)
Meyer 3935, Hurricane Cliff Road, 11-IV-75; Meyer 545, Black Canyon, 5-V-70; Meyer 1697, Oak Grove, 21-V-71; Meyer 1650, Central, 20-V-71; Cottam 5044, Gunlock, 17-IV-32(UT); Christian 802, Utah Hill, 12-IV-63(UT).
- Poa nervosa (Hook.) Vasey *NM/MF
Cottam 8880, Pine Valley Mountain, 26-VI-41(UT).
- Poa palustris L. CB/MR
Meyer 4163, Further Water, 27-VII-75.
- Poa pratensis L. IN/DR,MF,MR,MM
Meyer 3713, Mill Canyon, 5-VII-74; Meyer 2888, Hornet Point Road, 21-VII-73; Meyer 1620, Middleton, 15-IV-71; Meyer 3602, North Fork of the Virgin, 39-V-74; Moor Z664, Lava Point, 14-VII-70.
- Poa sandbergii Vasey *NM/HD,CD,FW,MB
This species and the one which follows are part of a variable and complex species group. The treatment here follows Hitchcock et al. (1969). The plants would formerly have been referred either to P. secunda Presl. or P. canbyi (Scribn.) Howell.
Meyer 3429-2, Enterprise Reservoir Road, 11-IV-74; Meyer 3481, Old Mormon Road, 12-IV-74; Meyer 3956, Hurricane Cliffs Road, 1-V-75; Higgins 668, Utah Hill, 27-V-66(BRY); Atwood 5009, Danish Ranch, 19-V-73(BRY).
- Poa scabrella (Thurb.) Benth. ex Vasey BO/MB
(P. canbyi Howell)
Cottam 6954, Zion Park, 12-V-36(UT).

- Polypogon monspeliensis (L.) Desf. IN/DR,MR
 Meyer 224, Red Hill, 8-VI-68; Moor Z1076, Gateway to the Narrows, 31-VII-70; Moor Z37, Smith Mesa, 11-VI-70; Weight 896Z, Coalpits Wash, 10-VI-35(UT).
- Puccinellia distans (L.) Parl. *CB/MR
 The species as it occurs in the county seems somewhat intergradient with P. airoides (Nutt.) Wats. and Coult.
 Meyer 1155, Pine Park, 7-VII-70.
- Schismus arabicus Nees IN/HD
 Atwood 4688, I-15, 5 miles north of St. George, 11-V-73(BRY).
- Schismus barbatus (L.) Thell. IN/HD,DR
 Meyer 3873, Beaver Dam Well, 5-IV-75; Meyer 2191, Middleton, 15-IV-73; Meyer 1640, Snow Spring Canyon, 20-V-71.
- Secale cereale L. IN/CD,DR,FW
 Meyer 1793, Pinto, 23-VII-71; Meyer 1904, Enterprise, 26-VII-71; Atwood 5105, Ash Creek Reservoir, 26-V-73(BRY).
- Setaria lutescens (Weigel) Hubb. IN/CD,DR
 Meyer 2033, New Harmony, 24-VIII-71; Meyer 3126, south of Rockville, 3-VIII-73.
- Setaria verticillata (L.) Beauv. IN/DR
 Meyer 3805, Hurricane, 22-VII-74; Stanton s.n., St. George, 17-VIII-31(UT).
- Setaria viridis (L.) Beauv. IN/CD,DR
 Meyer 2122, Springdale, 22-X-71; Meyer 3121, south of Rockville, 3-VIII-73; Meyer 3028, Gould Wash, 1-VIII-73.
- Sitanion hystrix (Nutt.) J. G. Smith WP/HD,CD,FW,MB,TF, MF

Most of the plants have one-awned glumes, but a few have glumes that are bifid or occasionally even trifid. The plants always have a few simple glumes as well as divided ones, however, and thus are not referable to S. jubatum J. G. Smith. A few collections seem to be hybrids with Elymus canadensis. Meyer 1265, cited on the following page, represents such a population.

Meyer 1672, Central, 20-V-71; Meyer 724, Lee Pass, 4-VI-70; Meyer 3508, Joshua Tree National Landmark, 18-V-74; Meyer 1762, Welcome Spring, 23-V-71; Moor Z1489, Lava Point, 28-VIII-70; Meyer 1265, Oak Grove, 1-VIII-70.

Sorghastrum nutans (L.) Nash *EA/DR

Moor Z1244, North Creek at Sunset Canyon Ranch, 13-VIII-70.

Sorghum halepense (L.) Pers. IN/DR

Meyer 3263, Leeds, 13-X-73; Stanton 610, St. George, 17-VIII-31(UT); Moor Z1222, Springdale, 5-VIII-70.

