

UNIVERSITY OF MISSOURI, ST. LOUIS

Department of Biology

**THE FLORA OF YANACocha, A TROPICAL HIGH-
ANDEAN FOREST IN SOUTHERN PERU**

BY WASHINGTON

H. GALIANO

A Thesis presented to the Graduate School of
the University of Missouri - St. Louis in partial
fulfillment of the requirements for the degree of
Master of Science.

This research was conducted at the Missouri Botanical Garden

March, 1990 Saint Louis,
Missouri USA

UNIVERSITY OF MISSOURI-ST. LOUIS

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CERTIFICATE OF APPROVAL

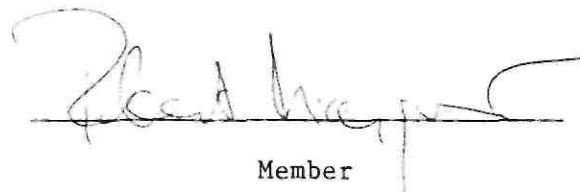
MASTER'S THESIS

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degree in Biology at the May 1990 graduation

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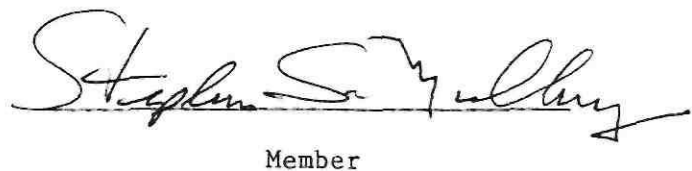

Member

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Eccremocarpus huaynolepac Vargas

Bignoniaceae

Plant. N. S. Eccremocarpus

PN-WGS - Yancocca 1991

Galiano - 1 ABSTRACT Yanacocha forest, a tropical high Andean forest of about 1500 hectares, is located in southeastern Peru in the Cordillera Oriental of Jrubamba Province, Cusco Department. This study constitutes a florula of this area, primarily based upon 1,800 collections of plants. The catalogue of vascular plants of the Yanacocha forest includes 96 families, 270 genera, and 510 specific and infraspecific taxa. Keys for each family and short descriptions of all taxa are presented. Comments :". the four habitats represented in the study area and the most important species in each are also discussed in comparison with florulas of other high Andean areas for which data are available.

this research was conducted is in the district of *Willabamba*, province of *Urubamba*, Department of *Cusco* in the Republic of Peru. The area studied extends in a southeastern to northwestern direction, in the shape of a narrow and irregular rectangle that lies between $13^{\circ}16'$ and $13^{\circ}19'$ north latitude and $72^{\circ}03'$ to $72^{\circ}05'$ west

longitude (Fig. 1). This region is immediately north of the city of *Willabamba* and approximately 55 km from the major highway that connects *Cusco*, *Willabamba*, and *Urubamba*. The area includes the major part of the eastern slope of that section of the Andean Cordillera of southeastern Peru -- the "Vilcaconga chain". Altitudinally it ranges from 2900 m to 4200 m above sea level. The area has a length of 8 km and the width varies from 4 to 5 km. The lower elevation of 2900 m includes part of *Urubamba* Valley, near the town of *Huayllabamba* and *Urquillos* across the *Viicayota* river. The part that is oriented from southwest to northeast includes elevations from 3000 to 3700 m and includes the *Maccari* Valley and the deep pass of *Yanacocha*, reaching elevations from 3730 to 4600 m. A distinct vegetational formation surrounds the drainage system of two high Andean lakes included in the study -- the *Yanacocha* (250 X 105 m long, 3897 m in altitude) and *Kellococha*

(250 X 105 m long, 4200 m in altitude). The boundaries of the study area on the northeast include the major peaks of *Illahuaman*, *Balcuniyoc*, and *Topsan*, with elevations from 4200 m. The other boundaries are the *Cancha-Cancha*, a deep pass, the *San Juan* Valley on the west, and the *Viicayota* river on

— :a 1. Map of Peru (inset) and contour map of Yanacocha region.

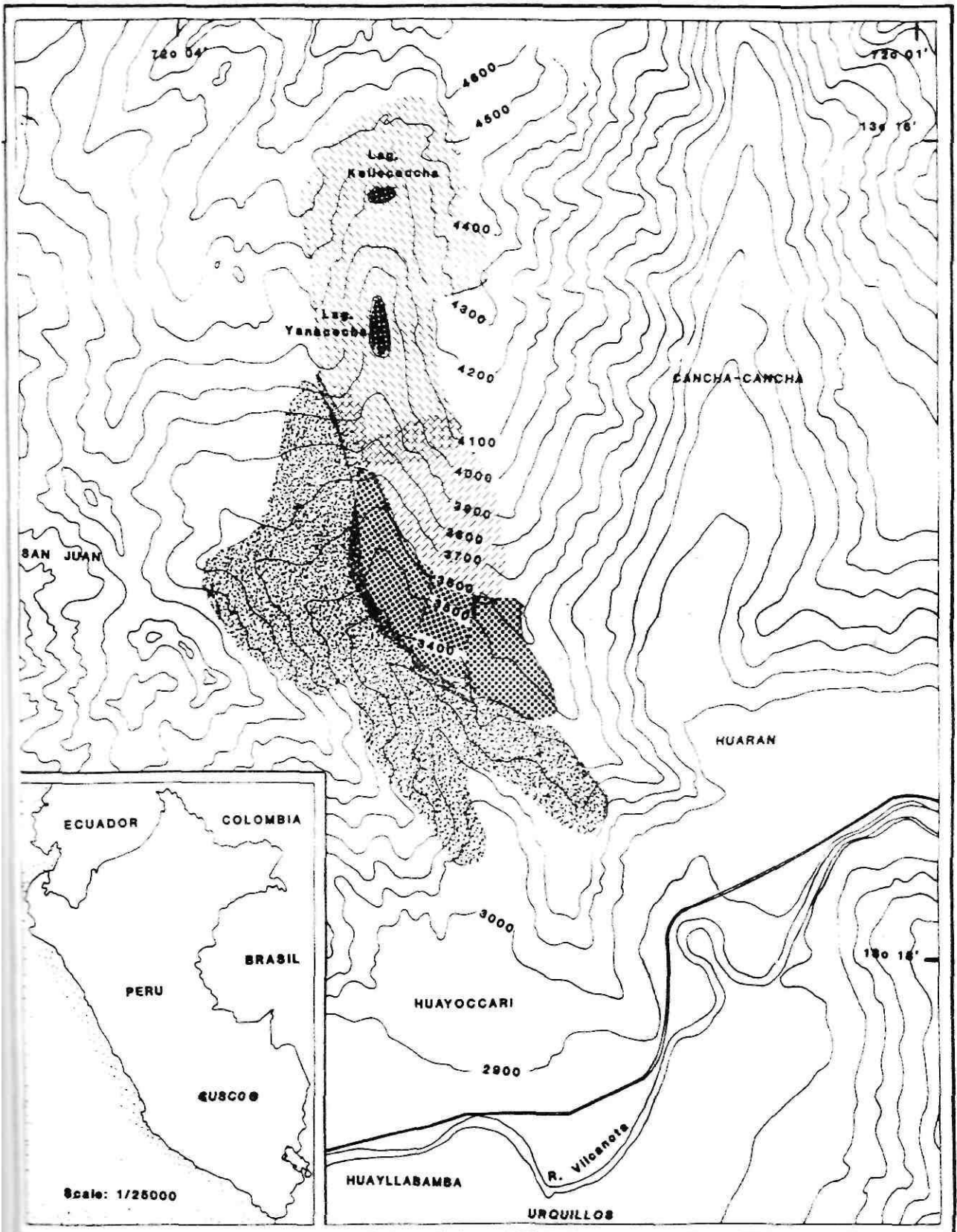



Fig. 1

AREA OF STUDY

 Polylepis Forest

 Mixed Forest

 Altered Forest

The extremes in topography, which includes snow-capped mountains, steep valleys, and deep lakes of glacial origin, and the rich and relatively undisturbed tropical high Andean forest, give the area an extraordinary scenic beauty. Above the limits of the forest, at elevations from 3700 to 4600 m, there is open puna vegetation.

There are few forests left in the environs of Cusco. The inaccessibility and distance to this forest has thus far served to protect it somewhat from human activities, although it has been subject to some disturbance. This is the best high-Andean forest in the Cusco region from the viewpoint of relative ease of access and relatively good preservation.

Scientifically and historically, the area offers many possibilities for research in different **fields such** as agriculture, agroforestry, botany, ecology, geology, glaciology, limnology, wild life, or hydrographic basin management. Also, the waters of the lakes and Huayocari valley, which were used for irrigation during the Inca epoch, presently continue to irrigate the Huayllabamba Valley. The ancient cave paintings and other artefacts found in the Huayocari region are of "historical significance in connection with the cultural development of Precolombian Andean cultures. These different **features** of the area make floristic study of this forest important as part of an effort to develop comprehensive plans for its conservation.

The following objectives served as **the basis for embarking** on a floristic study of the Yanacocha forest and Huayocari Valley:

- (a) Determination of what species of vascular plants occur in this **area;**

- (b) Observations of what habitats each species occupies;
- (c) Short descriptions of each species and identification keys for each family;
- (d) A comparison with the plants included in florulas of other high Andean locations.

Plant collections were made between July 1988 and August 1989. Two visits were made to the study area during December 1988 and August 1989. I also examined approximately 1800 sheets of some 510 species that had been collected previously in this area. Most of the collections were made by A. Tupayachi and P. Nunez. All collections from this area are deposited in the herbarium of the Missouri Botanical Garden, St. Louis and the National University of Cusco, Peru.

Identifications of the collected specimens mostly were made at the Missouri Botanical Garden, using the Flora of Peru and other taxonomic references and by comparison in the herbarium. In addition, comparison of collections in the herbarium of the Smithsonian Institution in Washington, D.C. helped to determine several taxa. Various taxonomic specialists provided identifications for their taxonomic specialities, including G. Allen (musci), L. Brako (lichens), D. Brunner (Echeveria), I. Recasas (Gynoxys), G. Carnevali (Orchidaceae), T. Croat (Araceae), Lidia (Cyperaceae, Juncaceae, and Poaceae), W. D'Arcy (Hebecladus, Hebecladus), J. MacDougal (Passifloraceae), D. Ford (Calandrinia), V. Funk (Agria), A. Gentry (Tecoma), R. Gereau (Bomarea, Caryophyllaceae, Rosaceae, and Sapindaceae), P. Goldblatt (Iridaceae), S. Jlanum) B. Leon (aquatic plants and pteridophytes), R. Liesner (families), J. Miller (Boraginaceae), R. Moran (pteridophytes),

nnson (Asteraceae), L. B. Smith (Broraeliaceae), W. D. Stevens .
 :=:2ceae), and J. Wurdack (Melastoraataceae). Familial limits -- ■
 Jnr.quist (1981).

iddition to listing the Florula of Yanacocha, some introductory ■ : _'
 : r. the tropical high-Andean flora of southeastern Peru are r.acei in this
 study.

GEOLOGY logical observations about

Pleistocene glaciation have been --: ;; the section between
 Huayllabamba and Yanahuara in the Urubamba
 ^.alaf atovich, 1956). This area in the southeastern Andes is iei as a
 "Contact Valley" because it is formed along a contact line -:-" :v:
 formations of different geological age. One formation, known ii the
 Yuncaypata formation and situated on the south flank of Lley, is
 composed of Cretaceous rocks containing lutites and red
 -reflating with gypsum, anhydrite, and rock salt with marine ;~£ iz
 the upper levels. The north flank, known locally as the -----
 formation, is formed by rock of the Mitu group, with layers of
 sandstone, and a Permian volcanic rock at the surface
 - . fiiiivich, 1953).

-- :eep lateral valleys formed by tributaries to the Urubamba River
 - _ayoccari, Yucay, Chicon, and Pumahuanca. These river valleys
 :~=d physiographically as "deep glacial valleys", **due** to **the** fact
 I -ere formed by erosive action of Pleistocene glaciers. They
 Ifee following characteristics: (1) U-shaped transverse profiles on
 =r carts; (2) the lack of rocky-spurs on these profiles; (3) the

presence of glacial sediments; (4) the presence of large erratic-blocks on the floor of the main valley; and (5) the existence of rocky-steps along the deep passes.

The floor of the Urubamba Valley is composed of pluvio-glacial sediments that can be traced to the alluvial-glacial sediments at the sources of the tributaries. These sedimentary deposits have created good soil conditions for agriculture due to their physical and chemical conditions. The only nutrients in relatively low supply are calcium carbonate and phosphoric acid (Kalafatovich, 1956).

Small basins that look like glacial cirques are found at the foot of craggy peaks with terraced steps up the sides, between 3900 to 4200 m in altitude. Two of these basins form the Yanacocha and Kellococha lakes. Almost all of the small rocky basins between the deep Huayllabamba and Yanahuara valleys include patches of Polylepis woodland.

CLIMATE

There are two meteorological recording stations near the study area, both at relatively low elevations. The stations at Calca (2928 m in altitude) and Urubamba (2871 m in altitude) record temperature, precipitation, humidity, and evaporation (Table 1). All data reported here are taken from their unpublished records during the 5-10 year period from 1978 to 1988.

According to Bowman (1938), Tosi (1960), and De Olarte (1976), the bottom of the Urubamba Valley constitutes a "dry pocket" with extreme dryness during the major part of the year. The lack of precipitation in the valley floor results from the ascending warmer air in relation to the

Table 1. Urubamba meteorological data

	Maximum	Minimum	Average	Precip.	Humidity	T-V	Evaporator
IEAR	Temp (C)	Temp (C)	Temp (C)	(mm)	(%)		
1973	23.1	6.2	14.1	500.4	65	8.9	1300.4
1979	23.3	6.4	14.8	344.0	66	10.7	1313.6
1980	22.9	6.6	14.7	230.8	73	11.8	1137.3
1981	21.8	7.2	14.5	219.3	75	11.8	1082.9
1982	22.0	6.2	14.1	127.2	74	11.5	1044.7
1983	22.4	6.0	14.3	2770.6	68	10.9	1088.6
1984	25.0	6.4	14.7	322.1	66	11.3	1017.6
1985	-	-	-	-	-	-	-
1986	22.6	6.4	14.5	353.6	67	9.9	1295.2
1987	22.9	6.7	14.7	499.7	68	11.1	1506.7
1988	24.5	6.4	15.6	431.2	80	11.1	1214.3

relatively great diurnal heat; moreover, it is influenced by the valley's orientation in relation to the highest altitudes of the Andean Cordillera. The latter acts as an orographical barrier to generate a pronounced rain shadow, not permitting passage of the winds loaded with high humidity from the Amazonian forests. In contrast, the upper levels of the high sierra and the smaller valleys have more favorable conditions of humidity.

Several diverse thermal strips directly related to altitude are also recorded (De Olarte, 1983, 1985); (1) at the highest part of the area, over 4000 m in altitude, extremely cold temperatures with averages lower than -10°C recorded; (2) from 3700 to 4000 m is a zone of cold temperature with average isotherms between 6 and 8°C; (3) from 3300 to 3700 m is a typically transitional strip between cold and temperate climatic conditions with average temperatures recorded mostly around 10-11°C; and from 2900 to 3300 m is a relatively warm climate with 5 years average temperature records of 13.8°C in Caica and 14.1°C in Urubamba.

The five-year average of recorded precipitation at Calca is 439.9 mm and at Urubamba 455.3 mm.

HISTORY OF EXPLORATIONS The long distance that must be walked to arrive at the high Andean puna forest has prevented its botanical exploration. In contrast, the lower altitude parts of the Huayocari and Urubamba valley have received much botanical attention. Among the most important botanical explorations was that of August Weberbauer in June of 1904 who stayed a long time in the locality of Yucay in the Urubamba Valley, making numerous collections.

Jaroslav Soukup conducted a reconnaissance of the same area in 1937, collecting around Yucay close to the Huayocari Valley.

Beginning in 1922, Fortunato L. Herrera dedicated much effort to the floristic exploration of southern Peru. He visited the Urubamba Valley several times and many of his specimens served to document the flora of lower altitudes in the valley.

In December 1963, Cesar Vargas C. explored the Huayocari Valley. Unlike earlier botanists he ascended the valley sides to ca. 3500 m, finding many additional species. Some of those species that were collected in this region are now threatened with local extinction.

Since 1985, personnel from the Universidad de Cusco have realized the importance of the Yanacocha area and have focused an increasing amount of attention on it.

I and my colleagues have visited Yanacocha repeatedly over the past five years. Botanists who have participated in this exploration include Percy Nunez, Alfonso Arestegui, Isaac Peralta. Especially valuable to our current knowledge of the flora of Yanacocha are the collections of Alfredo Tupayachi, who collected 1500 numbers, and Percy Nunez, who collected 400 numbers. The collections generated by this activity provide the basis for this Florula.

HABITATS OF THE YANACOCCHA FOREST A number of different systems of vegetation classification have been applied to the Peruvian Andes. Here I will use the Holdridge system (Holdridge, 1967; Tosi, 1960; ONERN, 1976) to describe the **different** habitats of Yanacocha. The application of the Holdridge system

Classification to this area is given in detail by the Life Zone map of Peru. In addition, informal designations based on conspicuous aspects of the vegetal communities of the study area, are employed to describe the equations of the region, notably in differentiating puna and Polylepis forest, both of which are mapped as the same Holdridge life zone.

Since Yanacocha is south of 13 S, it is considered by the Holdridge classification to belong to the subtropical latitudinal region. There are four different Holdridge Life Zones represented in the area: subtropical lower montane steppe (e-MS) in the driest part of the valley floor, subtropical lower montane dry forest (bs-MS) in moister parts of the valley floor, subtropical montane moist forest (bh-MS) on the moist slopes, and wet subtropical paramo on the high mountains above timberline (r-h-SaS). In addition, there are several different habitat types within each of these.

1. SUBTROPICAL LOWER MONTANE THORN STEPPE (e-MS)

The lower slopes situated southwest of the Huayocari region, between 3000 to 3300 m, are characterized physiognomically by a semi-arid vegetation type, conspicuously deciduous during the low rainfall period from December to March. The deciduous shrubs and small trees are intermixed with a few xerophytic species that remain evergreen during the rainy season. One of the most outstanding features is the prevalence of succulent plants, hence the designation "thorn scrub" for this vegetation.

a) **Trees or small trees of the lower montane thorn steppe.** There are relatively few trees in the lower montane thorn steppe. The most common tree species occurring in the most xerophytic zones are:

Caesalpinia spinosa (Fabaceae), Schinus pearcei, S. microphylla (Anacardiaceae), Proustia cuneifolia, Dasyphyllum leiocephalum (Asteraceae), and Maytenus cuzcoina (Celastraceae).

b) Shrubs of the lower montane thorn steppe. In contrast to the depauperate tree flora, many species of shrubs have been encountered in the Huayocari region. Common shrub species are: Apurimacia michelii (Fabaceae), Aloysia fiebrigii, A. scorondonioides (Verbenaceae), Zarnadesia horrida, Trixis divaricata, Flourensia polycephala, Helogyne tacaquirensis, Ophryosporus peruviana, Baccharis boliviensis (Asteraceae), Berberis boliviana (Berberidaceae), Eremocharis triradiata (Apiaceae), Dunalia lycioides, Lycianthes lycioides (Solanaceae), Krameria lappacea (Krameriaceae), Senna multiglandulosa, S. birostris (Fabaceae).

c) Succulents and caulirosettes. There are also some cactus and spiny rosette plants in this habitat, for example, Corryocactus squarrosus, Echinopsis cuzcoensis, Opuntia ficus-indica, Lobivia aximiliana (Cactaceae) and caulirosettes such as Furcraea andina (Agavaceae), Puya longistyla, P. ferruginea (Bromeliaceae).

d) Herbs of the lower montane thorn steppe. Many herbs also occur in the driest region. Most are dicots, but monocots are also well represented. Some of the more common herbs species are: Zinnia peruviana (Asteraceae), Kallstroemia parviflora (Zygophyllaceae), Rhacelia pinnatifida (Hydrophyllaceae), Iresine diffusa, Gomphrena elegans, Guilleminea densa (Amaranthaceae), Stenandrium dulce (Acanthaceae), Diastatea micrantha (Campanulaceae), Ipomoea minuta (Convolvulaceae), Salvia oppositiflora (Lamiaceae), Tarasa marini

'Malvaceae), Colignonia weberbaueri (Nyctaginaceae) , Calandrinia ciliata (Portulacaceae), Arcytophyllum thymifolium (Rubiaceae), Callisia repens, Commelina fasciculata (Commelinaceae), Cyperus aggregatus, Carex rcliviensis (Cyperaceae), Echeandia eccremorrhizum (Anthericaceae), Orgonidium vargasii, Spathantheum orbignyanum (Araceae), Fortunatia sessilis (Liliaceae), Malaxis fastigiata (Orchidaceae).

e) **Vines of the lower montane thorn steppe.** Vines are significantly reduced in number in relation to other habitats. Among the more common species are: Dioscorea incayensis (Dioscoreaceae), Cynanchum formensis, Cynanchum sp., Melinia peruviana (Asclepiadaceae). Two species of tendrillate sapindaceous vines are important components of this habitat, Cardiospermum halicacabum and Serjania squarrosa. 2. **SUBTROPICAL LOWER MONTANE DRY FOREST (bs-MS).**

This formation is closely related to the lower montane thorn steppe, and is the typical formation of most Peruvian inter-Andean Valleys. The part of the lower floor of the Huayocari valley that was originally subtropical dry forest retains only vestiges of natural vegetation. Much of this economically important area is terraced and dedicated to agricultural production that supports a great demographical density, but few native plants. This area produces much corn and other grains and is an important bread basket of the region.

This formation is altitudinally located between 2800 and 3350 m, with an annual precipitation of approximately 400 mm. The mean temperature is about 18 C, making the climate a temperate rather than tropical one. The best-preserved vegetation may be considered only seminatural, but shows some characteristics of original conditions.

a) **Trees of the lower montane dry forest.** Several of the largest trees of the study area can be observed in the montane dry forest region. Trees of this region include: Gedrela lilloi (Meliaceae), Erythrina falcata (Fabaceae), Alnus acuminata (Betulaceae), Salix zboldtiana (Salicaceae), Schinus molle, S. pearcei (Anacardiaceae), Glans neotropica (Juglandaceae), Acacia macrantha (Fabaceae), Myrcianthes oreophylla (Myrtaceae), Myrsine aff. pellucida (Myrsinaceae).

b) Small trees. A number of small trees are also characteristic of this zone, with Solanaceae especially prevalent. Tecoma sambucifolia (Loganiaceae), Maytenus cuzcoina (Celastraceae), Weinmannia pinnata (Celastraceae), Otholobium pubescens (Fabaceae), Solanura sp. (Solanaceae), Agaveckia lanceolata (Rosaceae), Nicotiana tomentosa, N. tabacum, Lestrum glomeratum, Solanum luteoalbum (Solanaceae), Aloysia triphylla (Verbenaceae).

c) Shrubs. In contrast to the trees and herbs, many species of native shrub still occur in the dry forest remnants. These include Chenopodium pentlandiana, A. sternbergiana, Ambrosia arborescens, Tristeguietia discolor, Baccharis buxifolia, B. pulchella, B. quitensis, Chenopodium connivens, Cronquistianthus urubambensis, Senecio izpanulatus, S. fortunatus, Stevia soratensis, Verbesina callacatensis (Verbenaceae), Acalypha aronioides, Croton churumayensis (Euphorbiaceae), Lepechinia floribunda, Salvia sarmentosa (Lamiaceae), Muehlenbeckia ~~==~~ tulata (Polygonaceae), Physalis peruviana, Solanum aloysiaefolium (Solanaceae), Calceolaria tripartita, C. engleriana (Scrophulariaceae), Meriania jasminioides (Valerianaceae).

Herbs. The herbs of the montane dry forest life zone are nearly
 widespread weeds, many of them Eurasian, not surprising in view of
 extensive cultivation here. Most of the herbs are compositae. Herbs
 here include: Amaranthus hybridus (Amaranthaceae), Daucus
carota (Apiaceae), Bidens andicola, Flaveria bidentis, Galinsoga
radiata, Heliopsis bupthalmoides, Jungia floribunda, Neocuatrecasia
rella, Schkurgia pinnata, Senecio vulgaris, Sigesbeckia jorullensis,
Basella oleracea, Tagetes maxima, Taraxacum officinale (Asteraceae),
Basella (Basellaceae), Hackelia revoluta, Heliotropium incanum (Boraginaceae),
Stellaria media (Caryophyllaceae), Euphorbia heterophylla (Euphorbiaceae)

573 TROPICAL MONTANE MOIST FOREST (bh-MS) The upper portion of the
 Huayocari Valley and the Yanacocha valley Located in this formation, at
 elevations from 3350 to 3800 m with an annual precipitation of
 approximately 560 mm. The mean temperature at the lower boundary is ca. 12 C,
 and at the upper limit ca. 6°C. Although there is not much more rain than on
 the valley floor, the lower temperatures lead to less evapotranspiration
 and more humid conditions which favor plant life.

This area is also used intensively for cultivation of corn and beans.
 What was originally probably an Escallonia resinosa woodland has been
 overexploited up to elevations of ca. 3600 m. However, between 3600 and
 3800 m there is a surviving "mixed forest" with the highest vegetational
 diversity of this region. This diversity of species increases toward the
 middle part of the Yanacocha valley where there has been less disturbance,
 where the original plant communities are still intact.

Mixed forest of the montane moist forest life zone. Trees are well represented in the "mixed forest" of the moist forest life zone. Especially predominant are Verbenaceae with six important tree species and Escallonia with three. One of the most dominant species is

Escallonia resinosa, with an altitudinal range between 3300 and 3700 m.

This species forms mixed forest, with several other arborescent species including Myrcianthes oreophylla, Duranta armata, Tillandsia mandonii, Inharelxylum herrerae, and C. dentata. This forest type is common on the slopes.

Toward the middle part of the deep valleys, where conditions are more

mesic, the number of species increases with additional trees including

Alnus acuminata, Vallea stipularis, Citharexylum pachyphyllum, Hesperomeles

lanuginosa, H. palcensis, Myrica pubescens, Pineda incana, Chromolaena

pinnata. Several epiphytes commonly occur in this forest, especially on

Escallonia. The three principal species are Tillandsia mandonii, Tillandsia

gayi, and Tillandsia cerrateana.

The most common species of trees in the montane moist forest are: Escallonia

longifolia (Asteraceae), Alnus acuminata (Betulaceae), Buddleja

incana (Buddlejaceae), Vallea stipularis (Elaeocarpaceae), Escallonia

rezilloides, E. resinosa (Escalloniaceae), Sebastiana obtusifolia

(Flacourtiaceae), Pineda incana (Flacourtiaceae), Myrica pubescens

(Myricaceae), Hesperomeles lanuginosa, H. palcensis (Rosaceae),

«

Inharelxylum dentatum, C. herrerae, C. pachyphyllum, Aegiphyla mortoni,

Duranta armata, D. mandonii (Verbenaceae).

In this vegetational formation the dominant shrubs belong to the

tribe of Asteraceae: Ageratina pentlandiana, Ageratina

bergiana, Chromolaena connivens, Helogyne tacaquirensis,

; Aeglegetia discolor, and Stevia soratensis, along with some Baccharis spp., Columellia obovata and Berberis boliviana. Woody vines are abundant, especially Passiflora mollissima, P. pinnatistipula, and the natural hybrid Passiflora X rosea.

Above the Escallonia resinosa forest, the slopes up to 3700 to 3800 have a dense closed-canopy forest where the characteristic species are Iscaionia myrtilloides, Citharexylum dentatum, and Hesperomeles lanuginosa. Between 3800 and 3850 there is a marked ecotone where the shrub Brachyotum naudinii is dominant. In this ecotone between forest and puna, shrubby species as Gaultheria glomerata, Pernettya prostrata, Vaccinium floribundum are also common as are herbs such as Lysipomia inciniata, Halenia weddelliana, and several Poaceae species. The arborescent species in this ecotone, such as Escallonia myrtilloides and Bynoxys longifolia, also constitute in places a transition to the Myrtilloides besserii forest, which extends from the upper limit of the Escallonia forest upward to 4200 m.

b) **Shrubs.** Shrubs occur both around the edge of the forest and in undisturbed areas in it. Among the shrubs of this vegetation are: Aeglegetia tricuneata, B. chilco, Cronquistianthus volkensis, Senecio rudbeckiifolius, S. rufescens, Viguiera procumbens (Asteraceae), Berberis earinata, B. humbertiana (Berberidaceae), Columellia obovata (Columelliaceae), Vaccinium floribundum (Ericaceae), Senna birostris (Fabaceae), Minthostachys spicata, Satureja boliviana (Lamiaceae), Brachyotum naudinii (Melastomataceae), Solanum nitidum (Solanaceae).

c) **Herbs.** Most of the herbs common in the moist forest climate are different from those in the dry forest valley floor vegetation and most

species. Only widespread *Daucus montanus* is common in both Bones. Common herbs include; *Daucus montanus* (Apiaceae), *Conyza - ' '----- a*, *Cosmos peucedanifolius*, *Gamochaeta spicata*, *Hieracium •: rrerae*, *Hypochoeris echeagarayi*, *Perezia pungens*, *Senecio - . :. :.f plus*, *S. herrerae*, *Stevia cuzcoensis*, *S. galeopsidifolia*, *laxa*, *T. pusilla* (Asteraceae), *Halimolobus* sp., *Lepidium • - - - -.i-iifidum* (Brassicaceae), *Arenaria lanuginosa* (Caryophyllaceae) . large spiny caulirosette plants also occur in this habitat: *Puya .:ra* and *P. herrerae* (Bromeliaceae). vines. Vines are better represented here than in the dry

Several species of both dicot and monocot climbers are common in i 1st forest formation. They include; *Apodanthera herrerae*, *Sicyos . - I- curbitaceae*), *Passiflora gracilens*, *P. mollissima*, *P. 5 • . '..-:::ula* (Passifloraceae), *Bomarea caldasii*, *B. sanguinea r:i;=:iaceae*). -T1ZPIS FOPvEST

:be study area, above elevations from 3750 to 4600 occur -:_:i; stands of *Poivylepis* woodland. This area of 350 hectares, : = the closed drainage of Yanacocha and Kellococha lakes.

zr.a *Poivylepis* woodland occurs at the same altitude as the puna Mpped as puna by Holdridge, it is here treated as a distinct type '*til*. rather than as a part of the puna (or pmh-SaS).

Rolylepis forest is found on rock slides with an easterly and ■spect. According to Walter and Medina (1969) an explanation ;f these trees in such unfavorable climatic conditions may be - : : ilands occur in more favorable microhabitats. In certain ".:_- = areas localized soil temperatures are distinctly higher

than in others; these are "niches of warmth". The minimum night temperatures of the Polylepis forest were observed to be ca. 7 C higher than on other exposed faces (Walter & Breckle, 1984). Polylepis is the highest naturally occurring arborescent dicotyledon genus of the world (Bardie, 1971).

The composition of the Polylepis woodland changes with altitude. Host of the forest has P. besseri as the dominant species, but above ca. 100 m P. subsericans appears. Around 4200 m the two occur sympatrically, an unusual situation in Polylepis (Simpson, 1979). In the Vinacocha Polylepis forest are also found dispersed individuals of such arborescent species as Escallonia myrtilloides, Gynoxys aff. nitida, and I. pillahuatensis. The presence of many understory and epiphytic species :f mosses, lichens, and ferns reveals the high moisture level in this ::rest type. The following is a short list of several of the common

:"-arborescent species:

a) **Shrubs:** Senecio ayapatensis, S. hastatifolius, S. hohenackeri, S. peruensis, S. praeruptorum (Asteraceae), Berberis saxicola (Berberidaceae), Ribes brachybotrys (Grossulariaceae), Hesperomeles ezarophylla (Rosaceae).

b) **Vines.** Pentacalia sp. (Asteraceae), Fuchsia apetala (Inagraceae), Passiflora trifoliata (Passifloraceae), Salpichroa hirsuta (Solanaceae), Bomarea edulis (Alstroemeriaceae).

c) **Herbs.** Azorella biloba, Bowlesia sodiroana (Apiaceae), Pyrocline alata, Senecio comosus, S. puna-sessilis, S. rhizomatus, Leraeria orbignyana (Asteraceae), Begonia veitchii (Begoniaceae), Plagiobothrys humilis, Hackelia mexicana (Boraginaceae), Cerastium

glomeratum (Caryophyllaceae), Plantago lamprophylla (Plantaginaceae),
Peperomia verruculosa (Piperaceae) , Valeriana coarctata, V. micropterina,
V. parvula (Valerianaceae). 5. **PUNA OR** SUBTROPICAL SUBANDEAN WET
PARAMO (pmh-SaS)

Although termed "subtropical subAndean wet paramo" by the Holdridge system, this is essentially the wet fascies of the high Andean vegetation universally known as puna in Peru and I will here refer to it by that name. Elevationally this formation is situated from 3900 to 4600 m on the slopes surrounding the Polylepis woodland. This area is much moister than the valley floor in both absolute and relative terms. The mean annual precipitation is about 1300 mm, with mean temperatures ranging between 5.2° and 3.9°C.

A set of peculiar plant life forms occur in high tropical montane habitats (Hedberg, 1979; Rauh, 1979; Smith and Young, 1987). Such life forms include acaulescent rosette herbs, cushion plants, and pachycaul kerb-trees. At the higher elevations of the Yanacocha region, cushion plants and rosette herbs are common, but pachycaul trees, represented in the Andes by Espeletia in Colombia and northern Ecuador, are absent, although some Puya species approximate them. Very few species of reduced trees occur as scattered individuals in the puna; all are found more typically inside the Polylepis woodland. These include;

a) **Trees.** Polylepis subsericans, Escallonia myrtilloides, Gynoxys aff. nitida, Citharexylum dentatum, Buddleja coriacea.

b) **Sclerophyllous shrubs:** Several species of sclerophyllous shrubs and subshrubs occur in the wet puna of Yanacocha. The most common species are: Baccharis odorata, Senecio ayapatensis, S. hastatifolius

-.steraceae) , Berberis saxicola (Berberidaceae), Siphocampylus i::inothrix (Campanulaceae), Pernettya prostrata (Ericaceae), Ribes :rachybotrys (Saxifragaceae), Brachyotum naudinii (Melastomataceae).

c) **Caulirosettes.** Dense communities of Puya herrerae and P. iensiflora are also present in this region.

d) **Cryptofrutices.** The puna at Yanacocha includes a number of :.:racteristic species of dwarf chamaephytic prostrate shrub including: 3=ccharis alpina, Senecio evacoides, Gaultheria glomerata, Ourisia ihamaedrifolia, Tetraglochin cristatum.

e) **Acaulescent rosette herbs.** Generally stemless rosette plants ire another characteristic feature of the puna, and they are well represented at Yanacocha. Families represented are Umbelliferae, -.5 r.eraceae, Malvaceae, Plantaginaceae, Solanaceae, and Valerianaceae. I:-mon species include; Oreomyrrhis andicola, Belloa pitolepis, //pochoeris meyeniana, Novenia tunarieasis, Senecio comosus, S. :.:livarianus, S. antennaria, Acaulimalva engleriana, Plantago australis, .ilandrinia acaulis, Solanum acaule, Valeriana coarctata, V. parvula, ■ysipomia laciniata.

f) **Cushion plants.** Another puna growth form is the cushion plant. The dense flattened or hemispherical cushion plant is composed of densely *zizked* and interwoven stems with an outer layer of living leaves. The ;:nmon species of cushion plants at Yanacocha are: Azorella biloba, - pochoeris taraxacoides, Perezia integrifolia, Werneria caespitosa, W. :£2tinata, W. rosenii, W. strigosissima, Saxifraga magellanica, Valeriana E:athulata, Aciachne pulvinata.

:. LAKES AND SWAMPS

Glacial lakes are a characteristic specialized habitat of the high Andes and have a distinctive associated aquatic flora. The Yanacocha and Kellococha lakes, as well as several streams in the valley bottoms create aquatic habitats where it is possible to observe the following species:

a) **Swamps:** Hypochoeris echegarayi, Polygonum hydropiperoides, Veronica serpyllifolia, Limnolobos limoselloides, Alchemilla diplophylla, Mimulus glabratus.

b) **Lakes and streams:** Callitriche heteropoda, Myriophyllum azuaticum, M. quitense, Ranunculus trichophyllus, Crassula venezuelensis.

SUMMARY OF FLORISTIC COMPOSITION AND

COMPARISON WITH OTHER FLORULAS

There are significant changes in floristic composition between the different vegetational types. In the lower montane thorn steppe, Urticaceae, Asclepiadaceae, Cactaceae, and Asteraceae (especially Gravilleae and Mutisieae) are prevalent. In the lower montane dry forest the Urticaceae, Asteraceae belong to the tribe Astereae, while Fabaceae, Malvaceae, and Verbenaceae become the other most important elements. In the montane moist forest, again there is a change in Asteraceae with Heliantheae and Heliantheae becoming the most prevalent tribes. In addition to Verbenaceae and Fabaceae, Lamiaceae, Passifloraceae, Polygonaceae, Rosaceae, Solanaceae and Scrophulariaceae **also** become important components of the vegetation, but Malvaceae mostly drop out. In the highest altitudes, in the Polylepis forest and puna, Senecioneae becomes the dominant group of Asteraceae. Rosaceae (Polylepis,

Hesperomeles, and in the puna, Alchemilla) remain important, while north temperate families, such as Valerianaceae and Caryophyllaceae become so. In addition the high altitude Bromeliaceae genus Puya becomes conspicuous as, of course, does Poaceae. It is especially noteworthy that there is a different predominant tribe of Compositae in each vegetation type.

Most Yanacocha species are restricted to or at least occur mostly in a single habitat. Only 132 species occur in more than one major habitat. By far the most diverse vegetation unit is the moist montane forest that has about twice as many species as any other vegetation type. Table 2 indicates the approximate number of species in each habitat. Other than the subtropical montane moist forest, which has 36% of the total Yanacocha species, each habitat has about the same number, between 73 and 90 species. If the two high altitude vegetations types, puna and Polylepis forest, are considered as a single unit, however, they have nearly as many species as the moist forest, 175 (or 35%).

Not indicated in Table 2 are the 132 species, constituting 26% of the total flora, that are found in more than one habitat. It is noteworthy that at Yanacocha the high altitude formations are richer in species than the lower altitude ones, contrary to the general altitudinal decrease in species diversity (e.g., Gentry, 1988), in part the result of the drier, less hospitable conditions at lower altitudes and in part to the greater disturbance to which the valley floor has been subjected. This finding emphasizes the fact that in the high Andes much of the floristic interest occurs at higher altitudes and consequently conservation efforts increasingly must be focussed there, as well as in the more publicized lowland rain forests.

Table 2. Number and percentages of species by habitat in Yanacoc h

HabUats	Number of species		Number of species in more than one habitat
	in habitat	Percentage	
Subtropical Lower montane thorn steppe (e-MS)	73	14	74
Subtropical Lower montane forest (bs-MS)	80	1.6	82
Subtropical montane moist forest (bh-MS)	182	36	191
Polylepis forest	85	19	89
Puna or subtropical sub-Andean Forest wet paramc	> -SaS) 90 (prh-	1.8	93

The Yanacocha flora includes 96 families, 270 genera and 510 species of vascular plants. Table 3 shows the distribution of the families, genera, and species in each major vascular plant group and the percent distribution of each of these major groups to the flora. The great diversity of taxa at each level are dicots. While the percent contribution of pteridophytes (and the minor representation of gymnosperms) is similar to that of many lowland tropical forests (e.g., Irigoin, 1978; Dodson & Gentry, 1978; Dodson et al., 1985), monocots seem to be much more poorly represented than in lowland tropical florulas (18% of the species versus 25-30% in lowland florulas).

Moreover, although there are many families and genera, relatively few of them contribute a large number of species to the flora. This same feature has also been noted in other high Andean floras (Tables 4-7). COMPARISONS OF THE YANACOCCHA FLORA WITH OTHER HIGH-ANDEAN FLORULAS Several other high-Andean localities have florulas comparable to that of Yanacocha. These include: (1) flora of the Argentine Puna adapted by Ruthsatz (1977); (2) flora of the Colombian paramos from Cleef et al.; and (3) flora of the Huascarán National Park from Smith (1988).

The Argentine Puna is located between 22°00' to 24°30' southern latitude and 65°00' to 67°00' western longitude, comprising altitudes between 2000 m and 5200 m. The climate is arid showing strong seasonal variation in temperature as well as rainfall. The distribution of precipitation varies altitudinally from 50 to 400 mm annually (Ruthsatz,

.

Table 3. Taxonomic **breve** review of Yanacocha vascular plants.

	Families		Genera		Species	
C-gymnosperms	1	1%	1	0.4%	1	0.2%
Pteridophytes	6	6%	13	5%	28	5%
Monocots	14	15%	36	13%	92	18%
Dicots	11	78%	220	81%	389	76%
Total	96		270		510	

--.~ Comparative diversity of high Andean florulas.

	Manacocha	Huascarán	Argentine	Colombian
	forest	Nat'l. Park (Smith, 1988)	Puna (Rutsatz, 1977)	Paramos (Cleef, 1981)
***	96	104	69	78
	270	339	288	214
	510	799	630	485

Table 5. Comparative taxonomic breakdown of the other high-Andean

: lorulas.

Irgentinan Puna;

	Famili es		Genera		Species	
I- /rmosperms	1		1	0.3%	3	0.4%
?:eridophytes	6	9%	11	4%	15	2%
.: r.ocots	10	14%	63	22%	147	23%
I icots	51	75%	213	73%	465	74%
::TALS	69		288		630	

Colombian Paramos:

	Famili es		Genera		Species	
J-/zmosperms	-		-		-	
r.eridophytes	13	17%	20	9%	39	8%
	13	17%	49	23%	103	21%
c l c 01s	52	66%	145	68%	343	71%
TOTALS	78		214		485	

-.ascan National Park;

	Famili es		Genera		Species	
I-Timosperms	1		1		1	
-: ceridophytes	14	13%	28	9%	67	8%
-: locots	18	17%	75	22%	206	26%
Zicots	71	68%	236	69%	525	66%
:::ALS	104		339		799	

Table 6. The ten largest families comparatively among the four high Andean florulas.
Yanacocha Forest;

Family	Genera	Species
1. Asteraceae	48	101
2. Poaceae	23	34
5. Fabaceae	17	22
Orchidaceae	9	10
5. Solanaceae	8	18
6. Scrophulariaceae	7	17
Caryophyllaceae	7	12
5. Lamiaceae	7	10
1. Rosaceae	6	14
13. Verbenaceae	5	10
TOTAL	137	248

Argentinan Puna:

Family	Genera	Species
1. Asteraceae	50	133
1. Poaceae	41	87
1. Brassicaceae	13	14
Caryophyllaceae	10	25
1. Fabaceae	10	40
1. Solanaceae	9	19
Cactaceae	7	37
1. Verbenaceae	7	15
Cyperaceae	5	14
1. Portulacaceae	2	15

Table 6, continued

Colombian Paramos:

Family	Genera	Species
Asteraceae	33	122
Poaceae	17	31
Scrophulariaceae	9	17
Orchidaceae	9	10
Cyperaceae Apiaceae		22
Ericaceae Rosaceae		20
Melastomataceae 10.		10
Juncaceae TOTAL	7	19
	6	13
	<u>3</u>	9
	108	273

Huascarán National Park;

Family	Genera	species
	59	164
	32	111
Asteraceae	12	33
Poaceae	11	19
Scrophulariaceae	11	15
Orchidaceae	10	25
Brassicaceae	10	20
Caryophyllaceae	9	18
Cyperaceae	8	26
Rosaceae	<u>8</u>	<u>26</u>
Fabaceae	170	457
Solanaceae		
TOTAL		

Table 7. Percentages of genera and species in the ten largest families of the four florulas

	Genera	Species
tanacocha forest	51%	49%
Argentinian Puna	54%	63%
Colombian Paramos	50%	56%
Peruvian National Park	50%	57%

Study area of the Colombian Paramos is situated between 3°55' to 0°00' southern latitude and 72°10' to 73°50' western longitude. The ranges are between 2500 and 4800 m. Due to its geographical position near the equator the climate is of the humid tropical type, with seasonal variation in temperature. Annual precipitation rates are 1500 and 3000 mm (Cleef, 1981). El Inga National Park is located between 8°40' to 10°20' latitude and 77°10' to 77°55' western longitude, the elevation is 2200 to 6770 m. Precipitation ranges between 470 and 1400 mm annually (Cleef, 1988). In general, the areas studied in Argentina, Colombia, Ecuador and Venezuela are larger than the Yanacocha area, which has only ca. 40 km² area intensively studied constituting only ca. 1500 km². Essentially the same families make up the floras of all four areas (Table 6). Asteraceae is always by far the most diverse family. The other most diverse families are Poaceae, Rubiaceae, Solanaceae, Scrophulariaceae, Caryophyllaceae, Ericaceae, and Verbenaceae. In the Yanacocha flora, only 61% of the families are represented by more than one genus, and 39% are represented by a single species. The 10 most diverse families account for 51% of the genera in the flora and 49% of

The equivalent results for other high Andean florulas are given in Table 7. In each flora about half the genera and species belong to a relatively small number of families. Together, the first five families contribute 26% of the genera and 26% of the species in the Yanacocha flora. Again, the preponderance of these two families is characteristic of high Andean vegetations (Table 8).

Table 8. Percentages of the three largest families in ; four Andean florulas.

Florula	Largest family (%)	Second largest (%)	Third largest (%)
Yanacocha forest	Asteraceae (20%)	Poaceae (7%)	Fabaceae (4%)
Argentinan Puna	Asteraceae (21%)	Poaceae (14%)	Fabaceae (6%)
Colombian Paramos	Asteraceae (25%)	Poaceae (6%)	Cyperaceae (4%)
Huascarán Nat'l Pa rk	Asteraceae (25%)	Poaceae (14%)	Scrophulariaceae (4%)

The mean number of species per genus at Yanacocha is 1.8; however, 66% of the genera are represented by a single species and another 25% by two or three species. Only 9% of the genera are represented by more than three species.

The ten largest genera account for 16% of the species in the Yanacocha flora (Table 9), and the largest genus, *Senecio*, alone accounts for almost 3% of the species in the entire flora (Table 10). *Senecio* is also the largest genus in two of the other three florulas. Only in Colombia is it replaced as the largest genus by *Espeletia*, and the species of that genus are largely microallopatric, occurring in different branches (some authors have split many off into segregate genera).

LIST OF YANACOCCHA TAXA

The following list includes all families, genera, and species of flowering plants found in the flora of Yanacocha forest. A list of non-vascular plants is also included, but not herein considered in most analyses. They are conspicuous and important elements, especially in the *Allylepis* woodland, and would be worthy of more detailed treatment than outside the scope of this thesis.

The taxonomic treatment of each family includes a short description of the family, keys for the species, and a short description for each species. The descriptions of species are based almost entirely on the specimens collected in the Yanacocha forest, except when the collections were insufficient. Collections from the Huayocari Valley (C. Vargas, 1983) have also been included as have some descriptive data from the reference works cited in the literature. The descriptions include all dicots and monocots except the Poaceae. Those interested in the Poaceae should consult the recent treatment by Tovar (1990).

Table 9, The ten largest genera in four Andean :loruias.

Genus (Family)	Number of	Species
Yanacoc ha f ores t:		
- Senecio (Asteraceae)	ca.	17
-• Baccharis (Asteraceae)	ca.	10
3. Werneria (Asteraceae)	ca.	9
-. Bomarea (Alstroemeriaceae)	ca.	8
; Calceolaria (Scrophulariaceae)	ca.	7
:, Solanum (Solanaceae)	ca.	7
- Sisyrinchium (Iridaceae)	ca.	7
Valeriana (Valerianaceae)	ca.	7
:. Tillandsia (Bromeliaceae)	ca.	6
10 Alchemilla (Rosaceae)	ca.	5
' TOTAL		83
Argentinan Puna:		
-• Senecio (Asteraceae)	ca.	26
• Opuntia (Cactaceae)	ca.	13
- Stipa (Poaceae)	ca.	14
-. Festuca (Poaceae)	ca.	9
Calandrinia (Portulacaceae)	ca.	9
Astragalus (Fabaceae)	ca.	9
- Echinopsis (Cactaceae)	ca.	9
Bacharis (Asteraceae)	ca.	8
Valeriana (Valerianaceae)	ca.	7
-: Arenaria (Caryophyllaceae)	ca.	7
• TOTAL		116

Table 9, continued.

