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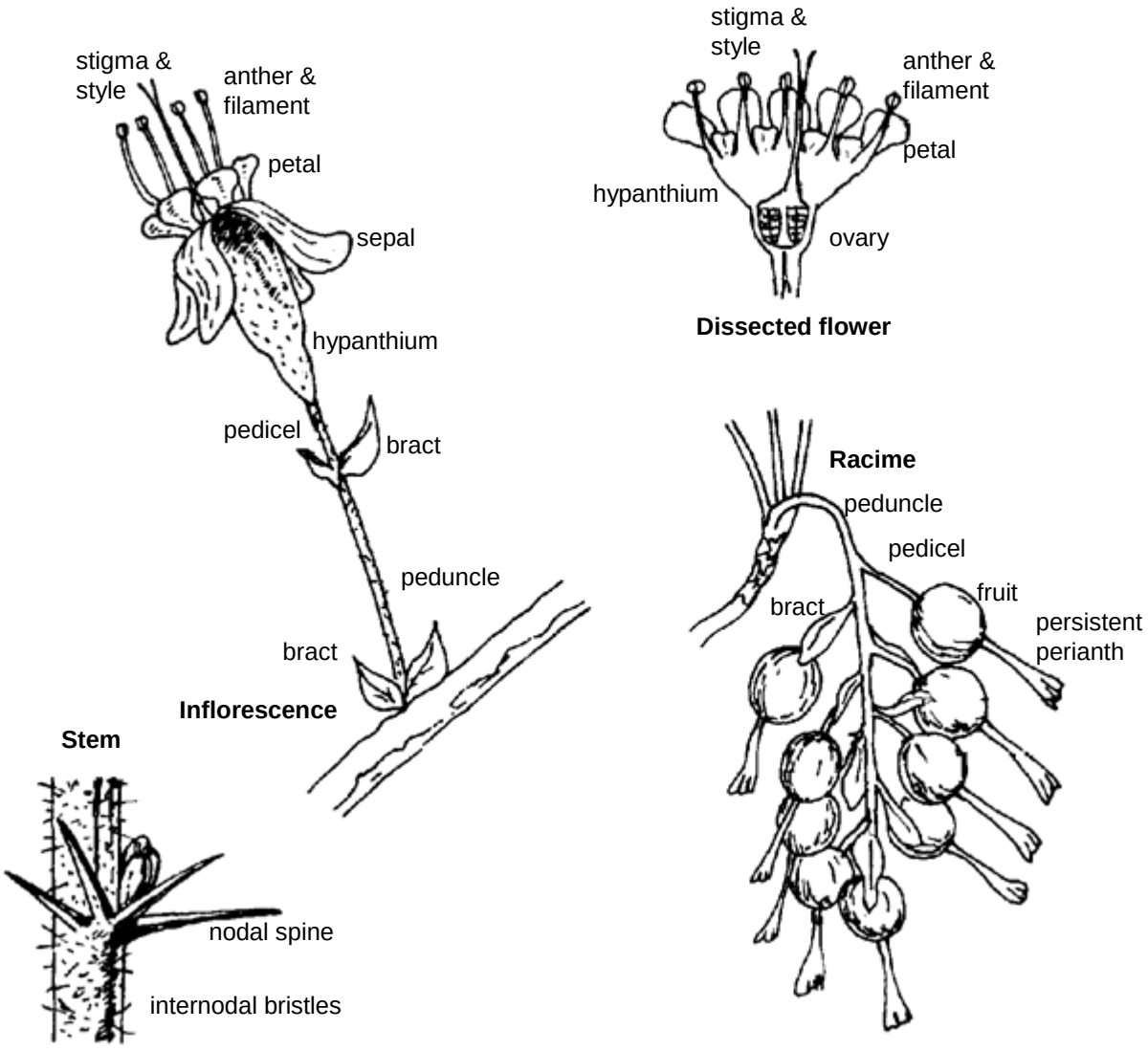

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Abstract. This document is a guide to the *Ribes* of Colorado and New Mexico and the rust fungi which infect them. Information is presented for 15 species of *Ribes* with diagnostic, vegetative features and notes on their geographic and ecological distribution. The guide is intended as a field aid in evaluating sites for blister rust hazard to white pine from associated ribes. Leaf rusts found on ribes are also described as a means for distinguishing them from white pine blister rust. The significance of each species to forest management is discussed.