Sphenopholis obtusata (Michx.) Scribn. NA/DR,MR

Meyer 3799, Kolob Arch Trail, 21-VII-74; Weight 960Z, Weeping Rock, 21-VI-35(Z); Weight 1073Z, Narrows Trail, 24-VI-35(UT).

Sporobolus airoides (Torr.) Torr. WP/DR

Meyer 615, St. George, 28-V-70; Cottam 8847, Sugarloaf, 20-VI-41(UT).

Sporobolus contractus A. S. Hitchc. MH/DR

Meyer 3138-2, Grafton Turnoff, 3-VIII-73.

Sporobolus cryptandrus (Torr.) Gray NA/CD,DR,FW,MB,TF,MR

This species is very closely related to the one which follows, being distinguished mainly by inflorescence shape, a rather intangible and phenologically flexible character. Some specimens are somewhat arbitrarily assigned.

Meyer 1477, Lava Point, 23-VIII-70; Meyer 3162, Wire Mesa, 16-IX-73; Meyer 2004, Honeycomb Rocks, 21-VIII-71; Meyer 1318, Oak Grove, 9-VIII-70.

Sporobolus flexuosus (Thurb.) Rydb. *MH/HD,CD,DR,FW

See note under S. cryptandrus.

Meyer 1723, Ivins Turnoff, 23-V-71; Meyer 2069, Diamond Valley, 21-X-71; Meyer 3158-1, Grafton Turnoff, 3-VIII-73; Moor Z1543, North Creek, 29-VIII-70.

Sporobolus giganteus Nash

*CH/HD

This species is very closely related to S. contractus, but the specimen cited below falls well within the limits of variation described for S. giganteus.

Meyer 2088, Snow's Canyon, 21-X-71.

Stipa comata Trin. and Rupr.

WE/CD,FW,MB,TF

Meyer 1034, Pine Valley Campground, 30-VI-70; Meyer 730, Lee Pass, 4-VI-70; Moor 21131, Lava Point, 21-VII-70; Cottam 5143, Diamond Valley, 19-IV-32(UT).

Stipa lettermanii Vasey

MI/TF,MF,MR,MM

The treatment of this species and the closely related S. occidentalis follows Hitchcock et al. (1969).

Meyer 2865, Little Creek Valley, 20-VII-73; Meyer 1267, Oak Grove, 1-VIII-70; Meyer 2914, Kolob Road near Iron County Line, 21-VII-73.

Stipa occidentalis Thurb. ex Wats.

WE/MB,TF,MF,MM

(S. columbiana Macoun)
(S. williamsii Scribn.)

See note under S. lettermanii.

Meyer 1814, Oak Canyon, 24-VII-71; Meyer 3716, Mill Canyon, 5-VII-74; Meyer 1046, Pine Valley Campground, 30-VI-70; Meyer 4145, Whipple Valley, 26-VII-75.

Stipa pinetorum Jones

*IM/MB

Meyer 1048, Pine Valley Campground, 30-VI-70.

Stipa speciosa Trin. and Rupr.

*MO/HD,CD,FW

This species is strongly petrophile, usually on limestone.

Meyer 3918, Curly Hollow Wash, 6-IV-75; Meyer 1706, Oak Grove Road, 23-V-71; Meyer 1757, Welcome Spring, 23-V-71; Cottam 8797, Washington Flat, 18-VI-41(UT).

Tridens muticus (Torr.) Nash

*SW/HD

Meyer 3330, Sand Mountain, 7-IV-74; Meyer 678, Red Hill, 2-VI-70; Harper 68, Castle Cliff, 17-V-64(UT).

- Tridens pilosus (Buckl.) A. S. Hitchc. *CC/HD
Meyer 1736, Castle Cliff, 23-V-71.
- Tridens pulchellus (HBK.) A. S. Hitchc. MH/HD
Meyer 1737-1, Castle Cliff, 23-V-71; Meyer 1558, Terry's Ranch, 14-IV-71; Cottam 5319, St. George, 8-VII-32(UT).
- Trisetum spicatum (L.) Richt. CS/MR,MM
Meyer 4145-1, Whipple Valley, 26-VII-75.
- Triticum aestivum L. IN/HD,CD,DR
Meyer 2712, Castle Cliff, 13-V-73.

Iridaceae

- Sisyrinchium bellum S. Wats. *MC/DR,MR
Washington County material seems closest to this species, although it approaches S. halophilum Greene in pubescence characters. According to Mosquin (1970), S. halophilum belongs to a large polymorphic species which he calls S. bermudiana L., and S. bellum is only doubtfully distinct.
- Meyer 666, Red Hill, 1-VI-70; Meyer 2373, Washington, 25-IV-73; Moor Z1210, Potato Hollow, 5-VIII-70.