Genus (Family)	Number of	Species
Colombian Paramo;		
-• Espeletia (Asteraceae)	ca.	25
-• Hypericum (Hypericaceae)	ca.	23
- Senecio (Asteraceae)	ca.	15
•		
- Diplostephium (Asteraceae)	ca.	14
-• Pentacalia (Asteraceae)	ca.	12
:		
Carex (Cyperaceae)	ca.	11
•		
- Paepalanthus (Eriocaulaceae)	ca.	8
Espeletiosis (Asteraceae)	ca.	7
,		
1. Gynoxys (Asteraceae)	ca.	7
13 Calamagrostis (Poaceae)	ca.	7
•		
TOTAL	129	-
Huascarán National Park:		
-• Senecio (Asteraceae)	ca.	39
-• Calamagrostis (Poaceae)	ca.	21
i Werneria (Poaceae)	ca.	18
- Poa (Poaceae)	ca.	16
:		
Solanum (Solanaceae)	ca.	16
•		
: Calceolaria (Scrophulariaceae)	ca.	15
•		
- Lupinus (Fabaceae)	ca.	15
Baccharis (Asteraceae)	ca.	13
1 Valeriana (Valerianaceae)	ca.	13
- Festuca (Poaceae)	ca.	12
* TOTAL	178	

Table 10. Contribution of largest genera to the Andean florulas.

Florula	% of the species in the ten largest genera	% of the species in largest genera
Argentina Puna	18%	Senecio 4%
Colombia Paramos	27%	Espeletia 5%
Ecuador Nat'l. Park	22%	Senecio 5%
Venezuela	16%	Senecio 3%

The familial classification system of the angiosperms adopted here is that of Cronquist (1981) as modified by Dahlgren (1988) for the zonosperms. This is the same system followed by Smith (1988), so any results are directly comparable to his.

The following are the families, genera and species -
eluded in the flora of Yanacocha forest: :N VASCULAR

PLANTS

LICHENS

r.adonia andesita Vainio iladonia sp.
aff. andesita Vainio riadonia confusa (R.
Sant.) Follm. & Ahti lladonia furcata
(Hudson) Schrader Iietyonema glabratum
(Sprengl.) Hawk.
I erniastrum lipidiferum (Hale & M. Wirth) Hale ex Sipnan
.-erniopsis trulla (Ach.) Nyl. ?lavopunctella flaventior
(Stirton) Hale iypotrachyna ensifolia (Kurokawa) Hale -
/potrachyna gigas (Kurokawa) Hale -/potrachyna reducens
(Nyl.) Hale ^ptogium digitatum (Massalongo) Zahlbr
irmotrema sp.
-^Itigera sp. (undescribed sp.)
:eltigera canina (L.) Willd.
^.ereocaulon meyeri Stein ^.ereocaulon
myriocarpum Th. Fr. 5~ereocaulum
ramulosum (Sw.) Rausch r.icta weigellii
(Ach.) Vainio Tsnea spp.

MUSCI

L-?.TRAMIACEAE

Ereutelia nigrescens Herz.

3?YACEAE

-ndodontium longifolium (Par.) Broth.

IICRANACEAE :^risodontium mittenii (C. Mull) Broth.

:?:MMIACEAE

-acomitrium crispilum (Tayl.) Jaeg.

5ZDWIGIACEAE

:rsunia canescens Schimp ex Britt.

-£?YRODANTACEAE

-«=pyrodon tomentosus (Hook.) Mitt.

T:KERACEAE «"~ckera

eucarpa Schimp.

POLITRICHACEAE

Polytrichadelphus magellanicus (Hedw.) Mitt.

POTTIACEAE

leptodontium erythroneuron Herz.

leptodontium tricolor (Williams) Zander

leptodontium viticulosoides (P. Beauv.) Wijk. & Marg.

leptodontium wallisii (C. Mull.) Kindb.

~*UIDIACEAE

Tnuidium peruvianum Mitt.

"ASCULAR PLANTS

PTERIDOPHYTES

--IIANTACEAE

-iantum poiretii Wikstr. *-rgyrochosma nivea* (Poiret)

Windham *--eilanthes marginata* Kunth l. *'eilanthes pruinata*

Kunth *?ellaea ovata* (Desv.) Weath.

-SPLENIACEAE

-splenium fragile C. Presl *-splenium monanthes*

L. *-splenium sessilifolium* Desv.

-splenium triphyllum C. Presl *Ilaphoglossum*

sp (1) *LLaphoglossum* sp (2)

• *rodsia montevidensis* (Sprengel) Hieron.

IP.YOPTERIDACEAE

-lystichum sp.

::lystichum montevidense (Sprengel) Rosenstock var *montevidense* *alystichum montevidense*

(Sprengel) Rosenstock var *nudicaule* Rosenstock) R. Tryon

IftMMITIDACEAE rammitis sp *irsrunitis peruviana*

(Desv.) C. Morton

IOPODIACEAE t-

perzia sp.

-perzia saururus (Lam.) Trev. St. Leon .."*opodium* sp.

PCLYPODIACEAE

-pyloneurum amphostemon (Kuntze ex Klotzsch) Fee.

lampyloneurum ensifolium (Willd.) J. Sm. *icrogramma
 chrysolepis (Hook.) Crabbe
 iphidium sp. ?ecluma curvans (Mett.) M.G. Price
 fc>lypodium buchtienii Christ. & Rosenstock --olypodium
 bryopodium Maxon rolypodium murorum Hook.

GYMNOSPERMS

■PHEDRACEAE

Ephedra americana H. & B. ex W.

ANGIOSPERMS

MONOCOTS

I.-.VACEAE

-rcraea andina Trelease

-liTROEMERIACEAE

-area caldasii (Kunth) Asc. ex Graebner
 -area aff cernua Griseb ex Baker
 -area aff edulis (Tusac) Herbert
 ::zarea dulcis (Hook.) Beauverd :-
 =rea ovata (Cav.) Mirbel
 -area aff petraea Kranzlin
 rizarea puberula (Herbert) Kra.
 "irea sanguinea Kranzlin

—*— -YLLIDACEAE

I-^-ephia coccinea Cavanilles
 ~: v.'ranthes parvula Killip

-- THZRICACEAE

^--eandia eccremorrhizum (Ruiz & Pavon) Cruden

---- :IAE

::nidium vargasii Bogner & Nicholson ■■■-
 i"~.antheum orbignyanum Schott

l= -ZLIACEAE

' densiflora Harms *- " i
 ferruginea Ruiz & Pavon Pt": a
 herrerae Harms *i": "a
 iongistyla Mez.
 ..andsia capillaris Ruiz & Pavon f. virescens L. B. Smith -
 i-.dsia cerrateana L.B. Smith

Tillandsia nana Baker *Tillandsia usneoides*
 Linnaeus *Tillandsia walteri* Mez.

DDMMELINACEAE -*allisia repens* Linnaeus -
smmelina longicaulis Jacq. -*rmmelina fasciculata*
 Ruiz & Pavon

liPERACEAE

lirex boliviensis Van Huerck & Mueller
lyperus aggregatus (Willd.) Endl.
yperus seslerioides H.B.K.
liirpus inundatus Poir.
 - *irpus rigidus* Boeck.

IIOSCOREACEAE -*scorea incayensis*
 Knuth

• :?OXIDACEAE

rypoxis humilis H.B.K.

:?:DACEAE

"irdenanthus sp. (undescribed)
ry-pella peruviana ssp *communis* Rav.
sella peruviana ssp *herreriae* (R.S. Foster) Rav.
 I -*syrinchium junceum* E. Meyen :-*syrinchium* aff
palmifolium Linnaeus
 -*syrinchium* aff *palustre* Diels
 -*syrinchium* aff *porphyreum* Kranzl.
 -*syrinchium praealtum* Kranzl
 -*syrinchium pusillum* Kunth
 -*syrinchium scirpoideum* Poeppig

"TS' CACEAE

^*Jir.cus bufonius* Linnaeus
 ."^-*.cus ebracteatus* E. Meyen
 i*Lizula racemosa* Desv.

LIACEAE *-*T.-oscordum* and *i col a*
 Kunth *Firrunatia sessiliflora* (R. E. Fries)
 Rav.

: - :DACEAE he -*eberbaueri* Schltr.
Htensteinia fimbriata H.B.K. [■*tsilea*
peruviana (Presl.) Garay *Iz.iendrum*
excisum Lindl. fc.=*xis fastigiata* (
 Reic. f.) O. Ktze.

Laxis tarmensis (Kranzl.) C. Schweinf. var *elata* C.Schweinf.
 ""•-^*anthus serripetalus* (Kranzl.) Luer r :... *iiun*
aureum Lind.

Eleocharis weberbaueri (Kranzl.) Scltr.
Eleocharis concaviflora C. Schweif.

: :ACEAE

Eleocharis pulvinata Benth
Eleocharis cenchroides Humb. & Bonp. ex Willdenow
Eleocharis aff. boliviana Mez.
Eleocharis tolucae Kunth -
Eleocharis adscensionis Linnaeus •:
Eleocharis simplex Lag.
Eleocharis cathartica Vahl.
Eleocharis lanata Kunth
Eleocharis glacialis (Wedd.) Pilger
Eleocharis ovata (Presl.) Stendel
Eleocharis recta (H.B.K.) Trin. I: =
Eleocharis vicinarum (Wedd.) Pilger
Eleocharis halophylla L. Parodi
Eleocharis nitida (H.B.K.) Pilger -
Eleocharis mathewsii Ball
Eleocharis minimum Pilger
Eleocharis nigricans (H.B.K.)
Eleocharis casapaltensis J. Ball
Eleocharis muticum Presl. *Eleocharis*
Eleocharis cristata (L.) Pers. *Eleocharis*
Eleocharis scabra H.B.K.

■ *Eleocharis peruviana* (P. Beauv.) Stendel
Eleocharis pubiflora (Trin. & Rupr.) Desv.
Eleocharis depauperata J. S. Presl.
 . : = *Eleocharis prostrata* Schribner & Merr. ~ -
Eleocharis clandestina Hochst. ex Chiov. annua
Eleocharis orridula Pilger "-..-"
Eleocharis lutosus Hitchc., *Eleocharis poiretii* Hitchc.
Eleocharis ichu (Ruiz & Pavon) Kunth

I *Eleocharis obtusa* (Nees & Meyen) A.
 Hitchc.
Eleocharis setum spicatum (L.) Richtt.
 DICOTS

•- TrlACEAE
 • *Eleocharis dulcis* (Cavanilles) Ness

fc.-j-7HACEAE

■ *Eleocharis hybridus* Linnaeus
 i : " *Eleocharis elegans* Martius
 . *Eleocharis densa* (Willd.) Moq.
Eleocharis diffusa H. & B. ex Willd.

B 1---CIACEAE

. *Eleocharis microphyllus* I.M. Johnston
 - 5 *Eleocharis molle* Linnaeus

Schinus pearcei Engl.

APIACEAE

Azorella biloba (Schltr.) Wedd.
 3owlesia sodiroana H. Wolff.
 Daucus montanus H. & B.
 Iremocharis triradiata (Wolff.) Johnston
 -reomyrrhis andicola (Kunth) Hook. f.

ARALIACEAE

Creopanax ischnolobus Harms ¹

&SCLEPIADACEAE

lynanchum sp (1) rynanchum
 sp (2) lynanchum tarmense
 Schltr. "lelinia peruviana
 Schltr.

ISTERACEAE

--3hyrocline alata (H.B.K.) De Candolle
 - ihyrocline ramosissima (Sch. Bip.) Britton
 -geratina pentlandiana (DC.) R. King & H. Robinson
 --7eratina sternbergiana (DC.) R. King & H. Robinson
 -jzbrosia arborescens Mill.
 • risteguietia discolor (DC.) R. King & H. Robinson
 :iccharis sp. (undescribed)
 :^3charis alpina H.B.K.
 Hiccharis boliviensis (Weddell) Cabrera
 :iccharis buxifolia (Lam.) Pers.
 :i3charis chilco H.B.K.
 :i3charis odorata H.B.K.
 ^=.3charis peruviana Cuatrecasas
 Hz^charis pulchella Schultz Bipontinus
 :c3charis quitensis H.B.K.
 rrzcharis tricuneata (L. f.) Pers.
 iizcharis trimera (Less.) DC.
 Birnadesia horrida Muschl.
 elloa piptolepis (Weddell) Cabrera
 :.iens andicola H.B.K.
 rromolaena connivens (Rusby) R. King & H. Robinson
 ^-rsium vulgare (Savi) Tenore ayza deserticola
 Philipi
 :saos peucedanifolius var tiraquensis (Kunth) Scherff.
 imquistianthus urubambensis (B.L. Robins) R. King & H.
 : :binson
 rrr.quistianthus volkensis (Hieron.) R.King & H. Robinson
 lasyphyllum leiocephalum (Wedd.) Cabrera "iveria
 bidentis (L.) O.Kuntze Flcurensia polycephala Dillon
 . insoga quadriradiata Ruiz & Pavon
 ~:chaeta americana (Mill.) Cabr.
 ■:chaeta purpurea (Linnaeus) Cabrera

liziochaeta spicata (Lam.) Cabrera :-
 =phalium dombeyanum De Candolle :.-oxys
 longifolia Weddell i' .-T.oxys aff nitida
 Musch. "yr.oxys pillahuatensis
 Cuatrecasas -.eracium neo-herreræ Zahn.
 t-=liopsis buphthalmoides (Jacq.) Dunal
 t-Elogyne tacaquirensis Hieron. zcchoeris
 echegarayi Hieron. rcchoeris eremophyla
 Cabrera Eyrchoeris meyeniana (Walp.)
 Grisebach
 zzchoeris taraxacoides (Walp.) Bentham *--.gia
 floribunda Lessing r« -gia malvaeifolia Muschel
 L-zilia violacea Weddell €; zuatrecasia hirtella
 R. King & H. Robinson : ~. cast rum marginatum
 (H.B.K.) Cuatrecasas Scvenia tunariensis (O.K.)
 Freire *--isia acuminata Ruiz & Pavon l~zseris
 albicans (D.Don) Ferreyra :~-.ryosporus peruviana
 (J.Gmel.) Robinson ir = r.ephelius ovatus Weddell
 : r^r.ephelius uniflorus Poeppig & Endlicher ----
 2calia sp (undescribed)
 ezia ciliosa (Phil.) Reiche
 -=rezia integrifolia Weddell
 ezia pungens (H.B.K.) Lessing ^rezia virens (Don)
 Hooker et Arnott :-stia cuneifolia Don curia
 pinnata var. octoaristata (D.C.) Cabrera :-rzio
 sp. (undescribed ?) :-erio antennaria Weddell
 ezio ayapatensis Schultz Bipont. ex Weddell
 Sarezio bolivarianus Cuatrecasas
 ^zio campanulatus Schultz Bipont. ex Klatt
 izio comosus Schultz Bipontinus fzio
 evacoides Schultz Bipontinus •=zio
 flaccidifolius Weddel • =zio fortunatus
 Cuatrecasas :*r:io hastatifolius Cabrera
 zi'o herreræ Cabrera :..-■= zio
 hohenackeri Schultz Bipontinus ■ "Mio
 peruensis Cuatrecasas it:~zio
 praeruptorum Schultz Bipontinus
 r--=zio puna-sessiles Cuatrecasas |te--
 Ezio rhizomatus Rusby -'--:::o
 rudbeckiifolius Meyen ex Walp. r~zio
 rufescens De Candolle
P -:::o vulgaris Linnaeus
 r=zeckia jorullensis H.B.K.
 Us oleraceus Linnaeus la
 cuzcoensis Hieronymus

5*evia **galeopsidifolia Hieronymus**
 i*svia **soratensis Hieronymus**
 '::e~es **laxa Cabrera** '-:=res **maxima**
O. Kuntze Tire-es multiflora H.B.K.
 "ire-es **pusilla H.B.K.**
 ixacum **officinale Waber**
 •is **divaricata H.b.K.** trresina
 callacatensis Hieronymus r.iera
 procumbens (Pers.) Blake --r==ria
 apiculata Schultz Bipontinus
 ~eria **caespitosa Weddell fctz-**
eria nubigena H.B.K. **~r = r:a
 orbignyana Weddell ^ria pectinata
 Lingelsh **fctr-^ria pygmaea**
 Gillies **fcr-** eria **rosenii R. E.**
 Fries **■ter-^ria strigosissima A.**
 Gray

■ =ria villosa Gray . =
 peruviana Linnaeus

it.:-. .=. alba Linnaeus
 .:~ = tuberosus Lozano

~ = veitchii **Hooker**

~r== boliviana Lechler ns
 carinata Lechler :is
 humbertiana Macbride **ris**
 saxicola Lechler

t_-=. zexicana (Schleth. & Cham.) I. M. Johnston
fci" revoluta (**Ruiz & Pavon**) I.M. Johnston :::um
incanum Ruiz & Pavon •:;lum **microstachyum Ruiz &**
Pavon ::t.-.rys humilis (Ruiz & Pavon) I.M.
Johnston

:=~pestris Linnaeus r.igra Linnaeus
 ■LLi **rusa-pastoris (Linnaeus) Moench**
 ■accrri.-ia perkinsiana **Muschl.**

K -" zipinnatifidum Desvaux

^pidium chichicara Desvaux
rcripa nasturtium-aquaticum (Linnaeus) Hayek
 I Lsymbrium sp

r::LEjACEAE
 :-idleja coriacea Remy
 i-idleja incana Ruiz & Pavon

STXACEAE

E*r/loceras laurifolia (Willd.) H.B.K.

"-- ITACEAE

rirryocactus **squarrosus** (Vaup.) P. **Hutchinson**
 fcriinopsis cuzcoensis (Britton & J.Rox) Friedrich & G.D. Roley
 l-rvibia **maximiliana** var. **corbula** (Herrera) **Rausch**
 :- **r.tia exaltata** A. Berg
 Ip_r.tia **ficus-indica** (Linnaeus) Miller

1ITRICHACEAE i-litriche heteropoda
 Engelm. ex Hegelm.

ISXrANULACEAE

.istatea **micrantha** (H.B.K.) Mc Vaugh
 :relia **tenera** H. B.K.
 - sipomia **laciniata** A. De Candolle subsp **laciniata**
 :.; -.ocampylus **actinothrix** Wimmer
 --ir.ocampylus **tupaeiformis** A. Zahl.

--•"LOPHYLLACEAE

r=r.aria lanuginosa (Mischaux) Rohrb ~r.aria standleyi
 Baehni & J.F. Macbride ::ionema ramosissima (Weinm.)
 Nelson & Macbride istium **danguyii** Macbride isrium
 glomeratum Tuill. -"istiun **nutans** Raf. ~T=ria cordata
 (Linnaeus) Willd. ex Roemer & Schultes kynaria **aff**
divaricata Kunth var stricta (Rusby) Duke
 rnychia **andina** Rohbr. Scergularia
aff andina Rohbr. "^Llaria
cuspidata Willdenow i-laria media
 (Linnaeus) Villars

-- S TRACEAE ■r:~enus
cuzcoina Loesener

: : :?ODIACEAE

2:•=- -podium aff. album Linnaeus (undescribed ?)
 -cpodium ambrosioides Linnaeus
 r:=---podium murale Linnaeus
 :podium petiolare H. B. K.
 • rpodiun quinoa Willdenow

1:LUMELLIACEAE

::lumellia obovata Ruiz & Pavon

XNVOLVULACEAE

ip. (undescribed)

"cnvolvulus crenatifolius Ruiz & Pavon

I.scuta grandiflora H. B. K.

"::3oea minuta R.E. Fries

:--.5 SULACEAE

ir=ssula venezuelensis (Steyermark) Bywater & Wickens

Iir.everia westii E. Walther

DDCURBITACEAE

-irdanthera herrerae Harms

ryclanthera brachybotrys (Poepp. & Endl.) Cogniaux

:yd anther a pedata (Linnaeus) Schrader

" - ~yos baderoa Hooker & Arnott

rryoNiACEAE

•einmannia pinnata Linnaeus

ELAEOCARPACEAE

iliea stipularis Linnaeus f.

: - : CACEAE

■aultheria glomerata (Cavanilles) Sleumer

?«rnettya prostrata (Cavanilles) Sleumer

"cccinium floribundum H.B.K.

PHORBIACEAE :=lypha aronioides Pax &

Hoffm. lr::on churumayensis Croizat

S^phorbia heterophylla Linnaeus I-rr.orbia

peplus Linnaeus r^rastiana obtusifolia

(H.B.K.) Pax & Hoffm.

~\3ACEAE

-aesalpinia spinosa (Mol.) Kuntze

Serma birostris (Vogel) var totorae Irwin & Barneby

Jerma multiglandulosa (Jacquin) Irwin & Barneby

: - rimacia michelii (Rusby) Harms

* - =iragalus garbancillo Cavanilles

l-lcgania ovalifolia H.B.K.

rctalaria incana Linnaeus 2alea

boliviana Britton lalea smithii

(Macbride) Macbride ■r - r.r.rina

falcata Bentham

rhyrus odoratus Linnaeus

...:nus aridulus C. P. Smith

^rinus microphyllus Desr.

lopinus paniculatus Desr. -?inus tomentosus De
 Candolle "edicago lupulina Linnaeus •elilotus
 indica (Linnaeus) Allioni -iholobium pubescens
 (Poir.) Grimes ^partium junceum Linnaeus
 "rifolium peruvianum Vogel -cia graminea Smith var
 grata (Philippi) Macbride

-:=cia macrantha Humb. & Bonp.

~ \COURTIACEAE --.eda
 incana Ruiz & Pavon

:i:TIANACEAE

Bentiana prostrata Haenke

^er.tianella persquarrosa (Reim.) Fabris

:~^ianella rima (D. Don) Fabris

i-E.-.tianella sandiense (Gilg.) Fabris

i = -.rianella umbellata (Ruiz & Pavon ex Don) Fabris

ialenia weddelliana Gilg

-ilenia stuebelli Gilg

IZRANIACEAE

irsnium herrerae Kunth Cranium

weberbauerianum Kunth Iridium

cicutarum (Linnaeus) L' Her

X?-5SULARIACEAE

Israllonia myrtilloides Linnaeus f.

::sllonia resinosa (Ruiz & Pavon) Pers.

.res brachybotrys (Weddell) Janczewski

LCRAGACEAE

ncphyllum aquaticum (Vellozo) Verdcourt

ncphyllum quitense H.B.K.

. I.-CPHYLLACEAE ^acelia pinnatifida
Grisebach ex Weddell

-ERICACEAE ^-•ericum sp
(undescribed ?)

~:iANDACEAE

"rrlans neotropica Diels

^-ZRIACEAE

neria lappacea (Dombey) Burdet & Simpson

—.*:ACEAE

.ter-ssna mandoniana Weddell .

_n amplexicaule Linnaeus

-[^]pechinia floribunda (Bentham) Epling
 lepechinioa meyenii Bentham * --.thostachys spicata
 (Bentham) Epling lilvia oppositiflora Ruiz &
 Pavon Silvia sarmentosa Epling Salvia scutellarioides
 H.B.K. :i~ureja boliviana (Bentham) Briquel
 lachys herrerae Epling

-IASACEAE

la-cphora contorta Presl.
 :i:cphora horrida (Britton) Urb. & Gilg.
 isa cuzcoensis Killip *=-[^]zelia
 fendleriana Urb. & Gilg.

L*I?A \ 'THACEAE

-adendron punctatum (Ruiz & Pavon) G. Don
 "r.podanthus acutifolius (Ruiz & Pavon) Van Tieghen

- '■'ACEAE ;;-limalva engleriana (Ulbr.)
 Krapovickas -zda cristata (Linnaeus)
 Schlecht r=sa sp. (undescribed) "irasa
 operculata (Cavanilles) Krapovickas "irasa
 marini Krapovickas

«T A5TOMATACEAE :i:r.yotum
 naudinii Triana

■ELIACEAE

rela lilloi C. De Candolle

'.-~^:NACEAE

:s:ne aff pellucida (Ruiz & Pavon) Sprengel

V~7ACEAE

zianthes oreophylla (Diels) Mc Vaugh

' " ..IACEAE

:_za pubescens H. & B. ex Willdenow

rTAGINACEAE -ir.onia weberbaueri

Heimerl

raris prostrata (Ruiz & Pavon) Heimerl

>■I-7ACEAE

-:bium denticulatum Ruiz & Pavon
 :: = ia apetala Ruiz & Pavon •ii'-iia
 boliviana Carriere * "I'.r.era rosea
 Aiton

".-.era multicaulis Ruiz & Pavon

:L\LIDACEAE

ii=lis **corniculata** Linnaeus
 lacalis **lotoides** H.B.K.
 illis petrophila Knuth

:--5S IFLORACEAE

-r=siflora gracilens (**Gray**) Harms
 :i=siflora mollissima (H.B.K.) Bayley
 "- = = siflora pinnatistipula Cavanilles
 ■Bsiflora X rosea (Karts.) Killip (P. pinnatistipula + ?.
 " :llissima) :=siflora trifoliata
 Cavanilles

--TCLACACEAE

".-.clacca bogotensis H.B.K.

ERACEAE -irrdmia sp
 (undescribed ?)
 leromia agapatensis C. De Candolle
 -:eromia ppucu-ppucu Trelease
 :=romia verruculosa Dahlst. ex Hill.

: _ _ .~AGINACEAE

-.i-.rago australis Lam. subsp. hirtella (H.B.K.) Rahn :-
 .ago lamprophylla Pilger -tago major Linnaeus

- : I-ALACEAE -ir.a amarella
 Chodat ■--.ma salicifolia Ruiz &
 Pavon

12 :-:NACEAE *-■=. ".lenbeckia hastulata
 (Smith) Standley *■-■=.*.lenbeckia volcanica
 (Bentham) Endlicher sr./gonum aviculare
 Linnaeus
 .vgonum hydropiperoides Michx.
 i-r>: acetosella Linnaeus
 : -. cuneifolius Campd.

T: IACACEAE

i-drinia **acaulis** H. B. K.
 i-.irinia **ciliata** (Ruiz & Pavon) C. De Candolle

I tO" rJLACEAE ::r.e decapetala **Ard.**
 -:r.e **helleborifolia** De Candolle
 "~ -jiizis seemanni O. Kuntze
 fcizfia **macropetala** (D.C.) **Duncan**
 ..-rulus flagelliformis Smith
 l*r -cuius limoselloides Turcz.
 ■» .---rulus praermorsus H.B.K. Ex D.C.

:- <CSACEAE

Letia spinosa Lam.

; - :IAE -r-eailla
diplophylla Diels
z'enilla orbiculata Ruiz & Pavon ~:-
eailla pinnata Ruiz & Pavon lemilla
ranunculoides Perry -enilla vulcanica
Sclecht & Cham. - raria chiloensis
(Linnaeus) Duchesne r=ria vesca Linnaeus
:^romeles heterophylla (Ruiz & Pavon) Hooker
eroeromeles palcencis C. Schneider **Ifcperomeles**
lanuginosa Ruiz & Pavon ex Hook. = r.eckia
lanceolata Ruiz & Pavon lepis besserii Hieronymus
lepis subsericans Macbride ::iglochinchristatum
(Britton) Rothmales

^.!:: - :ZÆ

cf. Mitracarpus) tophyllum thymifolium (Ruiz &
Pavon) Standley Bftliua aparine Linnaeus !«.. zi
mandonii Britton E j: r.ium ciliatum (Ruiz & Pavon)
Hemsl.

-- „ZIACEAE

humboldtiana Willdenow

--1ACEAE ^--rr.amalium procumbens
Ruiz & Pavon

I "ZACEAE

:_ispernum halicacabum Linnaeus fcET7=r.ia
squarrosa Radlk

⁷-AC-ACEAE laL-.iraga

magellanica Poiret

:.r :-r -LARIACEAE

*-:- = := acutifolia Ruiz & Pavon

fc.r-. = ia sp. (undescribed)

■-::= sp. (1) IIII.-. = i=

bartsiodes (Hook.) Edwin ^fc~-i:s

camporum Diels ■ier-- = i=

diffusa Bentham ^ . :^;laria

chelidonioides H.B.K.

-:Laria engleriana Kranzlin subp. engleriana

&L-:^rlaria myriophylla Kranzlin

-:laria scapiflora (Ruiz & Pavon)

CL.. r^rlaria sparsiflora Kuntze

.^eolaria tripartita Ruiz & Pavon
 .ceolaria virgata Ruiz & Pavon
 istilleja nubigena H.B.K. * r-Ius
 glabratus H.B.K. -^risia
 chamaedrifolia Bentham srrnica
 serpyllifolia Linnaeus "^^rcnica
 persica Poiret

:: IANACEAE

estrum **conglomeratum Ruiz & Pavon**
 -"ilia lycioides Miers
 i: ecladus sp (1):
 e^ladus sp (2)
 -.^c:nata sp
 -ic-iana tabacum Linnaeus
 -icriana tomentosa Ruiz & Pavon i-
 rctiana undulata Ruiz & Pavon .
 nanthes lycioides (Linnaeus) Hasler
 t/salis peruviana Linnaeus
 ilpichroa hirsuta (Meyen) Miers -
 ;ichroa micrantha Benoist - inum
 acaule Bitter
 :lanum aloysiifolium Dunal
 Scl-num caripense Dunal
 :.=num filiforme Ruiz & Pavon .
 =num luteoalbum Persoon Sclanum
 nitidum Ruiz & Pavon
 ■Jamifn sp ca. ochrophyllum Van Heurck & M.Arg.+ S. maturecalvans
 3 :tter

I IPAEOLACEAE

;=eolum peregrinum Linnaeus ;:=eolum
 tuberosum Ruiz & Pavon

11::ACEAE

rr.ica urens Linnaeus

-ZP.IANACEAE

i.=riana coarctata Ruiz & Pavon
 "i-=riana decussata Ruiz & Pavon -
 ^riana jasminioides Briquet i-
 eriana micropterina Weddell
 i.=riana parvula Killip

! "i-~riana spathulata Ruiz &

● PAVON IS3ZNACEAE

nphila mertonii Moldenke ... : .
 =ia fiebrigii (Hayek) Moldenke
 : sia scorodonioides H.B.K. -.:5ia
 triphylla (Hayek) Moldenke ~"=rexylum
 dentatum (Tafalla) D. Don irexylum
 herrerae Mansfeld

:. ^harexyluxn pachyphyllum Moldenke
: .ranta armata Moldenke Xranta
mandonii Moldenke =rrena
litoralis H.B.K.

.:la pygmaea Jussieu

I-: ?HYLLACEAE --Istroemia
parviflora Norton

FLORA OF THE YANACOCCHA FOREST ANGIOSPERMS

MONOCOTS

AGAVACEAE Plants usually with woody, erect stems. Leaves basal or in rosettes at the apex of the stem, thick, fibrous, with or without marginal prickles. Flowers bisexual, regular, trimerous; stamens 6; pistil 3-carpellate, ovary inferior or superior, 3-locular. Fruit a capsule or berry.

Furcraea andina Trelease

Cauli-rosette with a very short trunk. Leaves narrowly oblong-lanceolate, 30-65 X 3-10 cm, attenuate at apex, terminating in a brown spine, margin toothed with spines. Inflorescence a panicle, ca. 6 m tall; flowers cream-white or whitish green; perianth ca. 30 mm long; ovary inferior, ca. 20 mm long.

ALSTROEMERIACEAE Perennial herbs;

rhizomatous; roots fibrous or tuberous; stems erect or twining. Leaves simple, alternate, lanceolate to linear. Inflorescences terminal, umbel-like cymes, rarely a solitary flower, often subtended by leaf-like bracts. Flowers perfect, actinomorphic to somewhat zygomorphic; perianth segments 6, usually free; stamens 6, free, anthers pseudo-basifixed; ovary partially to fully inferior; 1- or 3-locular. Fruit a loculicidal capsule or indehiscent and berry-like.

Key to the species.

1. Plants erect or suberect, often recurved at summit
 2. Leaves ovate or ovate-lanceolate; ovary partly inferior
- Bomarea ovata

2'. Leaves narrowly linear to linear-lanceolate; ovary partly superior

3. Leaves pubescent on both surfaces. . . .Bomarea puberula 3'.

Leaves glabrous above

4. Leaves linear, less than 5 mm wide Bomarea dulcis

4'. Leaves narrowly lanceolate, more than 5 mm wide.....

..... Bomarea petraea

1'. Plants trailing or subscandent to climbing vines

5. Leaves linear-lanceolate; less than 13 mm; ovary partly superior Bomarea petraea

5'. Leaves narrowly lanceolate to broadly ovate; more than 11-18 mm; ovary inferior 6. Umbel compound, its rays branched

7. Leaves narrowly lanceolate, tepals 2-2.5 cm long Bomarea edulis

7'. Leaves narrowly ovate; tepals ca. 2.5 cm long. . . .
..... Bomarea ovata

6'. Umbel simple, its ray unbranched

8. Rays of umbel pubescent; few-flowered
.....Bomarea aff. cernua

8'. Rays of umbel glabrous or granular-puberulent; many-flowered 9. Umbel 13-15-flowered, sepals 2.5-2.7 cm

long; petals 2.7-2.9 cm long
.....Bomarea caldasii

9'. Umbel 8-12-flowered, sepals 3-3.6 cm long, petals 3.5-4.1 cm.....

.....Bomarea sanguinea

Bomarea caldasli (Kunth) Asch. & Graebner

Herbaceous vine. Leaves to 7.5-14.3 X 1.5-4.3 cm, glabrous above, glabrous to granular-puberulent beneath, narrowly to broadly lanceolate. Flowers in a dense umbel; sepals red to orange, 2.1-3.4 X 0.5-0.9 cm; petals red-orange to orange without; orange to yellow-orange within, with purple or brown to black spots, 2.5-4.1 X 0.9-1.6 cm. *Bomarea* aff. *cernua* Griseb. ex Baker

Herbaceous vine; stem slender. Leaves lanceolate or oblong-lanceolate 8-10.5 X 1.5-2 cm, glabrous above, pilosulous and glaucous beneath, membranous.

Flower in umbel, many-rayed, the rays 1.5-1.8 cm long, sepals oblanceolate-spatulate, 2.5 X 8-9 mm, red proximally, green distally; petals spatulate, greenish yellow, sparingly dotted with dark red within. *Bomarea dulcis*

(Hook.) Beauverd

Erect, rigid herb 15-45 cm high; stems glabrous or shortly yellow-tomentose. Leaves linear, 2.5-5 X 0.3-0.6 cm, finely cano-puberulent beneath. Flower in umbel, rays 1-4, usually forked near the base, sepals oblong, 2-2.5 cm long, ca. 5 mm wide; petals spatulate, yellow, green-tipped to sometimes purple at the tip.

Bomarea aff. *edulis* (Tussac) Herbert

Herbaceous vine. Leaves oblanceolate, 5-6 X 0.6-1.1 cm, gradually acuminate, glabrous above, sparsely crispate-pubescent with multicellular hairs or nerves beneath; bracts of involucre very small 4-6 mm long; rays of umbel, 1-2, 2.5 cm, usually 1-2 branched, ovary villous-pubescent; sepals red violet at base, often green at tip; petals yellow with green tip, with purple, black spots.

Bomarea ovata (Cav.) Mirbel

Suberect, trailing or subscandent herb; stem slender, glabrous. Leaves ovate or ovate-lanceolate, 4.5-6.5 X 1.3-0.8 cm, gradually or abruptly acuminate,

membranous, glabrous above, sparsely crispate-strigillose on the nerves beneath; bracts similar to the leaves, much reduced; umbel rays 2-7; sepals oblong or ovate-oblong, 2-3 X 0.5-0.7 cm, pink or reddish, green-tipped; petals subequal to the sepals, green, purple dotted.

Bomarea **petraea** Kranzlin

Erect to subscandent herb; stem glabrous, densely leafy, except in the lower part. Leaves linear-lanceolate, 3-6 X 0.8-1.3 cm, glabrous above, minutely grayish-puberulent beneath; bracts similar to the leaves, slightly smaller; umbel ray, 5-9 once or twice forked; sepals linear-oblong, pink to reddish, yellow-tipped; petals linear-spatulate, subequal to the sepals, yellowish, reddish at the margin.

Bomarea **puberula** (Herbert) Kranzlin

Erect herb 1-1.5 m high; stem densely rufo-tomentellous, recurved at the summit. Leaves linear, 2-4 X 0.2-0.4 cm, rufo-tomentellous on both surfaces, strongly revolute, coriaceous. Inflorescence loosely flowered subtended by oblong-lanceolate bracts, ca. 10 mm wide; sepals oblong-lanceolate, 2-3.5 cm long, red, green tipped; petals spatulate-unguiculate, subequal to the sepals, ca. 1 cm wide, reddish-yellow, green distally, purple-dotted at the upper margin.

Bomarea **sanguinea** Kranzlin

Herbaceous stout vine, glabrous; stem climbing 6 m or more. Leaves lanceolate, 5-9 X 1.5-2.8 cm, sessile, glabrous; bracts similar to the leaves, numerous. Umbels 10-12 rayed, the bractlets linear-lanceolate, sepals brink pink, subequal, ca. 3 cm long; petals slightly broader than the sepals, golden yellow, dark purple at the tip.

AMARYLLIDACEAE Perennial herbs, usually from a bulb. Inflorescence umbellate, flowers usually showy, regular or slightly zygomorphic; perianth of 6 parts, sometimes with a corona; stamens 6; ovary inferior.

Key to the species:

1. Flowers in umbels of 1-4 flowers, tubular; perianth bright red
Eustephia *coccinea*
- 1'. Flowers solitary or paired, funnelform; perianth pale pink
Zephyranthes *parvula*

Eustephia coccinea Cav.

Low bulbous herb 25-30 cm high. Leaves 3-4, linear, several dm long; pedicels to 2.5 cm long. Flowers tubular; perianth bright red, tipped green, ca. 3-3.5 cm long.

Zephyranthes parvula Killip

Small bulbous herb, the neck 1-2 cm long. Leaves 2-4, narrowly linear, 2-3 cm X 1-1.5 mm wide, acutish; peduncles ca. 1.5 cm long; spathe 1.5-3 cm long. Flower solitary, tube narrowly funnelform, whitish in lower half, deep pink in upper, the segments oblong, subequal. Fruit broadly ovoid, **ca.** 4-5 mm long.

ANTHERICACEAE Erect perennial herbs; from rhizomes, small corm-like structures, or with fibrous roots. Leaves basal, simple, linear. Inflorescence terminal, racemose, scapose, bracteate; flowers perfect, hypogynous; perianth segments 6, free to connate; stamens 6, filaments free; gynoecium 3-carpellate, ovary 3-locular, placentation axile, style terminal, 3-lobed. Fruit a loculicidal capsule; seeds black.

Echeandla eccremorrhiza (Ruiz & Pavón) Cruden

Erect herb to 40-70 cm tall, from fibrous roots. Leaves basal, linear, 25-50 X 0.6-1.2 cm, with persistent indumentum on both surfaces. Inflorescence racemose; peduncle 30-60 cm long; 1-3 flowers per node; flowers yellowish or white; perianth segments 0.8-1.5 X 4-5 mm. Fruit a loculicidal capsule, 6-9 X 3.5-5 mm, apex 3-lobed.

ARACEAE Plants herbaceous, lianescent, tuberous, or epiphytic. Leaves simple or compound, alternate, petioled with a sheathing base. Inflorescence (the spadix) composed of tightly packed flowers on a central peduncle which is surrounded by a single bract (the spathe) which may be highly colored, white or green. In some members the male and female elements are present in each flower, while in others, the female flowers are arranged at the base of the spadix and the male flowers occur toward the apex.

Key to the species.

1. Leaves cordate-ovate, 25-30 X 16-18 cm; deeply pinnatifid; spathe narrowly boat-shaped, peduncled Spathantheum orbignyanum
- 1'. Leaf ovate, 23-60 X 20-60 cm, pinnately to bipinnately compound; spathe broadly boat-shaped, short-peduncled Gorgonidium vargasii

Gorgonidium vargasii Bogner & Nicolson

Terrestrial from an underground corm. Tuber depressed-globular 4-10 X 3-4 cm. Petiole 26-60 cm long; leaf blade ovate, pinnately to bipinnately compound, 23-60 X 20-60 cm, the upper leaflets with elliptic lobes, the lower pinnatifid. Peduncle 8-13 X 0.5-0.8 cm. Spathe 11-30 X 4-7 cm, convolute at the base, reddish or purple above. Spadix sessile 15-28 cm long, base of the

spathe surrounding female flowers, 8-25 cm long, the apical portion surrounding male flower 1.5-3 cm long. Inflorescence with persistent spathe, fruiting part ca. 4 cm in diameter. Berries depressed-globular (fide Bogner & Nicholson, 1988). Spathantheum orbignyanum Schott

Terrestrial, with rootstock bearing a solitary leaf. Petiole 40-50 cm long; leaf blade cordate-ovate, 25-30 X 16-18 cm, bright green, glabrous, deeply pinnatifid; the divisions acute. Peduncle shorter than the petiole. Spathe green-whitish, fleshy, boat-shaped. Spadix half as long as the spathe, the male flowers occupying the upper third of the spadix and, in the middle third, constituting two interior series between the female flowers (fide Nicholson, 1988).

BROMELIACEAE Short-stemmed, herbaceous, epiphytic, or terrestrial. Leaves basal and rosette-like, spirally alternate. Inflorescence terminal, the bracts often colorful. Flowers 3-parted; sepals green; petals white, blue or yellow, free or connate at the base. Fruit a capsule or a berry, when capsular seeds with or without plumes.

Key to the species.

1. Leaf margin armed with spines
 2. Inflorescence laxly paniculate with pedicels more than 3 cm long Puya ferruginea
 - 2'. Inflorescence dense, pedicels less than 9-15 mm long
 3. Inflorescence branched, the branches (and central spike) rather laxly cylindric. Puya densiflora

Inflorescence very densely cylindric, unbranched or the individual branches not obvious

4. Inflorescence narrower, less than 9 cm in diameter
..... Puya longistyla

4'. Inflorescence thick., more than 15 cm in diameter
..... Puya herrerae

1'. Leaf margin smooth, unarmed

5. Leaves narrow, less than 2 mm wide, distichous

6. Plants diffusely branching, stem exposed between alternating bunches of leaflets; petals pale green or blue
..... Tillandsia usneoides

6'. Plants forming dense cluster; stem wholly concealed by the imbricate leaf sheaths; petals white, yellow or brown ,
..... Tillandsia capillaris

5'. Leaves broad, more than 1 cm wide, polystichous

7. Leaves more than 10 cm long; forming basal rosette

8. Inflorescence branched; leaves less than 5 cm wide at base

9. Inflorescence bracts broadly ovate, side branches mostly 2-3 cm long; making angle of more than 45 with rachis Tillandsia cerrateana

9'. Inflorescence bracts ovate-elliptic, side branches mostly less than 2 cm long; making angle of less than 45 with rachis Tillandsia gayi

8'. Inflorescence simply spicate; leaves to 7 cm wide at base
..... Tillandsia walteri

7'. Leaves less than 10 cm long; disposed along elongate stem. .
..... Tillandsia nana

Puya densiflora Harms

Terrestrial. Leaves rosulate, 1 m long; arched-recurving; 3-4 cm wide, serrulate, covered with a membrane of white scales above, glabrous beneath. Inflorescence branched, densely white stellate, densely subcylindric, many flowered; flowering stalk 1 m or higher. Floral bracts oblong-lanceolate; aristate. Sepals lanceolate, aristate, petals greenish. Puya ferruginea (Ruiz & Pavon) L. B. Smith

Terrestrial. Leaves densely rosulate, to 1 m long; blades narrowly triangular, acuminate, spine-tipped, 5 cm wide, spinose-serrate, white lepidate beneath. Inflorescence paniculate, laxly pyramidal, covered with ferruginous stellate scales; flowering 2-3 m high. Floral bracts ovate, acute, entire. Sepals oblong-obtuse, densely ferruginous-stellate; petals greenish white or purple. Capsule globose, 25 mm long. Puya herrerae Harms

Terrestrial. Leaves rosulate, ca. 1 m long; blades pale-lepidate beneath, glabrous above. Inflorescence compound, densely cylindric, covered with white wool except the petals; flowering stalk 1.5 m high. Floral bracts broadly ovate, acuminate. Sepals oblong, obtuse, subcoriaceous; petals greenish. Capsule globose. Puya longistyla Mez.

Terrestrial. Leaves spreading, 80 cm long; blades stiff, slightly curved, attenuate to subulate-circular; 25 mm wide, glabrous above, covered beneath with membrane or cinerous scales, serrate. Inflorescence densely paniculate, thyrsoid cylindric; flowering 1.5 m high. Floral bracts lanceolate, acuminate. Sepals acuminate, petals whitish or greenish. Tillandsia capillaris forma virescens (Ruiz & Pavon) L. B. Smith Epiphytic. Leaves distichous, 1-9 cm long, densely pruinose-lepidote, with

cinereous scales; blades erect or spreading. Inflorescence solitary; to 15 cm long in flower. Floral bracts, ovate, apiculate, with at least 5 strong nerves meeting near the apex. Sepals lanceolate, acute; petals narrow, white, yellow or brown.

Tillandsia cerrateana L. B. Smith

Plant epiphytic, stemless. Leaves forming basal rosette, suberect to 35 cm long, covered with appressed cinereous scales, 3-4.5 cm wide. Inflorescence densely paniculate, ca. 40-50 cm long; the bracts red, broadly ovate. Sepals ovate; the petals yellowish-red. Tillandsia gayi Baker

Plant epiphytic, stemless. Leaves rosulate, suberect to 35 cm long, covered with subappressed cinereous scales, 1-2.5 cm wide. Inflorescence paniculate, flowering stalk to 70 cm high, the bracts maroon, elliptic. Sepals lanceolate; petals red to violet. Tillandsia nana Baker

Plant epiphytic, caulescent. Leaves densely polystichous along length of stem, 5-10 cm long, covered with subappressed cinereous scales, 1-2 cm wide.

Inflorescence densely spicate; the bracts imbricate, elliptic-ovate, acute.

Sepals lanceolate-elliptic; petals rose or violet. **Tillandsia usneoides** (L.) L.

Plant pendent from trees, much-branched. Leaves distichous, 2.5-5 cm long, densely cinereous-lepidote. Inflorescence a solitary, pseudolateral flower; up to 8 m long; floral bracts ovate, apiculate or caudate. Sepals narrowly ovate, acute; petals narrow, acute or obtuse, pale-green or blue. **Tillandsia walteri** Mez.

Plant epiphytic, stemless. Leaves many in basal rosette, to 45 cm long, cinereous-lepidote; 5-7 cm wide at base. Inflorescence spicate, dense, distichous, to 40 cm long; the bracts imbricate. Sepals equal, obtuse; petals

Galiano - 66 COMMELINACEAE Succulent

perennial or annual herbs, often with swollen nodes. Leaves alternate, entire, with a membranaceous sheath at the base. Inflorescence sometimes subtended by a boat-shaped spathe; flowers pink, white or blue; sepals 3, usually green; petals 3, free; stamens 3 or 6; ovary superior.

Key to the species.

1. Flowers from spathe-like bract less than 1 cm long
..... Callisia repens
- 1'. Flowers from spathe-like bracts more than 1.5 mm long
 2. Spathes usually about 3-3.5 cm long, long acuminate
..... Commelina fasciculata
 - 2'. Spathes usually about 1.5-2.5 cm long, acute; plants glabrate. . .
..... Commelina longicaulis

Callisia repens L.

Procumbent-ascending herb to 10-30 cm high. Leaves ovate, to 6-12 X 4-8 mm. Spathe 5-6 mm long. Inflorescence umbellate, 6-flowered, the flowers scarcely exerted from the sheath; sepals linear-oblong, 2-3 mm, the petals shorter. Fruit an ovoid capsule.

Commelina fasciculata Ruiz & Pavon

Procumbent-ascending herb to 40-50 cm long. Leaves elliptic to 2-7 X 8-13 mm, villous to glabrous. Spathes ca. 3-3.5 cm long, long acuminate. Inflorescences umbellate, ca. 3-flowered. Flowers blue; sepals connate. Fruit an elongate capsule.

Commelina longicaulis Jacq.

Procumbent or ascending herb to 30-40 cm tall. Leaves ovate-lanceolate,

2.5-6.5 X 1.2-3 cm, acute or acuminate, margin ciliate. Spathes pointed, ca. 1.2-2.5 cm long. Inflorescence umbellate, far exceeding the spathe, 2-6 flowered. Flowers lilac; sepals free, ovate-lanceolate, ca. 6 mm long. Fruit an ovoid capsule.