Keywords: currant, gooseberry, *Cronartium ribicola*, *Cronartium occidentale*, *Coleosporium ribicola*, plant and rust identification

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Contents

Introduction

The family Grossulariaceae represented in our area by the genus *Ribes* is treated in the floras of Colorado, New Mexico, and adjacent regions. Holmgren (1997) in the Intermountain Flora provides an excellent, technical description of *Ribes* in the region west and north of our area (including many species not occurring here). Other regional floras are by Harrington (1954), Martin and Hutchins (1980), and Weber (1987, 1990). Plant identification books are by Carter (1988, 1997), Ivey (2003), and Vines (1960). Because of changes in taxonomy, reliance on floral characteristics, and incomplete information for species or regions, none of these references alone is sufficient for field crews conducting forest health surveys.

A serious disease of white pines is white pine blister rust (WPBR) caused by the fungus *Cronartium ribicola* Fisch. The life cycle of this rust fungus requires alternation between white pines (aecial hosts) and currants and gooseberries (telia hosts) in the genus *Ribes*. Several other rust fungi also infect ribes (our common name for currants and gooseberries). Because the importance of a ribes for blister rust spread and intensification varies by species and region, it is useful that survey crews properly identify ribes and the rust fungi infecting them.

This guide describes, with illustrations, the *Ribes* species and associated rusts occurring in Colorado and New Mexico based on published literature and reports, examination of herbarium collections, and field observations. Our taxonomy follows the checklists by Hartman and Nelson (2001) and the PLANTS Database (USDA, NRCS 2001) with several additions, exceptions, and reservations discussed under the various taxa. The PLANTS Database[1] approved common names and symbols (unique alphanumeric code for data entry) are provided. We indicate those characters that distinguish among *Ribes* species of the region with an emphasis on commonly seen field traits in our region. Although ribes are not especially difficult to identify to species, vegetative characters are variable and reproductive structures may be absent. Identification should be based on a knowledge of the species likely to be encountered (as provided here) and familiarity with the local populations developed from field study over the season to observe flowers, fruits, vegetative characters, and usual habitat associations.

Information on ribes distribution and abundance by species is essential (along with an understanding of microclimate) for assessing blister rust impacts and evaluating management options. For example, in the Sacramento Mountains of New Mexico, *Ribes pinetorum*, *R. cereum*, and *R. mescalerium* are widespread and common species; *R. inerme* occurs at a few locations. Although all these species are found in proximity to white pines, only *Ribes pinetorum* appears to be important in the spread and intensification of blister rust (Van Arsdel and others 1998). At Gallinas Peak, an isolated range north of the Sacramento Mountains, however, *R. inerme* is the only species present; and there it is responsible for sustaining a blister rust outbreak. Other species such as *Ribes montigenum* and *R. lacustre* may likewise be of minor important at some locations but are the major substrate for inoculum at other locations. Besides the invasive *Cronartium ribicola*, which infects white pines, ribes are infected by several native rusts that infect pinyon pines or other wildland plants. Therefore, recognizing ribes and rusts by species and understanding their epidemiological importance is useful for assessing blister rust hazard to a white pine population and developing effective and efficient forest health management plans.

[1] The PLANTS Database has additional general information on each species including distribution, federal status, and links to photographs and other useful databases.

Generic Description
Ribes L.
current (RIBES)