Juncaceae

- Juncus balticus L. CB/DR,MR,MM
Some of this material might be better referred to J. mexicanus Willd. but the two species are virtually indistinguishable in Washington County, especially from dried material. J. mexicanus may not be specifically distinct (Munz and Keck 1959).
- Meyer 1177, Enterprise Reservoir, 8-VII-70; Meyer 3736, Kolob Trail, 6-VII-74; Meyer 2939, Kolob Road near Iron County Line, 21-VII-73; Meyer 670, Red Hill, 1-VI-70; Moor Z451, Gateway to the Narrows, 2-VII-70; Moor Z316, Taylor Creek, 24-VI-70.
- Juncus bufonius L. CS/DR,TF,MR
Meyer 1623, Snow Spring Canyon, 20-V-71; Meyer 2809, Kolob Road at top of Hop Valley, 20-VII-73; Meyer 3022, Death Point, 22-VII-73; Meyer 3703, Mill Canyon, 5-VII-74.

- Juncus confusus Cov. *NM/MM
Meyer 4140, Whipple Valley, 26-VII-75; Meyer 1360, Kolob Reservoir, 21-VIII-70.
- Juncus ensifolius Wikstr. *NM/MR
Weight 925Z, Oak Creek, 10-VI-35(UT).
- Juncus interior Wieg. *PL/TF,MR
Meyer 1274, Pig Creek, 2-VIII-70; Meyer 2849, Kolob Road at top of Hop Valley, 20-VII-73; Moor Z1165, Lava Point, 6-VIII-70.
- Juncus longistylis Torr. WE/TF,MF,MR,MM
Meyer 2997, Kolob Reservoir, 22-VII-73; Meyer 3704, Mill Canyon, 5-VII-74; Meyer 3780, Kolob Trail, 21-VII-74; Meyer 1863, Browse, 25-VII-71; Meyer 2811, Kolob Road at top of Hop Valley, 20-VII-73; Moor Z1371, La Verkin Creek, 20-VIII-70; Moor Z1258, Oak Creek Canyon, 14-VIII-70.
- Juncus mertensianus Bong. *NM/MM
Meyer 4168, Further Water, 27-VII-75.
- Juncus nodosus L. *BO/DR
Meyer 1970, Mogotsu Wash, 21-VIII-71; Christian 1023, Bloomington, 22-VI-63(UT).
- Juncus parryi Engelm. *NM/MM
Meyer 4169, Further Water, 27-VII-75.
- Juncus saximontanus A. Nels. WE/DR,MR,MM
Most material from the county belongs to J. saximontanus forma brunnescens (Rydb.) Herm., which may sometimes be found growing with the typical form. The two present quite different appearances and are easily mistaken for separate species on cursory examination.
Meyer 761, Taylor Creek, 4-VI-70; Meyer 3791, Kolob Arch Trail, 21-VII-74; Meyer 895, Oak Grove Road, 15-VI-70; Moor Z1419, Lava Point Spring, 21-VIII-70; Moor Z460, Gateway to the Narrows, 2-VII-70.
- Juncus tenuis Willd. NW/MR
Meyer 892, Oak Grove Road, 15-VI-70; Weight 922Z, Oak Creek Canyon, 10-VI-35(UT).

- Juncus torreyi Cov. NA/DR,MR
 Moor Z1338, La Verkin Creek, 20-VIII-70; Moor Z750, East Fork of the Virgin, 16-VII-70; Weight 962Z, Weeping Rock, 21-VI-35(UT).
- Juncus tracyi Rydb. IM/MR
 Moor Z459, Gateway to the Narrows, 2-VII-70; Moor Z578, Lava Point, 7-VII-70; Weight 851Z, Emerald Pool Trail, 5-VI-35(UT).
- Juncus xiphioides E. Meyer *CA/DR,MR
 Moor Z464, Gateway to the Narrows, 2-VII-70; Moor Z1261, Oak Creek Canyon, 14-VIII-70.
- Luzula parviflora (Ehrh.) Desv. CB/MR
 Meyer 997, Pine Valley Campground, 29-VI-70.

Juncaginaceae

- Triglochin maritima L. CB/DR
 Nisson s.n., south of Washington, 16-V-40(DX).

Lemnaceae

- Lemna minima Phil. AU/MR
 Gentry 2213, Pine Valley, 31-VII-68(BRY).

Liliaceae

- Asparagus officinalis L. IN/DR
 Meyer 1616, Middleton, 15-IV-71; Christian 989, east of Santa Clara, 10-VI-63(UT).
- Calochortus flexuosus S. Wats. *MP/HD,CD,FW
 Meyer 4080, north of Mogotsu Wash, 17-V-75; Meyer 2428, Shinab Kibe Mountain, 27-IV-73; Meyer 1590, Terry's Ranch Road, 14-IV-71; Fisk s.n., Toquerville, 23-IV-30(UT); Harrison s.n., St. George, 26-V-32(UT).