CYPERACEAE Perrennial, graslike plants; stems often 3-angled, solid. Leaves in basal tufts, the blade grasslike with a closed, sheathing base. Inflorescence usually subtended by foliaceous bracts in whorls of 3. Flowers minute, subtended by bracts, arranged in spikelets.

Key to the species.

- 1. Peduncle with a terminal whorl of or at least 2 bracts, flowers perfect; achene not surrounded by a sac-like perigynium
 - 2. Spikelets distichous
 - 3. Small herb to 10 cm high; spikelets 2.5 mm long, arranged in a head..... Cyperus seslerioides
 - 3'. Tall herb to 60 cm high; spikelets 5 mm long, arranged in spikes Cyperus aggregatus
 - 2'. Spikelets not distichous
 - 4. Culms setaceous; spikelets 2-6 per culm Scirpus inundatus
 - 4'. Culms rigid; spikelets 1 per culm. .Scirpus rigidus
- 1'. Peduncle with a single terminal leaf-like bract, flowers imperfect; achene surrounded by a sac-like perigynium..... Carex boliviensis

Carex boliviensis Van Huerck & Muell. Arg.

Herb, from caespitose rhizome. Leaves linear, 70-80 X 1.5-2.5 mm.

Inflorescence spicate; peduncle 13-35 cm long; bracts 1.5-3 cm long, ovate; spikes (1-)2-3 per peduncle, the lower sessile, 8-10 mm long, the terminal on an erect, scabrous axis, ca. 2-14 mm long; floral bracts ovate, light brown. Achene elliptic to ovate, trigonous. Cyperus aggregatus (Willd.) Endl. Herb to 60 cm tall. Leaves ca. 20-45 X 0.4-0.3 cm, glabrous, umbels simple; bracts 5-6, ca. 10-30 cm long; spike ovoid-cylindric, 1-2 cm long; spikelets ellipsoid, ca. 4-5 mm long, yellowish. Achenes oblong-ovoid, 3-angled.

Cyperus seslerioides H.B.K.

Herb to 10 m tall. Leaves ca. 30-50 X 0.5-1 mm, scabrous margined. Inflorescence a globose head, with capitately congested spikelets, ca. 5 X 10 mm; bracts 3, ca. 1-2 cm long; spikelets ovate, 2.5 mm long; scales lanceolate, acute, yellowish. Achene obovate, 3-angled. Scirpus inundatus Poir.

Subaquatic herb to 10-20 cm tall; culms setaceous, 12-20 cm high. Leaf sheaths bladeless; spikelets subterminal, 2-3 mm long, 2-6 glomerate, ovate; scales obtuse. Achene sublenticular, smooth. Scirpus rigidus Boeckl.

Rigid herb; culms clustered, ca. 20-25 cm high, subterete, sulcate-striate. Leaves 2-3 at base, shorter, setaceous; spikelet terminal, oblong, 6-8 mm long, 8-12 flowered; bract erect, setaceous; scale lax, oval, obtuse, greenish-yellow. Achene plane-convex-angled.

DIOSCOREACEAE Mostly dioecious twining vines.

Leaves alternate, simple, usually entire, usually cordate, palmately veined. Flowers regular, unisexual, greenish, the perianth of 6 similar segments; stamens 6 or 3; ovary 3-celled, 2 ovules **per** cell; styles 3. Fruit a loculidically dehiscent, 3-valved, 3-winged capsule.

Dioscorea incayensis R. Knuth

Vine. Leaves broadly ovate, 5-10 X 2.3-6.3 cm, acuminate, deeply cordate, the basal lobes of the leaf + angulate, palmately ca. 9-veined; petiole ca. 2-3 cm. Male flowers in raceme, ca. 4.5-12 cm long; sometimes monoecious with inferior flowers male and superior flowers female, or with solitary female flowers, perianth campanulate, ca. 2 mm long. Fruit a 3-winged capsule.

HYPOXIDACEAE Herbs with tuberous rhizomes.

Leaves linear to lanceolate, sessile, with multicellular hairs.

Inflorescences in spikes, racemes or umbel-like or the flowers solitary.

Flowers actinomorphic, bisexual, 3-merous and epigynous; tepals 3+3, free or fused; stamens 3+3; ovary 3-locular, placentation parietal. Fruit usually a capsule.

-

Hypoxis humilis H.B.K.

Acaulescent perennial herb; corm ca. 1.5 cm long. Leaves linear-filiform, 1-10 X 2-3 mm, sparsely hirsute, margin whitish. Scape 1-flowered, bracts filiforms. Flowers yellow, ca. 8 mm long, segments ovate, acute, pubescent. Fruit globose-pyriform, black, minutely rugose, ca. 1.2 mm in diameter.

IRIDACEAE

Perennial herbs from rhizomes and bulbs. Leaves distichous, linear to lanceolate, flat or plicate. Inflorescences cymose or solitary, usually terminal, pedunculate. Flowers often pedicellate, subtended by bracts, actinomorphic, epigynous; perianth segments 6, petaloid, equal or unequal, free; stamens 3, anthers basifixed; ovary inferior, 3-carpellate, placentation axile. Fruit a loculicidal capsule.

- Key to the species. 1. Plants from tunicate bulb; leaves plicate
2. Subacaulescent; basal leaves oblanceolate. *Cardenanthus* sp.
- 2'. Caulescent, basal leaves linear or lanceolate.
3. Flowers bright yellow; leaves lanceolate
 *Cypella peruviana* ssp. *communis*
- 3'. Flower blue; leaves linear or nearly so
 *Cypella peruviana* ssp. *herrerae*
- 1'. Plants from well-developed rhizome; leaves linear, ensiform or cylindric 4.
- Flowers deep to pale yellow
5. Plants tall, 8-10 dm high; leaves more than 7 mm wide
 *Sisyrinchium praealtum*
- 5'. Plants lower, 3-45 cm tall; leaves less than 4 mm wide 6.
- Spathes 1-flowered; short stems 3-14 cm tall; leaves linear
7. Leaves 1-2 mm, less than 4 cm long
 *Sisyrinchium pusiilura*
- 7'. Leaves 0.5 mm wide, to 8 cm long
 *Sisyrinchium* aff. *palustre*
- 6'. Spathes 1-fascicled flowers; lower stems 30-45 cm tall; leaves
 ensiform, ribbed *Sisyrinchium* aff. *palmifolium*
- 4'. Flowers not yellow, usually blue to purple
8. Stems flattened and rigid; spathe ca. 2 cm long, 1-flowered. . . .
 *Sisyrinchium* aff. *porphyreum*
- 8'. Stems terete or wire-like; spathes ca. 3-5 cm long; 1-4 flowered
9. Spathe ca. 3-3.5 cm long; pedicels exserted from the spathe ca.
 3 cm; flowers 10-12 mm long..... *Sisyrinchium junceum*
- 9'. Spathe ca. 4.5-5 cm long; pedicels exserted from the spathe ca.
 4.5 cm; flowers 15-20 mm long. . . . *Sisyrinchium scimoideum*

Cardenanthus sp.

Subacaulescent bulbous herb, 6-8 cm high; bulbous ovoid ca. 1.5 cm long.

Basal leaves 3-4, linear-lanceolate, 4-5 cm X 5-6 mm. Spathe ca. 1.5-2 cm, acuminate; flowers sky blue, tepals ca. 1-1.2 cm long. Cypella peruviana Baker ssp. communis Rav.

Caulescent bulbous herb. Leaves 2-3, basal or superposed, lanceolate, 30-40 X 1.5-1.8 cm, cauline leaves 1-2, the upper reduced; stems terete. Spathe 4 cm long, 2-5 flowered. Flowers bright yellow, dotted or lined with red-brown or red-purple. Fruit an oblong capsule, ca. 2 cm long. Cypella peruviana Baker ssp. herrerae (R. S. Foster) Rav.

This taxon is very similar to C. peruviana ssp. communis, the difference only in the leaves more linear, the blue flowers, and the inner tepals longer, ca. 2-2.4 cm long.

Sisyrinchium junceum E. Mey ex Presl

Stems terete 3-6 dm long. Leaves linear, basal, 2-3, ca. 30-40 cm long.

Spathes narrow, ca. 3 cm long, few-flowered. Flowers ca. 2 cm long, violet or red-rose. Fruit an ellipsoid capsule, ca. 4-8 mm long. Sisyrinchium aff. palmifolium L.

Stems 30-45 cm tall. Leaves linear, 15-30 X 0.1-0.3 cm; bracts bifid. Spathes narrow, often less than 2 cm long. Flowers brick-yellow, petals ca. 1.5 cm long. Fruit a subglobose capsule, ca. 6 mm long. Sisyrinchium aff. palustre Diels

Stems 12-15 cm high. Leaves rosulate, narrowly-linear, 5-10 cm X 0.5-1 mm. Spathe ca. 1.5 cm long. Flowers pale yellow, 2-5, petals ca. 0.5 cm long.

Fruit a subglobose capsule, ca. 3 mm long. Sisyrinchium aff. porphyreum

Kranzl Stems 8-12 cm high. Leaves rosulate, linear, 3-7 cm X 1-2 mm. Spathe ca. 2.5

cm long. Flowers violet, petals ca. 8 mm long. Fruit a globose capsule, ca. 2-3 mm long.

Sisyrinchium praealtum Kranzl

Stems 8-10 dm tall. Leaves grass-like, linear, 4-6 cm X 5-8 mm, long acuminate. Spathe ca. 15 cm long, acuminate. Flowers pale yellow, petals ca. 5 mm long.

Sisyrinchium pusillum Kunth

A tufted little plant; stem 3-6 cm long. Leaves linear, 2.5-3 X 0.1-0.3 cm. Spathe ca. 8-12 mm long. Flowers yellow, petals 4 mm long. Fruit an ovoid capsule, ca. 2 mm long.

Sisyrinchium scirpoideum Poeppig

Stems terete 4-5 dm tall. Leaves linear, basals 2-3, 25-35 cm X 2-5 mm. Spathes ca. 2-5 cm long. Flowers obscure violet, 1-4; petals ca. 10 mm long. Fruit a globose capsule, ca. 5 mm long.

JUNCACEAE Perennial herbs, rhizomatous, rarely annual with fibrous roots; glabrous, except Luzula. Leaves alternate, often all basal, sheath usually open (closed in Luzula). Inflorescences terminal or sometimes lateral; variously paniculate, racemose, cymose, head-like, or spike-like. Flowers perfect or unisexual, hypogynous, perianth chaffy, 3-merous; stamens 3-6; ovary superior, 3-carpellate, 1-3 locular, with axile parietal, or basal placentation. Fruit a loculicidal capsule.

Key to the species.

1. Inflorescence a globose flower cluster less than 1 cm long or with a few separate flowers; leaves with open sheaths; leaf margin + ciliate-pubescent; capsule with numerous seeds

- Inflorescence lateral, with flowers + remote, not congested into head
Juncus bufonius
- 2'. Inflorescence terminal, many-flowered + spherical, congested into
 head ca. 8 mm in diameterJuncus ebracteatus
- 1'. Inflorescence + pyramidal, 1-3 cm long; leaves with closed sheaths; leaf
 margin glabrous; capsule with 3 seedsLuzula racemosa

Juncus bufonius L.

Erect annual herb 10-40 cm tall. Leaves mostly basal, 1-2 cauline, narrowly-linear, 5-15 cm long. Inflorescences lateral, the flowers remote or approximate; inferior bracts short. Flowers ca. 4-7 mm long. Fruit a trigonal-ovoid capsule, ca. 4-5 mm long. **Juncus ebracteatus** E. Meyer

Erect perennial herb 6-10 cm tall; rhizome long-creeping. Leaves linear, 6-9 cm long, sheaths 2-3 cm long. Inflorescences a condensed panicle, the flowers in dense, spherical, head-like cluster of 10-20; floral bracts 1 per flower, 1-2.5 mm long; perianth segments subequal 3-3.8 mm long. Fruit a capsule ca. 2.2 mm long, brown with dark, apices. **Luzula racemosa** Desv.

Erect perennial herb 30-50 cm high. Leaves linear, 5-16 X 1.5-0.4 mm, + ciliate-pubescent. Inflorescence a + pyramidal cluster of spikes, 1-3 or more cm long, the bracts scarcely leaf-like. Flowers 2-3 mm long, outer segments aristate.

LILIACEAE Herbs from tunicate bulbs or fleshy roots; stems short or elongate. Leaves alternate, basal, simple, sessile, linear. Inflorescence terminal scapose umbels, subtended by membranous bracts. Flowers perfect, actinomorphic,

nypogynous; perianth segments 6, alike, or distinctly sepals and petals, free or connate; stamens 6; free; ovary superior, 3-carpellate, 3-locular, placentation axile. Fruit a loculicidal capsule.

Key to the species.

1. Scape concealed in the bulb neck; leaves prostrate, inflorescences a contracted panicle, 12-16 flowered..... *Fortunatia sessilis*

1'. Scape well developed, ca. 5-10 cm long; leaves erect or ascending; inflorescences umbellate, 5-6 flowered *Nothoscordum andicola*

Nothoscordum andicola Kunth

Geophyte 3-15 cm high; bulbs obconic 2-3 X 1.1.5 cm. Leaves linear 8-20 cm X 1-2.5 mm. Inflorescence umbellate, scape well developed, 5-6 flowered. Flowers white or roseate, corolla funnelform, ca. 8-10 X 3-5 mm. Fruit a globose capsule ca. 5 mm in diameter.

Fortunatia sessilis (Fries) Ravenna

Geophyte, 3-5 cm high; bulbs globose, large 3 cm long, with a neck 8-15 cm long. Leaves prostrate, linear, 6-10 X 2-6 mm. Inflorescence a contracted panicle, with scape concealed in the bulb neck, 12-16 flowered. Flowers white, ca. 3-4 X 4-5 mm. Fruit an oblong capsule, ca. 4 mm in diameter.

ORCHIDACEAE Perennial herbs, epiphytic, terrestrial or vinelike. Leaf-bearing stems often swollen in epiphytes. Leaves alternate, simple, entire, plicate or leathery, basally with a closed sheath. Flowers bisexual, rarely unisexual, zygomorphic; sepals 3; petals 3, usually with one expanded; stamens and pistil joined to form a column, anther 1, rarely 2. Fruit a 3-parted capsule filled with minute dustlike seeds.

- Key to the species. 1. Basal part of the stem, with thickened pseudobulbs
2. Inflorescence an elongate raceme; flowers large with yellow labellum, ca. 1.5 cm long.....Oncidium aureum
- 2'. Inflorescence an urabelliform raceme; flowers small with greenish labellum, ca. 0.5 cm long
3. Herbs to 35 cm tall; leaves with ca. 2 cm long petiole; labellum with a triangular, flattened apical projection
-Malaxis tarmensis
- var. *elata* 3'. Small herbs to 10-15 cm tall; leaves sessile; labellum with a conical, thickened apical projection . .Malaxis fastigiata 1'. Basal part of the stem without thickened pseudobulbs
4. Plants epiphytic to lithophytic, rarely subterrestrial; leaves coriaceous to fleshy, conduplicate
5. Inflorescence 1-flowered to racemose; leaves 1 at top of stem
6. Rhizome short; flowers solitary, reddish; sepals longer than 1.5 cm.....Myoxanthus serripetalus
- 6' Rhizome elongate; flowers in raceme, greenish; sepals shorter than 1 cm.....Stelis concaviflora
- 5'. Inflorescence paniculate; leaves 3-8; distichous
-Epidendrum excisum
- 4'. Plants strictly terrestrial; leaves membranaceous, convolute
7. Inflorescences densely crowded; floral bracts relatively broad, longer than pedicellate ovary, pollinia 4; labellum uppermost in natural position

8. Labellum suborbicular, flat or shallowly concave, ca. 1 cm long and broad.....Altensteinia fimbriata
- 8'. Labellum deeply concave-galeate, apically 3-lobed; ca. 0.5 cm long and broad Aa weberbaueri
- 7'. Inflorescence lax to subdense; floral bracts narrow, shorter than or subequaling pedicellate ovary at least in apical flowers, pollinia 2; labellum lowermost in natural position
9. Inflorescence rigid, stout; labellum longer than 1 cm, basally produced into 2 short, nectaries; leaves ca. 30 cm long Pelexia weberbaueri
- 9'. Inflorescence flexible; labellum ca. 7 mm long, basally not forming nectaries; leaves ca. 20 cm long
..... Beadlea peruviana

Aa weberbaueri Schltr.

Terrestrial, up to 25 cm tall. Roots fasciculate, fleshy. Leaves 4-5, rosulate, elliptic to ovate-elliptic, ca. 4-5 cm long. Inflorescence erect in a cylindrical spike up to 20 cm tall. Flowers minute, glabrous; sepals oblong-ligulate, obtuse, ca. 2.5 mm long; petals oblique-linear, obtuse; uppermost lip, cucullate-concave, broadly obovate in outline, ca. 5 mm long. Altensteinia fimbriata H.B.K.

Terrestrial; up to 50 cm tall. Roots fasciculate. Leaves basal as well as cauline, lorate to linear-oblong, to 20 cm long. Inflorescence erect in a cylindrical spike up to 20 cm tall. Flowers dorsally pubescent, green, lip with white glandular fringe; sepals and petals to 20 mm long, 15 mm wide, lip prominent, suborbicular to obovate in outline, with fimbriate margin.

Beadlea peruviana (Presl.) Garay

Terrestrial, up to 40 cm tall. Roots fasciculate. Leaves basal, lanceolate-elliptic to ovate-lanceolate, to 12 cm long and 2.5 cm wide; petiole canaliculate, ca. 9 cm long. Scape erect, with concealed acuminate leaf-sheaths, terminating in a subdense spike, 15 cm long. Flowers greenish-white; dorsal sepal oblong-lanceolate, acute, ca. 4-6 X 1-1.8 mm; petals oblong-linear somewhat oblique, 3.5-4.5 X 0.5-1 mm; lip fleshy canaliculate. **Epidendrum excisum** Lindl.

Terrestrial; up to 50 cm tall. Leaves several, distichous, oblong or elliptic-oblong to ligulate, up to 20 cm long and 3 cm wide, rounded at the apex, deeply clasping at base, coriaceous. Inflorescence terminal, paniculate, floriferous part ca. 15 cm long. Flowers medium-size, yellow or greenish yellow; dorsal sepal elliptic-lanceolate, subacute, ca. 1-1.6 cm long; lateral sepals obliquely elliptic-lanceolate, acute. Petals linear, lip adnate to the lip up to its apex. Malaxis fastigiata (Reinch. f.) O. Kuntze

Terrestrial, up to 25 cm tall, with a bulbous-thickening at the base. Leaves 1 or 2, subopposite or distinctly separated, ovate-oblong or oval to ovate-lanceolate, obtuse at apex, cuneate or cordate at the base, up to 6 cm long and 3 cm wide. Inflorescences in an abbreviated raceme, subumbellate, ca. 2.5 cm long. Flowers very small, long-pedicelled green to yellowish; dorsal sepal lanceolate oblong, obtuse, up to 4 mm long; lateral sepals similar; petals linear-lanceolate, lip lanceolate-ovate, acuminate. **Malaxis tarmensis** (Kranzl) C. Schweinf. var. **elata** C. Schweinf. Terrestrial, up to 35 cm tall. Bulbous thickened at the base. Leaves 2-subopposite, elliptic to round-oval, 9-9.5 X 4.5-5 cm, acute to obtuse,

long-sheathing petiole. Inflorescence an subumbellate-raceme densely many flowered. Flowers green or yellowish; dorsal sepal oblong-lanceolate; lateral sepals obliquely oblong-ovate. Lip suborbicular-ovate, ca. 1.7 mm long.

Myoxanthus serripetalus (Kra'nzl) Schltr.

Lithophytic, up to 50 cm tall, rhizome abbreviated, stout. Leaves oblong-lanceolate, 18-20 X 2.8-3 cm, subacute, cuneate at the sessile base.

Inflorescence abbreviated, 1-flowered. Flowers rather large, brown, ca. 2 cm long, dorsal sepal oblong-lanceolate; lateral sepals similar; petals much smaller, rhombic-oblong-lanceolate. Lip subequaling the petals, arcuate recurved, short-clawed, ca. 7-9 mm long. **Oncidium aureum** Lindl.

Terrestrial, up to 80 cm high. Pseudobulb ovoid to pyriform. Leaves linear to linear-oblong-lanceolate, 30-45 X 1-1.5 cm, subacute to acuminate, narrowed to a conduplicate base. Inflorescences racemose to paniculate, the scape surpassing the leaves, with several spreading branches, few to many flowered. Flowers yellow throughout, sepals and petals brown or purplish; dorsal sepal ovate, concave, acute, 10-12 X 1.2-3 mm; lateral sepals lanceolate-ovate, acute. Petals oblong-ovate, acute. Lip larger than the other segments, 15-20 mm long, oblong-ovate. **Pelexia weberbaueri** (Kranzl) Schltr.

Terrestrial, up to 55 cm tall. Roots fascicled, slender-tuberous. Leaves basal, rosulate, up to 5, elliptic or oblong-elliptic, 10-12 X 3-4.5 cm, acute or short acuminate, cuneate at the base, petioles stout, channeled-conduplicate. Scape glabrous below the middle. Inflorescences a spike, elongate, many-flowered, lax below, rather dense above. Flowers medium size, greenish; dorsal sepal narrowly oblong; lateral sepals obliquely oblong-oblong-lanceolate; petals strongly adnate to the dorsal sepal; lip nearly as long as the sepals, linear-spatulate.

Stelis coacaviflora C. Schweinf.

Epiphytic to lithophytic, up to 22 cm tall; stems densely clustered. Leaves solitary, narrowly elliptic-oblong or oblanceolate-oblong, 5-6 X 0.8-1 cm, acute, cuneate, narrowed at the base to an indistinct petiole, minutely tridenticulate at the apex. Inflorescence a raceme, many-flowered, subdense above, rather loose below. Flowers small, bilabiate, green-yellow; sepals all connate below the middle; dorsal sepal broadly ovate; obtuse; lateral sepal entirely connate and deeply concave. Petals minute, subquadrate-ovate, lip very small but longer than the petals, ca. 1.5 mm long.

DICOT5

ACANTHACEAE Herbs, shrubs, vines, or small trees. Leaves opposite, simple, without stipules. Flowers tubular, gamopetalous; corolla 5-lobed, or 2-lipped; stamens 4 or 2, mounted on the corolla. Bracts subtending the flowers often well developed and often colored. Capsules bivalvate, elastically dehiscent.

Stenandrium dulce (Cav.) Nees

Small acaulescent herb 3-5 cm tall; hirsute-pubescent, Leaves oval or oblong, 1.3-2 X 0.5-0.8 cm, rounded at the apex, acute to obtuse at the base, puberulent above and beneath, petiole ca. 5-10 mm long.

Inflorescence few flowered, equal or shorter than the leaves; calyx hirsute-ciliate; corolla violet, narrowly tubular. Fruit bivalvate, oblong capsule, ca. 7-8 mm long.

AMARANTHACEAE

Herbs, shrubs, or vines'. Leaves alternate or opposite, simple, without stipules- Bracts of the inflorescence scarious. Flowers usually dry, small, congested, yellow, white or green; stamens 5, usually connate at the base; ovary superior, unilocular, usually with a single ovulp.. Fruit usually a utricle or nutlet, rarely fleshy.

Key to the species.

I . Leaves alternateAma ran thus hybri dus

I*. Leaves opposite.

2. Flowers in open panicles Ir.^jiff: di ff us a

2'. Flowers in dense heads.

3. Flowers sessile and glomerate, in the leaf axils; stamens peri.gynous; plants prostrate Gui lleminea densa

3'. Flowers in stalked heads; stamens hypogynous

..... (iomp_hrena e i egans

Amaranthus hybridus L.

Herb 0.5-1.2 m tall; sr.en erect-, glabrous. Leaves alternate, lanceolate to rhombic-ovate, acute to rounded at the apex. inflorescence a spike, terminal and axillary, the flowers minute, dense; bracts lanceolate with spinose tips. Flowers greenish. Fruit an utricle, equal *or* shorter than the sepals.

Gomphrena elegans Mart.

Shrubby, suffrutescent herb to 50 cm tall; stem branched, densely pilose. Leaves opposite, ovate to rounded, obtuse at base and apex,

pilose above, densely **whitish tomentose beneath**. **Inflorescence a**
 pedunculate head, the bracts densely pilose. Flowers small, whitish, the
 sepals linear-lanceolate. **Guilleminea densa** (Willdenow) Moquin

Prostrate herb, the stems densely lanate. Leaves with winged petioles,
 less than 1 cm long, elliptic to oval, obtuse or acute, contracted at the
 base, densely lanate. beneath. Inflorescence a sessile axillary
 glomerule, the bracts ovate, acute, scarious. Flowers small, whitish.

Iresine diffusa H. & B. ex Willd.

Herb to 1 m tall; stem erect or more or less sprawling. Leaves slender-
 petiolate, ovate to deltoid-ovate, acute or acuminate, cuneate at the
 base, short villous beneath. Inflorescence a broad lax panicle. Flowers
 small, whitish, the sepals obtuse. Fruit an utricle, black,
 lustrous.

ANACARDIACEAE

Trees or shrubs. Leaves alternate, simple or compound, without stipules,
 aromatic, often causing allergenic reactions. Flowers regular; sepals 3
 to numerous, free; petals 3-7 or absent, free; disc present; stamens
 twice the number of the petals; filaments free; ovary superior,
 unilocular. Fruit a drupe, often fleshy.

Key to the species.

1. Leaves simple, the leaflets entire, or subentire; branches
 spine-tippedSchinus microphyllus
- 1'. Leaves mostly compound, when in part simple, irregularly deeply
 encised margin; branches not spiny.

2. Leaves mostly 3-5-foliolate, in part simple; branchlets erect or spreading So hi nus pe_a rc_e_i

2'. Leaves 7 - 25 - 1 oliolate, branchlet.s lax or pendent.....
sj^_hi nus •P°_i-1 §

Schinus microphyllus lohnst-.on

Shrub to 2-3 m tall, the branchlet terminally spinose. Leaves simple, obovate, obtuse, cuneate. at base. Tnflorescenr.es few-flowered , the sepals deltoid, truncate; petals yellowish, ovate. Fruit a small pinkish-red drupe, ca. 2-3 mm in diameter.

Schinus molle L.

Tree 6-8 m tall; upper branches slender and more or less pendent. Leaves imparip.innately compound with numerous linear-lanceolate leaflets. Inflorescence a large pannicle of small yellowish-white flowers. Fruits globose lavender-pink drupes, ca. 6 mm in diameter.

Schinus pearcei Engl.

Small tree to 6 :n tall; branches slender, erect. Leaves irregularly divided or incised with (0-)3-5(or more) leaflets, the petiole winged. Inflorescence a small little-branched panicle, axillary or terminal; sepals ovate; petals yellowish-cream. Fruits lavender-red, ca. 0.5 mm in diameter.

APIACEAR Usually herbs. Leaves alternate, often compound and much dissected; petioles usually sheathing. Inflorescence a simple or compound umbel. Flowers bisexual, rarely unisexual, regular; calyx 5-lobed; corolla of 5 distinct petals; stamens 5, alternate with the petals, arising from a

disc; ovary inferior, bilocular, with axile placentation, a solitary pendulous ovule in each locule. Fruit a schizocarp, the 2 carpels united by their faces and separating at maturity.

Key to the species.

- 1. Inflorescence a simple umbel or capitate or open with dichotomous branching. 2. **Acaulescent** or cushion plants.
 - 3. **Leaves pinnatisect**, membranaceous; acaulescent plants.
*Oreomyrrhis andicola*
 - 3'. **Leaves entire, coriaceous**; cushion plants
*Azorella biloba*
- 2'. **Erect, sprawling** plants.
 - 4. **Leaves shallowly palmately 3-lobed; sprawling annual**.
*Hypochaeris glabra*
 - 4'. **Leaves finely bipinnately divided; perennial subshrub**.
*Fremontia californiana*
- J'. Inflorescence twice umbellate; individual **flowers mostly with**
 pedicels 1 or more cm long*Daucus montanus*

Azorella biloba (Schlechtendal.) Weddell

Caespitose, 2-6 cm high, forming a cushion plant. Leaves oblong or lanceolate, often notched at apex, cuneate at base, entire except the shallowly 2-lobed apex. Individual bracts several, linear-lanceolate. Flowers greenish or yellowish, in 5-10 flowered sessile umbels. Fruit ovate, ca. 2.5 mm long X ca. 2 mm broad (fide: Mathias & Constance, 1976).

Bowlesia sodiroana Wolff

Sprawling annual herb, 30-60 cm long. Leaves shallowly palmately 3-5 lobed, the lobes ovate to lanceolate, acute, 1 lobed or entire. Flowers small, greenish-white, in 1-5 flowered umbels. Fruit ovoid, 2.5 mm long 1.5-2 mm broad.

Daucus montanus Humb. & Bonpl.

Erect herb, 0.1-1 m tall, annual or biennial; stem solitary, few-branched. Leaves oblong pinnately divided to decomposed; hispid. Flowers white or purplish, in lax compound umbels; involucre foliaceous. Fruit oblong to ovoid. 2-6 mm long X 2-3 mm broad. Eremocharis triradiata (Wolff) I. M. Johnston

Low shrub to 0.8-1.3 m tall; stem dichotomously branched, spinescent. Leaves alternate, fascicled below, tritemate or triparted, the lobes cuneate-oblong, the central exceeding the two lateral. Flowers rather compact, 3-8 flowered umbels, deep maroon to blackish-violet. Fruit, orbicular to oval, ca. 1.5-2 mm long, sharply angled.

Oreomyrrhis andicola (Knuth) Hook.

Herb acaulescent, umbel lately branched, 3-30 cm tall. Leaves alternate, oblong to oval, pinnate, with bipinnatifid leaflets. Flowers white or rose-tinged, in simple pedunculate umbels; involucre not obvious. Fruit oblong-ovoid compressed laterally, 3-5 mm long X 1.5-2 mm broad.

AFALIACEAE Trees or shrubs, sometimes epiphytic. Leaves alternate, simple or palmately or pinnately compound, with prominent stipules. Flowers in umbels, 5-parted; stamens as many as the petals and alternate with them; ovary inferior. Fruit a berry.

Oreopanax ischnolobus Harms

Shrub or small tree to 4-6 m tall. Leaves palmately 4-8 parted nearly to base, the lobes narrow- to linear-lanceolate, acuminate, glabrous and lustrous above, pubertalous beneath. Inflorescence a branched panicle; petals greenish. Fruit subglobose or ellipsoid.

ASCLEPTADACEAE Perennial herbs or vines with milky sap. Leaves simple, entire, opposite, with stipules. Flowers in umbels or cymes; sepals 5; petals 5; stamens or petals forming a corona; stamens 5, the ant.hers united to form a cone which is attached to the stigma; pollen united into waxy pollinia, the ovary superior; carpels 2. Fruit a follicle, the seeds with a tuft of silky hairs at one end. Rarely found with flowers or fruit.

Key to the species.

- I . Leaf bases cordate or lobate; corolla tube equal to lobes
..... Mel i_ni_a peruviana
- 1'. Leaf bases acute or sometimes truncate, never lobate; corolla tube
much shorter than the lobes. 2. Inflorescences prominently pedunculate;
larger leaves more than
1 . 5 cm wide Cynanchum tarmense
- 2'. Inflorescences sessile; larger leaves less than 1 cm wide.
- 3. Stems and lower leaf surfaces densely tomentose; follicles to
ca. 5 cm long, reflexed on the pedicel .Cynanchum sp. I
- 3'. Stems with a line of hairs on young internodes, leaves
glabrescent; follicles to ca. 10 cm long, erect on the pedicel
..... Cynanchum sp. II

Cynanchum sp. I

Slender suffrutescent vine; stem pubescent.. Leaves lanceolate, 5-20 X 2-3.5 mm, acute at both ends, glabrescent above, densely tomentose beneath, petiole ca. 1-3 mm long. Inflorescences sessile, 2-flowered. Flowers whitish; corolla tube much shorter than the lobes. Fruit a linear follicle, ca. 3.5-5 . 5 X 0.2-0.4 cm, reflexed on the pedicel, tomentose. Cynanchum sp. IT

Suffrutescent vine; stems with a line of hairs on young internodes. Leaves lanceolate 1-5.5 X 0.3-0.8 cm, gradually acuminate at the apex, rounded at base, puberulent on both surfaces, petiole ca. 5-10 mm long. Inflorescences 2-3 flowered. Flowers greenish or whitish; calyx with ovate segments, gynostegium exceeding the corona, anthers subquadrangular; pollen oblong. Fruit a linear follicle, ca. 8-10 X 3.5-5 cm, puberulent:. Cynanchum tarmense Sen 11r.

Suffrutescent vine. Leaves ovate-elliptic, 1.7-4.5 X 0.8-1.7 cm, subacute to acuminate at the apex, obtuse at the base, glabrous on both surfaces, petiole ca. 1 cm. inflorescence an umbeliform-cyme, prominently pedunculate. Flowers numerous, yellowish; calyx with the segments ovate-lanceolate; the gynostegium exceeding the corona; anthers subquadrangular; pollen oblique-lanceolate. Fruit an erect follicle, ca. 7.5-8.5 X 0.5-0.6 cm, pubescent. Melinia peruviana Schitr.

Suffrutescent vine. Leaves subhastate-lanceolate, 8-10 X 2.5-6 mm, obtuse at apex, cordate to hastate-lobate at **the** base, puberulent on both

surfaces, petiole ca. 2-5 mm long. Inflorescence a dense umbellate cyme, 5-10 flowered. Flowers white; calyx with segments narrowly lanceolate; corona lobes oval-obtuse; anthers trapezoid; pollinia narrowly oblique-oblong. Fruit a follicle oblanceolate, c[^]. 5-6 X 0.5-0.6 cm; recurved at apex, striate, glabrous.

ASTERACEAE Herbs, shrubs, vines, or trees. Leaves alternate, opposite or whorled, simple or compound. Inflorescence a compound head (capitula) with a receptacle which usually is surrounded by obvious bracts (involucre), frequently with short central disc flowers and outer petal-like ray flowers; stamens 5, mounted at the apex of the corolla tube; anthers forming a cylinder around the style; ovary inferior, unilocular with one ovule. Fruit an achene, usually with a pappus. Since this is such a large family, the tribes are treated separately. The following key to tribes is adapted from Cabrera (19/8), D'Arcy (1975), and Dillon (1983). The former tribe Helenieae (including Tageteae) is here included in Heliantheae (cf. Mabberley, 1987).

Key to the tribes.

- 1. Capitula with staminate or perfect florets toward the middle, the corolla tubular or bilabiate; sometimes with pistillate florets toward the outside; usually without milky sap
- 2. Disk flowers tubular or bilabiate, never ligulate; anther tip with sterile, tongue-like, often hyaline appendages 3.

Florets all alike, perfect, corollas tubular, not yellow;
 anthers not tailed; receptacle usually naked; leaves mostly
 oppositeTribe EUPATORTEAE

- 3'. Florets often not all alike; corollas often yellow; anthers
tailed; receptacle naked or **with** paleae; leaves alternate or
opposite
4. Leaves mostly not spiny; involucral bracts not spiny;
anthers tailed or not; style shaft without an apical ring
5. Leaves alternate; anthers tailed or not, receptacle
mostly naked; pappus mostly bristles
6. Anthers obtuse; style branches often appendaged;
achene often compressed; hairs multicellular . .
..... Tribe ASTEREAE
- 6'. Anthers tailed; style branches rounded; achene
plump; hairs arachnoid..... Tribe INULEAE
- 5'. Leaves opposite or alternate; anthers not tailed;
receptacle with paleae or naked; pappus of **bristles**,
-
awns or scales
- 7'. Pappus of awns, stiff bristles or scales;
style branches often appendaged 8.
Receptacle with or without paleae, or naked,
enfolding the anthers; pappus of awns,
awns, or rarely numerous, strigose **bristles**;
leaves opposite or alternate, mostly
glandular, hairs often verrucose, or
typically bearing conspicuous **secretory**
cavities or glands filled with
essential oils as Tagetes.....
..... Tribe HELIANTHEAE

Receptacle deeply alveolate, **with the** margins of the alveolae prolonged into stiff mostly subulate awns, squamellae, or bristles; pappus generally biseriate, the inner series of bristles or squamellae rarely absent; leaves opposite or whorled in a basal rosette, usually tomentose beneath. . . Tribe LJABEAE 7*. Pappus of soft, silky, hair-like bristles;

style branches not appendaged

..... Tribe SENECTIONEAE

4'. Leaves and involucral bracts spiny; anthers tailed; style shaft with an apical ring Tribe CARDUEAE

2'. All flowers ligulate, the ligule 5-dentate at the apex; anther tips sterile but not differentiated into hyaline, tongue-like appendages; anthers mostly tailed Tribe MUTTSTEEAE

I.' . Heads with only perfect florets, the corollas ligulate, 5-dentate; sap milky..... Tribe LACTUOEAE

Tribe. ASTEREAE 1. Leaves in basal rosette or tiny and less than 5 mm wide; corolla 5-dentate; flowers bisexual fertile; herbs 2. Leaves along stem; marginal flowers with corolla filiform or

shortly ligulate at the apex; achenes non-ribbed

..... Conyza deserticola

2*. Leaves in basal rosette; marginal flowers with corolla strongly
ligulate; achenes with numerous ribs Noti castrum marg j natum 1'.

Leaves coriaceous or more than 5 mm wide; corolla 5-lobed; flowers
functionally unisexual, the male with atrophied ovary; subshrubs to small
trees

3. Stems winged, leafless, articulate . . . Baccharis trimera V

. Stems non-winged, with leaves, without articulations

A. Leaves narrowly linear, less than 1 mm wide.....

..... Baccharis boliviensis

A'. Leaves oblanceolate or oblong to ovate, more than 1 mm wide

de

5. Leaves with a conspicuous central nerve and with
secondary nerves pinnate or inconspicuous 6.

Leaves coriaceous, small, less than 2(-2.5) cm

long, only the central nerve conspicuous 7. Leaf

blade cuneiform, 3(-5)-dentate, near almost

truncate tip; capitula axillary.

..... Baccharis tricuneata

7'. Leaf blade *- obovate, entire or with

inconspicuous serrations; capitula terminal
or subterminal

8. Leaf margin finely serrate

..... Baccharis chilco

8'. Leaf margin entire . . Baccharis odorata

9. Erect shrub; leaves mostly more than 5
cm long; capitula subterminal, axillary,
mostly less than 1 cm long

- .10. Leaves narrowly obovate; capitula less than 5 mm long
..... Baccharis peruviana
- 10'. Leaves elliptic; capitula more than 5 mm long
LI. Inflorescence paniculate; leaves less than 2 cm long.
..... Baccharis odorata
- I J'. Capitula solitary, leaves more than 2 cm long
..... Baccharis buxifolia
- 9'. Repent frutescent; leaves less than 5 cm long; capitula sessile to subsessile, terminal, ca. 1 cm long.
..... Baccharis jujubifolia
- 6'. Leaves thin, chartaceous or membranaceous; in part more than 2 cm long, secondary nerves pinnate, t- conspicuous 12. Capitula less than 4 mm long, in relatively dense cluster; leaf margin entire
..... Baccharis quitense
- 12*. Capitula more than 6 mm long, openly pedicellate; leaf margin serrate
..... Baccharis pulchella
- 5'. Leaves predominantly triple-nerved from the base . .
..... Baccharis peruviana

Baceharris alpina H.B.K.

Repent, subshrub or cushion plant. Leaves obovate-elliptic, 4-10 X 1.3-3.5 mm, obtuse at the apex, attenuate at **the** base, glabrous, resinous. Inflorescence a solitary capitulum, the male heads with involucre campanulato-hemispheric, 5-7 mm across, the female heads with involucre campanulate, ca. 6 mm across, flowers numerous with pappus filiform. Fruit a cylindrical achene, 4.5-5 mm long. **Baceharris boliviensis** (Wedd.) Cabrera

Erect shrub 40-1.20 m tall. Leaves linear, needle-like, 1-2 cm long, entire, glabrous to punctate-glandular on both surfaces. Inflorescence of yellow capitula arranged in terminal cymes; the male heads with involucre campanulate, 2-3 mm across, phyllaries in 2 series; the female heads **with** involucre campanulate, 3-4 mm across, phyllaries in 2-3 rows. Fruit an oblanceolate achene, sericeous pubescent 1 mm long. Baceharris buxifolia (Lam.) Pers.

Erect shrub 1.5 m tall. Leaves obovate-oblong, 10-22 X 3-12 mm, rounded at apex, obtuse at the base, glabrous above, glutinous, punctate, beneath, coriaceous. Inflorescence a solitary capitula of cream-yellow flowers, the female capitula campanulate ca. 5 X 5 mm. Phyllaries 4-seriate; the female capitula tubular campanulate, ca. 6.5 mm long. **Baceharris chilco** H.B.K.

Shrub 0.3-1 m tall. Leaves obovate, 0.8-2 X 0.2-1.5 cm, obtuse-mucronate **at** the apex, cuneate at the base, resinous-glandular. Capitula solitary **or in** cymes; **the flowers white or cream; the male capitula with tubular involucre ca. 6 mm long, the female capitula with cylindrical involucre ca. 7 mm long. Achenes ca. 1.5 mm long, oblong, striate, glabrous.**

Baccharis odorata H.B.K.

Shrub 0.5-1.20 m tall. Leaves elliptic, 1-2 X 0.2-1-1 cm, rounded to obtuse at the apex, cuneate at the base, glabrous to glandular on both surfaces. Inflorescence short terminal panicle; capitula c.a. 6 mm in diameter, the flowers cream. Achenes striate, glabrous. Baccharis peruviana Cuatrecasas

Shrub 0.5-1.5 m tall. Leaves elliptic to ovate-elliptic, 1-3.5 X 0.4-1.2, subacute to obtuse at apex, attenuate to cuneate at the base, 3-veined, resinous-glandulous above, minutely pilose to puberulent beneath, the margin entire or very minutely subserrate. Inflorescence a solitary or subterminal cluster of white-flowered axillary capitula, the male capitula 7-8 X 4 mm; phyllaries 4-5 seriate; the female capitula 8-9 X 4 mm; phyllaries ca. 5 sessile; receptacle coriaceous, the phyllaries mostly 2-3 mm long.

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Baccharis pulchella Sch. Bop.

Erect herb or subshrub to 80 cm tall. Leaves lanceolate, 3-8 X 0.6-1 cm, acute at apex, attenuate at base, the margin finely serrate.

Inflorescence of several capitula in lax terminal corymbiform cyme, hemispheric, involucre scarious, the phyllaries linear, ca. 5 mm long.

Fruit a glabrous achene. **Baccharis quitensis** H.B.K.

Erect shrub to 1 m tall. Leaves broadly to narrowly lanceolate, 3-5.5 X 0.4-1.2 cm, acute at the apex, attenuate at base, midrib slightly impressed above, prominent beneath, the margin entire. Inflorescence of several capitula clustered in irregular cymose panicles, the capitula 5 X 6-7 mm, involucre campanulate, the phyllaries ca. 2 mm long. Fruit a minute achene, 1-2 mm long.

Baccharis tricuneata (L.f.) Pers. var. robusta Cuatr.

Shrub to 2-3 m tall. Leaves oblong-deltoid, 0.8-9 X 0.3-0.7 cm, rounded to subtruncate or 3-dentate at apex, cuneate at the base, glandular-resinous, pseudopetiolate. Inflorescences solitary axillary capitula; the male capitula subglobose, 5-6 X 3-5 mm across, the female heads globose-campanulate, 6-8 X 3-6 mm across. Fruits a small achene, 1.5 mm long. Baccharis trimera (Less.) DC.

Suffruticose herb 30-40 cm high; aphyllous; stems 3-winged, 2-10 mm wide, glabrous. Inflorescences of 1-few sessile capitula, the male capitula with involucre campanulate, 5-6 mm long, phyllari.es lanceolate-oblong, several-seriate, the female capitula with cylindrical involucre. Fruit an elongate achene, striate, 2.5 mm long. Conyza deserticola Philippi

Erect herb 20-30 cm tall. Leaves alternate along stem, the basal oblanceolate, 2.5-3 cm long, acute or obtuse at apex, attenuate at the base, grayish pubescent on both faces; the cauline lanceolate or sublinear. Inflorescence of capitula in dense terminal cymes, the involucre hemispheric, 5 X 6-8 mm. Fruit, an oblong-lanceolate achene, compressed, 2 mm long. Noticastrum marginatum; H. H. X. . .; Cuatr.

Erect herb 5-20 cm high. Leaves in basal whorl, 2-13 X 0.4-2 cm, lanceolate-obovate or spatulate, obtuse at apex, attenuate at the base, glabrous to sericeous, stem leaves reduced, linear, sessile, clasping at base, laxly sericeous. Inflorescences solitary on long pedicel (or subsessile: form acaulis (Wedd.) Cuatr.), involucre campanulate 0.7-1.7 X 0.8-1.8 cm; phyllari.es in 3-5-series. Fruit an oblanceolate achene, 5-9 mm long-sericeous-pubescent.

Gai Lano - 9/ Tribe CYNAREAE Cir3ium vulsare

(Savi) Tenore

Erect annual herb to 80-3 20 cm tall; stems winged, the wings dentate spinose. Leaves lanceolate, laterally 3-4-lobed, spinescent, spine-tipped at apex, decurrent at base, pubescent on both surfaces. Capitula large, sessile, solitary; involucre ovoid, ca. 30 X 25-30 mm. Flowers violet, isomorphic, tubular. Achenes ca. 8 mm long, obovate-ellipsoid, glabrous, with epigynous disk.

Tribe EUPATORIEAE Key to the species:

1. Pappus with a crown of scales, often with 1-30 bristle-like awns
 2. Leaves more than 5 cm wide, flowers bright roseate; corolla ca. 5 mm long Stevia soratensis
 - 2'. Leaves rhombic-obovate, less than 1 cm wide; flowers white-pinkish; corolla ca. 3 mm .long 3. Leaves rhombic-obovate, less than 1 cm wide; corolla ca. 3 mm long Stevia cuzcoensis
 - 3'. Leaves deltoid, more than 2.5 cm wide; corolla ca. 5 mm long Stevia galeopsi.difolia
- 1'. Pappus with numerous capillary bristles
 4. Pappus **of more** than 10 capillary or plumose bristles
 5. Sprawling herb; leaves less than 6 mm wide; florets minute, less than 3 mm long; corolla white-yellowish; anthers without connective appendage Ophryosporus peruvianus

Gaiiano - 96 5'. Erect

shrubs; leaves more than 10 mm wide; florets more than 5 mm long; corolla white, lavender or bluish; anther with connective appendage developed

6. Leaves mostly linear-lanceolate or ovate-lanceolate, usually rugose and pubescent;; inflorescence a

trichotomous corymb 7. Leaves conspicuously gray-tomentose beneath;

carpopodium symmetrical, without distinct upper

rim.....Aristeguetia discolor

7'. Leaves usually scabrous-pubescent beneath;

carpopodium a symmetrical, with distinct upper rim

8. Leaves linear-lanceolate ca. 8 mm long;

flowers lavender-violet

.....Cronquistianthus volkensii

8'. Leaves ovate-lanceolate. ca. 3 cm long;

flowers lilac... Cronquistianthus urubambensis 6'.

Leaves broadly ovate-lanceolate, mostly glabrescent;

inflorescence a much-branched corymbs 9. Leaves resinous;

flowers lavender-violet;

involucre more than 10 mm long

.....Chromolaena connivens

9*. Leaves non resinous; flowers white; involucre less than 5 mm long

10. Annual herb; leaves broadly-ovate, ca. 4 cm

wide, margin dentate; involucre ca. 4 mm long

.....Ageratina sternbergiana

Perennial shrub, leaves ovate-lanceolate, ca.

2.5 cm wide, margin serrate; involucre ca. 3

mm long..... Ageratina pentlandiana

4'. Pappus of 5 (or more) capillary bristles

1.1. Low shrub; leaves broadly triangular, ca.

1.5 cm wide, margin crenate; flowers

white; pappus without plumose-bristles . .

..... Neocuatrecasia hirte.1 la

11'. Tall shrub; leaves lanceolate, ca. 3 mm

wide, margin entire, 3-nerved; flowers

lilac; pappus with plumose-bristles. . .