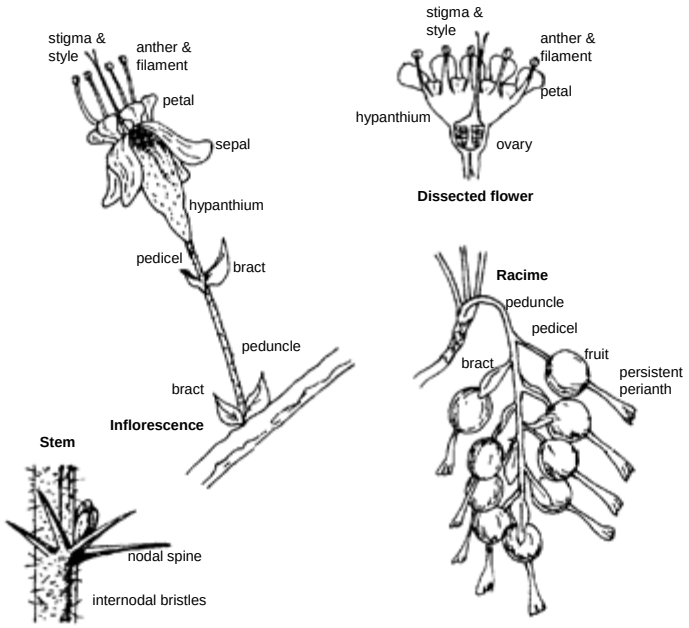

Figure 1. Morphological features of ribes (terms described in glossary). The perianth consists of a calyx (sepals) and corolla (petals) with inserted stamens (anther and filament) united into a hypanthium (or calyx tube) above the inferior ovary to which is attached the stigma and style (pistil). A single flower is joined to the stem by a pedicel (immediately inferior) and a peduncle, each may be subtended by leaf-like bracts. Multiple flowers are joined to common rachis (central stem) to form a raceme.

Stem: shrub to 3 m in height; erect or trailing; unarmed or armed with nodal spines and/or internodal bristles; twigs round, rarely ridged and angular; bark variously colored, some with glands; some with a distinctive, strong odor when broken or crushed.

Leaf: deciduous; petiolate; alternate or appearing fascicled; blade rotund to broadly angular; palmately veined and (3)5(7)-lobed; margin dentate or crenate, ciliate or not; base cordate, truncate, wedge-shaped, reniform; surface glabrous, pubescent, or glandular.

Inflorescence: terminating as short lateral branches; racemes axillary or solitary, pendant or erect; pedicel jointed below the ovary and disarticulating or not jointed, often with bracts.

Flower: about 1 cm long, 5-parted, perfect, regular, with an inferior ovary and showy calyx; calyx tube saucer-, bell-, funnel-, or cylinder-shaped; sepals erect, spreading, or sharply reflexed, often colored; petals usually shorter than sepals; stamens alternate with petals; both petals and stamens inserted in calyx tube forming the hypanthium; ovary inferior, 2-carpellate, 1-locular, with 2 parietal placenta; styles 2, more or less united.

Fruit: a berry; globose or subglobose; fleshy or pulpy but edible; mostly smooth, but often glandular and/or spiny, usually crowned with persistent flower parts; with numerous seeds.

Habitat: native and cultivated; mostly temperate and cold regions.

Notes: name from Danish *ribs* for red currant or from Arabic *ribas* for the plant; often among the first shrubs to leaf and flower in the spring; fruits often ripe by mid-summer. The family Grossulariaceae to which *Ribes* belongs was formerly submerged under Saxifragaceae. The phylogeny of *Ribes* has been recently examined by Messinger and others (1999), but recent monographic treatment is only available for the North American section *Grossularia* (Sinnott 1985).

In the vernacular, species of the genus *Ribes* are referred to collectively as "ribes" and our representatives are members of three major groups: gooseberries (subgenus *Grossularia*), the spiny currants (subgenus *Grossularioides*), and currants (subgenus *Ribes*, with several sections).

The gooseberries have the base of the flower firmly attached to the pedicel, usually a tapered hypanthium, and spines. Gooseberry flowers are solitary or in racemes of two or three flowers; and fruits are glabrous, spiny, or spiny and glandular. There are three native, common gooseberries in our region:

1. *Ribes pinetorum*
2. *Ribes inerme*
3. *Ribes leptanthum.*

The spiny currants and currants have jointed and disarticulating pedicels, several flowers per raceme, and glandular or glabrous berries. We recognize 12 native or commonly cultivated currants occurring in Colorado and New Mexico. These include two spiny currants (also known as gooseberry currants) with both nodal spines and internodal bristles:

4. *Ribes montigenum*
5. *Ribes lacustre*.

There are three "stinky" currants with abundant glands and small- or medium-sized leaves:

6. *Ribes viscosissimum*
7. *Ribes cereum*
8. *Ribes mescalerium*

There are five black currants with 5-lobed leaves and black or blue fruits:

9. *Ribes nigrum*
10. *Ribes hudsonianum*
11. *Ribes laxiflorum*
12. *Ribes americanum*
13. *Ribes wolfii*.