Calochortus nuttallii Torr.IP/HD,CD,FW,MB,TF,
MF

(C. aureus S. Wats.)

The last two specimens cited below belong to the yellow-flowered
C. nuttallii var. aureus (Wats.) Ownbey.

Meyer 965, north of New Harmony, 16-VI-70; Meyer 793, Washington Flat,
6-VI-70; Meyer 2859, Little Creek Valley, 20-VII-73; Moor Z510, Lava
Point, 7-VII-70; Moor Z16, Smith Mesa, 11-VI-70; Hall s.n., Grotto
Campground, 19-VI-36(UT); Cottam 3992, Pintura, 1-VI-39(UT);
Cottam 8560, near Short Creek, 10-VI-41(UT); Weight s.n., Petrified
Forest, 25-V-35(Z).

Disporum trachycarpum (S. Wats.) Benth. and Hook. *RM/MF

Meyer 3685, Mill Canyon, 5-VII-74; Weight s.n., Hidden Canyon,
21-VI-35(Z).

Fritillaria atropurpurea Nutt.

IP/CD,MB,TF,MF,MR,
MM

Meyer 4070, Black Hills Reseeding Area, 17-V-75; Meyer 846, Kolob
Reservoir, 11-VI-70; MacMillan, Glauser, and McNulty 577, Pine Creek
above tunnel, 19-IV-47(UT); Pendleton s.n., Pine Valley Campground,
12-V-40(UT).

Leucocrinum montanum Nutt.

IP/CD

Meyer 3581, Pine Park Road near Iron County Line, 25-V-74.

Smilacina racemosa (L.) Desf.

NA/MF,MR

Meyer 3598, North Fork of the Virgin, 29-V-74; Walsh s.n., Grotto
Campground, 27-V-33(UT).

Smilacina stellata (L.) Desf.

CB/MF,MR

Meyer 3614, North Fork of the Virgin, 30-V-74; Meyer 3568, Mahogany
Knoll, 19-V-74; Walsh s.n., Grotto Campground, 27-V-33(UT).

Veratrum californicum Dur.

WE/MR,MM

Meyer 3683, Mill Canyon, 5-VII-74.

Zigadenus elegans Pursh

*RM/MR

Palmer s.n., Kolob Arch Canyon, 20-VII-66(Z).

Zigadenus paniculatus S. Wats.

IM/CD,FW,MB,TF

Meyer 4071, Black Hills Reseeding Area, 17-V-75; Meyer 1649, Central, 20-V-71; Meyer 2649, Browse Road, 11-V-73; Gould 3514, Diamond Valley, 5-V-42(UT).

Orchidaceae

Corallorhiza maculata Raf.

NA/MF

Meyer 4152, Summit Trail at upper Hop Creek Crossing, 26-VII-75; Cottam 5352, Pine Valley Mountain, 10-VII-32(UT).

Epipactis gigantea Dougl.

WE/DR

(Peramium gigantea Coult.)
(Serapias gigantea A. A. Eat.)

Meyer 685, Veyo Resort, 3-VI-70; Cottam 8458, Berry Springs, 10-IV-41(UT); Weight 837Z, Emerald Pool Trail, 5-VI-35(UT).

Goodyera oblongifolia Raf.

*BO/MF

[Peramium decipiens (Hook.) Piper]

Weight 969Z, Hidden Canyon, 21-VI-35(UT).

Habenaria dilatata (Pursh) Hook.

*BO/MF,MR

Meyer 1000, Pine Valley Campground, 29-VI-70; Weight 1018Z, West Rim Trail, 26-VI-35(UT).

Habenaria sparsiflora S. Wats.

NM/MR

Meyer 1858, Browse, 25-VII-71; Cottam 8909, Pine Valley, 26-VI-41(UT).

Listera convallarioides (Sw.) Nutt.

BO/MR

Cottam 8889, Pine Valley Mountain, 26-VI-41(UT).

Potamogetonaceae

Potamogeton richardsonii (Benn.) Rydb.

*BO/DR

Hall s.n., La Verkin Hot Springs, 16-VI-1899(BRY).

Typhaceae

Typha dominguensis Pers.

AU/DR

This plant has commonly been referred to T. angustifolia L. in the past.

Moor Z1217, Sunset Canyon Ranch Pond, 5-VIII-70; anon., Zion Canyon, 12-IX-57(Z).

Typha latifolia L.

CB/DR

Boyle Z311, Zion Lodge, 13-VII-38(Z).

Zannichelliaceae

Zannichellia palustris L.

CS/DR

Hall s.n., Watercress Spring, 12-X-35(DX); Meyer 3226, Camp Springs Crossing, 17-IX-73.

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