..... Helogyne tacaqui rensis

Afteratina pentlandiana (DC.) K. & K.

Erect suffrutescent herb to 2 m tall. Leaves ovate-lanceolate, 2-5.5 X

0.8-2.7 cm, subacuminate, obtuse at the base, glabrous above,

puberulent-punctate beneath, margin serrate, the petiole 5-10 mm long.

Inflorescence a terminal corymb, many-flowered, the heads pedicelled,

12-15-flowered. Flowers white. Achenes glandular-glabrous, ca. 3 X 0.5 mm

across, thin, striate.

Ageratina sternbergiana (DC.) K. & R.

Erect herb to 80 cm tall. Leaves broadly ovate, 2.5-5 X 1.5-4 cm, acuminate

at apex, obtuse at base, glabrous above, subpuberulent beneath, the margin

dentate. Inflorescence a compound corymb, many-flowered, the heads

pedicelled, 25-30 flowered. Flowers white. Achenes 5-angled, ca. 2.8 X 0.8

mm, scabrous.

Aristeguietia discolor (DC.) K. & R.

Erect shrub to 1.5-2 m tall. Leaves oblong-lanceolate, 6-16 X 1-3 cm, acuminate at apex, attenuate at the base, subrugose-glabrous above, white-tomentose beneath, margin crenulate-revolute. Inflorescence a terminal trichotomous corymb, the capitula apically congested, subsessile, ca. 25-flowered. Flowers whitish. Achenes 5-angled, ca. 4 X 1 mm, glabrous.

Chromolaena connivens (Kusby) K. & K.

Erect shrub to 1.5 m tall. Leaves broadly to narrowly ovate, 3-9 X 1.4-4 cm, obtusely acuminate at apex, obtuse at base, scabrous above, prominently reticulate beneath and somewhat 3-ribbed, margin coarsely serrate. Inflorescence a dense terminal cyme, capitula cylindrical, ca. 1.2 X 0.4, 15-flowered. Flowers lavender-violet. Achenes ca. 4.5 mm long, black with sharp white angles.

Cronquistianthus urubambensis (B. L. Robins.) K. & R.

Erect perennial herb to 30-50 cm tall. Leaves ovate-lanceolate, 2.5-3 X 0.8-1.5, gradually acuminate at apex, obtuse at base, rugulose and puberulent above, tomentose beneath, margin crenate, the petiole 5-8 mm long. Inflorescence a terminal trichotomous corymb, the capitula 10-flowered. Flowers lilac. Achenes 5-angled, ca. 2.6 mm long, the ribs villous.

Cronquistianthus volkensis (Hieron.) K. & R.

Shrub to 1-1.5 m tall. Leaves linear-lanceolate, 3-8 X 0.5-1.5 cm, acute, cuneate at base, scabrous-puberulent above, cinereous-pubescent beneath, margin crenate-serrulate. Inflorescence a terminal corymbose cyme, the capitula ca. 8X6 mm, 10-12 flowered. Flowers violet. Achenes 5-angled, ca. 2.5-4 mm long, glabrous.

Helogyne tacaguirensis Hieron.

Shrub to 80 cm tall. Leaves lanceolate, 8-12 X 2-3 mm, obtuse and mucronate at apex, obtuse at base, glandular-puberulent above, glandular-punctate beneath, subchartaceous, 3-nerved, margin entire, sessile. Inflorescence densely corymbose, the capitula ca. 5-7 X 4-5 mm, 9-12 flowered. Flowers lilac. Achenes 5-angled, ca. 2.5-3 mm, inner angles scabrous-glandular*.

Neocuatrecasia hirtella K. & R.

Erect suffrutescent herb to 12-30 cm tall. Leaves triangular, 1-2.5 X 0.8-1.8 cm, obtuse to acutish at apex, truncate at base, densely puberulous above, short hirtellous beneath, margin crenate. Inflorescences terminal, corymbose, the capitula ca. 7-8 X 8-9 mm, ca. 30-flowered. Flowers white. Achenes 5-angled, ca. 3-4 mm long, attenuate at base, the ribs setaceous.

Ophryosporus peruviana (Gmel.) K. & R.

Sprawling herb to 1.5-2 m tall. Leaves finely rhombic-lanceolate, 1.5-4 X 0.4-0.6 cm, acuminate at apex, attenuate at base, glabrous above, puberulous beneath, margin distally serrate. Inflorescence a branched panicle, the capitula small, ca. 3 X 2 mm, 3-flowered. Flowers white-yellowish. Achenes ca. 3 mm long, angles scabrous.

Stevia cuzcoensis Hieron.

Suffrutescent herb to 30-40 cm tall. Leaves rhombic-obovate, 1-2 X 0.5-1.2 cm, acutish at apex, cuneate at base, glandular punctate above, scabrous-puberulent beneath. Inflorescence a dense corymb, the capitula ca. 14 X 3 mm. Flowers white-pinkish. Achenes ca. 5-6 mm long, angles scabrous.

Stevia galeopsidifolia Hieron.

Perennial herb to 30 cm tall. Leaves deltoid, 3-3.5 X 1.3-3 cm, acute at apex, truncate at the base, sparsely glandular-puberulous above, subglandular-pubescent beneath, margin crenate-dentate. Inflorescence a

dichasial corymb, the capitula ca. 1.2 X 3 mm. Flowers pale-reddish. Achenes ca. 3.5-4 mm long, with inner angles scabrous. Stevia soratensis Hieron. Erect perennial herb to 50 cm tall. Leaves subcuneate-lanceolate or triangular, 2-6 X 1.2-4 cm, obtuse at apex, obtuse at the base, glabrate above, viscous beneath, the margin crenulate. Inflorescence a dense corymb, many-flowered, the involucre ca. 8-10 X 2-3 mm. Flowers bright-roseate. Achenes ca. 4-5 mm long, glabrous.

Tribe HELIANTHEAE Key to the species. 1.

Leaves glabrous to puberulent, usually bearing conspicuous pellucid secretory cavities or glands filled with essential oils; receptacle naked; involucre bracts equal, mostly valvate, with pronounced pellucid glands (except Flaveria & Schkuria)

2. Achenes without pappus Flaveria bidentis

2'. Achenes with pappus or bristles

3. Phyllaries without oil glands; pappus with apically aristate pappus Schkuria pinnata /var. octoangulata

3'. Phyllaries and leaves with oil glands; pappus with non-aristate scales and small pointed hairs 4. Capitula solitary or in a dichasium; involucre glands

punctiform Tagetes pulchella

4'. Capitula in corymbose cyme; involucre glands linear

5. Involucre yellow; ray flowers conspicuously exceeding involucre Tagetes maxima

5'. Involucre reddish; ray flowers lacking

6. Involucre more than 1 cm long; pappus with 3-6 long paleae and same short scales . . . Tagetes multiflora 6'. Involucre less than 1 cm long; pappus with 1(-2) long aristae, and various small short scales. Tagetes laxa. 1'. Leaves variously pubescent, or glabrous, pellucid glands absent; receptacle with costate paleae; involucral bracts unequal, lacking pellucid glands

7. Female flowers with corolla absent Ambrosia arborescens

7*. Female or neutral flowers with corolla developed, usually ligulate

8. Corolla of marginal flowers persistent over the achene
..... Zinnia peruviana

8'. Corolla of marginal flowers caducous

9. Involucre with outer phyllaries elongate, ca. 10-15 mm long; leaves winged-petiolate, the petiole ca. 10 mm wide, capitula more than 8 mm wide; flowers white or lilac.....
..... Sigesbeckia jordanensis

9'. Involucre with outer phyllaries not elongate; leaves long-petiolate, the unwinged petiole ca. 2 cm long; capitula less than 6 mm wide: flowers yellow
..... Galinsoga quadriradiata

10. Achenes thickened or laterally compressed

11. Pappus absent; achene of disk-flowers, thickened, angled or weakly laterally compressed 12.

Inflorescences solitary; ligule ca. 2 cm long;

leaves ovate, non-resinous

J2'. Inflorescence a corymbose panicle; ligule ca. 1 cm long; leaves lanceolate, resinous

..... Flourensia polycephala

11*. Pappus present, formed by aristae or scales; achene of disk flowers very compressed laterally with margin winged..... Verbesina callacatensis

J0'. Achenes + compressed dorsally and isomorphic.

13. Leaves pinnatisect with 2-4 pairs of linear segments; ligule red or lilac, more than 2.5 cm long; achenes rostrate

• • Cosmos peucedanifolius var. tiraquensis

13'. Leaves lanceolate, serrate; ligule yellow, less than 2 cm long; achenes non-rostrate. .

..... Bidens andicola var. andicola

Ambrosia arborescens Mill.

Suffrutescent herb to 1-1.5 m tall, much branched. Leaves ovate in outline, bipinnatisect, 12-15 X 7-10 cm, the segments lanceolately few-lobed, acute, scabrous above, densely pubescent beneath. Male capitula in terminal racemes, 10-15 cm long, the involucre 4-5 X 5-6 mm, corolla tubular; female capitula sessile, axillary. Fruit an obpyramidal pseudofruit, ca. 0.5-1 mm long.

Bidens andicola H. B. K. var. andicola

Erect or ascending herb to 20-50 cm high. Leaves opposite, ovate-lanceolate, 2-3.5 X 1-2 cm, obtuse or acute at apex, narrowly attenuate at the base, laxly pubescent to glabrous on both surfaces, margin serrate. Capitula radiate, solitary, terminal; involucre campanulate, ca. 5-7 X 6-8 mm. Flowers

dimorphic; the marginal yellow, ligulate, neuter; the disk dark-yellow, bisexual, tubular. Achenes ca. 7-14 mm long, linear. Cosmos

peucedanifolius var. tiraquensis (Knuth) Scherff.

Erect or ascending herb to 30-40 cm tall. Leaves opposite, pinnatisect with 3-4 pairs of segments, 3.5-10 X 0.5-2 cm, the segments broadly lanceolate, elliptic or ovate, entire or lobed, more or less pubescent or glabrous.

Capitula solitary, long-peduncled, c.a. 10-30 cm long, involucre campanulate-hemispheric, ca. 10-12 X 15-18 mm. Flowers dimorphic; the marginal 8, roseate, neuter, ligulate, the disk numerous, yellow, bisexual, tubular.

Achene c.a. 10-15 mm long, fusiform, glabrous. Flaveria bidentis (L.) O. Kuntze

Erect annual herb to 10-15 cm high; dichotomously branched. Leaves lanceolate or elliptic, 2-3.5 X 0.4-1 cm, acute at apex, attenuate at base, glandular-pubescent on both surfaces, margin serrate, pseudopetiolate. Inflorescences a compact cyme; involucre cylindrical, 4-5 X 1 mm. Flowers yellow, dimorphic, the female ligulate. Achenes oblong, c.a. 2.5-3 mm long, black, glabrous.

Flourensia polycephala Dillon

Shrub to 2.5-3 m tall. Leaves lanceolate to lanceolate-elliptic, 7-13 X 1.7-2.5 cm, acute at apex, cuneate at base, resinous-glabrate, margin entire, strigillose. Inflorescence a cymose panicle. Capitula radiate; involucre hemispheric, 8-10 X 10-14 mm. Flowers dimorphic, the marginal 10-13, yellow, neuter, ligulate; the disk 20-30 yellow, bisexual, tubular. Achenes ca. 8-9 mm long, obconical, villous-sericeous. Galinsoga quadriradiata Ruiz & Pavon

Erect or spreading herb to 20-40 cm tall. Leaves broadly rhombic-ovate, 4-7.5

4.5 cm, acute at apex, cuneate to rounded at base, **glabrous to sparsely** pilose, margin serrulate-crenate and ciliate. Inflorescence a lax cyme. Capitula numerous, long peduncled, the involucre broadly campanulate, ca. 2.5-3 X 4-5 mm. [-'flowers dimorphic; the marginal 5(-8), ligulate, yellow, female; the disk numerous, tubular, whitish, bisexual. Achenes ca. 2 mm long, turbinate, sparsely glandular-pubescent. Heliopsis buphthalmoides (Jacq.)

Duval

Erect perennial herb to 50 cm tall. Leaves ovate to ovate-lanceolate, 3.3-6.3 X 2.2-3.7 cm, acute to cuspidate at apex, cuneate to truncate at base, sparingly pubescent above, densely pubescent beneath. Capitula solitary, long peduncled; involucre 5-7 X 12-18 mm; flowers dimorphic, the marginal 8-10 ligulate, yellow, female; the disk numerous, tubular, yellow, bisexual. Achenes ca. 10 mm long, obovoid, epappose, rugose. Schkuria pinnata var.

octoaristata (DC.) Cabrera

Erect annual herb to 20-40 cm high. Leaves pinnately or bipinnately dissected, linear, entire, 10-140 mm long, the segment, filiform, ca. 0.5-2 mm wide, glabrate to glandular-punctate. Inflorescences divaricate-cymose, the capitula radiate, numerous, the involucre 4-5 mm high; disk flowers 5-8, yellow. Achenes narrow, 3-4 mm long; pappus with 8 pappi, apically aristate.

Sisesbeckia jorullensis H. B. K.

Erect annual herb to 50 cm tall. Leaves deltoid or ovate-lanceolate, 6.5-8.5 X 3-5 cm, acute at apex, rounded or cordate at base, with glands and multicellular hairs on both surfaces, lower leaves winged-petiolate, upper sessile. Inflorescence a terminal dichotomous cyme, long peduncled. Capitula small; involucre with outer phyllaries ca. 10-15 mm long, the inner ca. 4 mm. Flowers dimorphic; the marginal ligulate, yellow, female; the disc tubular, yellow, bisexual. Achenes ca. 2-3 mm, obovoid, glabrous.

Tagetes laxa Cabrera

Erect annual herb to 30-50 cm tall. Leaves deeply pinnatisect, 20-60 X 15-30 mm, 3-8 pairs of segments, the segments linear or linear-lanceolate, 6-15 X 1-2 mm, glabrate or punctate, margin serrate. Inflorescence a lax terminal corymb; involucre cylindric, ca. 8-12 X 3-4 mm. Flowers green-yellow, dimorphic, the marginal 2-4, ligulate, female; the 7-11 of the disk bisexual. Achenes fusiform, black, ca. 5-6 mm long, pubescent. Tagetes maxima O. Kuntze

Erect biennial herb to 40-80 cm tall. Leaves pinnatisect., with 3-5 leaflet pairs, the leaflets 4,5-6 X 2-4 cm, lanceolate, glandular-punctate, margin serrulate. Inflorescences terminal corymbiform cymes; involucre cylindric-ovoid, ca. 1.2-1.6 X 4-5 mm. Flowers yellow, dimorphic; the marginal 4-5, ligulate, female; the disk flowers 8, bisexual, tubular. Achenes fusiform, ca. 6-8 mm long, pubescent. Tagetes multiflora H. B. K.

Erect annual herb to 15-30 cm tall; much branched. Leaves deeply pinnatisect, 10-40 X 6-20 mm, 3-6 pairs of segments, the segments linear or linear-lanceolate, 3-12 X 1.2-5 mm, glandular-punctiform, margin serrulate. Inflorescence in corymbiform-cymes, few-flowered; involucre cylindric, ca. 10-15 X 3-4 mm across. Flowers yellow, dimorphic; the marginal 3-5, ligulate, female; the disk 6-8, bisexual. Achenes fusiform, ca. 6-7 mm, gray, pubescent.

Tagetes pusilla H. B. K.

Erect herb to 5-20 cm tall. Leaves opposite, deeply pinnatisect, the segments in 7-8 pairs, linear, 15-30 X 10-20 mm, glabrous. Capitula solitary or in a simple dichasium, axillary and terminal; involucre ca. 7-9 X 2-2.5 mm. Flowers white and yellow, dimorphic, the marginal ligulate, female; the disk flowers bisexual. Achenes fusiform, striate, ca. 5 mm long.

Verbesina callacatensis Hieron.

Erect suffrutescent herb ho 1.5 m tall. Leaves alternate, rhombic-ovate, acuminate at apex, cuneate to ampLixicaul-auriculate at base, hirsute above, densely tomentose beneath, margin crenate-dentate. Inflorescence densely cymose. Capitula radiate, numerous; involucre narrowly campanulate; ca. 2-3 X 2.3-3 mm. Flowers white, dimorphic; the marginal 5 ligulate, bisexual; the disk numerous, tubular, bisexual. Achenes ca. 2 mm long, obovate, compressed.

Viguiera procumbens (Pers.) Blake (= V. pflanzii. Perkins) Erect or ascending herb to 1 m tall; perennial. Leaves opposite, ovate, 2.5-6.5 X 1.5-3.2 cm, acute or rounded at apex, rounded or short cuneiform at base, hispid-tuberculate on both surfaces, margin irregularly serrate. Capitula solitary, apical or axillary; involucre campanulate 9-10 X 11-12 mm. Flowers dimorphic; the marginal 14-18 yellow, ligulate; the disk numerous, yellow, tubular. Achenes ca. 3.5 mm long, compressed, pubescent. Zinnia peruviana L.

Erect annual herb J 0-30 cm tall. Leaves opposite, lanceolate to ovate, 2-3 X 0.4-1.2 cm, acute at apex, rounded at. base, more or less hirsute on both surfaces, sessile, 3-nerved. Capitula radiate, solitary at the end of branches; involucre campanulate, ca. 12-18 X 8-15 mm. Flowers dimorphic; the marginal 6-15 carmine or yeJlow and orange, ligulate; the disk 12-50, yellow, tubular. **Marginal** achenes **9-10** mm long; oblanceolate-linear, striate, the disk ca. 7-9 mm oblanceolate-linear, striate, sericeous.

Tribe **INULEAE**

Key to the species.

1. Acaulescent plants; forming cushion or rosettes, even the heads sessile; achenes densely sericeous

Rosette plants; leaves narrowly linear, ca. 1 mm wide, sharp-tipped,
glabrous Novenia tunariensis

2'. Cushion plants; leaves spatulate, ca. 2 mm wide, rounded at the apex,
white-tomentose on both faces Lucilia violacea

I'. More, or less caulescent plants, at least the inflorescence on obvious
stem; achenes glabrous, glandular or papillose

3. Pappus setae free basally, separately deciduous

4. Stems and leaves densely gray-tomentose; involucre narrowly
cylindrical; pistillate florets 1-8C-20) 5. Taller plants;
leaves decurrent, more than 8 mm wide;

capitula ca . 5 mm long..... Achyrocline lata

5'. Smaller plants; leaves non-decurrent, less than 2 mm wide;

capitula ca. 3 mm long..... Achyrocline ramosissima

4'. Stems and leaves laxly lanate; involucre campanulate;

pistillate florets 25-150..... Gnaphalium dombeyanum

3'. Pappus setae fused basally, deciduous as unit

6. Tiny plants; stem f developed; with 2-4 capitula, in axils of
tapper leaves; style branches of the hermaphroditic florets
apically acute, evenly papillose externally.....

..... Belloa piptolepis

6'. Small plants with stems well developed; with numerous
capitula, in axillary or terminal pseudospikes; style branches
of the hermaphroditic florets apically truncate with a ring of
collecting hairs toward the apices

7. Leaves + concolor, lanate on both surfaces; phyllaries
acute

Inflorescence a short glomerule, scattered along stem;

basal leaves dry at flowering.....

..... Gamochaeta purpurea

8'. Inflorescence a compact pseudospike; basal leaves persistent at anthesis. . . Gamochaetjj \$mer_LTi\$ⁿ³

7'. Leaves discolor, densely white tomentose beneath; inner phylaries obtuse..... Gamochaeta spi cata

Achyrocline alata (H. B. K.) DC.

Erect subshrub 50-80 cm tall; stems narrowly winged, laxly lanate. Leaves linear-lanceolate 5-10 X 0.4-0.7 cm, acute at apex, attenuate at base, slightly glandular and densely lanate on both surfaces, sessile, decurrent. Inflorescence a dense glomerate-cyme. Capitula numerous; involucre cylindric, ca. 5-6 X 1-2 mm. Flowers dimorphic; the marginal 3-5, yellowish, female, corolla filiform; the disk 1-3, bisexual, corolla tubular, 5-lobed, yellowish. Achenes ca. 1 mm long, glabrous.

Achyrocline ramosissima (Sch. Bip.) Britton

Ascending subshrub to 10-30 cm high; stems gray-tomentose. Leaves linear to linear-lanceolate, 5-30 X 2-3 mm, acute at apex, attenuate at base, lanate to densely lanate on both surfaces, sessile, briefly decurrent. Inflorescence a corymbiform-cyme. Capitula numerous; involucre fusiform, ca. 3-4 X 1-2 ram. Flowers usually 4 female and 1 male. Achenes ca. 1 mm long, glabrous.

Belloa piptolepis (Wedd.) Cabrera

Small perennial herb to 4-5 cm tall. Basal leaves forming rosette, leaves oblanceolate or spatulate, 5-12 X 3-4 mm, obtuse-mucronolate at

apex, attenuate **at base**, densely white tomentose on both sufaces, entire, sessile; the cauline smaller with the apical ones forming whor].

Inflorescence with 3-4 apically clustered capitula, sessile; involucre campanulate, ca. 4-5 X 2-3 mm. Marginal flowers 15-20, the central 4-5.

Achenes ca. 1 mm long, ellipsoid, papillose-granular. Gamochaeta americana (Miller) Cabrera

Erect, or ascending herb to 10-30 cm tall. Lower leaves spatulate, 15-30 X 3-6 mm, obtuse or acutish at apex, attenuate at base, glabrate above, densely tomentose beneath, the cauline leaves gradually smaller. Inflorescence a dense pseudospike, axillary and apical. Capitula numerous; involucre campanulate, ca. 3-4 X 2-3 mm. Marginal flowers numerous, the central 3-4. Achenes short, granular. Gamochaeta purpurea (L.) Cabrera

Erect annual herb 10-30 cm tall. Leaves oblanceolate, 20-50 X 3-8 mm, obtuse at apex, attenuate at base, sparsely lanuginose above, densely white-pannose beneath. Inflorescence a spike-like glom.erule, axillary and terminal.

Capitula sessile, involucre 4-6 X 2-3 mm. Marginal flowers numerous, the central, few. Achene ca. 0.6 mm long, granular. Gamochaeta spicata (Lam.) Cabrera

Ascending herb 10-40 cm tall. Basal leaves in rosette, spatulate, 30-60 X 0.5-1.5 cm, obtuse at **apex**, broadly attenuate at the base, glabrate to lanuginose above, densely white-tomentose beneath. Inflorescence a dense terminal spike, compound. Capitula numerous, sessile; involucre pyriform to campanulate, ca. 3-4 X 2-2.5 mm. Marginal flowers numerous, **the disk few**. Achenes ca. 0.5 mm long, granular. Gnaphalium dombeyanum DC. Erect herb to 20-40 cm tall. Leaves oblanceolate-linear, 2.5-4 X 0.4-0.6 cm,

acute at apex, broadly attenuate at base, slightly tomentose above, densely tomentose beneath, short decurrents. Inflorescence a terminal glomerulate corymbiform-cyme, the capitula numerous; involucre broadly campanulate, ca. 4-5 X 4-5 mm. Marginal flowers numerous, disk flowers few. Achenes ca. 0.6 mm XX, glabrous. Lucilia violacea Wedd.

Acaulescent. perennial herb to 1-2 cm high; forming small cushion. Leaves in rosette, spatulate, 6-12 X 1.5-2 mm, rounded at apex, attenuate at the base, white tomentose on both surfaces. Capitula solitary, sessile; involucre cylindric-ovoid, 4-6 X 2-3 mm. Achenes ca. 0.6 mm XX, sericeous-vi Hose.

Novenia tunariensis (O. Kuntze) Friere

Acaulescent perennial herb to 3-4 cm tall. Leaves in dense rosette, narrowly linear, 10-22 X 0.5-1 mm, acute at apex, broad at base, 1-nerved, coriaceous, glabrous. Capitula 1-4, sessile; involucre ovate-cylindric, ca. 8-10 X 4-5 mm. Flowers dimorphic, the marginal few, female; the disk few, bisexual. Achenes ca. 2-4.8 mm long, sericeous-pubescent.

Tribe LACTUCEAE Key to the species. 1.

Acaulescent or subacaulescent rosette plants; with sessile central capitula supported by a peduncle shorter than the leaves; pappus with plumose bristles

2. Flowers white or lilac

3. Leaves oblanceolate, more than 2 cm long, plants single or in small clusters; involucre to 2 cm long Hypochoeris echegarayi

3*. Leaves nearly linear, less than 2 cm long; becoming cushion plant; involucre small Hypochoeris taraxacoides

2'. Flowers yellow

4. Capitula usually on a short peduncle 1-3 cm long; involucre campanulate-cylindrical, 15-20 mm long; phyllaries usually hirsute in upper part Hypochoeris eremophylla

4'. Capitula usually sessile; involucre campanulate or hemispherical, 10-15 mm long; phyllaries usually glabrous. .
..... Hypochoeris menziesiana

J'. Erect plants (at least the pedunculate inflorescences); pappus with simple bristles

5. Achenes tuberculiform; capitula 1 per peduncle
..... Taraxacum officinale

5'. Achenes without protuberances at the upper part; capitula several per inflorescence
6. Basal leaves deeply laciniate-lobed, achenes non-rostrate. .
..... Sonchus oleraceus

b'. Basal leaves entire or serrulate, not lobed; achenes truncate at the apex Hieracium neo-herrerae

Hieracium neo-herrerae Zahn.

Erect perennial herb to 30-35 cm tall; stems hirsute. Lower leaves oblong-lanceolate to spatulate, 5-7 X 1.2-2 cm, obtuse at apex, broadly attenuate at base, laxly hirsute on both surfaces, the cauline leaves lanceolate, smaller than the inferior. Inflorescence a corymbiform several-capitulate cyme; involucre cylindrical-campanulate, 4-5 X 5-6 mm, the flowers yellow, isomorphic, all bisexual, the corolla ligulate. Achenes ca. 3 mm long, black, pappose.

Hypochoeris echegarayi Hieron.

Acaulescent perennial rosette herb. Leaves oblanceolate, 20-30 X 2-3 mm, obtuse at apex, attenuate at base, the margin with small triangular lobes toward the base. Capitula solitary, subsessile; involucre campanulate, 10-18 X 6-8 mm. Flowers numerous, white to pinkish; corolla ca. 12-20 mm long.

Achenes 4-5 mm long, cylindric, pappose. Hypochoeris eremophyla Cabrera

Acaulescent perennial rosette herb. Leaves oblanceolate, 20-60 X 5-12 mm, acute at apex, attenuate at base, glabrescent on both surfaces, margin with teeth or triangular lobes. Capitula solitary, sessile; involucre campanulate-cylindric, ca. 10-15 X 15-20 mm, the flowers numerous, yellow, corolla ca. 12-15 mm long. Achenes cylindric. **Hypochoeris meyeniana** (Walp.) Griseb.

Acaulescent perennial rosette herb. Leaves oblanceolate or spatulate, 20-40 X 4-10 mm, acute or obtuse at apex, attenuate at base, glabrous on both surfaces, margin dentate or lobulate. Capitula solitary, sessile; involucre campanulate, ca. 15-18 X 20-25 mm; phyllaries oblong-lanceolate, obtuse, to 2 cm long. Flowers numerous, yellow. Hypochoeris taraxacoides (Walp.) Benth.

Small acaulescent perennial, rosette herb, sometimes clustered into cushion plant. Leaves linear to lanceolate, 7-15 X 2-3 mm, acute at apex, vaginate at base, glabrous on both surfaces, margin dentate or with few minute triangular teeth. Capitula solitary, sessile or on short peduncle, involucre cylindric, ca. 18-20 X 5-6 mm. Flowers numerous, ligulate, ca. 10 mm long, white-lilac or reddish. Achenes cylindric, 5-sulcate, pappose. **Sonchus oleraceus** L. Erect annual herb to 30-60 cm tall; few branched. Lower leaves deeply

lacinate, 10-15 X 5-9 cm, acute or subobtuse, long attenuate onto winged petiole, clasping at base, glabrous; the upper leaves lanceolate, sessile and auriculate. inflorescence a corymbiform cyme; involucre campanulate, CA. 10-12 X 6-10 mm. Flowers numerous, yellow or white. Achenes ca. 3.5 cm long, compressed ovate-lanceolate, ribbed, pappose. Taraxacum officinale Weber
 Acaulescent perennial herb to 10-20 cm tall. Leaves in basal rosette, oblong or oblanceolate-oblong, 10-15 X 3-4 cm, acute at apex, attenuate at base, glabrous, margin deeply incised-pinnatifid. Capitula solitary on elongate scape ca. 3-20 cm long; involucre campanulate, ca. 12-14 X 10-20 mm. Flowers yellow, isomorphic, ligulate, 5-dentate at apex, bisexual. Achenes ca. 5 mm long, fusiform or obovate, 10-ribbed.

Tribe LABEAE Key to the species. 1. Leaves

ovate to rhombic-elliptic; ligule of marginal flowers linear, ca.

1.5 cm long X 2 mm wide Paranephelius ovatus

1'. Leaves oblanceolate; ligule of marginal flowers oblong-linear, 2-2.5 cm

long X 3 mm wide Paranephelius uniflorus

Paranephelius ovatus Wedd.

Acaulescent rosette herb. Leaves ovate to rhombic-elliptic, with a well-defined winged petiole, the blade 1.5-2.5 X 0.8-1.8 cm, obtuse at apex, attenuate onto petiole at base, glabrate above, white-tomentose beneath, the margin unevenly dentate. Capitula solitary, sessile, the involucre campanulate, ca. 1.5 X 2.5-3 cm. Flowers yellow, dimorphic; the marginal female, ligulate, ca. 1.5 cm long and 2 mm wide, 3-dentate at apex, the disk

flowers numerous, bisexual, tubular, 5-lobed. Achenes ca. 2.5 mm long, glabrous, ribbed, pappose.

Paranephelius uniflorus Poeppig & Endlicher

Acaulescent rosette **herbs**. Leaves oblanceolate, 6-12 X 2-4 cm, acute at apex, attenuate onto short petiole at the base, sparsely hairy above, densely white-tomentose beneath, the margin deeply lobate or dentate. Capitula 1-2 at the center of the rosette, short peduncled; involucre campanulate, 15 X 15-20 mm. Flowers yellow, dimorphic; the marginal female, 1-lobed, ca. 2-2.5 X 0.3 cm, oblong-linear, slightly 3-dentate at apex; the disk flowers bisexual, tubular, 5-lobed. Achenes ca. 3 mm, cylindrical, ribbed, glabrous, pappose.

Tribe MUTTSIEAE

1. Plants spiny

2. Leaves entire

3. Capitula more than 2 cm long Barnadesia horrida

3'. Capitula less than 1 cm long Dasyphyllum leiocephalum

2' . Leaves serrate..... Proustia cuneifolia

1'. Plants not spiny

4. Leaves pinnately compound with terminal tendril

..... Mutisia acuminata

4*. Leaves simple, without tendrils

5. Leaves palmately lobed and veined, about as wide as long; viney or

shrubby **6. Leaves palmately 11-13 lobed, densely tomentose**

beneath. . . .

..... Jungia malvaeifolia

6*. Leaves palmately 5-7 lobed, sparsely pubescent beneath

..... Jungia floribunda

Leaves pinnately veined, entire or variously serrate, much longer than wide; erect, usually herbaceous

7. Leaves densely white-tomentose below
..... Onoseris albicans

7'. Leaves puberulous to glabrate but not white below

8. Plants shrubby; flowers pale yellow.....
..... Trichoxys di varicata

8'. Plants low herbs; flowers white, blue or lilac 9.

Plants acaulescent with capitula sessile or almost sessile; scape ca. 0-15(-30) mm long 10. Leaves finely serrate; involucre 12-14 X

8-10 mm. . . Perezia integrifolia

10'. Leaves deeply pinnatifidly lobed;

involucre 15-20 X 12-15 mm
..... Perezia virens

9'. Plants caulescent with leafy stem; scape ca .

ca. 10-45 cm long

11. Scape ca. 10-18 cm high
..... Perezia ciliosa

11'. Scape ca. 35-45 cm high

..... Perezia pungens

Barnadesia horrida Muschler

Shrub 1-2 m tall, stems spiny. Leaves fascicled, oblanceolate, 10-25 X 2-6 mm, acute and spine-tipped at apex, cuneate at base, pubescent on both

surfaces. Capitula solitary or 1-4 at the ends of branchlets, the involucre oblong 2.5-3 X 1.5-2 cm. Flowers dimorphic, the marginal 8(-9) ligulate, purplish; the central tubular, 5-lobed, reddish. Achene ca. 4-5 mm long, cylindrical.

Dasyphyllum leiocephalum (Wedd.) Cabrera

Small tree to 3-4 m tall; branchlets with spines. Leaves elliptic-lanceolate, 1.5-3 X 0.3-0.8, spine-tipped at apex, acute at base, glabrous to slightly pubescent on both surfaces, 3-nerved. Capitula solitary along the lateral branchlets, 6-8 flowered, the involucre ca. 1-1.2 X 0.4-0.7 cm. Achenes ca. 4 mm long, densely sericous-villous. Jungia floribunda Lessing

Shrub to 80-120 cm tall. Leaves palmately 5-7 lobed, lobes rounded, 3-9 X 2.8-0.5 cm, scabrous above, reticulate-nerved and sparsely-pubescent beneath, petiole 2.5-6 cm long. Inflorescence a corymbose-panicle; involucre ca. 6-7 X 5-6 mm, campanulate. Flowers bisexual, dimorphic, the ray flowers white, bilabiate, the central flowers with short lips. Achenes ca. 5-6 mm long, fusiform, sparsely pubescent. Jungia malvaeifolia Muschler

Sprawling viny shrub. Leaves palmately 11-13 lobed, suborbicular, 5.5-9.5 X 6-9.5, lobes rounded, scabrous above, tomentose beneath, conspicuously reticulate nerved, margin dentate. Inflorescence a cymose panicle. Capitula numerous; involucre broadly campanulate, ca. 5-7 X 7-12 mm. Flowers bisexual, dimorphic; ray flowers white, bilabiate, unequal, the central with short equal lips. Achenes ca. 1.5 mm long, fusiform, pubescent. Mutisia acuminata

Ruiz & Pavon var. acuminata

Shrub to 1 m tall; branches flexuose. Leaves pinnately 9-14 foliolate, 6-12 X 2-3.5 cm with apical tendril, the leaflets lanceolate or elliptic-lanceolae

acuminate, attenuate at base. Inflorescences solitary, capitula pedunculate; the involucre ca. 45-60 X 12-15 cm. Flowers dimorphic; ray flowers 5-8, ligulate, red-orange, female; the disk flowers 10-20, yellow, bilabiate, bisexual. Achenes ca. 20 mm long, cylindric, fusiform. Onoseris albicans (D. Don) Ferreyra

Erect perennial herb ho 30-50 cm tall. Leaves lanceolate, 20-45 X 7-20 mm, acuminate, at. apex, attenuate at base, densely whihish-tomentose beneath, margin sinuate-dentate with sharp teeth. Gapitula terminal, solitary, involucre 12-15 X 7-15 mm, campanulate. Flowers bisexual, dimorphic, the marginal violet, bilabiate, lips unequal, the disk yellowish with shorter lobes. Achenes ca. 5-7 mm, ribbed, glabrous. Perezia ciliosa (Phil.) Reiche

Short stemmed perennial herb to 10 cm tall. Basal leaves rosulate, oblanceolate, 10-60 X 3-15 mm, acutish at apex, attenuate at base, glabrous on both surfaces, margin sinuate-dentate or irregularly dentate. Scapes ascending, ca. 4-16 cm long with reduced leaves lanceolate or ovate-lanceolate. Capitula solitary, the involucre 10-15 X 8-12 mm, campanulate. Flowers blue, 25-30, corolla bilabiate. Achenes ca. 3 mm long, turbinate, glandular-puberulous. Perezia integrifolia Wedd.

Small acaulescent herb 1-2 cm tall. Leaves obovate 12-15 X 7-8 mm, obtuse to acutish at the apex, attenuate at the base, glabrate on both surfaces, margin scarcely serrate, ciliate. Capitula solitary, sessile, the involucre oblong, ca. 8-15 X 7-12 mm, corolla bluish, bilabiate. Achenes ca. 1.8 mm long, turbinate, glandular-pubescent. Perezia pungens (H. B. K.) Less

Caulescent herb to 20-40 cm tall. Basal leaves loosely rosulate, elliptic-

lanceolate, 6-10 X 2-3.5 cm, obtuse at apex, attenuate at base, with large and uneven teeth, stem leaves smaller, lanceolate, more or less entire, cordate at base. Scapes with single capitula, these campanulate; the involucre hemispherical ca. 1.5-1.8 X 2-2.3. Flowers white, blue or violet, dimorphic; the ray flowers ligulate, the disk flowers evenly bilabiate, tubular. Achenes ca. 1-3 mm long, with glandular trichomes. Perezia virens (Don) Hook, et Amot Acaulescent rosette herb 2-8 cm tall. Leaves pinnatifidly lobed, oblanceolate-spatulate, 1.5-40 X 8-16 mm, obtuse or subacute at apex, glabrous to slightly puberulent on both surfaces, margin usually dentate and ciliate. Scape short, 2-30 mm long; involucre campanulate, 15-20 X 10-16 mm. Flowers blue, 20-30, blue or lilac, corolla bilabiate. Achenes ca. 2.2 mm long, turbinate, glandular-pubescent. **Proustia cuneifolia** Don var. **cuneifolia**

Shrub to 1-2 m tall; stem spinescent. Leaves oblanceolate to oblong, 2.5-6 X 0.8-2 cm, obtuse at apex, cuneate at base, puberulent on both surfaces, margin finely serrate. Inflorescence reduced, + glomerulate, the capitula numerous, sessile, the involucre campanulate 5-6 X 8-10 mm. Flowers 5 per head, isomorphic, white, the corolla bilabiate. Achenes ca. 3 mm long, turbinate, sericeous-pubescent. **Trixis divaricata** H. B. K.

Shrub 1-1.5 m tall; stems somewhat sprawling. Leaves lanceolate to oblong-lanceolate, 5-9 X 1.8-3.5 cm, acute or acuminate at the apex, attenuate and shortly auriculate at the base, glandular-pubescent above, lanuginose-tomentose beneath, minutely dentate. Inflorescences corymbose-paniculate, divaricate. Capitula numerous, the involucre cylindrical,

8-10 X 4-5 mm. Flowers 12, isomorphic, pale-yellow or white, the corolla bilabiate. Achenes ca. 4-5 mm long, cylindric.

Tribe SENECTIONEAE

Key to the species.

- 1. Phyllaries united to the middle; sessile rosette plants or the leaves clustered at apice of thick scaly stems 2. Leaves divided on the apex, bifid, ca. 5 mm long; branching subshrubs
..... Werneria roseni i
- 2'. Rhizomatous rosette herbs
 - 3. Leaves linear, less than 1 mm wide or mostly more than 9 cm long
 - 4. Leaves mostly more than 4 cm long
 - 5. Leaves 3-5 mm wide, strap-shaped; **phyllaries 15-30.** . . .
..... Werneria nubi^ena
 - 5'. Leaves linear, grass-like, 4-6 cm long; phyllaries 12-20
..... Werneria villosa
 - 4'. Leaves less than 4 cm long
 - 6. Leaves acute, mostly more than 1.5 cm long; phyllaries more than 12
 - 7. **Flowers white or lilac; phyllaries 13**
..... Werneria apiculata
 - 7'. **Flowers yellow; phyllaries 15-18**
..... Werneria pygmaea
 - 6'. Leaves obtuse less than 1.5 cm long; **phyllaries 8-12** . . .
..... Werneria caespitose

3*. Leaves oblanceolate or spatulate, more than 3 mm **wide**

8. Leaves sessile or short-petiolate less than 1.5 cm long;

phyllaries 10-14 9. Leaves obtuse-spatulate, mostly

less than 1 cm long;

margin hispid-setose Werneria pectinata

9'. Leaves lanceolate-spatulate, ca. 1 cm long; lamina densely

setose-stri gnse Werneria strigosissima

8'. Leaves attenuate Lo long petiolate more than 1.5 cm;

phyllaries 12-20 Werneria orbignyana

1*. Phyllaries free or occasionally united in groups of 2 or 3

10. Shrubs with leaves densely white-tomentose below

11. Ray flowers lacking; leaves mostly more than 6 cm long

..... Gynoxys longi folia

11'. Ray flowers present; leaves mostly less than 6 cm long

12. Leaves narrowly ovate; petiole slightly winged

..... Gynoxys pi. 1 lahuatensi s

12' . Leaves oblong-lanceolate; petiole unwinged.....

..... Gynoxys aff. nitida

10'. Herbs, vines, or subshrubs, or shrubby but the leaves not white below

13. Vine Pentacalia sp .

13'. Erect plants

14. Subcaulescent or caespitose rosette herbs or cushion

plants to 2-12 cm tall, leaves tomentose in lower or both

surfaces; capitula solitary

15. Capitula sessile; leaves less than 5 mm long; cushion

plant Senecio evacoides

Capitula peduncled; leaves more than 10 cm long; rosette

or subrosette herbs

16. Leaves broadly elliptic, sericeous-tomentose on both surfaces; stem repent. . . .Senecio antennaria 16'.

Leaves linear, glabrous above, villous-sericeous beneath; rosette plant

1/. Leaves less than 3 cm long
..... Senecio hoiivarianus

17' . Leaves more than 10 cm long.....
..... Senecio comosus

14'. Stem erect and leafy, usually branched; plants lower leaves variable, capitula-corymbiform cyme 18. Capitula discoid, all flowers equal with tubular corolla

19. Inflorescences in corymbose cymes

20. Leaves deeply lyrate-pinnatisect. .Senecio yulgare

20'. Leaves entire to serrate, not pinnatisect-lobed

21. Lower leaves elliptic-oblong and petiolate mostly more than 1 cm wide 22. Lower leaves long petiolate, with unwinged petiole

..... Senecio rhizomatus

22*. **Lower** leaves short petiolate **or with broadly winged petiole**

23. Leaves glabrousSenecio puna-sessilis

23'. Leaves white-tomentose below; inflorescence openly paniculate

21'. All leaves sessile or sublinear less than 1 cm wide

24. Leaves sessile, lanceolate 0.7-1 cm **wide**
..... Senecio hastati folius

24*. Leaves linear or sublinear, less than 0.7 cm **wide**

25. Leave narrowly linear, 1 cm long.....
..... Senecio rufescens

25'. Leaves sublinear, more than 1 cm wide

26. Leaf bases non-clasping; leaves broadest.
above middle . . . Senecio flaccidifolius

26'. Leaf bases clasping; leaves broadest at
base Senecio praeruptorum

27. Leaves deeply pinnatisect . . . Senecio rudbeckiaefolius

27'. Leaves entire to serrate

28. Leaves entire less than 3 cm long, **densely gray-**
tomentose on both surfaces Senecio hohenackeri 28'.

Leaves subentire, serrate, more than 6 cm long,

puberulent to glandular-pubescent 29. Shrubs with
densely leafy stems

30. Leaves linear-lanceolate, ca. 2.5-10 cm long,
the margin minutely repand-denticulate;
petiolate; ligule ca. 12 mm.....
..... Senecio peruensis

30'. Leaves lanceolate, ca. 2.5-9 cm long, the
margin sinuate-dentate; sessile; ligule ca. 8 cm
..... Senecio ayapatensis

29'. Shrubs with well-spaced alternate leaves,

31. Leaves lanceolate, ca. 10-2!) cm long, margin serrate; ligule 5 mm long
 Senecio fortunatus
- 31'. Leaves deltoid, ca. 7-9 cm long, margin crenate; ligule 6-7 mm long
 Senec. i o herrerae

Gynoxys aff. nitida Muschel

Small tree to 3-4 m tall. Leaves oblong-lanceolate or lanceolate, 3-12 X 1-3.5 cm, acutish or rounded at the apex, obtuse at the base, glabrous above, densely tomentose beneath, ochre-yellow or whitish, petiole 1.8-2.5 cm long. Inflorescences terminal and axillary corymbose-panicles. Capitula radiate; involucre campanulate-turbinate, ca. 6-7 X 8-9 mm. Flowers yellow, dimorphic, the ray flowers 8-10, ligulate, female; the disk flowers 12(10), tubular, funnelform, bisexual. Achenes 1.8-2 mm long, cylindrical, pubescent.

Gynoxys longifolia Wedd.

Small trees 2-4 m tall. Leaves lanceolate, 9-15 X 2-2.5 cm, acuminate or acute at apex, obtuse at the base, glabrescent above, densely whitish tomentose beneath, margin entire, petiole 9-10 mm long. Inflorescence a corymbose-panicle, capitula discoid, involucre campanulate, ca. 6-7 X 8 mm. Flowers yellow, 16-18, tubular, corolla salverform. Achene ca. 1.4-2 mm long, cylindrical, with sparse hairs, strigose.

Gynoxys pillahuatensis Cuatr.

Shrub to 3 m tall. Leaves narrowly ovate, 3-10 X 1-2.5 cm, acute at apex, rounded at base, glabrous above, densely white-tomentose below, the petiole

2 cm long, subwinged. Inflorescences terminal cymose-panicles. Capitula radiate, involucre campanulate, ca. 4-5 X 7-8 mm. Flowers yellow, dimorphic; the ray flowers ligulate, female; the disk flowers slightly funelform, bisexual. Achenes ca. 1.5 cm long, glabrous. Pentacalia sp.

Slender woody vine over Polylepis trunks, to 1-1.50 m long. Leaves ovate-oblong, 1.5-4.2 X 1-2.2 cm, obtuse at both ends, glabrate on both surfaces, margin crenate-dentate, petiole 0.5-1 cm long. Inflorescence a terminal corymbose cyme. Capitula 4-5, radiate; involucre campanulate, ca. 6-7 X 8-10 mm; phyllaries 11, linear-oblong, pubescent. Flowers yellow, dimorphic; the marginal female, ligulate, with ligule ca. 5-7 mm long; the disk, bisexual, tubular. Achenes ca. 1.8-2 mm long, glabrous. Senecio antennaria (Wedd.)

Cabrera

Subcaulescent herb to 5-12 cm tall. Leaves apically rosulate, 1.2-1.5 X 0.8-1.7 cm, broadly elliptic, obtuse, attenuate at the base, sericeous-tomentose on both surfaces, margin entire. Capitula discoid, solitary, peduncled; involucre campanulate, ca. 1.2 X 1.5 cm. Achenes ca. 1.5-2 cm long, glabrous.

Senecio ayapatensis Schultz Bipontinus ex Wedd.

Erect herb to 50 cm tall. Leaves lanceolate, 2.5-10 X 0.5-2.2 cm, acutish at apex, auriculate at base, glandular-puberulent on both surfaces, margin sinuate-dentate, sessile. Inflorescences corymbose, involucre well developed, ca. 1.2 X 1.8-2 cm. Flowers yellow, dimorphic; the marginal 8-12, ligulate; the disk florets numerous. Achene ca. 2 mm long, glabrous. Senecio

bolivarianus Cuatr. Caespitose herb to 3-5 cm tall, prostrate. Leaves basally rosulate, linear

20-40(-50) X 2-3.5 mm, acute at apex, attenuate at base, glabrous above, densely villous-sericeous beneath, the margin revolute. Capitula discoid, solitary, peduncled; involucre campanulate, ca. 9-10 X 15 mm. Flowers isomorphic, hermaphrodite, the corolla yellow. Achene ca. 1.2 mm long, glabrous, callose at base. Senecio campanulatus Schultz Bipontinus
Sprawling shrub to 1 m tall. Leaves elliptic-lanceolate or ovate, 5-14 X 2.5-3.5 cm, acute at apex, cordate or rounded at the base, glabrate above, gray-tomentose beneath, margin retrorse dentate. Inflorescence divaricate cyme. Capitula discoid; involucre broadly campanulate, 8-1.4 mm. Flowers yellow, numerous, isomorphic. Achenes ca. 2.5 cm long, glabrous. Senecio comosus Schultz Bipontinus

Decumbent herb to 40-50 cm tall. Leaves rosulate; the basals linear-lanceolate spatulate, 12-30 X 0.3-0.9 cm, acute, attenuate at the base, lustrous-glabrate above, densely whitish-tomentose beneath, the cauline gradually smaller. Inflorescence apical, laxly corymbose; capitula radiate, involucre campanulate, 12 X 15 mm. flowers yellow, dimorphic; the marginals female, ligulate; the disk numerous, bisexual. Achenes ca. 2 mm long, glabrous.