There are two red or ornamental currants with 3-lobed leaves and fruits colored red, white, yellow, or black:

14. *Ribes rubrum*
15. *Ribes aureum.*

A number of other ribes occur as introduced, cultivated, hybrids, or native species with very limited distribution in our region. These are identified and briefly described following our treatment of the common ribes. There is also some disagreement in taxonomy (identification) and synonymy (nomenclature). Until we obtain additional information, our treatments of these taxa are provisional.

Rusts of *Ribes*

Although several groups of fungi infect ribes, we are concerned here only with a few, similar appearing rusts (Uredinales). Rusts are distinguished by distinctive yellow, orange, brownish, or black sporulating structures on ribes leaves. Although not all of our species are described by Ziller (1974), he provides useful descriptions, photographs, and information on the life cycle for these rusts at the generic level. Bethel (in Goodding and Bethel 1926 and Wyckoff and Bethel 1923) identifies the rusts on ribes of the western states.

Cronartium ribicola and *C. occidentale* Hedgcock, Bethel, and Hunt (1918) produce damaging, perennial cankers on the stems of pine trees; and, with care, can be distinguished on ribes. The rust C*oleosporium ribicola* Arthur (=*C. jonesii* (Peck) Arthur) occurs as a leaf rust on pinyon and could be confused with one stage of the *Cronartium* rusts on ribes. *Melampsora ribesii-purpureae* Kleb. (=*M. confluens* Jacks.) alternates to willows; but we have seen no reports from Colorado or Arizona (Shope 1940, Yohem and others 1985). Several *Puccinia* are known to occur on western ribes (Arthur and Cummins 1962, Shope 1940). *Puccinia micrantha* Griff. alternates to rice-grass (*Oryzopsis*), *P. caricis* var. *grossulariata* Arthur to sedge (*Carex*); *P. parkerae* D.&H. occur only in the telial stage and is only known from *Ribes lacustre* (Goodding and Bethel 1926).

Field identification of these rusts may be difficult. Collections of the suspect rust on the ribes and potential alternate hosts for later microscopic or molecular examination are recommended.

Key to the rusts of *Ribes*[1]

1a. Aecia on leaves of ribes 2
  2a. Aecia within a peridium until mature 3
    3a. Aecia short, broad, densely aggregated, yellow to pale red ..... 5. *Puccinia caricis* var. *grossulariata*
    3b. Aecia long, slender, orange-red ..... 6. *Puccinia micrantha*
  2b. Aecial peridium rudimentary or absent ..... 4. *Melampsora ribesii-purpureae*
1b. Uredia or telia on leaves of ribes 4
  4a. Uredia on leaves of ribes 5
    5a. Uredia with a persistent peridium, spores liberated through a pore ..... *Cronartium ribicola* or *Cronartium occidentale*
    5b. Uredia appearing as large, flat, naked pustules; developing singly or in concentric rings; ..... 3. *Coleosporium ribicola*
  4b. Telia on leaves of ribes 6
    6a. Telia brown to purple, columnar 7
      7a. Telia long (4 mm), in dense patches covering the infected area ..... 2. *Cronartium occidentale*
      7b. Telia short (2 mm), in patches within the infected area ..... 1. *Cronartium ribicola*
    6b. Telia not brown to purple, not columnar 8
      8a. Telia black, breaking through host epidermis, flat; teliospores borne singly on pedicles; on *Ribes lacustre* ..... 7. *Puccinia parkerae*
      8b. Telia flattened, subepidermal cushion, orange, and waxy ..... 3. *Coleosporium ribicola*

[1] Adopted with modifications from Bethel as presented in Goodding and Bethel 1926.

1. *Cronartium ribicola*
white pine blister rust

The most important of the rusts on ribes is the invasive *Cronartium ribicola*, the cause of white pine blister rust (Samman and others 2003). Because the native rust *Cronartium occidentale* resembles *C. ribicola* and both occur in our region, care must be taken in identification of these rusts. Although differentiation in the uredial stage is difficult (Colley 1925), these rusts can be distinguished with careful examination in the telial stage (Table 1). Host differences for these two rusts are presented in discussions under the individual ribes.