Senecio evacoides Schultz Bipontinus

Subcaulescent herb to 2-3 cm tall. Leaves apically rosulate, obovate-spatulate, 4-10 X 2.5-5 mm, obtuse at apex, attenuate at base, whitish-tomentose on both surfaces. Capitula discoid, solitary, sessile; involucre campanulate, 7-8 X 5-6 mm. Flowers yellow, numerous. Achenes ca. 1.5 mm **long**, glabrous.

Senecio flaccidifolius Wedd.

Erect suffrutescent herb to 1 m tall. Leaves linear-lanceolate, 1.5-6.5 X 0.2-0.8 cm, acute at apex, longer attenuate at base, puberulent above, canescent-tomentose beneath, margin dentate revolute. Inflorescence a corymbose cyme; capitula 8-10, discoid, involucre 6-8 X 7-8 mm, calyculate, florets numerous. Achene ca. 2.2 mm long, glabrous. Senecio fortunatus Cuatr.

Shrub to 2 m tall. Leaves lanceolate, 10-25 X 2-4.2 cm, acuminate at apex, cuneate at base, glabrate to sparsely pilose above, cobweddy-puberulent beneath, margin serrate. Inflorescence a terminal panicle. Capitula radiate, involucre ca. 6 X 8-9 mm, hemispherical. Flowers yellow, dimorphic; the marginals 10-12, female, ligulate; the disk bisexual. Achenes ca. 1 mm, glabrous, striate. **Senecio hastidifolius** Cabrera

Shrub to 1 m tall. Leaves oblanceolate, 4-9 X 1.5-2.7 cm, acutish or obtuse at apex, attenuate and semisagittate at base, glandular-pubescent on both surfaces, margin short dentate. Inflorescence a lax terminal corymbose cyme. Capitula discoid; involucre broadly campanulate, 10-12 X 14-15 mm. Flowers yellow, numerous, isomorphic. Achenes ca. 2 mm, cylindric, glabrous, striate.

Senecio herrerae Cabrera

Erect herb to 50-100 cm tall. Leaves deltoid, 7-9 X 2.5-3.5 cm, acute at apex, truncate or slightly cordate at base, glandular-pubescent on both surfaces, margin equally dentate. Inflorescence a terminal corymbose cyme. Capitula radiate, involucre campanulate, short calyculate, ca. 6-7 X 7-8 mm. Flowers yellow, dimorphic; the marginals ca. 12, female, ligulate; the disk numerous, bisexual. Achenes ca. 2.5 mm long, papillose-pubescent.

Senecio hohenackeri Schultz Bipontinus

Shrub to 1 m tall. Leaves ovate-lanceolate or oblong-lanceolate, 1-2.5 X 0.5-1 cm, obtuse or acute at the apex, attenuate at the base, densely sericeous-tomentose **on both** surfaces, margin entire. Capitula terminal, solitary. Capitula radiate, involucre broadly campanulate, ca. 12 X 18-20 mm. Flowers yellow, dimorphic; the marginal 20 or more, female, ligulate; the disk numerous, bisexual. Achene ca. 1.2 mm, glabrous, striate. *Senecio peruensis* Cuatr.

Shrub to 1-2 m tall. Leaves linear-lanceolate, 4-9 X 0.5-0.9 cm, acuminate, attenuate at base, glabrate above, cobwebby puberulent beneath, margin repand denticulate. Inflorescence a terminal corymbose panicle. Capitula radiate; involucre broadly campanulate, ca. 10-12 X 12-15 mm. Flowers yellow, dimorphic; the marginals 10-12, female, ligulate; the disk numerous, bisexual. Achenes ca. 1.2 mm long, cylindric, pubescent. *Senecio praeruptorum* Schultz Bipontinus ex Klatt

Erect herb to 30-50 cm tall. Leaves rosulate; the basals elliptic or oblong, 8-10 X 1.5-2.5 cm, acute or obtuse at apex, rounded at base, glabrate-cobwebby on both surfaces, margin dentate, the cauline distally, linear-lanceolate, clasping at base. Inflorescence in corymbose-cymes. Capitula discoid, involucre campanulate, caliculate, ca. 6-8 X 10-12 mm. Flowers isomorphic, yellow, bisexual. Achenes ca. 2 mm long, cylindric, glabrous, striate.

Senecio puna-sessilis Cuatr.

Erect herb to 50 cm tall. Basal leaves elliptic-oblong, acutish or obtuse at apex, attenuate at base, papillose-puberulent on both surfaces, the margin dentate, the cauline obtuse-lanceolate, clasping at base, involucre 6 X 0.8 cm, campanulate, ca. 10-12-15 mm. Flowers yellow, numerous. Achenes ca. 1.2 mm, glabrous.

Senecio rhizomatus Rusby

Erect herb to 20-400 cm tall. Basal leaves rosulate, ovate-lanceolate, 4-5 X 2.2-3.2 cm, acute at the apex, rounded to deltoid at the base, laxly glandular-pubescent to glabrate on both surfaces, margin irregularly dentate, long petiolate ca. 10 cm, the cauline gradually smaller. Inflorescence a apical cyme. Capitula 3-5, discoid; involucre hemispherical, ca. 6-8 X 1.3-1.5 X- Flowers yellow, numerous, isomorphic. Achenes ca. 2 mm long, glabrous, striate.

Senecio rudbeckiifolius Meyer et Wallp.

Shrub to 50-1.50 m tall; much-branched. Leaves alternate, pinnatisect, 4-10 X 2-5 cm, the segments in 2-3 pairs, lanceolate or linear-lanceolate, 3-5 X 0.2-0.6 cm, acuminate to acute at apex, glabrous, margin finely serrate.

Inflorescence a densely corymbose cyme. Capitula radiate, numerous, involucre campanulate, ca. 8-10 X 6-7 mm. Flowers yellow, dimorphic; the marginals ligulate, female; the disk numerous, bisexual. Achenes ca. 1.5 mm long, cylindrical, sericeous-pubescent. **Senecio rufescens** DC.

Shrub to 40-60 cm tall. Leaves alternate, linear or linear-lanceolate, somewhat fleshy, 12-30 X 1-5 mm, acute or obtuse at apex, attenuate at the base, glandular-puberulent on both surfaces, margin revolute, sessile.

Capitula solitary or in lax cymes, discoid; involucre campanulate, 7-10 X 7 mm. Flowers yellow, numerous, bisexual. Achenes ca. 1.8-2 mm long, cylindrical, glabrous. **Senecio vulgaris** L.

Erect annual herb to 10-40 cm tall. Leaves deeply pinnatisect-lyrate, 4-7 X 1.5-3 cm, the inferior leaves alternate at base, the superior sessile and

subclasping, glabrate. Inflorescence **a corymbiform** cyme. Capitula discoid; involucre cylindric, 5-6 X 4-5 mm. Flowers yellow, isomorphic, bisexual. Achenes ca. 3 mm, cylindric, pubescent.

Werneria apiculata Schultz Bipontinus

Low caespitose herb ho 2-3 cm tall. Leaves sparsely rosulate, linear or linear-lanceolate, 2-4 X 0.1-0.3 cm, acute at the apex, sheathing at base, papyraceus-scarious, 4-5 nerved. Inflorescence solitary, capitula radiate, subsessile; involucre campanulate, ca. 8-10 X 6-7 mm. Flowers white or lilac, dimorphic; the marginal female, ligulate, ca. 6 mm long; the disk numerous, tubular, bisexual. Achenes minute, glabrous, ca. 1 mm long.

Werneria caespitosa Wedd.

Small caespitose herb to 1.5-2 cm tall; rhizome repent. Leaves densely rosulate, narrowly linear, 1.5-2.5 cm X 1-1.2 mm; acute at apex, broadly vaginate at base; papyraceous, coriaceous, sub 3-nerved. Capitula solitary, radiate, sessile; involucre campanulate, ca. 10-12 X 7-8 mm. Flowers yellow, the marginal violet, dimorphic; the marginal 12-14, ligulate, female, the disk numerous, tubular. Achenes ca. 1 mm long, linear.

Werneria orbignyana Wedd.

Caespitose herb 6-8 cm tall. Leaves rosulate, obovate to broadly spatulate, ca. 2-6 cm X 2-8 mm, acutish to rounded at apex, attenuate at base, glabrous, fleshy, margin glandular-serrulate. Inflorescence solitary; capitula radiata, peduncled; involucre broadly campanulate, ca. 2.2-2.4 X 1.5-2 cm. Flowers inner lilac, outer dark violeet, dimorphs; the marginal 12, ligulate, female; **the** disk yellow, tubular, bisexual. Achenes ca. 2.5 mm long, glabrous.

Werneria nubigena H. B. K.

Caespitose subacaulescent herb to 10-12 cm tall. Leaves rosulate, broadly

linear, ca. 4-10 X 0.3-0.5 cm, rounded at the apex, broadly vaginate at the base, glabrate on both surfaces, membranaceous. Inflorescence solitary, capitula radiate, sessile; involucre broadly campanulate, ca. 2.5-3 X 3-5 cm. Flowers radiate, dimorphic; the marginal white, ligulate, ca. 1.5-2 cm long, female; the disk yellow, ca. 1.3 cm long, numerous, bisexual. Achene ca. 3-4 mm long, glabrous. Werneria pectinata Lingelsh

Caespitose to cushion herb to 1-1.5 cm tall. Leaves rosulate, ovate-spatulate, 5-7 X 3-4 mm, obtuse at apex, broadly vaginate at base, glabrate, margin glandular-ciliolate. Capitula solitary, radiate, sessile; involucre campanulate, ca. 8 X 6 mm. Flowers yellowish, dimorphic, the marginal ligulate, female; the disk 10-15, tubular. Achenes ca. 1.5 mm long, cylindric, glabrous. Werneria pygmaea Gill

Small caespitose herb to 1 cm tall. Leaves rosulate, linear, 10-15 X 1 mm, subrotund at apex, not: vaginate at base, glabrous, entire. Capitula solitary, radiate, sessile to short peduncled; involucre campanulate, n-8 X 5-6 mm. Flowers dimorphic; the marginals white, female, ligulate; the disk numerous, yellow, tubular. Achenes ca. 2.5 mm long, striate, glabrous. Werneria

strigosissima A. Gray

Low caespitose herb to 3-4 cm tall. Leaves rosulate, lanceolate-spatulate to cochleiform, 8-12 X 3-7 mm, obtuse to acutish at apex, vaginate at base, densely setose-strigose on both surfaces. Capitula solitary, radiate, sessile; involucre ca. 14-16 X 10-12 mm, campanulate, strigose. Flowers dimorphic; the marginal 1/2 yellow, female, ligulate; the disk yellow, bisexual, tubular. Achenes ca. 2 mm long, glabrous.

Werneria villosa A. Gray

Acaulescent herb to 4-15 cm tall. Leaves rosulate, linear, A-10 X 0.1-0.2 cm, acute to subobtuse, vaginate at base, glabrate, margin somewhat revolute. Capitula or scape, ca. 2-10 cm high, solitary. Capitula radiate, involucre hemispheric, ca. 10-12 X 12- 18 mm. flowers dimorphic; the marginal yellowish-white, female, ligulate, the disk yellow, tubular, bisexual. Achenes ca . 2 min long, oblong-ovate.

BASELLACEAE Twiners or procumbent herbs.

Leaves alternate, simple, entire, often fleshy, extipulate. Inflorescences axillary or supra-axillary spikes, racemes or panicles. Flowers bisexual; sepals 5, nearly free to connate in a tube, colored; petals 0, stamens 5, connate basally; anthers dorsifixed; ovary superior, 3-carpellate, unilocular. Fruit a berry or drupe; embryo peripheral.

Key to the species.

- 1. Herb, at first erect but. soon sprawling; flowers pedicellate; petals caudateUllucus tuberosus
- 1'. Twining herb; flowers sessile; petals not caudate. . Basella alba

Basella alba L.

Succulent, twining herb to 1 m long. Leaves alternate, ovate to orbicular, obtuse at the apex, subcordate at the base. Flowers small, sessile; corolla 5-lobes. Fruit red or white. Native plant.

Ullucus tuberosus Lozano

Herb succulent, at first erect but soon sprawling. Leaves long petiolate,

oblong-lanceolate, obtuse at the apex, cuneate at the base. Flowers
pedicellate in racemes, few-flowered, axillary; corolla greenish-yellow.
Fruit greenish. Cultivated plant.

BEGONIACEAE Succulent herbs or vines,
creeping or erect; stems jointed. Leaves alternate, simple, the base
oblique; with stipules. Flowers unisexual; staminate flowers composed of 2
large sepals and 2 small petals, with many stamens; pistillate flower with 2
to many sepals; ovary and fruit winged.

Begonia veitchii Hook.

Herb to 30-40 cm tall, succulent, with tuberous root; stem short. Leaves
broadly cordate-ovate to reniform to suborbicular, lobulate, crenate-serrate,
glabrous above, densely pubescent beneath, 5-12 cm long. Flowers pink or red,
in cymes; peduncle 20-30 cm long; male flowers with 4 equal tepals; female
flowers with 5 tepals, like the staminate. Fruit a 2-winged capsule.

BERBERIDACEAE Shrubs and herbs. Leaves
alternate, entire or serrate, pinnately compound, trifoliate, exstipulate.
Inflorescences cymes, racemes, fasciculate, solitary. Flowers bisexual, the
parts hypogynous; sepals 6(4), free; petals 6(4), free; stamens 6(4-15), free,
opposite the petals, ovary 1-carpellate. Fruit an ovoid drupe.

Key to the species.

1. Inflorescence a small raceme; branchlets with trifid spines at nodes.

2. Leaves ca. 1.5 cm long, typically entire . . Berberis boliviana 2'

Leaves small, 1.2 cm long, apical ly 3-t.oothed, the teeth

spine-tipped..... Berberis humbertiana

1*. Flowers solitary or fasciculate, branchlets without spines at nodes. 3.

Leaves cuneate-obovate, ca. 2.5 cm long, 5-6 spinose-dentate

at the apex..... Berberis carinata

3'. Leaves obovate, ca. 3 cm long, regularly spinose dentate . .

..... Berberis saxicola

Berberis boliviana Lechler

Shrub to 2 m tall; stem with slender trifid spines. Leaves 5-8 fasciculate, obovate-cuneate, sessile, pale-green, subcoriaceous, entire. Flowers yellow, in short racemes; sepals and petals subequal. Fruit an ovoid drupe, black. 8 mm long.

Berberis carinata Lechlet-Shrub to 1 m tall; stem unarmed. Leaves cuneate-

obovate, 1.5-2.5 cm long, 8-12 mm wide, 5-6 spinose-dentate at the apex,

lustrous above, papillose beneath. Flowers solitary, nodding; sepals 5, dull

yellow; subrotund; petals yellow, obovate. Fruit ovate, black, lustrous, 1 cm

long. **Berberis humbertiana** Macbride

Shrub to 1-1.5 m tall; stem with short trifid spines, 8-15 mm long, 4-5 mm

wide. Leaves cuneate-obovate, 3 spinose-dentate at the apex, rigid-

coriaceous, lustrous above. Flowers in short racemes, 4-6 flowered; sepals

subrotund; corolla yellow-golden. Fruit a globose drupe 3 mm long.

Berberis saxicola Lechler

Shrub to 0.8-1 m tall; stem robust, without spines. Leaves in fascicles of 8, obovate, attenuate to the short petiole, 2.5-3 cm long, 1.2-1.5 cm wide, spinose-dentate, coriaceous. Flowers axillary, sepals 5-6, oblong-obovate, red-orange; petals orange. Fruit an ovoid drupe, 1.2 cm long.

BETULACEAE Monoecious trees. Leaves

alternate simple, separately margined petiolate, stipules deciduous.

Inflorescence unisexual; male flowers in elongate pendent catkins; female inflorescence erect or small pendulous and subwoody with dichasium subtended by bracts. Fruit, a 2-winged samara or a nut.

Alnus acuminata H.B.K. var. acuminata

Trees to 12-15 m tall. Leaves ovate to ovate-lanceolate, acuminate at the apex, obtuse to rounded at the base, the margin serrate. Male catkins pendent; female catkins short., erect, or pendent, becoming woody cones with 5-lobed scales. Fruit samaroid, obcordate, 2.5-3.5 mm.

BJGMONIACEAE Trees or lianas, sometimes hemi-

epiphytic. Leaves simple or compound, fasciculate or opposite, often tendrillate in vines. Inflorescence racemose, paniculate, or solitary and cauliflorous. Flowers large, showy; calyx cup-shaped or bilabiate; corolla tubular-campanulate to tubular; stamens usually 4, a posterior staminode also present. Fruit a dehiscent capsule with winged seeds, or indehiscent and baccate, or hard-shelled.

Tgcoma sambuci^olla H.B.K.

Small tree to 4 m tall. Leaves imparipinnate, 7-11 folioJate, the leaflets oblong, acuminate, serrate, glabrous. Inflorescence a terminal panicle; calyx minute, campanulate; corolla yellow, funnel form, 2.5-4 cm long. Fruit a linear capsule, seed winged.

BOKAGTNACEAE

'Herbs, shrubs, trees or lianas; stems terete. Leaves alternate, simple, usually entire, without stipules. Inflorescences scnrpioid, uncurling as the flowers open. Flowers regular, tubular; sepals 5; corolla 5-lobed; stamens 5, mounted on the corolla, equal; ovary superior, the st.yle often split. Fruit of 4 nutlets or a drupe.

Key to the species.

-

- 1. Leaves linear to oblanceolate,, less than 5 mm wide.
 - 2. Leaves oblanceolate, 1 mm wide K< 1 j otrcp i_u_mmi c m s ta c hyu
 - 2' . Leaves linear, 1-2 Tim widp PI agiobothrys humul s s
 - L' . Leaves lanceolate to ovar.e, more than 5 mm wide.
 - 3. Leaves densely canesceni below He 1 iot rop lur. incarum
 - 3'. Leaves not canescent, greenish below.
 - 4. Leaves lanceolate; fruit prickles ca. 1 mm long
 Hackelia mexicana
 - 4'. Leaves narrowly ovate-elliptic; fruit prickles short . .
 Hackelia revoluta

Hackelia mexicana (Schlecht. & Cham.) I. M. Johnston

Herb to 40 cm tall. Leaves lanceolate 2-7 X 1-1.5 cm, acuminate at the apex, obtuse at the base, pseudopetiolate, sparsely hispidulous on both faces. Inflorescence a lax, few-flowered scorpioid cyme, the flowers ca. 5 mm long, campanulate, whitish-cream. Fruit ca. 3 mm long, covered with long spines ca. 1 mm long.

Hackelia revoluta (Ruiz & Pavon) I. M. Johnston

Erect herb to 50-80 cm tall. Leaves **ovate-elliptic** 2.5-7.5 X 1-2.5 cm, acute, **hispidulous above, slightly pubescent beneath. Inflorescence a lax few-flowered scorpioid cyme, the flowers ca. 7 mm long, salverform, white. Fruit 4-lobed, ca. 2.5 mm long covered with short spines.** Heliotropium incanum Ruiz & Pavon

Shrub to 1-1.5 m high, suffrutescent. Leaves ovate to ovate-elliptic, rugose-bullate and green above, canescently pubescent beneath. Inflorescence a dense terminal cincinnus, ca. 3 cm long; the flowers about 4 mm long, the petals white or purplish. Fruit nutlets ca. 3 mm in diameter. Heliotropium tachyum Ruiz & Pavon

Prostrate herb, basally ligneous. Leaves elliptic to suboblong, 1.5-2.5 X 5-10 mm, rounded or obtuse at apex, hispidulous on both faces. Inflorescence a **short dense cincinnus, ca. 1 cm long, the flowers about 2-3 mm long, the petals white. Fruit 2 nutlets, tuberculate, ca. 2.5 mm in diameter.**

Plaguobothrys humilis (Ruiz & Pavon) I. M. Johnston

Small, prostrate to ascending herb to 10 cm high. Leaves linear, 1-2.5 cm X 1-2 mm, widened at base, rounded at apex, sparsely pubescent. Inflorescence a glomeruliform axillary cincinnus, the corolla salverform, white. Fruit nutlets, small, ovoid ca. 1 mm in diameter.

.ia Liano -- 13? **BRASSICACEAE** Herbs, rarely undershrubs.

Leaves alternate or rarely subopposite. Inflorescence a raceme or corymb.

Flowers bisexual, actinomorphic, the part hypogynous ; sepals 4, free; petals 4(0); stamens 6, tetradynamous; ovary divided longitudinally by a secondary septum, 2-carpeilate. Fruit a bivaived silique or silicle.

Key to the species.

1. Fruits a silicle less than 4 mm long, compound.
 2. Fruit obtriangular-cordate, compressed laterally
..... C'apse] la burja^-pjstqrj^s^
 - 2'. Fruit ovoid to ellipsoid, compressed dorsoventrally.
 3. Leaves pinnatifid; sepals persistent . . Lepidium bipinnatifidum
 - 3'. Leaves mostly undivided, sepals caducous
..... LepjdiuTn chj cbicara
- 1'. Fruit a narrow silique more than b mm long, more or less terete.
 - i. Plants terrestrial, leaves simple or with narrow segments. 5.
Plants covered with branched hairs.
 - b. Leaves simple, lobed, without glandular-pubesence
..... Halimolobus sp.
 - 6*. Leaves pinnate to bipinnate, with glandular-trichome among the branched hairs . . Descurainia perkinsiana 5'. Plants glabrous or with simple hairs
 7. Silique conspicuously rostrate
 8. Cauline leaves clasping. . Brassica campestris

Cauline leaves petiolate . . Brassica nigra

/' . Silique non-conspicuously rostrate

..... Sisymbrium sp.

4' . Plants aquatic leaves pinnate with suborbicular segments .

..... R_ojrJ.pjDa nasturtium-aquaticum

Brassica campestris L.

t'rect annual] herb to 1 m tall; stems mostly glabrous. Lower leaves short petiolate, pinnatifid to pinnate-lobed; superior leaves, sessile, lanceolate, entire, clasping at the base. Inflorescence terminal raceme; sepals greenish-yellow, oblong-elliptic; petals yellow, 7-12 mm long. Fruit an ascending silique, 4-6 cm long.

Brassica nigra (L.) Koch

Erect annual herb to 0.8-1 m tall; stems hispid to glabrous. Leaves inferior petiolate pinnate-lobed; superior leaves, petiolate, lanceolate to elliptic, margin dentate. Inflorescence in apical racemes; sepals yellowish, narrowly elliptic; petals yellow, 4-8 mm long. Fruit an erect silique, 1.5-2 cm long.

Capsella bursa-pastoris (L.) Moench

Low annual herb to 0.3 m tall. Leaves of basal rosulate, oblanceolate, serrate, lobulate to pinnatisect; cauline leaves lanceolate, simple, entire or serrate. Inflorescence a corymbiform raceme; sepals green-reddish ovate; petals white, obovate, 1.2-2 mm long. Fruit an obtriangular-cordate or obovate silicle, 5-6 mm long.

Descurainia perkinsiana Muschl.

Biennial herb to 30-45 cm tall. Leaves bipinnate with pinnately-lobed leaflets. Inflorescence corymbiform raceme; sepals greenish, ovate; petals yellow 2.5-3 mm long. Fruit a narrowly cylindrical silique, 0.6-1.2 cm long.

Halimolobus sp.

Herb to 1-1.2 m tall. Leaves lanceolate or oblanceolate **auriculate** and **clasping** at the base, densely pubescent in both sides, margin conspicuously-dentate to subentire. Inflorescence a terminal raceme; sepals green, oblong-lanceolate; petals white, 4-5 mm long. Fruit ascending silique, valves convexes, 2-3 cm long, ca. 3.3 mm wide. **Lepidium bipinnatifidum** Desvaux

Perennial herb to 10-30 cm high. Leaves basal bipinnatifid, long petiolate, the cauline smaller, pinnatifid to laciniate, sessile. Inflorescence in racemes, elongate, densely flowered; sepals concave; petals white, linear.

Fruit an ovate-elliptic silicle, 2.5-3.5 mm long. **Lepidium chichicara** Desvaux

Perennial herb to 10-40 cm high. Leaves basal narrowly oblanceolate, long petiolate, crenate or lobed, the cauline oblong or linear, entire or serrulate. Inflorescence in numerous racemes; sepals green, white margined; petals white, spatulate. Fruit a rhombic-elliptic silicle, 2.5-4 mm long.

Rorippa nasturtium-aquaticum (L.) Hayek

Semi-aquatic herb. Leaves mostly simply pinnate, the leaflets ovate or suborbicular, in L-5 pairs. Inflorescence in a corymbiform terminal raceme; sepals green, oblong or obovate; petals white, obovate, ca. 2 mm long. Fruit **an arcuate legume-like silique, 10-20 mm long and 2-3 mm wide.** **Sisymbrium sp.**

Herb 10-30 cm tall. Leaves narrowly lanceolate, **coarsely dentate.**

Inflorescences an open **few-flowered** terminal raceme. **Fruit** a **narrow elongate silique, 3-4 cm long, 1 mm wide, reflexed at maturity.**

BUDDLEJACEAE

Shrubs or trees. Leaves opposite, simple, usually with stipules. Flowers bisexual, regular; calyx 4-lobed, corolla tubular, 4-lobed; stamens as many as the lobes of the corolla and alternate with them, mounted on the corolla tube; ovary superior, locules 2. Fruit a capsule, the seeds often winged.

Key to the species.

- 1. Leaves large, to 16 cm long, oblong lanceolate; upper surface rugose; margin crenulate to serrulateBuddleja incana
- 1'. Leaves small, to 3 cm long, mostly oblong, upper surface smooth; margin entire Buddl eja coriacea

Buddleja coriacea Kemy

Trees or shrubs to 4-8 m tall, crown dense. Leaves mostly oblong elliptic, coriaceous, entire, dark green and smooth above, caulescent beneath.

Inflorescence giomorulato and compact, the peduncles short. Flowers with corolla orange-yellow changing to orange-red. Fruit an ovoid capsule, tomentose, ca. 4 mm long, opening septicidaily, the seeds winged. Buddleja incana Ruiz & Pavon

Trees 5-10 m tall, with relatively open crown. Leaves oblong-lanceolate subcoriaceous, the margin crenulate ot serrulate, rugose above, tomentose-lanuginous beneath. Inflorescence paniculate, ternately divided, long peduncled. Flowers golden yellow to yellowish orange. Fruit a cylindrical capsule, ca. 0.6 mm long, opening septicidaily, the seeds **winged**.

BUXACEAE

Trees or shrubs. Leaves simple, opposite or alternate, entire exstipulate. Inflorescences mostly dense axillary racemes or spikes, on the flowers solitary, the plants monoecious or dioecious, the female flowers fewer than the male flowers. Sepals 4 or 6; petals 0; stamens 4 or 6 (to 30 in Styloceras); ovary superior, 3(2-4) loculed. Fruit a loculicidal capsule, sometimes dehiscent explosively, or drupe; seeds black and shiny.

Styloceras laurifolia (Willdenow) H.B.K.

Small tree ca. 4-5 m tall. Leaves obovate to oblong-elliptic, 7-30 X 2.6-5 cm, obtuse or barely acute, lustrous above, paler beneath, sub 3-veined from above base. Inflorescence axillary spikes, the male flowers sessile, unibracteate without perianth, anthers often 12, the female flowers without petals, solitary, calyx 4-lobed, the bifid stigma very large. Fruit basically globose, the two style branches enlarged and persistent, forming 2 "horns".

CACTACEAE

Succulent shrubs, trees or vines; often epiphytes, with fleshy, flattened or strongly ribbed stems usually spiny. Leaves early deciduous or lacking. Flowers solitary, regular; sepals and petals undifferentiated, numerous; stamens numerous; ovary inferior. Fruit a berry.

Key to the species.

1. Plants small, nearly globular, ca. 8 cm high . Lobivia maximiliana

1*. Plants tall, shrubs or trees, ca. 2-6 m high

2. Stems cylindrical or flattened, without ribs

3. **Flowers bright yellow; stem with ovoid** segments, flattened laterally, spineless.....Opuntia ficus-indica

3'. Flowers brick-red; stem with cylindrical segments
.....Opuntia exaltata

2'. Stems columnar, with ribs

4. Stems 1-2 m tall, ribs 8 or 9; areoles more than 1-1.5 cm apartCorryocactus squarrosus

4'. Stems 2-6 m long, ribs 7 or 8; areoles rather close together, less than 1-1.5 cm apartEchinopsis cuzcoensis

Corryocactus squarrosus (Vaup.) P. Hutchinson

Shrub to 1-2 m tall; stem and bracts cylindrical; ribs 8 or 10; areoles spiny, the spines yellowish, ca. 15 per areole. Flowers bright red to scarlet, 3-4 cm long, borne toward the ends of branches. Fruit 2-3 cm in diameter, juicy, spiny.

Echinopsis cyzwenis (Britton & J. Hon) Friedrich & G. D. Rowley

Erect tree 5-7 m tall, much branched, columnar; ribs 7 or 8; areoles close together; the spines numerous, ca. 12 per areoles. Flowers white-cream, 5-6 cm long, fragrant. Fruit ovoid-cylindrical, 8-10 cm long with short spines.

Lobivia maximiliana var. corbula (Herrera) Rausch

Small plant, nearly globular, growing in slumps; ribs 12 or more; the areoles filled, with spines 6-9 per areole, yellowish. Flowers purplish, 1.5-2 cm long. Fruit globose, ca. 1.5 cm in diameter, with short spines.

Opuntia exaltata A. Berg

Erect tree, 2-5 m high; stem branched, cylindrical, tuberculate; the areoles mostly with 1-3 dark yellow spines. Flowers brick-red, 3 cm long (including ovary). Fruit pear shaped, 9 cm long, spinescent.

Opuntia ficus-indica (L.) Miller

Erect or tree-like, 2-5 m high; stem branched, flattened into large ovoid segments; areoles small, spineless. Flowers large, yellow, 7-10 cm long, borne marginally on the segments. Fruit obovoid-cylindric, 7-10 cm long, edible.

CALLITRICHACEAE

Small usually aquatic herbs, stems slender. Leaves simple, opposite, linear, entire exstipulate; plants monoecious. Flowers minute, solitary; perianth 0; stamen 1; anther small, basifixed; pistil 1, 2-carpellate; ovary superior. Fruit 2 schizocarp of 2 or 4 mericarps.

Callitriche heteropoda Engelm. ex Hegelm.

Aquatic herb. Leaves opposite, stipulate, the floating ovate-rotund, 3-8 X 2-4 mm, 3-nerved, forming a rosette at the end of branches; the submerged linear, 3-5 cm long, 5-nerved. Flowers monoecious, minute, axillary, solitary to 2-3 flowered. Fruit, compressed, ca. 1/3 mm in diameter'.

CAMPANULACEAE Herbs, shrubs or small trees.

Leaves alternate, simple, without stipules. Flowers tubular, zygomorphic, bilabiate; calyx lobes, corolla lobes, and stamens 5; anthers joined around the style; ovary mostly inferior. Fruit a capsule or berry.

to the species.

- i. Small herbs, rarely more than 40 cm tall; corolla less than 13 mm long 2. Corolla more than 5 mm long, the tube cleft dorsally to the base or nearly so; ovary inferior 3. Slender erect, herbs; flowers distinctly bilabiate in lax few-flowered racemes; fruit opening by the two apical valves *Lobelia tjsnerji*
- 3'. Small acaulescent plants; flowers almost equally 5-lobed, borne singly from center of the leaf rosette, opening by an operculum *Lysipomia laciniata*
- 2' . Corolla tube less than 5 mm long entire; ovary superior *Diastatea micrantha*
- 1'. Erect shrubs or small trees; corolla 30-50 mm long
 - 4. Leaves pubescent below with stellate trichomes, rough above; corolla more than 0.7 cm across at base, dorsally red, ventral yellowish *Siphocarpium actinotrix*
 - 4'. Leaves pubescent, below with simple trichomes, smooth above; corolla ca. 0.5 cm across at base, orange-red *Diastatea micrantha*

Diastatea micrantha (H.B.K.) McVaugh

Erect, slender herb, 10-30(-40) cm high. Lower and upper leaves more or less reduced; middle leaves sessile to petiolate, margin serrate-dentate. Flowers in lax bracteate racemes. Corolla 4-6 mm, pale blue to pale lilac; bilabiate, the two dorsal lobes triangular. Fruit and oblong-ovoid capsule.

Lobelia tenera H.B.K.

Glabrous or puberulent herb with far creeping rhizomes, producing several unbranched, ascending slender stems. Leaves usually closely set near base, increasingly remote distally. Basal leaves, if present, oblanceolate-spathulate, margin entire to sparsely denticulate. Flowers in lax, 3-10 flowered racemes; corolla pale-blue, distinctly bilabiate; the two dorsal lobes linear, recurved. Fruit a capsule, ovoid or oblong-ellipsoid.

Lysipomia laciniata D.C. subsp. laciniata

Acaulescent rosette-forming herb to 4-6 cm high. Leaves oblanceolate to obovate, pinnately toothed, subacute, narrowed at the base to a winged petiole. Flowers borne singly at the center; sepals filiform; corolla white with purple at the base. Fruit ellipsoid. **Siphocampylus actinothrix** Wimmer

Shrub to 2-3 m tall. Leaves lanceolate, 8-12 X 1.5-2.5 cm, acute to acuminate, acute at the base, margin denticulate, rough on both faces. Flowers in axils of the reduced upper leaves; pedicels 5 - 12 cm long, corolla 3-5 cm. long, curved, dorsally red, ventrally yellowish. Fruit capsular- 1 I. cm long.

Siphocampylus tupaiformis A. Zahl.

Shrub to 1-2.5 m tall. Leaves ovate-oblong, 7 X 12 X 1-3.2 cm; acute, truncate to rounded at the base, margin irregularly serrulate-denticulate, **smooth above**, simple pubescent beneath. Flowers arranged in a long dense raceme, the pedicels 3-5 cm long; hypanthium hemispheric, calyx and sepals triangular; corolla dorsally orange-red, ventrally yellow. Fruit capsular about 1 cm in diameter.

CARYOPHYLLACEAE

Herbs with swollen nodes. Leaves opposite, simple, the petiole bases connate. Flowers white, regular; sepals 5; corolla with 5 lobes; petals free; stamens 5 to 10; ovary superior; styles and stigmas 2-5. Fruit a capsule.

Key to the species.

1. Stipules absent; sprawling or erect herbs not forming cushion plants
 2. Leaves linear to lanceolate or the apex obtuse, always less than 1 cm wide
 3. Petals shorter than sepals or absent, the flowers less than 4 mm long
 4. Petals much shorter than the sepals or absent; leaves less than 5 mm long, subcoriaceous. . . . Arenaria standleyi 4'.
Petals and sepals subequal; leaves mostly more than 5 mm long, membranaceous..... Arenaria lanuginosa
 - 3'. Petals conspicuously longer than sepals, the flower more than 4 mm long.
 5. Leaves narrowly elliptic to narrowly obovate in part more than 5 mm wide Cerastium glomeratum
 - 5'. Leaves linear to narrowly oblong-lanceolate, less than 5 mm wide
 6. Flowers in dense terminal pseudo-umbels
..... Cerastium danguyi
 - 6'. Flowers axillary, solitary or few at each node . .
..... Cerastium nutans

2'. Leaves ovate to elliptic, acute, in part more than 1 cm wide

7. Petals shorter than the calyx

..... Stellaria media

/' . Petals longer than the calyx

..... Stellaria cuspidata

1*. Stipules present; if the stipules not obvious then dense cushion plants.

8. Leaves spine-tipped; densely branched cushion plant; fruit not

capsular 9. Leaves clustered toward branch tips, narrowly ovate

to

lanceolate Paronychia andina

9' . Leaves scattered along branches, linear

..... Cardionema ramosissima

8'. Leaves not spine tipped, plants more or less openly branched,

not cushion plants; fruit capsular

10. Leaves ovate; styles more or less united

Li. flowers clustered at end of inflorescence .

..... Drymaria aff. divaricata

11'. flowers scattered in diffuse inflorescences . .

..... Drymaria cordata

10' . Leaves linear; styles free

..... Spergularia aff. andina

Arenaria lanuginosa (Michx.) Rohrb.

Sprawling herb. Leaves sublinear to lanceolate, acute, membranaceous. Flowers solitary, axillary, the pedicels slender 2-2.5 cm long; sepals ovate-oblong, carinate; petals white, shorter than the calyx. Fruit a capsule slightly longer than the calyx.

Arenaria standleyi Bach. & Macbride

Sprawling prostrate herb. Leaves ovate-lanceolate to sublinear, acute, subcoriaceous. Flowers solitary, axillary; pedicels 2 mm long; sepals lanceolate-acute; petals white, shorter than the calyx. Fruit a capsule, ovoid, 2 mm long.

Cardionema ramosissima (Weinm.) Nelson & Macbride

Cushion plant, stem much branched; j^{\wedge} lanate pubescent. Leaves linear", subulate, spine-tipped, 4-8 mm long, glabrate. Flowers tiny, axillary, sessile, the petals shorter than sepals. Cerastium danguyii Macbride

Low herb, 25-35 cm high. Leaves linear-lanceolate, 1-2 cm long, acute, densely pubescent. Inflorescence loosely umbellate, the flowers clustered, the pedicels 0.5-0.8 cm long; sepals obtuse; petal, whitish 6-7 mm long. Fruit a capsule 8-10 mm long. Cerastium glomeratum Thuill.

Nearly erect herb, annual, 15-30 cm tall. Leaves ovate or narrowly, obovate, acute to obtuse pubescent. Flowers in more or less dense clusters, the pedicels 1.5-2 mm long; sepals sharply pointed, petals slightly shorter than the calyx, whitish. Fruit a capsule elongate, h-/ mm long. Cerastium nutans Raf.

Erect or sprawling herb, to 40 cm high. Leaves lanceolate, acute, viscid pubescent. Flower solitary or in 3-flowered clusters, the pedicels 1.5 cm long, the sepals lanceolate, scarious margined; petals usually half as long as sepals. Fruit a curved capsule, 12-15 mm long. **Drymaria cordata** (L.) Willd. ex Roemer & Schultes Sprawling tenuous plant, much branched. Leaves nearly orbicular, glabrous or

slightly pubescent. Inflorescence an open cyme; sepals acute, ca. 4 mm long;
petals whitish, shorter than the sepals. Fruit a capsule, 3 mm long.

Drymaria aff. divaricata Kunth var. stricta (Rusby) Duke

Small prostrate herb. Leaves broadly rounded-ovate acute, glabrous.

Inflorescence cymose, many flowered, the flowers terminally clustered; sepals acute; petals not clawed, deeply bifid, greenish-white. Fruit an ovoid capsule, 3 mm long.

Paronychia andina A. Gray subsp. andina

Low cushion-forming herb, tufted; stems much branched. Leaves oblong-lanceolate, spine-tipped, coriaceous; stipules imbricate.

Inflorescences terminally congested; flowers sessile; sepals oblong, scarious; petals lacking. Fruit, tiny, inconspicuous.

Spergularia aff. andina Rohrb.

Prostrate or ascending, small herb. Leaves linear, 1.5-2 cm long, 1 mm wide, mucronate at apex, sessile, shortly pubescent. Flowers few, solitary, axillary; sepals ovate lanceolate, broadly scarious at the margin; petals whitish slightly exceeding the calyx. Fruit ovoid, 2.5 mm long.

Stellaria cuspidata Willd. ex Schlecht.

Prostrate or sprawling herb. Leaves ovate or ovate-oblong, acuminate, more or less cordate at the base, pubescent. Flowers solitary, axillary; pedicels 2.5-3 cm long; sepals oblong-lanceolate, obtuse; petals twice as long as sepals, whitish. Fruit an ovoid capsule, 6 mm long.

Stellaria media (L.) Villars

Sprawling to suberect herb. Leaves ovate, the upper sessile, the lower short petiolate, glabrate or pubescent. Flowers solitary, axillary; pedicels 2-4 cm long, the sepals shorter than the bifid petals. Fruit a capsule, narrowly ovoid, 3.5-4 mm long.

CELASTRACEAE

Trees, shrubs, and climbers. Leaves alternate or opposite, simple, entire or toothed, stipulate or exstipulate. inflorescence axillary, cymose or fasciculate, or rarely the flowers solitary. Flowers small, usually bisexual; sepals (3-)4--5, free or connate; petals (3-)4-5, free; stamens 4-5; alternating with the petals, ovary superior, 2-5 carpellate. Fruit, a loculicidal capsule; seeds often with colored aril.

Maytenus cuzcoina Loesener

Shrub or small tree to 3.5 m tall. Leaves oblanceolate, 1.5-3.5 X 0.5-1.5 cm, obtuse or acute at apex, acute at the base margin subentire to subserrulate, coriaceous. Inflorescence axillary contacted, fasciculate, the flowers minute, the pedicels, e.g., 1 mm long; sepals rotund; petals ovate-suborbicular, greenish. Fruit capsular, ca. 1-1.5 mm long, the valves coriaceous .

CHFJNOPODIACEAE Herb. Leaves alternate, sometimes fleshy, entire or toothed, exstipulate, often somewhat, triangular. inflorescence axillary and terminal, spicate to more or less paniculate. Flowers minute, greenish, the plants sometimes monoecious or dioecious; sepals 2-5, free or connate; petals 0; stamens 2-5 **and** opposite the calyx; ovary superior, unilocular **with 1 basal ovule**. Fruit a small nutlet or achene, the embryo usually curved or spiral.

Key to the species.

1. Leaves and inflorescence gland-dotted Chenopodium ambrosioides
- 1'. Leaves and inflorescence without gland-dots

Leaves sharply seriate, lustrous on the upper surface; inflorescence

chiefly axillary Chenopodium murale

2'. Leaves entire or sinuately seriate, dull on the upper surface;
inflorescence **terminal** 3. Leaves more than 2 cm long, the more in +
sinuate; seeds white or

pale Chenopodium quinoa

3'. Leaves less than 2 cm long, essentially entire; seeds black or
blackish Chenopodium petiolare

Chenopodium ambrosioides L.

Erect or ascending herb to 30-40 cm tall. Leaves oblong to ovate to lanceolate 2-8 X 1.5-3.5 cm, margin sinuate-dentate or sinuate pinnifid, **usually** gland-dotted. Inflorescence in spikes, glomerate, short or elongate. **Fruit an utricle containing one horizontal or vertical seed, nearly black.**

Chenopodium murale L.

Erect or ascending herb to 20-35 cm tall. Leaves ovate-rhombic, 1.5-6 X 1-3 cm, margin irregularly sinuate-dentate, glabrous above. Inflorescence in cymes or panicles, lax or dense, glomerulate. Fruit an utricle containing a seed, black, lustrous.

Chenopodium petiolare H.B.K.

Erect or spreading herb, less than 50 cm tall. Leaves hastate-lobate; entire or slightly sinuate, slender, petiolate, 1-2 X 0.5-1.2 cm, densely farinose. Inflorescence large and open in spikes, slender and interrupted. Fruit on utricle.

Chenopodium quinoa Willd.

Erect herb, annual, to 1-1.8 m tall. Leaves broadly rhombic, 3-10 X 2-8 cm,

lobate at the base, margin sinuate-dentate. Inflorescence a dense panicle, compact, erect, leafy. Flowers green, yellow, or purplish. Fruit an utricle; seeds whitish or pale, 1.5 mm in diameter.

COLUMELLIACEAE Shrubs and small trees.

Leaves opposite, simple, entire or serrate, exstipulate. Inflorescences few-flowered cymes. Flowers bisexual, slightly zygomorphic; sepals 5 free above the ovary; petals 5, connate; stamens 2, the. anthers twisted; ovary inferior, 2-carpellate. Fruit a septicidal capsule; seeds numerous.

Columellia obovata Ruiz & Pavon

Shrub or small tree, up 1.5-2 m tall. Leaves obovate, 0.5-1.5 X 0.5-0.8, glaucous above, grayish-sericeous beneath, margin mostly entire or with 2-3 minute teeth. Flowers 1-3, terminal on short branches, the petals yellow, ca 5 mm long and xxx. Fruit a small xxx septicidally 2-valved capsule.

CONVOLVULACEAE

Usually vines, sometimes herbs or shrubs, always without tendrils; sap often milky. Leaves alternate, simple, without stipules. Flowers bisexual; corolla tubular, showy, pink, white, blue, or yellow, 5-lobed or entire, plaited or twisted in the bud; stamens 5, mounted on the corolla at the base, alternate with the lobes; ovary superior. Fruit a capsule.

Key to the species.

- 1. Parasitic plants without chlorophylls or leaves
..... Cuscuta grandiflora

1*. Autotrophic plants, **with green leaves**

2. Leaves divided, palmatisect; plant erect. Ipomoea minima

2' . Leaves subentire, more or less hastate, vine

.....Convolvulus crenatifolius

Convolvulus crenatifolius Ruiz & Pavon

Vine, the stem glabrous. Leaves narrowly ovate or ovate-lanceolate, 2.5-10 X 1-5 cm, acute, cordate with rounded or acute auricles at base, glabrate. Inflorescence a few-flowered cyme, axillary, sepals elliptic or obovate; corolla white, campanulate-funnelform. Fruit a subglobose capsule, 4 valvate, 8-9 mm long.

Cuscuta grandiflora H.B.K.

Vine, parasitic, stems red or reddish; bracts triangular-oblong, 1-2 mm long. Leaves absent. Inflorescence a few-flowered glomerule; flowers tiny, the calyx as long as corolla tube; corolla white or reddish. Fruit a depressed globose capsule, circumsessile.

Ipomoea minima K. *K.* Fries

Perennial herb, to 30 mm tall. Leaves palmatisect, 10-15 X 4-10 mm, the 5-7 segments linear to oblanceolate, obtuse at the apex. Flowers solitary, the corolla lilac, funnelform, ca 2 cm long. Fruit a subglobose capsule. Roots edible.

CRASSULACEAE Herbs. Leaves fleshy, often thick, simple or compound, entire or dentate; stipules lacking.

Inflorescences cymose; racemose or solitary. Flowers regular, symmetrical, perfect; calyx hypogynous, persistent, 4- to 5-parted or

lobed; petals 4-5, free or united; stamens 4-5 or 8-10; receptacle usually with a scale at the base of each carpel; carpels 4-b, distinct or united below; ovules numerous.

Key to the species.

1. Aquatic; leaves small and linear; flowers small less than 2 mm long. .
..... Crassula venezuelensis
- 1'. Terrestrial; leaves ovate, more than 1 cm wide; flowers tubular more than
10 mm long Echeveria westii

Crassula venezuelensis (Steyermark) Bywater & Wickens

Aquatic herb. Leaves opposite, linear to narrowly lanceolate, 3.5-6 mm long. Flowers tiny, solitary, 1 per node, 4-merous; sepals triangular-ovate; petals exceeding sepals. Carpels 6-8 seeded (fide **Bywater** & Wickens, 1984).

Echeveria westii E. Walther Vel sp. aff.

Terrestrial, more or less rosette-forming, succulent. Leaves densely clustered, rhomboid-obovate-acuteish to obtuse, glabrous, 10-40 ~m long, 10-20 mm broad. Inflorescence racemose, i-A-flowered, the flowers 5-merous; peduncle 10-20 cm tall; sepals subequal; corolla urceolate, red-rose at base, **yellow** at apex. Fruit composed of 5 fallicles.

CUCURBITACEAE Vines with tendrils. Leaves alternate, entire to palmately or pinnately lobes; tendrils at the leaf base; without stipules. Flowers unisexual, the male inflorescence often differing from the female; calyx lobes 5, corolla lobes 5; stamens 1-5, variously arranged, often united and with twisted

anthers; ovary inferior. Fruit usually a 1- to many-seeded **berry often with a** hard outer shell.

Key to the species.

- 1. Leaves simple, variously lobed
 - 2. Inflorescence densely villous with moniliform trichomes, margin of leaf lobes coarsely sinuous dentate. Apodanthera herrerae
 - 2'. Inflorescence glabrous or sparsely puberulous; margins of leaf lobes entire to finely serrate
 - 3. Leaves essentially unlobed, merely 5-angled; anthers longitudinally dehiscent.....Sicyos bj^dejroa
 - 3'. Leaves strongly 3-5 lobed; anthers transversely dehiscent. Cyclanthera brachybotrys
- 1* . Leaves palmately compound..... Cyclanthera pedata

Apodanthera herrerae Harms

Herbaceous perennial vine. Leaves palmately 3-5 lobed, 10 cm long, the lobes ovate or lanceolate, irregularly sinuous-lobulate to subentire, laxly villous beneath; tendrils bifid. Male flowers in more or less corymbose several-flowered axillary racemes; female flowers solitary, the corolla tubular funnelform, golden yellow. Fruit ovoid, green with greenish longitudinal ridges.