These rusts can also be separated by colormetric procedures (Acree and Goss 1937 and Cave 1944). Vogler (personal communication) has developed a DNA molecular technique for identifying among these and other rusts on ribes. He is now accepting collections of rust-infected ribes leaves to build a genetic library, make and validate identifications [Det Vogler, Institute of Forest Genetics, Placerville, California, dvogler@california.com].

Table 1. Signs and symptoms of *Cronartium ribicola* and *C. occidentale* on ribes[a].

Character	*Cronartium ribicola*	*Cronartium occidentale*
Onset of telial formation	later	earlier
Density of telial mats	sparse, never "fur-like"	very dense, "fur-like"
Color of mature, un-germinated telia	straw brown, orange-tinge	dark brown
Color of older, germinated telia	retains orange color longer but may have lavender-purple tinge	soon develops a lavender-purple tinge
Extent of telial production on infected portions of the leaf	much of the infected portion of the leaf without telia	most of the infected portion of the leaf with telia
Pattern of infection on leaf	small, scattered spots	large, continuous areas
Hardman symptom characteristics, by order of increasing severity[b]	slight necrosis by spotting (from rust or secondary fungi); general necrosis of infected area; blister necrosis as large raised or sunken dead areas; angular necrosis delimited by veins; necrotic areas bear uredia but no telia.	telia present with no visible host reaction; chlorosis around telia visible on dorsal side of leaf; "green island effect[c]"; purpling[d] on dorsal leaf side

[a] Table based on descriptions by Kimmey (1946), Miller (1967), and our observations.
[b] Symptoms by D. Hardman, unpublished work described by Miller (1967).
[c] A condition commonly caused by leaf spot fungi where green, infected patches are surrounded by yellow or light green areas.
[d] Marked by a purple black or brown discoloration different from the usual reddening of diseased or aging leaves.

The relative importance of the various ribes species as a host for the spread and intensification of *Cronartium ribicola* depends on two factors—environment and physiology. Critical in rust epidemiology are environmental factors including host abundance, distribution, and microclimate. The capability of a ribes as a substrate for production of telia depends on physiological factors of the host–pathogen interaction. These physiological factors include susceptibility to infection at the aecial and uredial stages, disease development rate and extent within the infected leaf, and leaf retention. Variation is introduced by difference in genetics, microclimate (temperature and humidity, Van Arsdel and others 1956) and architecture (leaf morphology and exposure).

Rankings and ratings of ribes species for blister rust infection and inoculum production have been based on studies in laboratory and field experiments and observations. Clinton and McCormick (1924) screened about 40 taxa of ribes by inoculating leaves in petri dishes; McDonald and Andrews (1981) used petri dish inoculations to examine clonal variation in resistance. Inoculations in gardens have been widely used to explore differences in susceptibility; this technique has been used by Spaulding (1922), Hahn (1928), Kimmey (1935, 1938), Kimmey and Mielke (1944), Hummer and Fin (1999), and others. Several studies (Buchanan and Kimmey 1938, Kimmey and Wagener 1961) had gone beyond rating relative susceptibility to investigating disease gradient expressed in pine from point sources of different ribes species. Relevant information had also been obtained from careful observation. Taylor (1922) reported the pattern and abundance of telia on leaves of several species of ribes. Mielke and Hansbrough (1933), Lachmund (1934), and Mielke (1937) observed ribes populations exposed to natural infection. Mielke and others (1937) also provided a methodology for describing and quantifying the amount and distribution of rust. None of these reports, however, included all the ribes species of our region and none integrated results into a comprehensive scale of relative importance.