Cyclanthera brachybotrys (Poeppig & Endlicher) Cogniaux

Slender vine; stem glabrous. Leaves palmately 3(-5) lobed, the lobes triangular to oblongish, more or less serrate, scabrous beneath; tendrils bifid. Male flowers pedunculate many flowered racemes; female flowers

solitary, subsessile; calyx tube glabrous, corolla yellowish. Fruit 3-4 cm long, acute, sparsely echinate with flat prickles.

Cyclanthera pedata (L.) Schrader

Slender vine; stem glabrous. Leaves digitately compound, 7-15 cm long, with 5-8 leaflets, these lance-oblong, attenuate at the base, margin dentate; tendrils trifid. Male flowers in narrow panicles; female flowers solitary, pedicellate, the calyx teeth setaceous. Fruit 12-16 cm long, sparsely echinate or smooth, rostrate.

Sicyos baderoa Hook. & Arn.

Slender vine; stem glabrous except, at the nodes. Leaves deeply cordate angled or slightly 3-5 lobed, entire or minutely denticulate, 6-8 cm long and wide, beneath; tendrils trifid. Male flowers in 3-8 flowered racemes, short peduncled; female inflorescence several-flowered, the corolla greenish-white. Fruits clustered, dry, 4-6 mm long.

CUNONACEAE

Shrubs and trees. Leaves pinnately compound or trifoliolate (occasionally simple), serrate, mostly opposite. Inflorescence usually a narrow dense raceme. Flowers small, bisexual; sepals usually 4-5, *tree* or basally connate; petals usually 4-5, free; stamens 8-10, the filaments free; ovary superior, semi-inferior or inferior, 2-(3-5-) carpellate, 2-(3-5-) locular. Fruit usually a small capsule, dehiscent ventrally; seeds glabrous or long pilose.

Weinmania pinnata L.

Small tree to 3-4 m tall with conspicuous subfoliaceous stipules. Leaves opposite, pinnately 3-5(-9) foliolate, the leaflets obovate to

elliptic-lanceolate, 1.5-3.8 X 0.6-1./ cm, the terminal longer, obtuse at the apex, acutish at the base, glabrous above, puberulent beneath, the margin dentate. Inflorescence axillary racemose, to b . 5-7 cm long. Flowers fasciculate, pediceled; sepals ovate; petals white or pinkish, ca. 2 mm long. Fruit a small capsule.

ELAEODACEAE

Trees or shrubs. Leaves simple, alternate, stipulate, usually entire. Flowers regular usually bisexual; sepals 4-5; petals 4-5, free, often absent; stamens many, arising from a disc; ovary superior, 2- to many-lobed. Fruit a capsule or a drupe.

Vallea stipularis L. f.

Small tree to 6-8 m tall. Leaves ovate-lanceolate to broadly ovate, 3-6 X 1-3 cm, acute to acuminate at the apex, cordate to subtruncate at the base, bright green above, glaucous beneath; stipules conspicuous but caducous. Inflorescence cymose terminal few-flowered; sepals reddish, lanceolate; petals roseate to dark or bright red, ca. 1 cm. long. Fruit berry-like, subglobose, the surface tuberculate, ca. 1 cm. across.

ERICACEAE Shrubs or subherbaceous (elsewhere often hemiepiphytic climber or small tree). Leaves alternate, simple, entire (rarely, crenate or more or less serrate) exstipulate. Inflorescence terminal or axillary racemes or panicles. Flowers usually bisexual; sepals 5(3-8), free or connate; petals 5(3-8) usually connate into a frequently urceolate tube, (free in Befaria);

stamens twice as many as the corolla lobes, the anthers often with conspicuous appendages; ovary 5(2-20) carpellate, the placentation axile. Fruit a berry (usually) or drupe or a septicidal or loculicidal capsule.

Key to the species.

1. Ovary superior; leaves mostly more than 1 cm long (if in part less than narrowly oblong-elliptic) 2. Leaves less than 5 mm wide; fruit a berry; calyx non accrescent. .

..... Fernettya prostrata

2'. Leaves more than 5 mm wide; fruit a fleshy capsule; the calyx accrescent Gaultheria glomerata

1' . Ovary inferior; leaves less than 1 cm long, + ovate

..... Vaccinium floribundum

-Gaultheria

glomerata (Cav.) Sleumer

Terrestrial shrub or subshrub, to 50 cm tall; stems densely ferruginous-striate. Leaves ovate or oblong-ovate, 1.8- < X 1-2.5 cm, subacute, rotund-truncate or cordate at the base, glabrous above, sparsely strigose beneath, margin conspicuously strigose serrulate, revolute, coriaceous. Inflorescence in axillary racemes, 7-12 flowers; calyx short, 5-lobed, triangular-ovate; corolla ovate, urceolate, reddish to carmine, 4 mm long. Fruit a fleshy capsule, ca. 5 mm long. Pernettya prostrata (Cav.) Sleumer

Suberect shrub to 40 cm tall; stem densely branched. Leaves elongate-elliptic, 10-20 X 3-4 mm, acutish at base and tip, margin crenate, glabrate on both surfaces. Flowers solitary, axillary; calyx lobes ovate; corolla white

rose, urceolate-cylindric, ca. 3 mm long. Fruit a globose berry pale or roseate, ca. 8 mm in diameter.

Vaccinium floribundum H.B.K.

Erect shrub to 1 m tall. Leaves elliptic to ovate, 7-12 X 3-7 mm, slightly obtuse at both ends, margin minutely serrate, glabrous. Flowers in short axillary racemes, 4 merous, corolla roseate, urceolate. short-cylindric. Fruit a berry globose, fleshy, black-blue, ca. 8-10 mm in diameter.

EUPHORBACEAE

Herbs, shrubs, vines, or trees, often with milky juice. Leaves mostly alternate, simple or palmately compound, usually stipulate. Flowers usually borne in cymes or cyathia superficially resembling flowers. Flowers highly reduced, unisexual; staminate flower with stamens often reduced to 1, usually with a disc; pistillate flowers often pedicellate, the ovary superior, mostly 3-loculed. Fruits usually 3-parted; locules with 1 or 2 seeds.

Key 10 "the species .

1. Shrubs or small trees without latex; inflorescence spicate.

 Inflorescence axillary; leaves less than 3 cm long

 Acalpha aronioides

2*. Inflorescence terminal; leaves in part more than 3 cm long

 3. Leaves ovate, acuminate at the apex subcordate or truncate at the base

 Croton churumayensis

 3'. Leaves obovate, rounded-obtuse or subacute at the apex, acute or cuneate at the base

 Sebastiania obtusifolia

1*. Herbs with milky latex; inflorescence few-flowered, more or less flat-topped

4. Leaves ovate or obovate less than 1 cm long, obtuse; opposite

..... Euphorbia peplus

4'. Leaves oblong-lanceolate, more than 2 cm long; alternate,

acute or acuminate Euphorbia heterophylla

Acalypha aronioides Pax & Hoffm.

Shrub 1-2 m tall; stem densely branched. Leaves narrowly elliptic, 1.2 X 0.8-1.2 cm, acute or subobtuse at both ends, margins crenate-serrulate, glabrous above, sparsely puberulous beneath near midvein. Inflorescence a dense axillary spike, bisexual, the minute flowers ca. 1 mm long, apetalous, the few female flowers at the base. Fruit a small capsule 1 mm thick.

Croton churumayensis Croizat

Shrub or little tree 1-1.5 m tall. Leaves ovate, 2-8 X 0.8-3.5 cm, acuminate at apex, subcordate or truncate at base, sparsely stellate-pubescent above, densely stellate-pubescent beneath. Inflorescence a spike terminal. The flowers whitish, subsessile, ca. 2 mm long. Fruit an ellipsoid capsule, 4.5-4 X 3.5 mm.

Euphorbia heterophylla -.

Erect herb to 15-45 cm tall, annual, stem with few branches. Leaves alternate, clustered at the apex, oblong-lanceolate (elsewhere to ovate or linear), 3-7 X 0.5-1 cm; leaves subtending flowers often pink at the base. Inflorescence terminal, the few "flowers" (cyathia) congested. Fruit a 3-parted capsule, 5-6 mm broad.

Euphorbia peplus L.

Small suberect herbs. Leaves opposite, sessile, ovate or obovate, blade very

thin, mostly less than 1 cm long, rounded at the apex. Inflorescence terminal with 2-3 flowering branches ("flowers"). Fruit a capsule, deeply 3-sulcate.

Sebastiania obtusifolia (H.B.K.) Pax & Hoffm.

Small tree 2-4 m tall. Leaves obovate or spatulate, 1.5-5.5 X 0.8-3.5 cm, acute or cuncate at base, subacute or rounded-obtuse at the apex, margin entire or scarcely crenulate, subcoriaceous, undersurface mostly glabrous. Inflorescence a terminal spike. 3-5 cm long, female flower at base. Fruit a capsule, globose-ovoid, 10 mm in diameter.

FABACEAE Herbs, shrubs, vines, or trees.

Leaves mostly alternate, compound (usually), or simple, usually with stipules. Flowers bisexual, commonly zygomorphic; calyx 5-lobed, corolla usually with 5 petals, distinct or with the petal base joined; stamens mostly 10; ovary superior, 1-loculed. Fruit a legume, variously dehiscent or indehiscent.

Key to the species.

1. Leaves 1-3-foliolate or simply pinnate

∴ Leaves even pinnate; flowers yellow, not pea-like

3. Leaflets 8-12 pairs, glabrous; pods appressed puberulent . . .

..... **Senna birostris**

3'. Leaflets 6-8 pairs, conspicuously and softly yellowish-tomentose

beneath; pods densely tomentose Senna multiglandulosa

2'. Leaves 1-3 foliolate, or odd pinnate or even pinnate with terminal tendril; flowers pea-like

9*. Leaves 1-2 or 3-foliolate

13. Leaves 3-foliolate

14. Trees or large shrubs

15. Trees to 15-25 m tall; trunk armed; flowers orange-red; leaves not gland-dotted.....

.....Eryt-.hri na f"al cata

15'. Small trees to 3 m tall; trunk unarmpd; flowers blue; leaves densely gland-dotted.....

.....Otholobium pubescens

14'. Erect or decumbent or viny herbs

16. Vines; flowers violet

.....Cologania ovaiifolia

16'. Herbs; flowers yellow to pinkish 17. Erect

herbs; leaflets mostly more than 10 mm long; inflorescence elongate 18.

rods ovoid-obiong, inflated, ex. 2.5-3.5 mm Long; flowers ca. 10

mm long..... . . . Crotalaria inc.ana

18'. Pods globose, compressed, ca. 3-4 mm long; flowers 2-3 mm long

17'. Decumbent or procumbent herbs; leaflets less than 7 mm long;

inflorescence globose

19. Flowers pinkish; inflorescence ca. 1 cm across; pods

rotund-elliptic.....Trifolium peruvianum

19'. Flowers yellow; inflorescence ca. 4 mm across; pods curved

.....Medicago lupulina

13'. Leaves simple or 2-foliolate

20. Leaves simple or 1-foliolate, without tendrils; flowers

yellow; small trees Spartium junceum

20'. Leaves 2-foliolate, with **terminal** tendril; **flowers** bluish and **white**;

subscandent herbs . .Lathyrus odoratus 1*. Leaves bipinnate; branches spiny

21. Leaflets less than 4 cm wide; flower's yellow.

..... Acacia macrantha

21*. Leaflets 5-10 mm wide; flowers yellow-reddish . .

..... Caesalpinia spinosa

Acacia macrantha Humb. & Bonpl. ex Willd.

Small tree to 4 m tall, trunk spiny. Leaves bipinnate **with 10-60 pairs, each with 20-30 leaflet pairs, the leaflets minute, 1.2-3 mm long. Flowers yellow** in heads, 6-7 mm thick including stamens.

Apurimacia michelii < Kusby) Havrc-s

Spreading shrub or small tree 2-3 m high. Leaves pinnate, with 3-9 leaflet pairs, oblong-elliptic or lanceolate-obtuse. 1.5-3 X 0.4-0.6 cm, mucronate or acutish, sparsely villous above, minutely appressed strigillose beneath.

Inflorescence a raceme, many-flowered; flowers small less than 5 mm long; **petals whitish to dull bluish-white. Fruits a flattened pod 5-6 cm long.**

Astragalus garbancillo Cav.

Low subshrub to 50 cm tall. Leaves pinnte, with 10-15 leaflet pairs, the leaflets elliptic or narrowly oblong, 4-10 X 2-5 mm, obtuse or emarginate, often grayish, sparsely villous above, puberulous beneath. Inflorescence a raceme, many-flowered; calyx black, pilose; corolla whitish or yellowish to purplish. Pods ovoid-oblong, 1 cm long, 3-4 seeded.

Caesalpinia gpinosa (Molina) Kuntze

Tree 4-6 m tall, **with** spreading spines and gray bark. Leaves bipinnate, pinnae 12-16 foliolate; the leaflets oblong-elliptic, rounded at apex, oblique at the base, glabrous above, puberulous beneath. Inflorescences racemes 8-12 cm long; sepals obovate, the segments serrulate; petals reddish-yellow, ca. 5-7 mm long. Fruit a legume reddish, ca. 10 cm long. Cologania ovalifolia H.B.K.

Slender herbaceous vine. Leaves 3-foliate, the leaflets 2-4 X 1-2 cm., acute or obtuse at the apex, inequalateral at the base, with trichomes retrorsely appressed above and sparsely beneath. Flowers paniculate, axillary ca. 2 cm long, calyx tube ca. 1 cm long; corolla papilionate, dark to light violet.

Pods linear, compressed. **Crotalaris incana** L.

Erect herb, 30-40 cm high. Leaves trifoliate, the leaflets elliptic or obovate, 1.8-3 X 1.2-1.5 cm, apex rounded, acute, the base cuneate, glabrous to strigose above, pilose beneath. Inflorescences a terminal raceme; calyx campanulate, the sepals ca. 1 cm. long, corolla yellow, papilionate.

Pods ovoid-oblong, inflated, 2.5-3.5 cm long, pilose. Dalea boliviana Britton

Prostrate ascending herb to 30-40 cm long. Leaves pinnately 8-11 foliolate, **the** leaflets broadly oblong-obovate, 2-6 X 1.2 mm, obovate-emarginate **at** apex, obcordate at the base, glabrous above, puberulent to glandular punctate beneath. Inflorescence a spike moderately dense long peduncled, 8-10 mm in diameter X 1-2 cm long, the flowers bicolored, the banner white with colored basal lobes, **the** central bright **blue** or violet. Pods small 2.6-3 mm long.

Dalea smith!i (Macbride) Macbride

Erect suffruticose 0.4-1 m tall. Leaves pinnately 15-16 foliolate; the leaflets oblanceolate to narrowly oblong-ovate, 0.6-1.5 X 0.2-0.7 cm, obtuse to emarginate at the apex, puberulent on both sides. Inflorescence a spike pedunculate, elongate, 3-6 cm long X 1-1.5 cm in diameter, densely pilose; flowers bicolored, the banner whitish, the central indigo blue. Pods 3.5 cm long obtusely sub-triangular.

Erythrina falcata Benth

Large armed tree, 15-25 m tall. Leaves 3-foliolate, the leaflets entire, elliptic to elliptic-obovate, 5-16 X 2.5-8 cm, acute or obtuse or rounded at both ends, glabrous above, puberulous beneath. Inflorescence a raceme; calyx broadly campanulate the flowers orange-red, the banner elliptic-ovate. Fruit a compressed pod 10-12 cm long.

Lathyrus odoratus L.

Herb, usually more or less scandent. Leaves with terminal tendrils, leaflets elliptic-obovate, 3-5 X 1-2.3 cm, obtuse or mucronulate at apex, glabrous on both sides, the stipules sagittate. Inflorescence racemose; flowers bicolored, the banner violet, the central whitish. Pods subterete.

Lupinus aridulus C. ? Smith

Erect perennial herb, branched at the base. Leaves digitately 6-8 foliolate, the leaflets oblanceolate-obtuse, 1.5-5 cm X 4-10 mm, sericeous beneath. Inflorescence a raceme; flowers bicolored, the banner yellowish, the others violet.

Lupinus microphyllus Desr.

Small prostrate-ascending shrubby 10-12 cm tall. Leaves digitate, 7-9 foliolate, the leaflets linear, 3-7 cm long, ca. 1mm wide, with few appressed

trichomes. Inflorescence a subcapitate-raceme, the flowers subsessile, 7 mm
long, the banner whitish, glabrous, the central blue, the keel eciliate. Pods
oval, acuminate, tomentose, 12-15 mm long.

Lupinus paniculatus Desr.

Herb or shrub to 1 m tall. Leaves digitately 5-8 foliolate, the leaflets
broadly lanceolate, 2-5 cm x 2-10 mm, acute or obtuse, subsericeous beneath.
Inflorescence a raceme, the flowers bicolorous, the banner suborbicular, the
epistemonous broad, the keel eciliate. Pods elongate densely tomentose,
yellowish, 2.5-3 cm long.

Lupinus tomentosus DC.

Subshrub usually 1-1.5 m tall, branches densely sericeous-tomentose. Leaves
digitate, 5-7-foliolate, the leaflets obovate, mostly 1-2 cm x 1-4 mm,
acute or rounded at apex, apiculate, densely adpressed-sericeous on both
sides. Inflorescence a raceme, the flowers bicolorous, less than 1 cm long,
the banner suborbiculate, pubescent, the wings 8 mm broad, the keel eciliate.
Pods pilose.

Medicago lupulina L.

Decumbent herb 10-12 cm long. Leaves 3-foliolate, leaflets **broadly obovate**,
the leaflets minutely serrulate; stipules serrate. Inflorescences
in short racemes 0.5-0.8 cm long; flowers yellow. Fruit pods curved, 2.5-3 mm
long, reticulate, adpressed pilose.

Melilotus indica (L.) Allioni

Low erect herb to 0.5 m high, annual; stem diffusely branched. Leaves
3-foliolate, the upper leaflets oblong, the lateral lanceolate, serrulate
around the apex. Inflorescence a slender axillary spike, flowers yellow 2-3
mm long. Fruits globose, 3-4 mm long.

Otholobium pubescens (Poir.) Grimes

Small tree to 3 m tall. Leaves 3-foliate, 3-5 X 1-2 cm, oblong-lanceolate, acuminate, nearly glabrous above, slightly appressed hispid beneath, densely black-glandular. Inflorescence a spike, 10-20 cm long; flowers blue. Fruit pods ovate.

Senna birostris (Vogel) var. totorae Trwin & Barneby Shrub or bush 1-3 m tall.

Leaves with 6-9 leaflets pairs, linear-oblong-elliptic, 1.5-2.5 X 0.4-0.7 cm, rounded at the base, rounded to acute at apex, pale green above, paler beneath.

Inflorescence a raceme with 8 or more flowered. Flowers yellow. Pods oblong, flattened, 5-8 cm long. Senna multiglandulosa (Jacquin) Irwin & Barneby

Shrub or small tree 1-3.5 m tall. Leaves pinnate with 6-8 leaflets pairs, these oblong-lanceolate or oblanceolate-elliptic, 2.3-4.2 x 0.6-1.4 cm, obtuse at the apex, oblique at the base, margin revolute, puberulent above, yellowish-tomentose beneath. Inflorescence raceme, 4-12 flowered; flowers obscure-yellow. Pods elongate-oblong, ca. 10-12 cm long. Spartium junceum L.

Small tree 3-4 m tall; stems glabrous, with finely striate cylindrical branches. Leaves 1-foliate, simple, often lacking. Inflorescence inconspicuous racemes, flowers yellow. Fruit pods elongate, linear, 6X4 cm.

Trifolium peruvianum Vogel

Small procumbent herb to 10-12 cm long. Leaves digitately 3-foliate, the leaflets obovate-serrulate. Inflorescences in heads, 6-8-flowered; calyx somewhat pilose; corolla white to pale pink, 5 mm long. Fruit pods rounded elliptic, membranous.

Vicia araminea Smith var. grata (Philippi) Macbride

Sprawling subscandent herb with lanceolate stipules. Leaves pinnate with 4-5 leaflet pairs and a forked terminal tendril, the leaflets elliptic-oblong, 1-1.8 X 0.3-0.4 cm. Inflorescence a raceme, laxly 2-4 flowered; flowers white with a large blue-black spot 10-15 mm long. Pods elliptic acuminate at the ends, glabrous, 1-2 cm long.

FLACOURTIACEAE

Trees or shrubs. Leaves usually alternate, simple, often glandular-serrate, the stipules often falling early. Flowers generally bisexual regular; sepals 2-15, free; petals 5-many or absent, usually small, stamens numerous, free or in bundles opposite the petals; disc often present; ovary superior, unilocular, the placentae parietal. Fruit variable but typically a berry or 3-parted capsule.

Pineda incana Ruiz Lopez & Pavon

Terrestrial creeper 3-4 m tall. Leaves oblong, 2.5-4 X 0.9-1.3 cm, rounded or acutish at apex, acute to obtuse at the apex, white stellate-pubescent beneath, the margin serrulate. Inflorescence a short corymbose form-racemes. Flowers bisexual; sepals oblong-lanceolate; corolla yellow or reddish. Fruit a capsule, ca. 8 mm in diameter.

GENTIANACEAE Herbs rarely shrubs. * Leaves

opposite, rarely verticillate, simple, exstipulate. Inflorescence terminal and axillary dichasia. Flowers actinomorphic, bisexual; sepals 4-5, connate; petals 4-5, connate, the lobes

contorted; stamens 4-5; ovary superior, 2-carpelate, mostly unilocular, placentation parietal. Fruit a septicidal capsule; seeds minute.

Key to the species.

1. Corolla campanulate, yellow, with 4 pendulous spurs

2. Spurs about half as long as corolla Halenia weddiana

2'. Spurs about one third as long as corolla . . . Halenia stuebelii 1'. Corolla salverform or funnelform, sky-blue, violet, white or yellowish; without spurs

3. Procumbent tiny herbs ca. 3-10 cm long; with interlobed plaits Gentiana prostrata

3'. Erect and low herbs more than 10 cm tall; corolla without interlobed plaits 4. Basal leaves ovate-lanceolate or oblong

5. Leaves ovate-lanceolate, 1.5-4.5 X 0.5-2 cm; inflorescence an umbellate-cyme, 3-6 flowered; corolla sky blue to violet or lilac, tube whitish Gentianella umbellata

5'. Leaves oblong, 4-10 X 2-4 mm; Inflorescence racemose, 6-8 flowered; corolla white or yellowish, the throat blue green spotted..... Gentianella persquarrosa

4'. Basal leaves linear-lanceolate or narrowly lanceolate

6. Leaves linear-lanceolate, fleshy; inflorescence a solitary flower; corolla white, with violet or green veins Gentianella sandiensis

6'. Leaves narrowly-lanceolate, membranaceous;
inflorescence a lax, 1-4 flowered cyme; corolla
violet, with tube whitish. Gentianella rima

Gentiana prostrata Haenke

Procumbent tiny herb to 3- 10 cm high. [Leaves opposite, sessile, lanceolate or ovate, 5-12 mm long, acute, glabrous. Flowers solitary, borne at the apex of branches; calyx tubular. Corolla sky blue, with throat yellow and violet dorsal lines, hypocrateriform. Fruit a cylindrical capsule, ca. 10 mm long.

Gentianella persquarrosa (Keim.) Fabris

Herb to 10-12 cm high, basally decumbent, spreading. Leaves in part in basal rosette; these oblong, subrotund at apex, short petiolate, the cauline leaves obovate-oblong, acute. Inflorescence racemose, 6-8 flowered. Flowers campanulate, ca. 12-15 mm long, petals white or yellowish, the throat blue-green spotted.

Gentianella rima CD. Don) Fabris

Cauliscent-ascending herb 25-30 cm tall. Leaves rosulate; the basal narrowly lanceolate, 6-10 X 0.4-0.6 cm, acutish, largely attenuate at the base, membranaceous; the cauline lanceolate, sessile, much smaller. Flower's in lax 1-4 flowered cymes; calyx connate-campanulate, lobes narrowly lanceolate-acutish; corolla ca. 2.5-3 cm long, lobes obovate-oblong, violet, with tube white to yellowish.

Gentianella sandiensis (Gilg.) Fabris

Cauliscent ascending herb 15-30 cm high. Leaves densely rosulate; the basals linear-lanceolate, 4-5 X 0.5-0.7 cm, acute, attenuate at the base, fleshy; the cauline much smaller. Flowers apical and solitary; calyx campanulate, with

lanceolate acutish lobes; corolla ca. 15-20 mm long, white, with violet or green veins or exterior band, tube often yellow.

Gentianella umbellata (Nuiz & Pavon ex Don) Kabris

Erect herb to 30-40 cm tall. Leaves rosulate; the basal lanceolate, long petiolate, acute, ca. 5 cm long; the cauline ovate-lanceolate. Inflorescence in apical umbellate-cymes of 3-6 flowers. Flowers somewhat salverform, ca. 1.5-2.3 cm long, sky blue, sometimes violet or lilac, tube whitish. Halenia weddelliana Gilg.

Erect herb 15-40 cm tall. Leaves rosulate and narrowly lanceolate at base, 3-4 X 0.3-0.4 cm, gradually acuminate, attenuate at base; the cauline similar, but more elongate. Inflorescence an umbelliform-cyme, 3-8 flowers; calyx lobes broadly lanceolate, acute; corolla greenish-yellow; 1.5 cm long including the 5-6 mm long pendulous spurs, these somewhat divaricate. Fruit an acuminate capsule, ca. 15 mm long.

Halenia stuebelli Gilg.

Erect herb to 35 cm tall. Basal leaves densely rosulate, lanceolate, acute at apex, narrowed at the base; the cauline leaves sessile, long-lanceolate. Inflorescence a terminal cyme, 5-10 flowered, sometimes also with 1-5 flowered cymes in axils of upper leaf pair; calyx lobes lanceolate; corolla yellow; the spurs pendulous, about one third as long as corolla.

GERANIACEAE Herbs. Leaves alternate or opposite, simple or compound, usually stipulate; blades pinnately or palmately cleft or parted, rarely entire. Inflorescence axillary to terminal, cymose or subumbellate. Flowers perfect, regular to somewhat zygomorphic. Sepals 5, free to partially connate; petals often

deciduous, 5, imbricate, usually with nectiferous disc glands; stamens usually
twice the number of sepals; filaments often basally connate; ovary superior,
5-lobed; styles 3-5, united around a carpophore stigmas free. Fruit a capsule
or schizocarp, usually dehiscing elastically.

Key to the species.

- 1. Leaves palmately lobed or parted
 - 2. Petals ca. 16 mm long, whitish Geranium weberbaueri Am
 - 2'. Petals ca. 6 mm long, carmine Geranium herrerae
- 1' . Leaves pinnate Erodium cicutarium

Geranium herrerae Kunth

Spreading herb to 20 cm high. Leaves palmately 7-parted, petioles 20 cm long,
the lobes 3-lobulate, dentate. Inflorescence biflowered; sepals broadly
ovate, petals carmine, 6 mm long. Fruit with the beak minutely puberulous.

Geranium weberbauerianum Kunth

Spreading herb to 20-30 err. high. Leaves deeply palmately 5-7-parted, the
lobes broadly rhomboid, unequal; all coarsely palmately pinnatifid with obtuse
to rounded segments. Inflorescence 1-flowered, solitary; sepals lanceolate
8-9 mm long; petals whitish with deep colored veins. Fruit 14 mm long, beak
minutely puberulent (fide Macbride, 1949).

Erodium cicutarium (L.) L'Herr

Procumbent-ascending rosulate herb to 10-15 cm high. Leaves finely
bipinnatisect, alternate or subopposite. Inflorescence 5-10 flowers; sepals
ovate, petals rose-purple 4-5 mm long. Fruit 5 one-seeded carpel-tails
bearded.

GROSSULARIACEAE

Shrubs or trees. Leaves alternate, pinnately or palmately veined, stipules usually absent, sometimes present. Inflorescence a terminal or axillary raceme, or the flowers solitary. Flowers bisexual; sepals 5(4), basally connate; imbricate or valvate, persistent; petals ⁴, inserted on the calyx-tube; imbricate or valvate; stamens 5(4), inserted on the calyx-tube; anthers small; ovary inferior, 2-carpel late. unilocular. Fruit a capsule or berry; seeds numerous.

Key to the species.

- 1. Shrubs to 1.50 m tall; leaves palmately veined
..... Ribes brachybotrys
- 1*. Trees to 8-14 m tall; leaves pinnately veined
 - 2. Flowers in a terminal thyrsoid-panicle; leaves more than 1.5 cm long, oblanceolate , rounded at the apex..... Escal3 onia resinosa
 - 2'. Flowers solitary, leaves less than 1.5 cm long, cuneate-obovate l.e, the apex obtuse but usually apicuiate..... Escallonia myrtilloides

Escallonia myrtilloides L. f .

Tree to 8-10 m tall, densely branched. Leaves cuneate-obovate, 0.7-1.5 X **0.4-0.7 cm**, obtuse, **but** usually + apicuiate, **the** margin minutely serrulate.

Flowers solitary, axillary; petals whitish, spatulate-obovate, 6-7 mm long.

Fruit a broad obconical capsule, ca. 4 mm long, the persistent subulate calyx lobes forming apical rim. Escallonia resinosa (Ruiz & Pavon) Fers.

Tree 8-14 m tall. Leaves oblanceolate, 2.5-5 X 0.7-1 cm, rounded at the apex, margin subentire to minutely serrulate. Inflorescences densely thyrsoid-paniculate, terminal; corolla cream-white, petals 4-5 mm long. Fruit a capsule, flat-topped with a beak from persistent style, 3X4 mm. Ribes

brachybotrys (Weddell) Janczewski

Erect shrub to 1.5 m tall; branchlets reddish. Leaves rotund 3-5-lobed, bullate-rugose and glabrous above, paler and minutely pilose beneath. Inflorescence a 5-10 flowered raceme; corolla short, campanulate, 3-4 mm long. Fruit a berry, orange or red, 5-10 mm in diameter.

HALORAGACEAE

Herbs, annual or perennial, mostly aquatic. Stipules none. Leaves opposite or verticillate, in our species linear or with linear segments; when submerged pinnately divided. Flowers minute, hermaphrodite or unisexual, the ovary hypogynous. Fruit usually minute, nutlike or drupaceous.

Key to the species.

- 1. **Emergent leaves more or less entire at least in upper parts;** submerged leaves pectinately divided, not glaucous, slender plants Myriophyllum quitense
- 1'. **All leaves pectinately divided, glaucous, stout plants** Myriophyllum aquaticum

Myriophyllum aquaticum (Vellozo) Verdcourt

Stout aquatic herb, the stem rooting freely from lower nodes. Leaves all whorled, only slightly dimorphic, with pectinate, leaflet linear, less than 1-2 cm long, glaucous. Inflorescence with tiny unisexual flowers, axillary in emergent leaves. Fruit a cylindrical mericarp. Myriophyllum quitense H.B.K.

Aquatic herb, with weak stems. Leaves all verticillate, dimorphic, the submerged leaves pectinate with pinnae and radiis somewhat flattened, the emergent leaves narrowly ovate to oblong, not divided. Inflorescence with tiny unisexual flowers borne in the axil of emergent leaves only. Fruit a mericarp, with rounded dorsal surface.

HYDROPHYLLACEAE Herbs to subshrubs, usually pubescent, sometimes spiny or glandular. Leaves alternate or rarely opposite, estipulate. entire to pinnately lobed. Inflorescences mostly scorpioid cymes or solitary flowers. Flowers perfect, regular, 5-merous; sepals distinct or connate at the base; corolla tubular at the base, the lobes imbricate; stamens epipetalous and alternate with the corolla lobes, included or exerted; ovary superior; styles 1 or 2. Fruit a capsule.

Phacelia pinnatifida Grisebach (ex. Wedd.)

Erect herb 30-50 cm high. Leaves oblong-elliptic, pinnatisect or bipinnatisect 5-8 X 1.5-2.5 cm, the margins irregularly dentate or crenate. Inflorescence a densely scorpioid cyme, viscid pubescent; calyx accrescent; corolla campanulate, white or lilac. Fruit a subglobose capsule 4-6 mm long, pubescent.

JUGLANDACEAE

Aromatic resinous tree. Leaves alternate (elsewhere rarely opposite), pinnately compound, the leaflets serrate (elsewhere rarely entire), with resin-secreting pellate glands, exstipulate; plants monoecious. Male inflorescences usually catkins of reduced apetalous flowers, erect or pendulous 1-8 in a cluster; calyx 3-6 lobed or absent; stamens 3-40; anthers basifixed; female inflorescence a spike or the flowers +• solitary; calyx 4-toothed, the ovary inferior, 2-carpelate, 1(-2) locular. Fruit a nut or samara.

Juglans neotropica Diels

Tree 25-30 m tall. Leaves pinnate with 7-8 leaflet pairs, the leaflets gradually long-acuminate, rounded to subcordate, sparsely pubescent above, densely velvet-pubescent beneath, the margin minutely serrulate.

Inflorescence monoecious; the staminate aments, yellowish-brown pilose, 20-25 cm long; the pistillate inflorescence 3-10 flowered; calyx urceolate; with 4 segments. fruit a large nut.

K. KAMERIACEAE Small shrubs and herbs.

Leaves alternate, simple, entire, exstipulate. Inflorescences axillary or terminal racemes or the flowers solitary. Flowers bisexual, zygomorphic, rather open-like, the sepals 5(4), free; petals 5, the 3 upper long-clawed, free or connate, the 2 lower usually much smaller, thick and glandular; stamens 4(3); ovary superior, 2-carpelate, unilocular. Fruit a globose bristly achene, exozoochorous, 1-seeded.

Krameria lappaeaa (Donibey) Burdet & Simpson

Subshrub 0.3-0.8 m tall. Leaves simple, oblanceolate or obovate, 5-10 X 2-5 mm, mucronate, abruptly cuneate at the base; densely sericeous on both surfaces. Inflorescence a raceme; sepals slightly saccate, glandular petals cuneate to orbicular, red-purple; petaloid petals, free, spatulate, deep red with green margins. Fruit ovoid, densely villous and with numerous, scattered spines, ca. 5-8 mm in diameter.

LAMIACFAE Annual or perennial herbs or subshrubs, usually with aromatic oils, the stems and the twigs usually quadrangular. Leaves opposite or whorled, simple to compound without stipules. Flowers often congested at the nodes, bisexual, stamens 2 or 4 mounted on the bilabiate corolla, with a nectariferous disc between the stamens and the ovary; ovary superior, 2-loculed. Fruit of 4 nutlets.

Key to the species.

1. Calyces relative large, more than 6 mm long; leaves mostly more than 2 cm long
2. Calyx evenly 5 toothed, with subulate teeth, broadly campanulate;

stamens 4 Lepechinia floribunda

- 2'. Calyx bilabiate **or** irregularly 2-4 toothed, the lobes **not** subulate, tubular or narrowly campanulate; stamens 2

3. Leaf base obtuse or truncate; inflorescence an open raceme; stamens exerted from upper lobe; flowers blue or red
- 4.

Corolla blue; leaves deltoid or truncate-subcordate;

..... Salvia scutellarioides

4'. Corolla red or roseate; leaves oblong-lanceolate;

..... Salvia oppositi flora

3'. Leaf base cuneate; inflorescence fascicled-racemose; **stamens** included in upper lip; flowers lilac . . Salvia sarmentosa i' . Calyces small, less than 5 mm long; leaves mostly less than 2 cm long or distinctly bullate above

5. Stamens 2; inflorescences axillary 1-3 flowered, vppv small prostrate plant with round leaves. . . .Hedeoma mandoniana 5'. Stamens 4; inflorescence several to many-flowered; plant more or less erect; leaves longer than broad or distinctly triangular 6. Corolla tube less than 6 mm long; inflorescence few to

several-flowered, subtended by non-clasping leaves longer than wide

7. Leaves tiny, less than 3 mm long

..... Satureja boliviana

7'. Leaves more than b mm long

3. Calyx reticulate-veined with 5 acutish lobes; leaves bullate above, mostly 3-5 cm long

..... Lepechinia meyeri

8'. Calyx not reticulate-veined, the lobes acuminate; leaves **not bullate, mostly less than 3 cm long** 9.

Leaves nearly entire; corolla white, ca. 3-4 ran

long Minthostachys spicata

9*. **Leaves strongly crenate-serrate; corolla pink, ca.**

8-10 mm long Stachys herrerae

apex, founded at- the base, rugose and r. i nereous-hi rsute abovp, pale-puborulous beneath, margin rrenulate. Inflorescences a congest.tid terminal g l omeru l ate-spike, also a tew sessi ,1 e f l owers in axils of upper leaf pairs. Kl owers white; calyx reticulate veined, ca.) mm long; corolla ca. 3-4 mm long; stamens 4. Fruit 4 obovoid nutlets, ca. I.2 mm long. **Min.thostacnys spicata** (Benth.) feipiing

Erect subshrub ca. I m tall, stems with exfoliating surface. Leaves ovate 1-2 cm X 8-12 mm, acute at apex, rounded at the base, upper leaves white-hirsute, the lower glabrous, the margin slightly serrate. inflorescence compounded of short axillary and terminal cymes; flowers white; calyx para 1 leily-veined, villous, ca. 2 mm long; corolla 3-4 mm long. Fruit 4 small nutlets. *Salvia oppositiflora*. Ruiz & Pavon

Rrect shrubby 40 cm tall. Leaves oblong-lanceolate, 2-3 cm X 5-8 mm, subobtuse at apex, rounded or cordate at the base, rugulose-scabrous above, densely white-tomentose beneath. Inflorescence in racemes 1-4 flowered; calyx strongly bilabiate, finely ribbed, 9-10 mm long; corolla red or pink with yellow trichomes, ca. 20 mm long; stamens 2; the anthers Jong-exserted. Fruit 4 obovoid nutlets, ca. 3.5-4 mm long. **Sa_lyla_ sarmentosa** F.pling

Erect shrub to 80 cm tall. Leaves oblong-lanceolate, 1.5-3 X 0.3-0.6 cm, obtuse or subacute at both ends, puberulent above, pale tomentose beneath, the margin entire. Inflorescence fascicled-racemose. Flowers blue, calyx irregularly 2-4-labiate, 7-10 mm long; corolla ca. 8 mm long; stamens 2. Fruit obovoid nutlets ca. 2.5-3 mm long. **Salvia scutellarioides** H.H.K.

Procumbent herb to 80 cm long. Leaves deltoid, 2-6 X 1.8-4.8 cm, obtuse at apex, truncate-subcordate at the base, sparsely hirsute above, appressed

canescent beneath. Inflorescence an elongate raceme. Flowers blue, calyx densely glandular-pubescent, ? tipped, ca. 9-10 jnm long; corolla ca . 12-25 mm long.

Satureja boliviana (Benth.) Briquet

Rect shrub to 1 m tall. Leaves tiny, obovate or ovate-elliptic, 5-10 X 4-5 mm, subobtusate at both ends, short pubescent on both surfaces, the margin entire. Inflorescence a solitary flower or few-flowered tascicle, axillary; calyx tube 2-2.5 mm long, corolla white, ca. 3-4 mm long. **Stachys herrerae**

Epling

Decumbent herb 20-40 cm long. Leaves ovate 1.5-3 X 1-1.5 cm, obtuse at apex, cordate at the base; sparsely hispidulous above, puberulent beneath, the margin crenate. Inflorescence an axillary few-flowered fascicle; calyx turbinate, 5-dentate, 5 mm long; corolla pink, the lower lip much longer than upper, ca. 10 mm long. Weed in cultivated areas.

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LOASACEAE Herbs or shrubs, often with stinging hairs. Leaves opposite or alternate, simple or variously divided, usually serrate, without stipules. Flowers bisexual, regular; sepals 4 or 5; petals 4 or 5, distinct; stamens numerous, usually gathered in bundles opposite the petals or all the filaments joined to form a low ring; ovary inferior, locule 1-3. Fruit a capsule.

Key to the species.

1. Flowers white; erect plantLoasa cuzcoensis
- 1'. Flowers yellow or orange; plant usually more or less scandent
2. Capsule spirally twisted, laterally dehiscent

3. Corolla yellowish; leaves ovate-oblong pinnately lobed slightly
 setoseCajophora contorta
- 3'. Corolla orange; leaves oblong, pinnatifid; still pilose. . . .
Cajophora *aff.* horrida
- 2'. Capsule straight, apically dehiscentMentzelia fendleriana

Cajophora contorta Presl.

Slender vine, scandent. Leaves ovate in general outline, 3-6 X 2-3 cm, incompletely pinnatisect, with 6-12 pairs of oblong to ovate lobes, regularly serrate-dentate, setose on both surfaces. Flowers solitary, axillary; calyx lobed 1/8 cm long; corolla yellow, contorted, the petals 1.5 cm long. Fruit spirally twisted.

Cajophora horrida (Britton) Urb. *ft* Gilg

A coarse herb, erect or somewhat scandent, with white bristly-pubescent. Leaves oblong-ovate in outline, pinnatisect, with 7-10 pinnae or lobes, 5-15 X 1.5-4.5 cm, tomentose beneath. Flowers solitary, mostly terminal; calyx 8-10 X 7-8 mm across, the lobes ca. 1 cm long, corolla orange, the petals 2-2.5 cm long. Fruit a thick spirally twisted capsule, setose, 2.5 X 2 cm.

Loasa cuzcoensis Killip

Erect herbs to 30-45 cm high. Leaves ovate to lance-ovate, subpinnately lobed, 5-12 X 3-10 cm, hispidulous to setose on both surfaces. Inflorescence few-flowered; flowers white, the petals stalked ca. 1 cm long. Fruit a narrow capsule to 2 X 1 cm, hispidulous-setose.

Mentzelia fendleriana Urb. & Gilg

Subshrub to 1 m high, bushy, spreading. Leaves ovate-lanceolate or oblong-lanceolate, lobed toward the middle part of the base and dentate to the

apex. flowers solitary, axillary; calyx tube 8 mm long, the teeth lanceolate 10 mm long. Corolla orange, 2.5-3 cm long. Fruit capsule sessile, well-pedicel led.

LORANTHACEAE

Parasitic shrubs or vines. Leaves opposite, entire, coriaceous and inconspicuously nerved. Inflorescence usually spicate, sometimes corymbose or racemose, the flowers minute to large; tepals 3-6; stamens equalling the tepals and adnate to them; ovary interior, usually 1-celled. Fruit a berry.

Key to the species.

- 1. Parasitic shrub; flowers cream, perfectly 6-merous; petals 1.0-12 mm long
 *Tripodanthus acutifolius*
- 1'. Tree, flowers orange to yellow, 6 or 7-merous, petals 8-25 mm long . . .
 *Gaiadendron punctatum*

Gaiadendron punctatum (Ruiz & Pavon) G. Don

Tree. Leaves broadly lanceolate to ovate to / X 4 cm, acutish to rounded at apex, rounded at the base, coriaceous, lustrous above, densely punctate beneath. Inflorescence 2 raceme, solitary in leaf axils. Flowers bisexual, 6-merous, yellow or red, petals 8-25 mm long. Fruit a dull orange, globose, berry ca. 10 mm in diameter.

Tripodanthus acutifolius (Ruiz & Pavon) Van Tieghem

Parasitic shrub. Leaves lanceolate to ovate, 4.5-7 X 1-3 cm, acuminate at apex, rounded to acutish at the base, somewhat coriaceous, slightly lustrous above, punctate beneath. Inflorescence a raceme, solitary from the leaf axil and also terminal. Flowers bisexual, 6-merous, cream, petals 10-12 mm long. Fruit ovoid, 7 mm long.

Galiano - 185 MALVACEAE Usually herbs, sometimes shrubs or trees. Leaves alternate, simple, entire, serrate, or variously lobed, usually palmately veined, stipulate. Flowers bisexual, regular; sepals 5, distinct or basally joined, often subtended by an apicalyx; petals 5, distinct; stamens numerous, monadelphous (the filaments fused into a tube around **the** style); ovary superior, 2- to many-loculed. Fruit usually a capsule, often dehiscing radially into mericarps; sometimes a berry.

Key to the species.

1. Acaulescent rosette herbs *Acaulimalva engleriana*
- 1'. Erect or sprawling herbs. Leaves alternate, colony stem
 2. Inflorescence a solitary, axillary flower. *Anoda cristata*
 - 2'. Inflorescence a scorpioid, cincinnus
 3. Leaves more than 4 cm long; plants erect
 *Tarasa operculata*
 - 3'. Leaves less than 2 cm long, plant more or less sprawling . . .
 *Tarasa marini*

Acaulimalva engleriana (Ulbr.) Krapovickas

Acaulescent rosette herb to 3-5 cm tall. Leaves broadly ovate, 5-7 lobed or incised, truncate or subcordate at base, 15-30 X 12-25 mm, margin irregularly crenate, glabrous above, stellate-hirsute beneath. Flowers solitary, subsessile, the pedicel 10-30 mm; calyx stercose-hirsute, 10 mm long; corolla white or lilac, 20-30 mm long. Fruit ca. 3 X 3 mm forming mericarps.

Anoda cristata (L.) Schlecht.

Herb to 30-40 cm tall, erect or sprawling. Leaves variable,

triangular-hastate or with lateral lobes, margins dentate to serrate, truncate to cordate at base, 3-5 X 3-4 cm; hispid-setose above and sparsely beneath. Flowers solitary, axillary, the calyx lobes 7 mm long, corolla roseate or lavender, 1.5 cm long. Fruit with 10 or more dehiscent mericarps, ca. 3-5 mm long.

Tarasa operculata (Cav.) Krapovickas

Erect herb to 40 cm high. Leaves 3-5 lobes, 3.5-6 X 1.5-5 cm, lobes triangular-acutish, middle lobe longer than laterals. -inflorescence an axillary cincinnus, scorpioid, many flowers; flowers lilac; petals 6-8 mm long. Fruit dehiscent into mericarps. Tarasa marini Krapovickas

Low often prostrate herb, the stipules lanceolate, 4 mm long. [Leaves 1.2-2.2 X 1.3-0.8 cm, semiorbicular; slightly 3-lobed, mostly **1-1.5** cm long, more or less straight at the base, the margin dentate-crenate, hirsute-stellate on both surfaces. inflorescence a few-flowered axillary cincinnus; calyx 5 mm long, stellate-pubescent, corolla whitish. Fruit dehiscing to 6-7 mericarps, ca. 1.5 X 1 mm.

MELIACEAE

Shrubs or trees. Leaves alternate, pinnate (elsewhere sometimes trifoliolate or unifoliate), without stipules. Flowers usually bisexual, less frequently unisexual, white or pinkish, regular, the calyx small; sepals 4-5; petals 4-5; stamens 8-10, the filaments partially or completely united to form a tube; disc usually present between stamens and ovary, the ovary superior, 2-5-loculed. Fruit a capsule, often large and somewhat woody.

Cedrela lilloi O.C.

Tree to 30 m. Leaves paripinnate with 6-9(-12) pairs of leaflets; leaflets variable in size (20-)25-60(-70) cm long, mostly opposite, ovate-lanceolate to oblong-lanceolate, acuminate at the apex, rounded or subacute at the base, glabrous. Inflorescence paniculate, terminal or subterminal, as long as or longer than leaves. Flowers pinkish-violet on the outside, filaments fused to base of narrow gynophore. Fruit a capsule, obovoid to oblong. 3-3.5 cm long; seeds winged.

MELASTOMATACTAE Shrubs (elsewhere often herbs, trees or vines). Leaves opposite, simple, usually with 3-9 obvious parallel veins, without stipules. Flowers bisexual, regular, the perianth and stamens borne on a hypanthium; sepals 4-6; petals 4-6, distinct; stamens mostly twice as many as petals, the anthers typically opening by terminal pores, the connective usually with conspicuous appendages; ovary superior or inferior, 1 to several celled. Fruit a capsule or berry.

Brachyotum naudinii Triana

Shrub to 1.80 m tall. Leaves ovate to elliptic, to 5-18 X 4-/(-10) mm, the apex rounded to blunt-acute, base obtuse to subtruncate, 3-veined, sparsely strigillose; petiole 2-5 mm long. Flowers usually solitary on short lateral branchlets, usually tetramerous, occasionally 5-merous, petals deep purple; imbricate to form tube. Pollination by Trochilidae.

MYRSINACEAE Trees or shrubs. Leaves alternate, simple, without stipules, pellucid-punctate. Flowers bisexual or unisexual, regular; sepals 4-5,

distinct or somewhat connate at the base; corolla 4-5-lobed, the petals joined at the base; stamens as many as the corolla lobes and opposite them, usually mounted on the corolla; the ovary superior, 4-6-loculed with axillary or free central placentation. fruit a drupe, usually one-seeded.

Myrsine aff. pellucida (Ruiz & Pavon) Sprengl

Small tree to 4 m tall, glabrous. Leaves elliptic-oblong, 6-13 X 3-6 cm, acute at base, rounded at apex, subcoriaceous, lustrous above, pellucid-punctate and with resiniferous lines beneath. Flowers ramiflorous-glomerulate, the pedicels 8-10 mm long; calyx glabrous, densely punctate, the sepals lanceolate; petals ca. 2 mm long, punctate-lined. Fruit a globose berry ca. 4 mm in diameter.

MYRICACEAE

Aromatic trees and shrubs. Leaves alternate, simple, entire or dentate, with sessile, resinous glandular hairs, stipulate or exstipulate; plants monoecious, dioecious or polygamous. Inflorescences an axillary, catkin-like spike, the flowers reduced and greenish; male flowers without perianth; stamens 4-8, anthers basifixed; female inflorescences erect, very short, flowers with sepal-like bracteoles; ovary superior, 2carpellate, unilocular. Fruit a drupelet or nutlet.

Myrica pubescens H & B ex Willd.

Tree 4-5 m tall, stem much-branched. Leaves lanceolate-obovate, 7-10 X 1.5-3 cm, acute or acuminate. Sharply serrate or denticulate, more or less pilose, glabrescent. Inflorescence an aments, 3-6 cm long; the bracts subulate, acuminate, exceeding the flowers. Fruit globose, papillose, ca. 5 mm long, thick, bluish purplish to bluish, wax covered.

MYKTACEAK

Shrubs or trees. Leaves opposite (in ours), simple, entire, without stipules. Flowers bisexual, regular; sepals 4-5; petals 4-5, distinct, white or pink; stamens numerous; ovary inferior, 1-loculed with intruding placentae, these commonly fused and the ovary apparently 4-5-loculed. Fruit usually a berry (in ours).

Myrcianthes oreophylla (Diets) McVaugh

Tree 5-8 m tall. Leaves ovate to orbicular, 1-3 X 1-4.5 cm, rounded at apex, and base, coriaceous, appressed puberulous below, the margin entire.

Inflorescence a dichasium; 3-flowered, axillary, the central flower sessile; hypanthium obpyramidal 4-angled, densely white-hairy, stamens numerous, up to 8 mm long; petals white obovate ca. /mm long. Fruit an ellipsoid berry.

NYCTAGTNACEAE

Herbs or vines (elsewhere often shrubs or trees), sometimes dioecious. Leaves usually opposite, simple, entire, without stipules. Flowers bisexual or unisexual, regular, highly colored bracts often subtending each flowers; calyx 5-lobed, petal like; petals absent; stamens 1-many; ovary superior, L-loculed, the basal ovule solitary. Fruit usually a berry-like anthocarp enclosed by the persistent calyx.

Key to the species.

- I. Flowers white, plant climbing or subscandent; leaves commonly verticillate, glabrous; inflorescence umbellate, not subtended by bracts *Colignonia wjabjirbaueri*.

L'. Flowers magenta, plant erect to procumbent; leaves chiefly opposite, sparsely villous; inflorescence cymose-paniculate, involucrate
..... Mi rabi I i s prostrata

Colignonia weberbaueri Heimerl

More or less clambering suffrutescent herb. Leaves verticillate, ovate or deltoid-ovate, glabrous. Unflorescence umbellate. Flowers minute, 12-20, the perianth white. Fruit an anthocarp, turbinate, obpyramidal.

Mirabilis prostrata (Ruiz & Pavon) Heimerl

Erect or procumbent herb. Leaves opposite, ovate to elongate-deltoid sparsely villous. inflorescence a paniculate-cymose. flowers small, the perianth *red* or pink. Fruit an anthocarp, shorter than the involucre.

ONAGRACEAE Herbs or shrubs. leaves

alternate or opposite, simple, stipules none or caducous. Flowers bisexual, regular; sepals commonly 4; petals commonly 4, yellow, red or white; stamens usually 4 or 8; ovary inferior, usually 4-loculed. Fruit a capsule or a berry.

Key to the species.

- 1. Seeds normally with a tuft of hairs (coma) at the free end; calyx tube short or lacking *Epilabium denticulatum*
- I'. Seeds without a coma; calyx tube prolonged beyond the ovary.
 - 2. Fruit a berry, plants woody shrubs or climbers, flowers red, more than 5 cm long
 - 3. Flowers with petals but these often shorter than the colored sepals; leaves mostly opposite or ternate. . . *Fuchsia boliviana*

Flowers without petals, leaves largely alternate and deciduous at anthesis; petals minute nr larking . . .Fuchsia apetala 2'. Fruit a capsule; plants herbaceous; flowers pink to yellowish, less than 2 cm long

4. Petals **pink** or purplish; capsule straight. . . Oenothera rosea

4'. Petals yellow or greenish, drying orange-red; capsule curved

..... Oenothera inultj caul is

Epilobiuin denticu latum Ruiz & Pa von

Erect herbs to 30 cm tall. Leaves lanceolate ovate, subobtuse, serrulate to subentire; petioles to 3 mm long. Sepals 3-4 mm long; petals purple or rose, 5-6 mm long; ovaries densely grayish pubescent. Capsule slender, 3-5 cm long, pubescent; seeds fusiform, minutely papillose, the tuft of terminal trichomes.

Fuchsia apetala Ruiz & Pavon

Vine-like shrub, often epiphitic, to ca. 1. m high. Leaves elliptic-ovate, subentire, rounded to subcordate at base, acute to acuminate at apex, finely pubescent above, villous beneath. Flowers few; hypanthium orange-scarlet; sepals reddish-orange spreading lance-ovate 22-25 mm long; petals 0. Fruit an oblong red berry.

Fuchsia boliviana Carriere

Erect bushy shrubs or small tree 2-4 m tall with arching branches. Leaves opposite or ternate, acute to rounded at base, acute to acuminate at apex, pubescent to subglabrous above, pale green and ashy puberulent to densely canescent below. Inflorescence drooping terminal raceme or few-branched panicle. Flowers numerous, the pedicels slender, pendant. Floral tube funnel form. Sepals lanceolate 10-20 mm long. Petals scarlet, 8-16(-20) mm long. Berry cylindrical, thick, dark purple.

Oenothera multicaulis Ruiz & Pavon

Prostrate or procumbent perennial herb, to 20 cm tall. Leaves of basal rosette broadly oblanceolate; obtuse, subglabrous; cauline leaves sessile, lanceolate-ovate. Flowers solitary, axillary, sessile, yellow or greenish, drying orange to red; hypanthium strigose; sepals spreading-reflexed, lanceolate; petals broadly obovate. Capsule arcuate, the seeds brown.

Oenothera rosea Alton

Erect perennial herb 10-50 cm tall. Leaves usually not crowded, the basal oblanceolate to obovate, entire to sinuate-dentate; cauline leaves gradually reduced up the stem mostly oblong-ovate. Flowers axillary, arranged into slender racemes. Hypanthium 4-8 mm long, strigilose; petals rose to red-violet. Fruit an obovoid capsule, the seeds oblong-obovoid.

OXALIDACEAE

Herbs, shrubs or trees. Leaves alternate, palmately or pinnately compound, usually estipulate. Flowers bisexual, nearly regular; sepals 5; petals 5; stamens 10, the filaments united at the base; ovary superior, 5-locular with axile placentation. Fruit a capsule or rarely a berry, the seeds arilate.

Key to the species.

1. Stems and lower surface of leaves hirsute-villous corolla about 18-20 mm long.....*Oxalis Petropolitana*
- 1'. Stems and lower surface of leaves glabrous to loosely pilose. Corolla about 3-5 mm long
 2. Diffusely branching herb; leaflets deeply incised at apex, concolorous, green below*Oxalis corniculata*

2*. Short broad herb from hap root; leaflets slightly incised at apex,
whitish below ~~Oxalis~~ Oxalis lotoides

Oxalis corniculata L. var sp. aff.

Prostrate diffusely branching herb; stems loosely pilose to nearly glabrous.
Leaves 3-foliate, the leaflets cuneate-obcordate, ca. 1.5 X 1.5 cm, deeply
incised. Inflorescences on peduncles to 10 cm long, puberulous; corolla ca.
4-5 mm long, pale yellow to orangish. Fruit an erect slender capsule ca. 8-10
mm long.

Oxalis lotoides H.B.K. s.l.

Erect herb from thick tap root, spreading or procumbent herb 5 dm. Leaves
3-foliate, the leaflets obcordate, all sessile, 8-15 X 9-12 mm, slightly
apically incised with obtuse sinus, appressed puberulous and whitish below.
Inflorescence irregular pedunculate cyme, to 3-6 cm long, 2-9 flowered; sepals
6-7 mm long, petals yellow with red lines, ca. 7-8 mm long.

Oxalis petrophila K. Kunth

Erect or procumbent herb to 100 cm tall: stems hirsute-villous. Leaves
3-foliate, the leaflets obcordate, 1.4-1.8 X 1.5-2 cm, villous below.
Inflorescence an irregular, pedunculate cyme. 2-5 flowered; sepals linear, 8-10
mm long; corolla pale-yellow, ca. 18-20 mm long.

PASSIFLORACEAE Shrubs or (usually) vines with
axillary tendrils. Leaves alternate, simple or rarely compound, often
strikingly lobed, stipulate. flowers bisexual, regular; sepals 5; petals 5 (or
absent), distinct, an annular corona of many erect filaments between the petals
and stamens; stamens usually 5, borne with

the pistil on a common stalk (androgynophore); ovary superior, usually
3-parted, unilocular with parietal placentation, the stigmas usually 3. Fruit
a berry or rarely a capsule, often with edible pulp surrounding the seeds.

Key to the species.

1. Leaves glabrous; flowers less than 6 cm long . . Passiflora gracilens

1'. Leaves pubescent on one or both surfaces; flowers not more than 6 cm long

2. Leaves 3-foliolate, the margins of the leaflets entire or serrulate,
often revolute; bracts free to the base. . . Passiflora trifoliata 2'.

Leaves moderately to deeply 3-lobed, the margins serrate, not revolute;
bracts free to the base or united basally 3. Bracts connate more than
half their length, the free portions

entire; corona of minute teeth Passiflora mollissima

3', Bracts free to the base or connate only at very base and the free
portions serrate; corona of filaments up to 2 cm long *h*. Stipules
deeply pinnatisect throughout; coronal filaments

0.6-2 cm long; anthers nearly basifixed

..... Passiflora pinnatistipula

h' . *Zr. iouie** pinnatisect distally, deeply serrate basally; coronal
filaments 0.3-1.0 cm long; anthers nearly basifixed. . . .

..... Passiflora X rosea

Passiflora gracilens (A. Gray) Harms

Herbaceous vine; stipules setaceous. Leaves narrowly 3-lobed, the lobes
ovate-oblong, the basal ones divaricate, glabrous on both surfaces, the margin
minutely serrulate. Flowers subtended by bracts ovate, ca. 6-8 mm long at

anthesis; petals ca. 8-10 cm long, bright, pink; corona reduced to a shallowly sinuate purplish ring. Fruit ovoid, ca. 2-4 cm long.

Passiflora mollissima (H.B.K.) Bayley

Vine; stipules subreniform. Leaves wide 3-lobed, the lobes ovate-oblong, acute the sinuses acute, glabrescent above, grayish-tomentose beneath.

Flowers subtended by bracts ovate, ca. 3.5 cm long, united one third basally of their length; petals ea. 3 cm long, pink; corona reduced a purple band with a few crenulations. Fruit oblong-ovoid 8-10 cm long.

Passiflora pinnatistipula Cav.

Vine; stipules pinnatisect. Leaves wide. 3-lobed, the lobes lanceolate or oblong-lanceolate, acuminate, rugose and glabrous above, white-tomentose beneath, the margin sharply-serrate. Flowers subtended by bracts ovate, free, sharp-serrate, ca. 1.5 cm long; petals roseate or white, faintly blue-tinged, ca. 3.5 cm long; corona 2-ranked, the outer rank filamentose, blue and white, the inner a ring of minute, deep purple tubercles. Fruit subglobose, ca. 5 cm diameter.

Passiflora X rosea ■. Kars.) Killip (P. pinnatistipula X P. 2L9 ^{ijj^jma};

Vine; stipules linear-lanceolate, pinnatisect distally. Leaves 3-lobed, the lobes ovate or ovate-oblong, rugose-glabrescent above, yellowish-tomentose beneath. Flowers subtended by bracts cordate-ovate, free to the base, **ca. 2 cm long, or rarely slightly connate at very base; petals bright pink, ca. 2.5-3 cm long; corona filamentose in 2 series. Fruit ovoid, ca. 8 cm long.**

Passiflora trifoliata Cav.

A stout vine; stipules oblong-lanceolate, glandular-fimbriolate. Leaves 3-foliolate, the leaflets ovate-oblong, densely short hirsute-villous on both surfaces, acute, the margin entire, revolute. Flowers subtended by bracts

ovate-oblong, free to the base, ca. 2-1.5 cm long, closely lacinate-
fimbriate, petals ovate-oblong, deep pink, white toward the base, ca. 2 cm
long; corona minutely tuberculate, 2-ranked. Fruit ovoid, 4-5 cm long.

PHYTOLACACEAE

Herbs (elsewhere sometimes shrubs, trees, or vines). Leaves alternate,
entire; stipules absent or minute. Flowers bisexual or rarely unisexual,
regular, small; sepals 4-5; petals absent; stamens 3-many, often borne on a
disc; ovary superior, 2-to many-loculed, or apocarpous with each pistil
unilocular. Fruit variable, often a berry with red juice.

Phytolacca bogotensis H.B.K.

Herb to 0.8-1 m tall. Leaves oblong-elliptic, 5-15 X 1.8-5 cm, acute at both
ends or acuminate, chartaceous. Inflorescence a dense many-flowered raceme,
ca. 6-8 cm long; sepals subequal, 2 mm long. Fruit a several-seeded lobed
purple berry 5-6 mm in diameter.

PIPEKACKAE

Rect or scandent herbs, shrubs or small trees; nodes often swollen and
jointed. Leaves alternate, rarely opposite or whorled, petiolate, entire,
stipules joined to the petiole when present. Flowers minute, bisexual or
unisexual, generally in dense fleshy spikes; sepals and petals absent; stamens
1-4(-6); ovary superior, 1-loculed, the solitary ovules basal. Fruit a small
drupe.

Key to the species.

1. Plants acaulescent; spikes **4-6 mm long**

2. **Leaves distinctly pellate round, scarcely 0.5 mm in diameter; spikes**
 scarcely 4 mm long Peperomia verruculosa
- 2'. Leaves not peltate, more *or* less elliptic, more than 1 cm long; spikes
 6 mm long Peperomia ppucu-ppucu
- 1* . Plants with slender leafy stems; spikes ho 50 mm long
 Peperomia agapatensis

Peperomia agapatensis D.C.

A puberulent, suffrutescent, erect, branching herb; sometimes epiphytic.

Leaves commonly 4 at the node, oblong, obtuse, subacute at the base, 0.5-1.5
 cm long. Spikes terminal, borne several together, 50 mm long. Fruits minute,
 round, pointed.

Peperomia ppucu-ppucu Trelease

A small, glabrous herb, rooting from many nodes. Leaves crowded, about 3 at a
 node, rounded-elliptic. Spikes terminal. 6 mm: long, densely flowered. Fruit.s
 minute, ovoid at the base.

Peperomia verruculosa Dahist. ex. Hill.

A small, glabrous, acaulescent herb. Leaves from a subglobose corolla, round,
 peltate below the middle; less than 5 mm long. Spikes axillary, closely
 flowered. Fruit minute, ovoid, verruculose.

PLANTAGINACEAE Annual or perennial herbs.

Leaves in basal rosettes, alternate, sheathing at the base venation appearing
 parallel. Inflorescence scapose or spicate. Flowers small, bracteate, perfect;
 corolla tubular, scarious, limb actinomorphic, 4-lobed; stamens 4, rarely 2,
 alternate with the corolla lobes, exserted, inserted on the corolla tube; ovary
 superior, bilocular, placentation axile; style 1; filiform; stigma bifid; fruit
 capsular.

Key to the species.

- 1. Leaves linear; inflorescence subglobose Plantago lamprophylla
- 1'. Leaves elliptic to ovate; inflorescences linear-cylindric
 - 2. Leaves narrowly elliptic or obovate-elliptic, 1-2 cm wide
 Plantago australis
 - 2'. Leaves broadly ovate-elliptic, 4-6 cm wide Plantago major

Plantago australis Lap., subsp. hirtella (H.B.K.) Kahn

Acaulescent herb **6-25** cm tall. Leaves in basal rosette; narrowly elliptic, or obovate-elliptic., 6-20 X 1-2.2 cm., acute, margin subentire to somewhat denticulate, subglabrous or villous on both surfaces. Inflorescence a slender spike, the peduncle 15-25 cm long; flowers 2-3 mm long. Fruit a tiny capsule.

Plantago lamprophylla Pilg.

Small caespitose herb to 5-10 cm high. Leaves linear, 1-10 cm X 1-2 mm, densely whitish sericeous-villous. Inflorescence a globose or ovoid-globose spike, 4-5 mm long, the peduncles equaling the leaves; sepals 3-4 mm long, hirsute-villous; corolla lobes ovate-lanceolate, ca. 2 mm long. Fruit a tiny broad capsule.

Plantago major L.

Herbs to 15-35 cm high. Leaves in basal rosette, elliptic-ovate, rounded at the base, 10-20 X 4-6 cm, the margin + denticulate. **Inflorescence a** cylindrical spike, the **peduncle** 8-25 cm long, the spikes 4-12 cm **long**; sepals glabrous, 1.70-2 mm; corolla tube 1.5-2 mm long. Fruit a minute conical **capsule.**

POLYGALACEAE Herbs, shrubs, vines or trees.

Leaves simple, usually alternate, stipules

absent. Flowers superficially resembling pea flowers, bisexual, zygomorphic, each subtended by a bract; calyx zygomorphic; sepals typically 5; the two inner large and petaloid; corolla of 3 or 5 distinct petals; stamens usually 8, joined in a split sheath; ovary superior, 2-- to 5-locular. Fruit a capsule, drupe, berry or samara.

Key to the species.

- 1. Plants small herbaceous; fruit winged; leaves oblanceolate or linear-lanceolate; racemes usually with a short axis; corolla yellowish
Monnina amarella
- 1'. Plants shrubs or small trees; fruit without wings; leaves usually elliptic; racemes simple, axillary or terminal; corolla apically blue, basally yellow.....Monnina salicifolia

Monnina amarella Chodat

Small herb 5- 25 cm tall. Leaves linear-lanceolate or oblanceolate, 1-2 X 0.1-0.4 cm, obtuse at apex, attenuate at base, 1-2.5 cm long, glabrescent.. Inflorescence a short terminal spike **0.8--1** cm long; sepals free, 1-1.5 long. Slower 2-4 mm long; the wings purple, ovaries, the keel yellow. fruit an ovate drupe, 3.5-5 mm across (narrowly winged).

Monnina salicifolia Ruiz & Pavon

Shrub to 3 m tall. Leaves elliptic 1-3.5 cm X 2-10 mm, obtuse or acute, pubescent to glabrous. Inflorescence a short spicate raceme 1.5-2 cm long; sepals free. Flowers 4-5 mm long; the **wings indigo-blue; the keel yellow, 3-lobed. Fruit an ellipsoid drup or berry; drying reticulate, 5-6 mm long.**

trees, stems often with swollen nodes. Leaves alternate, simple, usually with a sheathing stipular growth (ochrea) at the petiole base. Flowers unisexual or bisexual, regular; perianth undifferentiated, 3-to 6-parted, continuing to grow and becoming an enlarged wing in the fruit of some genera; stamens 6-9; ovary superior, 1-loculed. Fruit an achene, sometimes winged.

Key to the species.

1. Plants herbaceous; perianth not becoming fleshy

2. Perianth segments 6, in 2 series, the inner ones accrescent, in fruit and enveloping the achene, sometimes with granules on the outer surface

3. Flowers dioecious or polygamous; leaves hastate; valves (inner perianth segments) not enlarged in fruit

..... Rurpex acetocel 1 a

3'. Flowers usually androgynous; leaves obovate, valves enlarged in fruit..... '^iliClf^ cuneifolius

Z! Perianth segments 3, equal, never with granules

4. Plants prostrate; flowers axillary, solitary; ochrea small, inconspicuous, not deeply lacerate .Polygonum aviculare 4*. Plant erect; flowers in long pedunculate spikes; ochrea with long bristles on the margins .

. . .Polygonum hydropiperoides 1'. Plants shrubby or subshrubby; perianth fleshy in fruit

5. Flowers in sessile glomerules; leaves small rhombic-elliptic, plants usually prostrate and matted

..... Muehlenbeckia volcanica

5'. Flowers in simple racemes; leaves more or less hastate-lobate; woody, scandent..... Muehlenbeckia hastulata

Muehlenbeckia hastulata (Smith) Standl.

Scandent or prostrate, more or less ; ocrea large and brown. Leaves hastate - ovate or linear-hastate, 1-2.5 X 0.3-0.6 cm; obtuse to acuminate at apex, truncate to attenuate at the base, coriaceous, glabrous petiolate. Inflorescence in axillary and terminal elongate racemes, 1-3 cm long. Fruit a 3-angled achene.

Muehlenbeckia volcanica (Benth.) Fendlicher

Scandent or prostrate, subwoody; ocrea small and soon deciduous. Leaves rhombic-elliptic, 7-14 X 5-6 mm, acute or obtuse at apex, cuneate-attenuate at the base, fleshy-coriaceous, glabrous, subsessile. Inflorescence on axillary panicles, the flowers yellowish-cream. Fruit a small achene enclosed in the perianth.

Polygonum aviculare L.

Prostrate to ascending herb, much branched; ocrea conspicuous. Leaves lanceolate or narrowly oblong, 8-20 X 2-3 mm, obtuse or acutish. Flowers solitary, minute, sepals 5, petals tiny, green or whitish. Fruit a convexed achene .

Polygonum hydropiperoides Michx.

Erect, herbs to 20-40 cm tall; ocrea ca . 1-2 cm long, strigose. Leaves lanceolate or linear-lanceolate, 3-6.5 X 0.7-1 cm, acuminate at apex, long attenuate at the base, glabrous, almost sessile. flowers small, pink in dense terminal racemes 3-5 cm long. Fruit an achene, trigonous. **Rumex acetocella** L.

Erect slender herb to 10-40 cm high, ocrea 3-5 mm long. Leaves linear, or lanceolate and hastate, 1-3.5 X 0.2-1.3 cm, obtuse at apex, attenuate at the base, glabrous. Inflorescence a branched panicle; flowers unisexual, the pistillate flowers reddish. Fruit a minute achene, 1 mm long.

Rumex cuneifolius Campol.

Low herb to 50 cm tall; ochrea developed. Leaves lanceolate, cordate or rounded at the base. Inflorescence a branched panicle. Fruits smooth achene, 2 mm long, .

PORTULACACEAE Annual or perennial herbs, usually somewhat fleshy, ascending or erect, commonly with the flowers and fruits enclosed in long, white or brownish hairs. Uppermost leaves forming an involucre around the sessile flowers. Calyx deciduous; ovary partially inferior. Capsule circumscissile.

Key to the species.

- 1, Plants acaulescent, perennial, with a thick fusiform root
..... Calandrinia acaulis
- 1'. Plants caulescent, the stems short, slender. . . Ca_la_n_drin_ia ci liata

Calandrinia acaulis H.8.K.

Small perennial tufted herb with thick tap root. Leaves linear numerous to 6 cm long. The solitary white flowers more or less hidden between the leaves. Fruit an elliptic capsule. Seeds rounded-ovoid, very minute, punctulate.

Calandrinia ciliata (Ruiz & Pavon) D.C.

Small annual herb with short slender stem, the stem in fruit becoming sever cm long. Leaves linear-spatulate, glabrous. Flowers sessile, solitary, but apically clustered in axils of reduced leaves; corolla purple. Fruit a capsule. Seeds minute, lustrous.

RANUNCULACEAE

Herbs or vines. Leaves opposite, usually compound and without stipules.

Flowers perfect, monoecious, regular; sepals 3-15, separate; petals as many as sepals or **absent** and the inner sepals petal-like; stamens numerous, spirally arranged; carpels 1 to many, separate, 1-locular, superior. Fruit an achene, follicle., or rarely a berry.

Key to the species.

- 1. Plants not scandent, herbaceous; leaves simple to once or twice compound, if bicompond with linear segments
 - 2. Flowers less than 3 cm across, yellow or white; leaf blades entirely to variously divided, less than 4 cm wide
 - 3. Flowers white; petals absent but tepals petaloid; achenes glabrous
 - 4.* Leaves palmately 3-5 parted, each leaflet 4-7 cm wide. . .
Ajonejone hel leborifolia
 - 4'. Leaves irregularly pinnately divided, each leaflet, divided into slender segments; achenes densely tomentose or sericeous
Anemone decapetala
 - 3' . Flowers yellow; petals present, 5-8; any
 - 5. Aquatic plants; leaves glabrous divided or not; flowers **less than 2 cm across** 6. Floating leaves more or less large; immersed leaves dissectedRanunculus flageelliformis
 - 6'. **Floating** leaves more or less **elliptic and long-petiolate; immersed leaves absent**.....
Ranunculus limoselloides

Galiano - 204 5'. Terrestrial plants; leaves more or less
pinnately divided,

usually markedly pubescent . . . Ranunculus praermorsus

2'. Flower large, more than 5 cm across, greenish cream; blade oval to
orbicular 5-6 cm wide. Krapfia macropetala

1*. Plants scandent, fruticose; leaves ternately bipinnate, Leaflets ovate . .
. Cjematis parvifrons

Anemone decapetala Ard.

Erect perennial herb 6-30 cm high. Basal leaves long petiolate, leaves much
divided into slender segments. Flowers solitary subtend by much divided
leaf-like involucre; tepals white 10-12, linear-oblong, ca. 1 cm long. Fruit
a compressed achene, suborbicular, 2.5 cm long.

Anemone helleborifolia DC.

Erect herb to 30-50 cm tall. Basal leaves long petiolate, 5-30 cm long,
5-palmatisect, with 2-parted lateral segments, asymmetrical, ca. 1/ X 17 cm,
margin serrate. Inflorescence a compound 3- flowered cyme; flowers white or
yellowish; tepals 5. Fruit ovoidal achenes, ca. 3 X 1.5 mm, glabrous.

Clematis seemannii O. Kuntze

Subwoody vine. Leaves ternately bipinnate, leaflets variably lobed or entire,
ovate, 5-30 X 5-25 mm, obtuse to acute. Flowers solitary, axillary, white or
greenish; tepals 4-5, pubescent; stamens and pistil, numerous. Fruit a
reddish achene, fusiform-compressed; ca. 5 X 2 mm, the persistent style
densely plumose.

Krapfia macropetala (DC.) Duncan

Conspicuous stemless herb to 30-40 cm tall. Basal leaves long-petiolate,
blades suborbicular, 8-10 X 6-7 cm, margin irregularly crenate to dentate;
petiole winged in 3-4-flowered cymes, flowers greenish-cream or pinkish, 3.5-7

cm; sepals 5, green striations. Fruit a small achene, ca. 3 mm long, semi-ovoid.

Ranunculus flagelliformis Smith

Aquatic herbs, submerged. Leaves 3-parted, 6 cm long, segments divided, laciniate-filiform, glabrous. Flowers solitary or in 2-flowered cyme; sepals 5, oblong; petals 5 elliptic. Fruits achenes, subglobose, 2-2.5 mm.

Ranunculus limoselloides Turcz.

Aquatic herb to 15 cm long. Leaves dimorphic, the emergent ovate to elliptic, 5-9 X 3.5-9 mm, the submerged filiform. Flowers solitary, 1.5 mm across, long peduncled; sepals 3-oblong; petals 5-6, yellowish, suborbicular. Fruit: an achene abovate, 1-1.5 mm long.

Ranunculus praermorsus H.B.K. ex DC.

Erect herb to 1 m tall, densely hirsute-pubescent. Leaves variously subrotund, trisect or trifid, the cauline leaves deeply pinnatifidly divided, ca. 6X5 cm, pilose on both surfaces. Flowers solitary, axillary, sepals 5, yellow-greenish, ovate; petals 10-12, ca. 1 cm long bright yellow. Fruits Δ -trilocular, obovate, 3 X 1.5 cm.

*HARTMACRAE Trees or shrubs, sometimes scandent, often armed with spines. Leaves simple, alternate, opposite or subopposite, often 3- to 5-nerved, entire or serrate; usually stipulate but these deciduous. Inflorescences axillary cymes; flowers green or yellowish, small, perfect or polygamodioecious, calyx tube 4- to 5-lobate; petals 4-5 or none, inserted in the throat of the calyx; stamens 4-5, inserted with the petals; disc perigynous; ovary sessile, free or immersed in the disc, superior or connate with the calyx tube, 3-celled; fruit capsular or drupaceous.

Colletia spinosa Lam.

Shrub 1.5 m tall, the branches decussately opposite, apically spinescent. Leaves opposite, obovate-lanceolate, obtuse, concave, carinate beneath, glabrous. Flowers solitary, in axillary tubercled, yellowish, pendent; calyx greenish-yellow, campanulate; petals none. Fruit a globose capsule, glabrous, ca . 4 pirn long.

ROSACEAE Herbs, shrubs and trees. Leaves pinnately compound *or* simple, alternate, mostly serrate, rarely entire, stipulate or rarely exstipulate. Inflorescence terminal, racemose *or* cymose. Flowers bisexual, the parts hypogynous, perigynous or epigynous, a hypanthium oft.en present; sepals 5(3-10), imbricate, free or basally connate; petals 5(3-10) or 0, free, imbricate; stamens in 1-4 series of 5 or 10 each; ovary 5(2-15)-carpellate, 5(2- 15)-locular, plancementation axile. Fruits follicles, achene, drupeCs). pome, ra reIy a capSHIP.

Key to the species.

1. Li?riV(?:-i simpifi and pinna te iy-veined; inflorescence corymbose
 2. Leaves lanceolate; fruit stellate-spreading; ovary superior; plant unarmed Kageneckia lanceolate
 - 2'. Leaves broadly ovate-elliptic, oblong-elliptic or elliptic-obovate; fruit a pome; ovary inferior; sometimes with spiny-tipped stems as H. heterophylla and H. palcencis
3. Leaves coriaceous and reticulate-veined especially beneath, ca. 3.5 cm wide Hesperomeles lanuginosa

3'. Leaves subcoriaceous or chartaceous, often little at net-veined,
or smaller, ca. 1.5-1.8 cm wide.

4. Leaves mostly 2-2.5 X 1.8 cm, somewhat ferrugineous-pubescent
beneath; irregularly dentate; the leaves shorter than the corymbs; stems
without spines. . . .Hesperomeles palcens is 4'. Leaves mostly 0.6-1.5
X 0.4-1 cm, glabrous beneath, more or less **crenate-serrate** from below
the middle, the corymbs

shorter than the leaves; stems **spiny-tipped**.....

.....Hesperomeles heterophylla a

1'. Leaves compound or simple and palmately-veined; inflorescence often
racemose or solitary

5. Trees or shrubs; leaves compound imparipinnate; ovary 1-
carpellate

6. Leaves 3-foliolate; fruit + cylindrical.....

.....Polylepis subsericans

7'. Leaves 7-foliolate; fruit turbinate.....

.....Polylepis besseri

5'. Herbs or low subshrubs; leaves 3-foliolate, simple to pinnately compound;

ovary many carpellate 8. Leaves 3-foliolate; fruit fleshy with many carpels fused

9. Leaflets chartaceous, pilose on both surfaces.....

.....Fragaria vesca

9'. Leaflets coriaceous, silvery-white to reddish the lower surface. .

.....Fragaria chiloensis

8'. Leaves simple or pinnately compound; fruit a dry achene; 1-3 carpellate 10. Low

herbs; leaves variously

11. Leaves appendaged with 2-leafy blades along the costa-

subaquatic..... Alchemilla diplophylla

11'. Leaves more or less lobed to pinnate, not appendaged

12. Leaves palmately cleft or parted

13. Basal leaves orbicular, 9-11 lobed

..... Alchemilla orbiculata

13'. Basal leaves 3-lobed, the lateral lobes not deeply

cleft..... Alchemilla vulcanica

12'. Leaves pinnately cleft or parted

14. Basal leaves at least bipinnate

..... Alchemilla pinnata

14' . Basal leaves palmately 3-sect

..... Alchemilla ranunculoides

10'. Subshrubs; leaves all pinnate, the leaflets less than 5 mm long

..... Tebraglochin cristatum

Alchemilla diplophylla Dieis

Erect semiaquatic herb to 5-10 cm high. Leaves cuneate-obovate, 5-10 X 4-6

cm, irregularly 3-dentate, the leaf blade with 3 appendages subequaling, petioles

2-4 cm long. Flowers almost glabrous. Alchemilla orbiculata Ruiz & Pavon

Decumbent herb. Leaves orbicular-reniform, 1.5 X 2 cm, the sinus closed or

open, margin dentate, glabrous above, villous beneath, long petiolate, 5-12 cm

long. Inflorescence corymbose, flowers 3-4 mm long, sericeous-villous.

Alchemilla pinnata Ruiz & Pavon Procumbent herb. Leaves bipinnatifid, 1.5-3

cm long, unequally divided,

gray-villous. Flowers solitary, axillary or terminal, glomerulate, hypanthium

villous to glabrate, lobes green or yellowish. Fruits achenes 1-2. Alchemilla

ranunculoides Perry

Procumbent herb 10-12 cm tall. Leaves palmately 3-sect, orbicular-ovate, 1-

1.5 X 1-1.2 cm, the terminal segment rhombic-ovate, the margin with deep

sinu-incise. sparsely hirsute on both surfaces. Inflorescence in apical

glomerules; hypanthium oblong-ventricose, 1.5-3 mm long. Alchemilla

vulcanica Schlecht. & Cham.

Ascending herb to 10-12 cm high, suffrutescent. Leaves cuneate 3-7-lobed, 3-30

glabrous above, pilose beneath. Inflorescence terminal cymose, pedicels 1-5 mm;

hypanthium turbinate-campanulate, ca. 1.5 mm long; lobes 8; spreading. Fruit 1-

4 achenes, stipitate. Fragaria chiloensis (L.) Duchesne

Erect herb to 15-30 cm tall, stoloniferous. Leaves 3-foliolate, the leaflets

broadly obovate, the margin crenate, coriaceous, the lower surface silvery-

white or reddish. Inflorescence cymose. Flowers white, 5-7 mm in diameter, petals

5-7. Fruit elongate-conic or spherical, 4-6 cm long. Fragaria vesca L.

vesca herb to 12-25 cm high, stoloniferous. Leaves 3-foliolate, leaflets

ovate or ovate-rhombic, acuminate, irregularly dentate, pilose on both

surfaces. Inflorescences in cymes, usually longer than the leaves, 1-4

flowered; sepals equal to the epicalyx; petals white, orbicular. Fruit

elongate-sphaerical, 4-6 cm long. Kaeneckia lanceolata Ruiz & Pavon

Small **tree** to 4-5 m tall. Leaves lanceolate or oblanceolate, 1-3.5 X 0.4-1.2

cm, rounded or short acute at apex, long cuneate at the base, glabrous,

slightly pubescent beneath, the margin finely serrulate. Inflorescence

corymbose, 3-flowered; calyx 5 mm long; petals yellowish, 5-6 mm long. Fruit

a solitary capsule, star-shaped, 8-12 mm across. Hesperomeles heterophylla

(Ruiz & Pavon) Hook.

Shrub to 3-4 m tall, armed. Leaves oblong-elliptic or elliptic 0.6-1.0 X 0.4-

1.0 cm. rounded or acute at apex, acute at the base, lustrous above, pale

beneath, margins obscurely crenate-serrate. Inflorescence in a cyme-corymbose,

4-5-flowered; calyx 4 mm long; corolla yellow 3-4 mm long; stamens numerous

exserted. Fruit drupaceous, reddish, 6 X 8 mm across. Hesperomeles palcensis C.

Schneider

Shrub to 2-3 m tall, unarmed. Leaves elliptic-obovate, 1.2-3 X 0.8-1.8,

rounded at the apex, acute or rounded at the base, pale lustrous above,

pubescent beneath, the margin irregularly dentate. Inflorescence a corymbose-

cyme, many flowered, calyx 6 mm long, lobes triangular, corolla slightly

exceeding the sepals, yellowish. Fruit drupaceous. 5 X 6 mm across..

Hesperomeles lanuginosa Ruiz & Pavon ex Hook.

Small tree to 6 m tall, unarmed. Leaves ovate-elliptic, 2-3 X 2.2-3.5, rounded

at the apex, subacute at the base, coriaceous, rugose-puberulent above, *reticulate-*

ferruginous-villous beneath. Inflorescence in dense corymbs; calyx

ovate, 4-5 mm long, corolla white-cream, 3-3.5 cm long. Fruit drupaceous, **10-**

15 mm across. Polylepis besserii Hieronymus

Trees 4-12 m tall. Leaves 5-7-foliolate, the leaflets oblong-obovate,

emarginate at **apex**, asymmetrically subtruncate at base, the margin crenate,

revolute; dull above, grayish lanose beneath. Inflorescence a pendent raceme,

3-8 flowered; 3-6 cm long; flowers actinomorphic 0.8-1.0 cm in diameter;

sepals 3-4, ovate. Fruit turbinate, with flattened spines, densely lanose, ea.

1.2 X 0.6 cm. Polylepis subsericans Macbride

Trees 3-10 m tall. Leaves 3-foliolate, the leaflets narrowly obovate to elliptic, slightly emarginate at the apex, attenuate at the base, sparsely dull pilose above, densely sericeous-pilose beneath. Inflorescence a short pendant raceme, 3-4 flowered, 2-3 cm long. Flowers actinomorphic., 5-8 mm in diameter, sepals 4; ovate; stamens purple. Fruits cylindrical, with flattened spines, ca. 5X4 mm.

Tetraglochin cristatum (Britt.) Rothm.Jes

Sprawling decumbent shrub to 10-25 cm high; armed. Leaves imparipinnate 4-foliolate, 0.3-1 cm long, the leaflets linear, 4-5 mm long, sharply acute, glabrate, lustrous, and sparsely villous, the margin revolute. Flowers solitary, axillary. Fruit 3-winged, rounded, ca. 5-7 X 5-6 mm.

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RUBfACfCAE Herbs, vines, shrubs or tree.

Leaves opposite *or* whorled, simple, usually entire; stipules well-developed or caducous to leave an interpetiolar ridge or other scar. Flowers usually bisexual, usually regular; calyx 5-lobed; corolla tubular, 4- to 5-lobed; stamens as many as corolla lobes and alternate with them, borne on the corolla tube; ovary inferior, usually 2-loculed with axile placentation, usually multiovulate. Fruit a capsule or **berry**.

Key to the species

1. Plants shrubby, erect; leaves coriaceous; stem terete.....

..... Arcytophyllum thymifolium

Plants herbaceous, more or less scandent or sprawling; leaves membranaceous;
stem 4-angled

2. Flowers with 1 or 2 bracts at the base of long pedicels; peduncle well developed

J. Stems with verticillus 4-8 foliolatus; fruit pubescent-

..... Galium aparine.

I'. Stems with verticillus 4 foliolatus; fruit almost glabrous.

..... Galium mandonii

2'. Flowers with 4 bracts at the base of very reduced pedicels; peduncle shorter than the bracts Relbunium ciliatum

Arcytophyllum thymifolium (Ruiz & Pavon) Standl.

Erect stout subshrub to 40-50 cm tall. Leaves linear, 4-10 X 0.8-1 mm, acute, glabrous, revolute; the stipules triangular-ovate, dentate. Inflorescences in terminal cymes, 3 or more flowered; calyx lobes linear-lanceolate; corolla 5-7 mm long. Fruit a septidially dehiscent capsule, ca. 6-8 mm long.

Galium aparine L.

Sprawling slender herb. Leaves in pseudo-verticillus 6-8 foliolate, 1-4 cm X 1-4 mm. The blade oblong-linear, acuminate, with hairs retrorse.

Inflorescence axillary, few-flowered; hypanthium greenish, papillate; corolla tiny, white. Fruit biglobose, with uncinata hairs, papillose at **the base 2 X 4 mm.**

Galium mandonii Britt.

Decumbent slender herb. Leaves 4-foliolate, in pseudoverticillus, 5-10 X 1-2 mm, the blade linear-oblong, sessile, acute, with retrorse scabrous hairs.

Flowers solitary, axillary, puberulent. Fruit biglobose, glabrous, 2X3 mm.

Relbunium ciliatum (Ruiz & Pavon) Hemsl.

Subscandent herb. Leaves 4-foliolate in verticillus, 0.6-1 X 0.2-0.3 cm, the blade oblong-elliptic or obovate, acute, with hairs retrorse-flexuose. Flowers solitary; corolla tiny yellowish, glabrous. Fruits subglobose, glabrous, ca. 3 mm in diameter.

SALTCACEAE

Trees and shrubs. Leaves simple, deciduous, alternate, crenate, stipulate. Inflorescences erect or pendulous catkins, the plants dioecious, rarely with flowers bisexual; perianth absent; male flowers with 1-2 small linear glands; stamens 2-3(-60), anthers basiflexed or dorsifixed; female flowers with distinct glands, ovary 1-locular, 2(-4) carpellate, parietal or basal placentas. Fruit a loculicidal 2-4 valved capsule.

Salix humboldtiana Willd.

Tree to 6-12 m tall. Leaves alternate, linear-lanceolate, or linear, 2-10 X 0.4-0.8 cm, glabrous, the margin finely serrate. Inflorescence a dense ament, 3-6 cm long, dioecious; with pilose rachis; the staminate flowers with 4-8 stamens, the pistillate flowers ellipsoid, glabrous. Fruit a dehiscent pyriform capsule, 4-5 cm long, the seeds with long trichomes.

SANTALACEAE Shrubs and herbs, sometimes

parasitic on roots or stems. Leaves alternate or opposite, simple, entire, exstipulate. Inflorescences axillary and terminal racemes, spikes, head, often cymose. Flowers small, bisexual; sepals 3-6 free or basally connate, valvate or slightly imbricate, sepaloid or petaloid;

petals 0; anthers basifixed or dorsifixed. Ovary inferior, (2-)3-5 carpel late, unilocular. Fruit a nut or drupe.

Quinchajnalium procumbens Kuntz & Pavon

Low procumbent-ascending herb 20-30 cm tall. Leaves alternate, narrowly-linear, 1-3 X 1.5-3 mm, acute at both ends glabrous, sessile. Inflorescence a terminal head. Flowers sessile, tubular; outer reddish-brown, inner yellow, the tube ca. 5-6 mm long.

SAPINDACEAE Trees, shrubs or tendrillate vines. Leaves usually alternate, simple or pinnately compound. Flowers bisexual or unisexual, regular or zygomorphic; sepals 4-5; petals 4-5 or absent, distinct, equal or unequal, often with scaly or hair-tufted nectaries on the inner side; disc outside the. stamens, glandular; stamens 10 in 2 whorls of 5 each, often reduced to 8 or 5; ovary superior, usually 3-loculed. Fruit variable, usually 3-part.ed, often winged.

Key to the species.

- i. Fruit an inflated capsule; Leaves puberulous . . . Cardiospermum halicacabum
- 1'. Fruit 3-winged, splitting into separate samaras; leaves glabrous
..... Serjania squarrosa

Cardiospermum halicacabum L.

Tendrillate vine. Leaves variable: the upper biternate, terminal leaflet rhombic-lanceolate, 2-4 X 0.8-2.5 cm, acuminate; the lateral smaller; the lower ovate, the lateral oblong, obtuse or subacute at **both** ends, puberulous,

the margin incised-dentate. Inflorescence a cymose-panicle, axillary. Flowers small, yellowish-green. Fruit an inflated capsule. **Serjania squarrosa** Radlk
Tendrillate vine shrub. Leaves subbipinnate, 8-9 X 5-6 cm, the lower pinnae 5-foliolate, the following ternate, the upper simple, glabrous; the margin crenate or serrate. Inflorescence an open panicle, 8- 12 cm long. Flowers small, white. Fruit 3- - winged, splitting into separate samaras.

SAXIFRAGACEAE Herbs. Leaves simple or compound, alternate or basal rosette, rarely opposite, exstipulate. Inflorescence racemose or cymose or rarely a solitary flower. Flowers usually bisexual, the parts hypogynous; sepals 5(-7), free; petals (4-)5(-7) or 0, free or rarely connate; stamens 5-10, free, anthers small; ovary 2(-5)-carpellate, 1-2(~5)-locular, placentation axile. Fruit a septicidal capsule.

Saxifraga magellanica Poiret

Cushion plant to 1-5 cm high, subglabrous. Leaves cuneate, 7(-9)-lobed, 1-2.5 cm long, sparsely long villous above, puberulent beneath. Inflorescence a central cluster of several flowers, pedicels 8-10 mm long. Flowers minute; petals white-cream, 2-3 mm long. Fruits a small ovoid capsule, truncate.

SCROPHULARIACEAE

Herbs (ours), elsewhere shrubs, vines, or very rarely trees. Leaves usually opposite, simple or pinnatisect, usually serrate; stipulate. Inflorescence a raceme or panicle or reduced to a single axillary flower or a few flowers

fasciculate in the leaf axils. Flowers perfect, usually zygomorphic; calyx 4-
to 5-lobed; corolla 4- to 5--lobed; the petals fused basally; stamens 4 or 2;
ovary superior, 2 carpellate. fruit usually a capsule, rarely a berry.

Key to the species.

1. Upper corolla lip forming a hood that, encloses the anthers and the style 2.
Flowers with inflated saccate lower lip, yellow, upper lip arched or
saccate; stamens 2; leaves lanceolate to elliptic or pinnatifid 3. Leaves
in basal rosette; flowers borne singly on long pedicel. .

..... Calceolaria scapiflora

3'. Leaves borne along stem, inflorescence racemose or paniculate

4. Hygrophytic annual herbs with succulent stems; leaf blades
pinnatifid or dissected 5. Flowers less than 1 cm long, the
"slipper" not strongly

contracted at base Calceolaria tripartita

5'. Flowers more than 1 cm long, the "slipper" strongly
contracted to basal neck Calceolaria chelidonioides 4'.

Mesophytic or xerophytic herbs and shrubs, usually perennial; the
stems non-succulent; leaf blades entire or subentire 6. Leaves small,
less than 0.7-0.4 cm.

7. Inflorescence raceme-like, several-flowered;
leaves sparsely pubescent below flowered

..... Calceolaria myriophylla

7'. Inflorescence a few-flowered terminal cyme; leaves
densely white tomentose below

..... Calceolaria sparsiflora

6*. Leaves mostly more than 1-0.5 cm

8. Leaves lanceolate, entire, less than 15 mm

wide..... Calceo Ian a engleriana

8'. Leaves ovate to suborbicular, serrate, more than 20 mm wide. .

.Calceolaria virgata 2'. Flowers tubular, mostly red or purplish; lower lip

not saccate, with 3 distinct lobes; upper Lip forming a relatively narrow

hood; stamens 4; leaves mostly sublinear or with sublinear lobes 9.

Leaves alternate, with 1-2 pairs of narrow lateral lobes; lower

lip with reduced and narrow lobes. . . .Castillej a nubigena 9'. Leaves

opposite, the margin crenate, dentate or serrate; lower lip with

rounded lobes 10. Flowers yellow or orangish

11. Small annual herbs; glandular pubescent only on calyx and

pedicel; flowers yellow..... Bart si a diffusa

li'. Perennial herbs; glandular pubescent, throughout; t lower?;

ornngish, t-.he '.'01-0 113 tube include in the calyx, ca. h mm

Jong Kaj~J.j3ia. sp.

L0* , Flowers pink t.o purple or ^o.-bined red-yellow

12. Corolla bright red dorsally and bright yellow

ventrally, ca. 20 mm long. .Bartsia camp0rum 12* .

Corolla pink to purple, less than 15 mm long. . .

..... Bartsia bartsioides

1*. Upper corolla lip more or less rounded, neither hooded nor enclosing the

anthers 14. Stamens 2; calyx 4-lobed or parted; corolla blue

15. Perennial herb; leaves broadly elliptic to ovate; the upper and

lateral lobes corolla pale blue with deep blue lines

..... Veronica serpyllifolia

15' . Annual herb; leaves broadly ovate to suborbicu] ar; the lower

lobes corolla whitish, the upper blue with violet lines. . . .

..... Veroni ca persica

IV. Stamens V calyx S-lobod or parted; corolla yellow, orange, or red

16. Calyx segments united below into a well developed tube;

corolla tubular red-orange or yellow 17. Small prostrate,

perennial herb; corolla horizontally

positioned, red to red-orange, ca. 1.5 cm long

..... Ourisia chamaedrifolia

17'. Small decumbent, annual herb; corolla vertically

positioned, distinctly bilabiate, yellow, often red-brown

spotted, ca. 1 cm Jong Mimulus g_labratus

16'. Calyx segments parted to near the base; corolla rotate,

orange Alonsoa acutifolia

Alonsoa acutifolia Ruiz & Pavon

Erect perennial subshrub, 3-10 dm tall. Leaves petiolate; the blades

lanceolate or narrowly lanceolate, narrowing to acute apex. inflorescence a

terminal raceme. Calyx 5-parted to below middle; corolla rotate, orange to

red, the 3 lobes of the upper lip larger, the lateral ones rounded and

intermediate in size. Fruit a narrowly ovoid capsule.

Bartsia sp.

Erect, perennial herb, 30-35 cm tall; **stem usually branching from the base.**

Leaves linear to narrowly lanceolate-ovate, subentire to crenulate, obtuse apically, clasping base. Flowers in dense spike or spike-like; calyx tubular-funnelform, lobes lanceolate or narrowly lance-oblong; corolla orangish, the tube largely included in the calyx, galea shorter than the lip, the anthers glabrous. Fruit a capsule longer than the calyx, oblong to ellipsoid-ovoid.

Bartsia bartsioides (Hook.) Edwin

Erect, perennial herbs, 2-4 dm tall; stems branched. Leaves linear to linear-lanceolate linear-oblong, crenate or dentate, obtuse apically, clasping at the sessile base. Flowers in dense spikes. Calyx inflated, lobes acute, pubescent; corolla pink or purple; 10-15 mm long, glandular pubescent. Fruit a capsule ellipsoid-ovoid.

Bartsia canvporum Diels

Erect, perennial herb or subshrub; stems much branched. Leaves variable, narrowly lanceolate to lanceolate-oblong, rarely almost linear, mostly to subobtuse apically, the margin crenate-bullate. Flowers in spike-like racemes, few (6-8) to many (to 12 or more), dense to lax; calyx subcampanulate, teeth narrowly triangular to lanceolate; corolla bright red dorsally and orange yellow ventrally, ca. 20 mm long; tube longer than lips, throat, little inflated. Fruit an ovoid capsule.

Bartsia diffusa Benth.

Small herb, 10-20 cm tall; stems erect above, decumbent below. Leaves oblong to lance-ovate, bullate-crenate, obtuse apically, sessile at base. Flowers in a dense spike, glandular pubescent; calyx tubular-campanulate, lobes obtuse; corolla yellow, exserted. Fruit an ellipsoid capsule.

Calceolaria chelidonioides H.B.K.

Erect herb to 2 m tall; stem rather succulent. Leaves ovate in outline,

pinnatifid, petiolate, **with** 2-4(-5) pairs at lateral pinnae, **the** margin serrate or biserrate. Inflorescence terminal or axillary 2-flowered sepals broadly ovate, 5-6 mm long; corolla pale to bright yellow, unspotted, 2-2.5 mm long. Fruit a small conical capsule. Grows at edge, of water. Calceolaria engleriana Krazlin subsp. engleriana

Erect shrub or subshrub, 0.2-1.3(-2) m tall. Leaves lanceolate, acutp, cuneate t.o rounded at base, 0.5-5 cm long, green above, tomentose and grayish below. Inflorescence a panicle composed of numerous cymes; sepals 6-9 mm long; corolla bright yellow, 1.5-2 cm long. Fruit an ovoid capsule. Calceolaria myriophylla Krauzlin

Low shrub or subshrub, 0.1-0.8 m tall. Leaves decussate, opposite blades coriaceous, elliptic or ovate, subacute at apex, rounded to cuneate at base, 3-10 mm long, the margins entire or somewhat crenulate, somewhat strigose. Inflorescence raceme-like with 3-10 pairs of 1-2-flowered cymes. Flowers with sepals 3-4 mm long; corolla bright yellow, the throat with red spots inside, p.a. 15 :rjr. long. Fruit a conical capsule. Calceolaria scapiflora (Ruiz & Pavon) Benth.

Rosette herb 3-16 cm tall, sometimes becoming cushion plant. Leaves obovate to spatulate, obtuse, cuneate at base to por.ioie almost, as lone a blade, the margins entire, to crenulate or subserrate; more or less sparsely villous with white hairs above and below. Flower solitary, erect on a long peduncle; sepals ovoid 4-5 mm long; corolla bright yellow, with dark purple-brown spots inside. Fruit a broadly ovoid capsule. Calceolaria sparsiflora Kuntze

Erect much branched shrub, 0.2-0.8(-3) m tall. Leaves decussate; blades subcoriaceous, obovate to oblanceolate, obtuse to acute at apex, cuneate at

base, 0.5-1 X 0.2-0.3 mm; **the margins revolute, serrate; upper surface** grayish-green to deep green, subglabrous; lower surface densely pubescent and whitish. Inflorescence 2-4 pairs of 1(-4) flowered cymes; sepals ovate, 3-4 mm long; corolla light yellow, unspotted. Fruit a narrowly ovoid capsule.

Calceolaria tripartita Ruiz & Pavon

Erect, ascending or decumbent herb, 20-80 cm tall. Leaves dissected to the midrib or less, with 1-2(-3) pairs of lateral pinnae with serrate margins, petiolate. Inflorescence terminal or axillary, 2-flowered. Sepals ovate, acuminate, ca. 5-6 mm long; corolla bright to deep yellow, unspotted, ca. 1 cm long. Fruit a conic or sub-globose capsule, ca. 8 mm in diameter'. Grows at edge of water.

Calceolaria virgata Ruiz & Pavon

Erect or ascending subshrub, 0.1-1(-1.5) m tall; stems strigose or tomentose with whitish hairs. Leaves decussate, petiolate; blades ovate to subcircular, obtuse or acute, truncate to cuneate at base, 1-3.5 X 0.6-3 cm, the margins serrate; upper surface, short-hirsute; lower surface, pale grayish-green, strigose. Inflorescence a panicle with 4-6 pairs of 4-12 flowered cymes; flowers with sepals ovate to elliptic; corolla bright lemon yellow, 1-1.5 cm long. Fruit a small conical capsule.

Castilleja nubigena H.B.K.

Small perennial herb, 3-10 cm tall. Leaves lanceolate, sometimes entire, usually with 1-2 pairs of long narrow lateral lobes. Flowers in congested spicate raceme; sepals inflated, unequal, red or brownish-purple; corolla shaggy pubescent, yellowish. Fruit a broadly, ovoid capsule.

Mimulus glabratus H.B.K.

Small glabrous herb 5-10 cm tall. Leaves petiolate, ovate to rotund, rounded

apically, cuneate basally; irregularly dentate. Flowers solitary in leaf axils; calyx campanulate, shallowly 5-dentate; corolla c.a. 1 cm long, bilabiate, yellow, often red-brown spotted. Fruit, a small ovoid capsule, included in the calyx. Ourisia chamaedrifolia Benth.

Small prostrate perennial herb. Leaves petiolate, broadly ovate to rotund, acute to obtuse, more or less crenate, viscid pubescent above, black-punctate beneath. Flowers solitary in axils of leaves; calyx gibbous at the base, 5-lobed to below middle; corolla horizontally positioned, red to red-orange, ca. 1.5 cm long. Fruit a capsule. Veronica serpyllifolia L.

Small perennial herb. Leaves sessile; blades elliptic to ovate, rounded to obtuse, crenate to entire. Flowers in a terminal raceme; calyx with 4 ovate or oblong segments; corolla subulate, 4-5 mm across, the upper and lateral lobes pale blue with deep blue lines, the small lower lobe - *crop*-. Fruit a small capsule, ca. 3 mm long. Veronica persica Polret

Small annual, subprostrate herb. Leaves short petiolate; blade ovate to suborbicular, rounded apically, cordate basally, crenate-dentate. Flowers in a terminal raceme; calyx with 4 lanceolate segments; corolla subrotate; 8-12 mm across, the lower lobe whitish, the upper blue with violet lines. Fruits a capsule ca. 4 mm long.

SOLANACEAE Herbs, shrubs, small trees or vines. Leaves alternate (or apparently opposite through concrescence of adjacent nodes), simple or compound; without

stipules. Flowers bisexual, regular or slightly zygomorphic; calyx usually 5-lobed; corolla tubular, typically 5-lobed; stamens mounted on the. corolla tube, alternating with the corolla lobes, 5 (rarely 4 or 2), the anthers sometimes joined and often opening by a terminal pore; ovary superior, of 2 carpels, the placentation axile. Fruit a berry or a capsule.

Key to the species.

1. Fruit a dehiscent capsule; stems strongly viscid with glandular trichomes 2.

Corolla tubular-salverform, ca. 8 mm long, yellow-greenish; annual

herbs 0.3-1 m tall.....Nicotiana undulata

2'. Corolla funnelform, more than 3 cm long; usually pink or red;

subarborescent 2.5-3 m tall

3. Corolla with stamens far-exserted, ca. 1.5-2 cm

.....Nicotiana tomentosa

3'. Corolla with stamens barely subexserted, ca. 2-4 mm long. . . .

.....L- i cot L- jlla ^ab a cur.

L' . Krui', fleshy, indehiscent ; ste"'s glabrous to variantly pubescent 4.

Anthers dehiscent by an apical pore 5. Leaves simple, entire

6. Erect small trees more than 2 m tall

7. Leaves more or less ovate, ca. 5 cm wide, rugose above, with long

cobwebby hairs above when young, glabrescent

.....Solanum ca. ochrophyllum +

maturecalvens 7'.

Leaves elliptic-ovate, ca. 3.5 cm wide; persistently puberulous,

scabrous above . . .Solanum luteoalbum

6*. **Sprawling shrubs** to shrubs less than 2 m tall

8. Stems with leaves simple and interstitial leaflets

..... Solanum fili forme

8'. Stems only with simple leaves and without interstitial leaves

9. Leaves oblong-lanceolate; corolla lilac-purple; erect, spreading shrub

..... Solanum nitidum

9'. Leaves lanceolate to narrowjy ovate; corolla lavender or bluish; sprawling shrub. . . .

..... Solanum aloysaeifolium

5*. Leaves innate or ternate compound

10. Acaulescent-rosette herb, up to 8 cm tall; leaves odd-pinnate, leaflets 11

..... Solanum acaule

10' . Climbing, or sprawling vine-bush, tip to 2 m tall; leaves

3-foliolate Solanum caripense

4'. Anthers longitudinally dehiscent

li. Calyx clearly accrescent in fruit, growth even early apparent

II. inflorescence axillary, racp^o^e, 2-3 flowered; fruiting calyx reflexed, rotate and spreading beneath the berry 13.

Corolla campanulate

14. Stems villous; leaves ovate ca. 8 cm wide; inflorescence mostly 3-flowered

..... Hebecladus sp. 1

14'. Stem nearly glabrous; leaves ovate ca. 3.5 cm wide; inflorescence mostly 2-flowered

..... Hebecladus sp. 2

- 13*. Corolla rotate Jaltomata sp.
- 12'. Inflorescence mostly solitary flowers; fruiting calyx inflated, around berry Physa lis peruviana
- 11'. Calyx not at all or scarcely accrescent, even below mature fruit
 - 15. Scandent or ascendent herb; corolla tube well developed 16. Corolla tubular-hypocrateriform, yeJlow, ca. 3-5 cm long; anthers exserted.....
 - Salpichroa hirsuta
 - 16'. Corolla tubular, greenish, ca. JO mm long; anthers included..... Sal pi chroa micrantha
- 15'. Small trees to shrubs
 - 17. Small trees without spinescent branches; leaves more than 10 cm long: corolla narrowly tubular ca . ".5 cm long, greenish-white . . . Cest urn conglomeratum i/'.
 - Shrubs with spinescent. branches; leaves less r.han « cm long; 'oroi la tubular or rotate; deep purple or white 18. Corolla tubular, ca. 2 cm long, deep purple; leaves lanceolate-spatulate, ca. 4 cm long . . . Dunalia lycioides
 - 18'. Corolla rotate, ca. 1 cm in diameter, white; leaves obovate to oblong-elliptic ca. 2 cm long
 - • • • Lycianthes lycioides

Cestrum conglomeratum Ruiz & Pavon

Small tree 3-4 m tall, stem glabrous. Leaves elliptic-lanceolate, 8-12 X 2-2-3.5 cm, acuminate at apex, acute at the base, subcoriaceous. Flowers sessile, in glomerate axillary and ramiflorous multi-flowered clusters; calyx tubular-cupuliform, ca. 2 mm long; corolla greenish-white, narrowly tubular, ca. 1.5 cm long. Fruit succulent baccate.

Dunalia lycioides Miers

Shrub 2 m tall, with spinescent branches. Leaves mostly clustered on reduced short-shoots, lanceolate-spatulate 1-2 X 0.4-0.8 cm, rounded at apex, attenuate at the base, entire, rather fleshy. Flowers nodding, solitary or geminate axillary or from center of leaf cluster; calyx campanulate, 2-3 mm long; corolla deep blue purple, tubular, ca. 2 cm long, anthers included. Fruit a berry, ca. 1 cm in diameter, red.

Hebecladus sp. 1

Perennial herb to 1 m tall and stems villous. Leaves ovate, 8-10 X 4-7 cm, acute at apex, rounded at the base; margin undulate. Inflorescence axillary, reduced-racemose, 2-3 flowered; calyx campanulate; corolla yellowish-green, campanulately spreading. Fruit, a berry, spreading beneath the calyx.

Hebecladus sp. 2

Erect perennial herb 0.5-0.8 m tall, the stem glabrous or glabrate. Leaves ovate, 3.5-7 X 2-4 cm, acute at apex, cuneate at the base. Flowers mostly 2, rarely solitary, pedicels subequal; calyx spreading; corolla pale-yellow, purplish at base, campanulate-ventricose. Fruit a berry covered spreading by the expanded calyx.

Jaltomata sp.

Erect, perennial herb, 0.5-1.0 m tall; ligneous at the base. Leaves rhombic-ovate, 2.5-5.5 X 1.5-3 cm, acuminate at apex, cuneate at the base. Inflorescence axillary, mostly 2-flowered, pedicels subequal; calyx spreading; corolla lemon-yellow, rotate. Fruit a berry, subtended by spreading calyx.

Lycianthes lycioides (L.) Hassler

Shrub to 1.5 m tall; branchlets spine-tipped. Leaves obovate to oblong-elliptic, 0.8-2.5 X 0.3-1 cm. Inflorescences axillary, the flowers solitary or in fascicles of 2-5; calyx broadly campanulate; corolla rotate, violet-blue to whitish. Fruit drupiform, ca. 8 mm long.

Nicotiana tabacum L.

Small tree, 2-3 m tall, the stem viscid-pubescent. Leaves decurrent, ovate-elliptic or lanceolate, 15-30 X 5-15 cm, acuminate, cuneate to attenuate at the sessile base, puberulent on both surfaces. Inflorescence a panicle; flowers pink or reddish; calyx cylindrical-campanulate, ca. 1.5 cm long, strongly 5-dentate; corolla ca. 5 cm long, infundibuliform; anthers held near mouth of tube. Fruit a narrowly ellipsoid capsule, *Cri.* 1.8 cm long.

Nicotiana tomentosa Ruiz & Pavon

Small tree, 1-2 m tall, the stem viscid-pubescent. Leaves decurrent, ovate to elliptic-lanceolate, acuminate, the petiole winged, auriculate at base, 15-25 X 6-12 cm, puberulent above, viscid-tomentose beneath. Inflorescence a lax, more or less flat-topped panicle; flowers pink; calyx cupuliform-campanulate, ca. 1.5 cm long; corolla 3.5-4 cm long, infundibuliform; stamens long-exserted. Fruit a broadly ovoid-capsule, ca. 1.5 cm long.

Nicotiana undulata Ruiz & Pavon

Shrubby annual ca. 0.5 m tall, the stem viscid-pubescent. Basal leaves in

rosette, elliptic to lanceolate; **the** upper leaves ovate-elliptic to lanceolate, 1.5-6 X 1.8-3 cm, acute to obtuse, rounded at the base, pubescent on both surfaces, ribbed and commonly corrugated. Inflorescence a panicle with racemously extended branches. Flowers greenish-yellow; calyx cupulate, ca. 1 cm long; corolla tubular, ca. 1.5 cm long. Fruit a broadly oval capsule, ca. 5-10 mm long. Physalis peruviana L.

Herb to 1 m tall. Leaves broadly ovate, 4-8 X 3-6 cm, acuminate, cordate. Flowers solitary, axillary; corolla yellowish, dark blue-purple spotted at base, ca. 12 mm long; calyx soon accrescent, villous, teeth acuminate. Fruit a berry, totally covered by accrescent calyx; ca. 1.5 cm in diameter, the expanded calyx to 5 cm long. Salpichroa hirsuta (Meyer) Miers

Climbing shrub several meters long; stems pubescent. Leaves ovate, 1-3 X 0.8-1.5 cm, obtuse apex and base. Inflorescence few-flowered or reduced to single pendent flower; calyx glandular hirsute, 5-lobed near base; corolla yellowish, tubular-infunneliform, ca. 1.5 cm long, stamens and style short-exserted. Fruit a berry, ca. 1.5 cm long and thick. Salpichroa micrantha

Benoist

Scandent shrub to 2.5 m long; stems glabrous. Leaves ovate-triangular, 1.2-2.8 X 0.8-2 cm, obtuse, cordate at base, glabrous on both sides. Flowers solitary, axillary; calyx with sepals basally connate, ca. 2 mm long, the free part triangular-lanceolate; corolla tubular, greenish, ca. 1 cm long; anthers subsessile. Fruit a globose berry. Solanum acaule Bitter Small rosette herb to 10 cm tall; stem usually lacking, tubers few 1-2,

globose to ellipsoid. Leaves odd-pinnate, oblanceolate in outline; leaflets 7-11, sessile, broadly ovate-elliptic to suborbicular, obtuse at the **apex**, rounded at the base. Inflorescence reduced, racemose 3-6 flowers; calyx 3-6 mm long, the sepals triangular-ovate; corolla rotate, violet-blue; anthers ellipsoid, yellow. Fruit subglobose to ovoid, dark green. Solanum aloysaeifolium Dunal

Shrub, 0.5-1.8 m tall; stem pubescent with branched trichomes. Leaves alternate, short petiolate; blades ovate to lanceolate, acuminate at the apex, obtuse to attenuate at the base, entire. Inflorescences cymose-corymbose, ca. 4-8 flowered; calyx pubescent 2-3 mm long; corolla violet-blue, rotate; anthers linear and style pubescent. Fruits a globose berry. Solanum caripense Dunal

A viny herb or shrub; stems densely pilose. Leaves entire to 3-foliolate; leaflets ovate to ovate-elliptic, acute to acuminate at apex, rounded at base, densely hirsute. Inflorescence a reduced raceme, ca. 3-10 flowered; sepals lanceolate n- / ; long, pilose; corolla rotate, purple to lavender or bluish. Fruit globose to ovoid, green-purplish. Solanum filiforme Ruiz & Pavon

Shrub 0.5-0.8 m tall; stem much-branched, densely pilose. Leaves simple and entire, ovate to elliptic, rounded at apex, truncate or cordate at the base, strigose both surfaces, **pseudostipular** leaves. Inflorescence **pseudoterminal**, **few-9** flowered; **calyx with** obtuse lobes, pilose; corolla rotate, **lavender-purple**; anthers elliptic in outline. Fruit globose. Solanum luteoalbum K & P. **Shrub to 2 m tall, rather sparsely and finely villous with stellate and gland-tipped trichomes. Leaves ovate, acute, puberulent or hispidulous.**

Inflorescence a **few-flowered** lateral raceme; calyx deeply parted, ca. 3 mm long; corolla blue to whitish-yellow, anthers linear. Fruit, a berry, orange, glabrous, ca. 2 cm in diameter. Solanum nitidum Ruiz & Pavon

Shrub or subshrub, 1.5-1.8 m tall. Leaves oblong--lanceolate, acute or decurrent at base, acuminate at the apex, pulverulent to stellate-tomentose. Flowers in terminal racemes; calyx 5-lobed: corolla lilac-purple, deeply 5-parted; anthers linear. Fruit a berry, dark when mature, 8-10 mm in diameter.

Solanum sp. (S. ochrophyllum Van Heurck & M. Arg. f. S. maturecalvans Bitter?)

Shrub or small tree 2-3 m tall. Leaves elliptic to lanceolate, 6.5-14 X 3.5-5.5 cm, acute at both ends, rugose above, with white arachnoid-tomentose trichomes on apical leaves, conspicuously reticulate-veined and glabrous beneath, submembranaceous. Inflorescence a terminal $V^{\wedge}C^{\wedge}TP$, 3-6 flowered; ray cupulate, the broad obtuse lobes ca. 2-3 mm long, corolla white or bluish, the lobes parted *namely* to base. Fruit, a berry, ca. 10 mm in diameter. According to S. Knapp, the Yanacocha material is intermediate between these two species.

TROPAEOLACEAE Herbs or vines without tendrils. Leaves alternate, simple, without stipules. Flowers bisexual, zygomorphic and spurred; calyx bilabiate, of 5 distinct sepals, the dorsal one produced into a spur; corolla of 5 distinct petals, the upper 2 differing in shape from the lower 3; stamens 8 in 2 whorls; ovary superior, 3-locular with axile placentation. Fruit 3-seeded.

Key to the species. 1. Leaves irregularly 3-7 lobed, weakly peltate; corolla yellow, lobes

toothed.....Tropaeolum peregrinum

1*. Leaves 5-lobed, about one third of way to base, strongly peltate; corolla dark yellow to orange, lobes not toothed 'Tropaeolum tuberosum

Tropaeolum peregrinum L.

A climbing annual herb. Leaves peltate, 3-7 lobed, 3-7 X 3.5-8 cm, the lobes entire, acute or obtuse, glaucous, the petioles 4-11 cm long. Flowers in pseudoracemes, axillary; calyx lobes of different form, yellowish or greenish; petal lobes toothed, yellow with purple spots along the nerves, 15-20 mm long. Fruit a schizocarp, carpels 10-14 mm long, dark brown. Tropaeolum tuberosum

Ruiz & Pavon

A climbing annual herb, with obconic or pyriform tubers. Leaves suborbiculate-peltate, 4-5 X 5-6 cm, the lobes rotundate, obtuse to truncate at apex, glaucous, the petioles ex. 10 cm long. flowers solitary, axillary, pedicels 10-15 cm; calyx reddish, lobes lanceolate; straight or curved 18-20 mm; petals dark-yellow or orange, with darker reddish veins, 6-9 mm long. fruits a schizocarp, carpels 4-5 mm long, dark brown.

URTICACEAE Monoecious or dioecious herbs, shrubs, or small trees, sometimes scandent, armed with stinging hairs in some genera, sap usually watery. Leaves-alternate or opposite, simple, with stipules. Flowers unisexual, regular, minute, usually greenish; perianth of 2-5 parts undifferentiated into sepals and petals; staminate flowers with 2-5 stamens, opposite perianth parts; filaments distinct; ovary superior, 1-loculed. Fruit an achene.

Urtica urens L.

Upright urticating herb to 15-30 cm tall. Leaves opposite, ovate, 2.5-7.5 X 1-5 cm, acute to obtuse at apex, rounded or cuneate at the base, the margin incised-dentate. Inflorescences monoecious, the flowers minute and greenish, the staminate in spikes 1-1.2 cm long; the pistillate in glomerulate panicles. Fruit a flattened-ovoid achene, 1.5 mm Long.

VALERIANACKAE Herbs, rarely shrubs or lianas, dried specimens usually malodorous. Leaves opposite, sometimes rosulate, often much divided, exstipulate. Inflorescence mostly a thyrse, sometimes a head. Flowers usually zygomorphic, bisexual; sepals 5, connate; petals 5, connate, the lobes imbricate; stamens 4-1, inserted on the corolla; ovary inferior, 3-carpellate, 3-1 locular, placentation axile-subapical. Fruit an achene or nutlet.

Key to the species.

i. simple rosette herbs or low or sprawling herbs or subshrubs; Leaves more than 3 mm wide 2. Leaves simple; plant a more or less caespitose rosette herb

3. Basal leaves linear to lanceolate-spatulate; inflorescence congested, spicate, sessile..... Valeriana coarctata

3'. Basal leaves suborbicular or obovate, with long petiole; inflorescence pedunculate, often branched Valeriana parvula

2'. Leaves pinnately compound; plant usually an open herb or subshrub, sometimes scandent

Plant **a diffuse herb, sometimes scandent; leaflets mostly more than 1 cm long**. Leaflets in 4-10 pairs, I-L.5 cm long; bractlets obtuse

..... Valeriana jasminioides

5'. Leaflets in 2-3 pairs, the terminal one more than 2.5 cm long; bractlets acute..... Valeriana decussata

4'. Plant more or less caespitose; leaflets less than 1 cm long..... Valeriana micropterina

1'. Cushion plant, subacaulescent, with dense branching; leaves linear, ca. 1-2 mm wide..... Valeriana spathulata

Valeriana coarctata Ruiz & Pa von

Erect caespitose herb, 4-6 cm tall with thick tap root. Leaves basally clustered; linear to lanceolate-spatulate, subacute, ciliolate, glabrous or sparingly pilosulous, subrevolute, fleshy. Inflorescence congested-spicate, the heads of small flowers sessile. Fruit. (fide Killip, 1936) lanceolate-oblong, glabrous. Valeriana decussata Ruiz *fit* Pa von

Plant, scandent *or* sprawling, suffrutescent at the base. Leaves opposite or fascicled at the nodes, imparipinnate, the leaflets 5 or 7, more or less lanceolate, acute, scaberulous above, sparingly to densely tomentose beneath. Inflorescence a diffuse panicle of small white flowers. Fruit (**fide Killip, 1936**) ovate, pubescent. Valeriana jasminioides Briguet

A scandent or sprawling herb, 50-80 **cm tall**; stem glabrescent. Leaves densely fascicled at the nodes, imparipinnate, the leaflets 4-10 pairs, elliptic, or

narrowly lanceolate, acuminate, sessile, entire or serrulate.

Inflorescence paniculate, trichotomous and dichotomous, the flowers in loose clusters. Fruit ovate, sparingly pilosulous. **Valeriana micropterina** Weddell
Erect caespitose herb, 15-30 cm tall, the root thick. Basal leaves numerous, linear-lanceolate in outline, blades ir/rip a rip innate, the leaflets L2-15 pairs, opposite to suba 1 ternate, ovate or lanceolate, obtuse or subacute, sessile. Flowers in dense heads forming an interrupted spike. Fruit, ovate, 3-nerved.

Valeriana aff. parvula Killip

Erect caespitose herb, 3-15 cm tall, Leaves orbicular or ovate-orbicular rounded at the apex, abruptly narrowed to a long winged petiole.

"Inflorescence a dense terminal cyme of small white flowers. Fruit (fide **Killip**, 1936) lanceolate-ovate, 1 nerved, glabrous.

Valeriana spathulata Ruiz & Pavon

Cushion plant., subcaulescent, caespitose, 5 cm tall. Leaves linear or spatulate 3-4 cm long, ca. 2 mm wide, obtuse, sparingly pilose. Inflorescence sessile, not strongly congested; flowers small, whitish. Fruit unknown.

VKKBEMACRAE Herbs, shrubs, vines or trees; stems or twigs often tetragonal. Leaves usually **opposite** or whorled, mostly simple, sometimes **palmately compound, without** stipules. **Flower** typically **bisexual**, zygomorphic or rarely regular; calyx usually 5-lobed; corolla usually 4- to 5-lobed, the lobes unequal; stamens 4 or 2, rarely 5; ovary superior, 2-carpellate, mostly 4-lobed, becoming 4- to 10 lobed through false partition, the placentation axile. Fruit a drupe, nutlet or capsule.

Key to the species.

- 1. Herbs or small shrubs less than 2 m tall
 - 2. Fruits splitting into 4 nutlets; herbs . . -Verbena lihora l.i s
 - 2'. Fruits splitting, into 2 nutlets; shrubs
 - 3. Inflorescence subcapitate, few flowered; .leaves cuneate.
 - Aloysia fiebrigii
 - 3'. Cnfloresrence spicate, clearly longer than thick at anthesis, becoming lax, many-flowered 4. Leaves ternate, broadly elliptic .
 - . Aloysia scorodoni oides
 - 4'. Leaves 3-4 verticillate, lanceolate
 - Aloysia triphylla
- 1'. Trees or large shrubs more than 2 m tall 5.
 - Flowers in racemes, often few-flowered 6.
 - Fruit half way enclosed by the calyx
 - 7. Spines present; inflorescence an axillary raceme
 - Citharexylum herrerae
 - 7'. Spines absent; inflorescences terminal (sometimes on short racemes that appear axillary)
 - 3. Leaves rigidly heavy-coriaceous
 - Citharexylum dentatum
 - 8' . Leaves coriaceous Citharexylum pachyphyllum
 - 6'. Fruit included in the calyx
 - 9. Calyx ca. 4-5 mm long; corolla tube exserted ca. 10 mm
 - Duranta armata
 - 9'. Calyx ca. 6-8 mm long; corolla tube exserted ca. 8 mm
 - Duranta mandonii
- 5'. Flowers in axillary capitate-cymes, many-flowered
 - Aegiphila mortonii

Aeftiphila mertonii Moldenke

Shrub 3-4 m tall. Leaves oblong or elliptic, 6-12 X 2-3.8, obtuse at apex, acute at the base, appressed pubescent above, white-tomentose beneath.

Inflorescence an axillary dense .capitate cyme; flowers golden-yellow, calyx 5-ribbed, corolla 5-8 mm long. Fruit a globose drupe, ca. 8 mm in diameter.

Aloysia fiebrigii (Hayek) Moldenke

Shrub or small tree to 3.5 ~ tall; branches 4-angled. Leaves lanceolate, acute, scabrous, setulose above, glandular-punctate beneath. Flowers in few flowered, lax heads; calyx densely puberulent; corolla with petals white-pinkish, subbilabiate. Aloysia scorodonioides H.B.K.

Shrub or small tree to 3 m tall; branches elongate. Leaves ternate, elliptic, evenly crenate; upper surface rugose-pubescent, scabrous; lower surface white-tomentose. Flowers in dense spikes, axillary; calyx pilose-hirsute, with subulate teeth; corolla pale rose. Aloysia triphylla (L'Her) O. Kuntze

Shrub or small tree, 2.5-3 m tall. Leaves 3-4 verticillate, lanceolate, entire or slightly serrate, acute, glandular, punctate beneath. Flowers in spikes slender or terminal panicle; calyx tubular; corolla white or bluish.

Citharexylum dentatum (Tafalla) D. Don

Tree, 5-6 m tall; stem unarmed; branchlets quadrate. Leaves with thick petiole, obovate-oblong to elliptic, rounded to acute at apex, attenuate at base, margin entire or spinose dentate, coriaceous. Flowers in few-flowered racemes; calyx setaceous or linear; corolla whitish-cream, glabrous except the villous throat. Fruits drupes, subglobose, lustrous, black with fresh.

Citharexylum herrerae Mansfeld

Tree, 6-7 m tall; branchlets quadrate, spiny, green. Leaves oblong-elliptic to lanceolate, decurrent, long petiolate, rounded to acute at apex, margin entire or serrate below the middle, chartaceous, glabrous above, punctate beneath. Flowers in axillary racemes; calyx 5-dentate; corolla whitish-cream. Fruit an oblong-globose drupe, lustrous, red when fresh.

Citharexylum pachyphyllum Moldenke

Shrub or small tree 2-3 m tall; branchlets tetragonal. Leaves oblong or elliptic, 1.3-2 X 0.6-1 cm, rounded but mucronate at tip, subacute at the base, glabrous, lustrous on both surfaces, punctate beneath. Inflorescence a raceme. Flowers subsessile; corolla yellow; cupulate ca 5 mm long. Fruit a drupe.

Duranta armata Moldenke

Shrub or tree, 3-5 m tall, stem with notably spine-tipped branches and branchlets. Leaves membranous, oblanceolate or elliptic, acute to obtuse, margin entire or 2-4 dentate, lustrous above, punctate beneath. Flowers in terminal racemes; calyx campanulate, 4-5 mm long; corolla tube cylindrical; petals violet-purple to white. Fruit a drupe, tetragonal, red.

Duranta mandonii Moldenke

Shrub or small tree, 3-4 m tall; stem armed with small spines. Leaves ternate or opposite, mostly obovate, cuneate basally, rounded apically; margin entire, revolute, glabrous above, punctate beneath. Flowers in terminal racemes; calyx ribbed, more than 9 mm long, slightly puberulent; corolla tube cylindrical; petals light purple to whitish. Fruit a drupe, tetragonal, yellow.

Verbena litoralis H.B.K.

Herb 50 cm tall. Leaves oblanceolate, serrate, acute to acuminate at the apex

and the base. Flowers in terminal panicle composed of numerous spikes; calyx subtruncate, with minute teeth; corolla blue. Fruit oblong, **dry with 4-nutlets.**

VIOLACEAE Shrubs and herbs, sometimes small trees or scandent. Leaves alternate, rarely opposite, simple, entire or toothed, rarely lobed. stipulate. Inflorescence an axillary raceme, spike or panicle or the flowers solitary. Flowers zygomorphic, usually bisexual; sepals 5, free *or* slightly connate; petals 5, free, rarely shortly connate, one often gibbous or spurred; stamens 5, mostly hypogynous; ovary superior, 3(2-5) carpel late, 1-locular, placentation parietal. Fruit a loculicidal capsule.

Viola pismaea Juss. **ex** Foir.

Small perennial herb, 5-12 cm. tall. Leaves in basal rosette, linear, acutish or subobtusate 2-1/2 cm long, 2-3 mm wide. Flowers solitary; corolla bluish, the petals 1-1.5 cm long, striate-veined, the lower petal inferior, carinate with a spur. Fruit a capsule.

ZYGOPHYLLACEAE Shrubs, trees, or herbs

(ours). Leaves usually pinnately compound and opposite. Inflorescence axillary, the flowers solitary or in cymes, the sepals and petals 4-5, usually twice (to 3 times) as many as the petals; ovary superior, 4-5 celled. Fruit various; usually a 5-parted capsule.

Kallstroemia parviflora Norton

Low sprawling herb, 20-30 cm tall. Leaves even pinnate, mostly 6-foliolate; leaflets elliptic to oblong or oval, grayish sericeous, mostly ca. 0.5-2 cm. Flowers pentamerous; sepals lanceolate, with white trichomes; corolla orangish; petals obovate. Fruit ovoid, strigose, beaked, with mericarps abaxially rugose to tubercled.

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APPENDIX 1

LIST OF EXSICCATAE EXAMINED

Those collections without additional indication were collected by A. Tupayachi except that numbers 759-873 and 1142-1222 were collected jointly by A. Tupayachi and W. Galiano. Numbers preceded by * were collected by Percy Nunez, and those preceded by CVC were collected by C. Vargas C.

NON VASCULAR PLANTS

LICHENS

Cladonia andesita Vainio, 823
 Cladonia sp. aff. andesita Vainio, 640
 Cladonia confusa (R. Sant.) Follm. & Ahti, 950, 1167, 1167a
 Cladonia furcata (Hudson) Schrader, 959
 Dictyonema glabratum (Sprengl.) Hawks. 642, 960
 Everniastrum lipidiferum (Hale & M. Wirth) Hale ex Sipman, 944
 Everniopsis trulla (Ach.) Nyl. 633, 637, 815, 956
 Flavopunctella flaventior (Stirton) Hale, 822
 Hypotrachyna ensifolia (Kurokawa) Hale, 641, 824, 952
 Hypotrachyna gigas (Kurokawa) Hale, 817
 Hypotrachyna reducens (Nyl.) Hale, 638
 Leptogium digitatum (Massalongo) Zahlbr., 934
 Parmotrema sp. 953, 954a
 Peltigera sp. (undescribed) 643.
 Peltigera canina (L.) Willd. 825
 Stereocaulon meyeri Stein, 954c

Stereocaulon myriocarpum Th. Fr. 639, 954b
Stereocaulon ramulosum (Sw.) Rausch, 833
Sticta weigeli (Ach.) Vainio, 644, 939
Usnea spp. 633, 636, 827, 960, 962, 962a

MUSCI

BARTRAMIACEAE

Breutelia nigrescens Herz. 669

BRYACEAE

Acidodontium longifolium (Par.) Broth. 816

GRIMMIACEAE

Racomitrium crispilum (Tayl.) Jaeg. 670

HEDWIGIACEAE

Braunia canescens Schimp ex Britt. 667-818

Lepyrodon tomentosus (Hook.) Mitt. 819, 829.

NECKERACEAE

Neckera eucarpa Schimp. 666- 826

POLYTHRICHACEA

Chorisodontum mitteni (C. Mull.) Broth. 830

Polytrichadelphus magellanicus (Hedw) Mitt. 831

POTTIACEAE

Leptodontium erythroneuron Herz. 671

Leptodontium tricolor (Williams) Zander, 666A

Leptodontium veticulosoides (P. Beauv.) Wijk. & Marg. var.
panamense (Lor.) Zander, 831

Leptodontium wallisii (C. Mull.) Kindb.

THUIDIACEAE

Thuidium peruvianum Mitt. 832

VASCULAR PLANTS

PTERIDOPHYTES

ADIANTACEAE

Adiantum poiretii Wikstr. CVC23307

Argyroschisma nivea (Poiret) Windham, 1055

Cheilanthes marginata Kunth, 958

Cheilanthes pruinata Kaulf. 814B, 892

Pellaea ovata (Desv.) Weath. 890

ASPLENIACEAE

Asplenium fragile C. Presl, vel sp. aff. *9263

Asplenium monanthes L. 152, 153, 1162, *9268

Asplenium sessilifolium Desv. *9267

Asplenium triphyllum C.Presl, 814C

Elaphoglossum sp (1)

Elaphoglossum sp (2)

Woodsia montevidensis (Sprengel) Hieron *7064

DRYOPTERIDACEAE

Polystichum sp. 812

Polystichum montevidense (Sprengel) Rosenstock var. *montevidense*
*9270, 152 *Polystichum montevidense* (Sprengel) Rosenstock
var. *nudicaule*
(Rosenst.) R. Tryon, *9236 *Polystichum*
pygnolepis (Klotzsch.) Moore, 622

GRAMMITIDACEAE

Grammitis sp. 902

Grammitis peruviana (Desv.) C. Morton 814A

LYCOPODIACEAE

Huperzia sp 972

Huperzia saururus (Lam.) Trev. St. Leon, 82 0

Lycopodium sp. *7 08 0

POLYPODIACEAE

Campyloneurum amphostemon (Kuntze ex Klotzsch) Fee. 151, 813,
903, 7035* *Campyloneurum ensifolium* (Willd.) J.

Smith. *Microgramma chrysolepis* (Hooker) Crabbe,
758, 6988* *Niphidium* sp. *7109

Pecluma curvans (Mett.) M.G. Price 79 *Polypodium*
buchtienii Christ. & Rosenst. 131, 631 *Polypodium*
bryopodium Maxon, 821 *Polypodium murorum* Hooker,
6991

GYMNOSPERMS

Ephedra americana H. & B. ex W. 155

ANGIOSPERMS

MONOCOTS

AGAVACEAE

Furcraea andina Trel. 7 62

AMARYLLIDACEAE

Bomarea caldasii (Kunth) Asch. ex Graebner, 1187

Bomarea aff cernus Griseb ex Baker, 1160

Bomarea aff edulis (Tusac) Herbet Fortass sp. nov

Bomarea dulcis (Hook.) Beauverd, 1190

Bomarea ovata (Cav.) Mirbel, 72 5, 7 020*

Bomarea aff. petraea Kranzlin, 730

Bomarea puberula (Herbert) Kra. 7070*

Bomarea sanguinea Kranzlin, 1010

AMARYLLIDACEAE

Eustephia coccinea Cav. 156

Zephyranthes parvula Killip,

ANTHERICACEAE

Echeandia eccremorrhizum 900, 1007

ARACEAE

Gorgonidium vargasii Bogner & Nicolson, 858A

Spathantheum orbignyanum Schott, 858B

BROMELIACEAE

Puya densiflora Harms, CVC590

Puya ferruginea R. et P. 931

Puya herrerae L.B. Smith, CVC22544

Puya longistyla Mez. 1198

Tillandsia capillaris R.etP. f. *virescens* (R.et P.) L.B. Smith

1200 *Tillandsia cerrateana* L.B. Smith,

757 *Tillandsia gayi* Baker 1014

Tillandsia nana Baker, 1150 *Tillandsia*

usneoides Linnaeus *Tillandsia walteri*

Mez. 756

COMMELINACEAE

Callisia repens L. 996

.*Commelina*

fasciculata Ruiz & Pavon 923

Commelina longicaulis Jacq. 1087

CYPERACEAE

Carex boliviensis Van Huerck & Muell Arg. 1097

Cyperus aggregatus (Willd.) Endl. 924

Cyperus seslerioides H.B.K. 1069

Scirpus inundatus Poir, 621

Scirpus rigidus Boeck. 656, 835

DIOSCOREACEAE

Dioscorea incayensis Knuth. 1029

HYPOXIDACEAE

Hypoxis humilis H.B.K. CVC7656

IRIDACEAE

Cardenanthus sp. 867

Cypella peruviana ssp. *communis* Rav

Cypella peruviana ssp. *herrerae* (R.S. Foster) Rav.

Sisyrinchium junceum E. Meyen, 980A

Sisyrinchium aff *palmifolium* Linnaeus 933, 979, 980, 1078

Sisyrinchium aff *palustre* Diels 936

Sisyrinchium aff *porphyreum* Kranzl. 904

Sisyrinchium praealtum Kranzl, 649, 860

Sisyrinchium pusillum Kunth 780

Sisyrinchium scirpoideum Poeppig, 9 66

JUNCACEAE

Juncus bufonius L. 803

Juncus ebracteatus E. Meyen, 768

Luzula racemosa Desv. 161, 658, 1129, 1168.

LILIACEAE

Nothoscordum andicolum Kuth. 1027

Fortunatia sessiliflora (R. E. Fries) Rav. 901

ORCHIDACEAE

Aa weberbaueri Schltr. 974 *Altensteinia*

fimbriata H.B.K. 1009 *Beadlea peruviana*

(Presl.) Garay, *9226 *Epidendrum excisum*

Lindl. 793

Malaxis fastigiata (Reinch.f.) O.Ktze 1107
Malaxis tarmensis (Kranzl.) C, Schweinf. var *elata* C. Schweinf.
*7005
Myoxanthus serripetalus (Kranzl.) Luer 1216
Oncidium aureum Lind. 755
Pelexia weberbaueri (Kranzl.) Scltr. *7130
Stelis concaviflora C. Schweif. 951

POACEAE

Aciachne pulvinata Bentham, 627
Aegopon cenchroides H. & B. ex Willd. 1217
Agrostis aff boliviana Mez. 1184
Agrostis toluensis Kunt , 656
Aristida adscencionis Linnaeus, 998
Bouteloua simplex Lag. CVC9297
Bromus catharticus Vahl.
Bromus lanatus Kunth, 1063
Calamagrostis glacialis (Wedd.) Pilger, 1124, 1182, 1125
Calamagrostis ovata (Presl.) Stendel, 733, 1163
Calamagrostis recta (H.B.K.) Trin. 652, 1126
Calamagrostis vicunarum (Wedd.) Pilger, 1123, 1183
Chloris halophylla L. Parodi, 998B
Cortaderia nitida (H.B.K.) Pilger, CVC19727
Disanthelium mathewsii Ball, 1218
Disanthelium minimum Pilger, 696
Eragrostis nigricans (H.B.K.) Stend.

Festuca casapaltensis J. Ball, 1116 *Hordeum muticum* Presl. 727
Koeleria cristata (L.) Pers. CVC629 *Melica scabra* H.B.K. CVC607
Muhlenbergia peruviana (P.Beauv.) Stendel 661, 1143
Nassella pubiflora (Trin. & Rupr.) Desv. 1047
Paspalum depauperatum J. S. Presl. 99 0 *Paspalum*
prostratum Schribner & Merr. 909 *Pennisetum*
clandestinum Hochst, ex Chiov. *Poa annua* L. *7063
Poa horridula Pilger, 863, 1062, *7053 *Polypogon*
lutosus Hitch. CVC16337 *Sporobolus poiretii*
Hitch. CVC22219 *Stipa ichu* (Ruiz & Pavon) Kunth
1060 *Stipa obtusa* (Nees & Meyen) A. Hitchc. 694,
695 *Trisetum spicatum* (L.) Richt. 654

DICOTS

ACANTHACEAE

Stenandrium dulce (Cav.) Ness.

AMARANTHACEAE *Amaranthus hybridus* L.

806 *Gomphrena elegans* Mart. 95

Guilleminea densa (Willd.) Moq. 711

Iresine diffusa H. & B. ex Willd. 99

ANACARDIACEAE

Schinus microphyllus I.M. Johnston, 674

Schinus molle L. 171, 738 Schinus

pearcei Engl. 750

APIACEAE

Azorella biloba (Schlecht) Wedd. 646, 865

Bowlesia sodiroana H. Wolff 983

Daucus montanus H. & B. 705

Eremocharis triradiata (Wolff.) Johnst. 713

Oreomyrrhis andicola (Kunth) Hook f. 723, 759

ARALIACEAE

Oreopanax ischnolobus Harms. CVC14985

ASCLEPIADACEAE Cynanchum sp. 94 5

Cynanchum sp. 103A, 1034 Cynanchum

tarmense Schltr. 91, 761 Melinia

peruviana Schltr. 103B

ASTERACEAE

Achyrocline alata (H.B.K.) DC. 1040, 1184

Achyrocline ramosissima (Sch.Bip) Britt. 1081

Ageratina pentlandiana (DC.) K. & R. 142, 706

Ageratina sternbergiana (DC.) K. & R. 917

Ambrosia arborescens Mill. 1061

Aristeguietia discolor (DC.) K. & R. 703, *9277

Baccharia alpina H.B.K. 961
Baccharis boliviensis (Wedd.) Cab. 30, 124, 676, 783
Baccharis buxifolia (Lam.) Pers. 607 *Baccharis chilco*
H.B.K. CVC14984 *Baccharis odorata* H.B.K. CVC14990
Baccharis peruviana Cuatr. 834, 1033, *9228 *Baccharis*
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Cosmos peucedanifolius var *tiraquensis* (Kunth) Scherff, 1011
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Cronquistianthus volkensis (Hieron) K. & R. 682, 789, 1084
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bidentis (L.) O.Kunthze, 1022 *Flourensia polycephala* Dillon,
105, 1036 *Galinsoga quadriradiata* R. et P. 805 *Gamochaeta*
americana (Mill.) Cabr. 908 *Gamochaeta purpurea* (L.) Cab.
978 *Gamochaeta spicatum* (Lam.) Cab.

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Gynoxys aff. nitida Musch. 612
Gynoxys longifolia Wedd. 985
Gynoxys pillahuatensis Cuatrecasas, 611, 613, *9241
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Brassica nigra L.

Capsella bursapastoris (L.) Moench.

Descurainia perkinsiana Muschl. 1065

Halimolobus sp. *7016, 976A

Lepidium bipinnatifidum Desv.

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Roripa nasturtium-aquaticum (L) Hayek, 979

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Echinopsis cuzcoensis (Britton & J. Rose) Friedrich & G.D. Rowley

Lovibia maximiliana var. *corbula* (Herrera) Rausch

Opuntia exaltata A. Berg

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Epilobium denticulatum R.et P.

Fuchsia apetala R.et.P. 745

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Calandrinia acaulis H. B. K. 689

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*7112 *Polylepis besserii* Hieronymus, 896, 137A, 1044, 1092, 1130,
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