Based on published literature and observations, we propose a classification scheme (Table 2) for describing the relative importance of various species of ribes to blister rust epidemiology. The scheme is especially relevant to the spread and intensification of blister rust as it occurs in Colorado and New Mexico with some consideration for adjacent, infested areas such as Wyoming. The scheme is our subjective opinion of the susceptibility of the ribes to rust infection and capability of producing viable inoculum under typical field conditions where the species usually occurs. We consider physiological and ecological factors and their usual variability. Class A species are those that with exposure to the rust and favorable conditions generally express a high level of incidence, more than 66 percent of leaves infected, and a high level of disease severity, more than 66 percent of infected leaf area diseased. Class B species are those that express intermediate levels of incidence, 6 to 66 percent of leaves infected, and severity, 6 to 66 percent of infected area diseased, and those whose expression is generally low but occasionally results in significant telial production. We grade *R. inerme* as Class B; it is light to moderately infected in Colorado and a portion of New Mexico and can be responsible for significant infection of the white pine population. We grade *R. montigenum* as Class B; this high-elevation ribes occurs at sites often too cold for good rust development but can be an important inoculum source where and when more favorable temperatures prevail. Class C species are those that express low levels of incidence, less than 6 percent of leaves infected, or severity, less than 6 percent of area diseased. Class D species are those that are rarely observed with white pine blister rust uredia or telia and considered as insignificant to spread and intensification to white pines. Low grades for native species in their usual locations relative to white pines can be based on either resistance or escape. *Ribes aureum* is frequently found in Utah to be infected by pinyon blister rust, but we seldom find it in close proximity to native white pines. *Ribes americanum* is neither very susceptible nor found very close to native white pines. Both *Ribes aureum* and *R. americanum*, however, could be important hosts of white pine blister rust to planted white pines in urban and suburban areas, especially with sprinkler irrigation. The present scheme and classification of species are provisional.

Table 2. Importance of ribes of Colorado and New Mexico (and adjacent regions) to the spread and intensification of white pine blister rust.

Species	Class[a]
1. *Ribes pinetorum*	A
9. *Ribes nigrum*	A
10. *Ribes hudsonianum*	A
2. *Ribes inerme*	B
4. *Ribes montigenum*	B
5. *Ribes lacustre*	B
6. *Ribes viscosissimum*	B
11. *Ribes laxiflorum*	B
12. *Ribes americanum*	C
13. *Ribes wolfii*	C
15. *Ribes aureum*	C
3. *Ribes leptanthum*	D
7. *Ribes cereum*	D
8. *Ribes mescalerium*	D
14. *Ribes rubrum*	D

[a] Ribes are classified on the basis of their susceptibility to infection and capability of supporting production of telia under field conditions. Class A species have the highest potential for contributing to spread, Class B species have moderate or variable potential, Class C species have low potential, and Class D species are usually insignificant.

2. *Cronartium occidentale* pinyon blister rust

The native rust *Cronartium occidentale* causes of stem rust cankers on pinyon pines (*Pinus edulis* Engelm. and *P. monophylla* Torrey and Fremont). The biology and pathology of pinyon blister rust is described by Hedgcock and others (1918). Identification of pinyon blister rust on ribes is treated previously under the discussion for *Cronartium ribicola*. Pinyon blister rust is widely distributed across the range of its pine hosts and on ribes much further. Stillinger (1944) suggests the extended range of pinyon blister rust may be the result of long distant transport. Pinyon blister rust kills pines in heavily infested areas (Van Arsdel and Krebill 1995), but conditions are seldom suitable for large and sustained outbreaks. *Ribes aureum*, *R. leptanthum,* and *R. velutinum* are major hosts of pinyon blister rust; *R. inerme* is intermediate in infection; *R. montigenum* is a reported host (Anonymous 1921); *R. viscosissimum* is reported host (Graham 1966); *R. nigrum, R. americanum,* and various red currents are resistant to infection by *Cronartium occidentale* (Hedgcock and others 1918).

3. *Coleosporium ribicola*
pinyon leaf rust

Coleosporium ribicola causes a needle rust of *Pinus edulis* (Long 1916) and a leaf rust on ribes in Colorado, Arizona, and New Mexico (Shope 1940, Yohem and others 1985, and our observations). The aecial stage on pinyon appears as a typical needle rust (see Ziller 1974 or Nicholls and others 1968 for illustrations of other *Coleosporium* rusts). Although the rust may cause some defoliation, we have not observed nor received reports of any serious damage. Long (1916) reports pinyon leaf rust occurring early and at the upper limits of the host. Both Long's and our observations suggest successive uredial spread of the rust through the season to ribes populations quite distant from the perennial host (at least 10s of miles). On ribes, the telia stage of *Coleosporium* could be confused with the uredial stage of *Cronartium*; except that infection spots of *Coleosporium* are more reddish-orange, smaller, rounder, and discrete and the telia form a shiny, rounded cushion. This rust was observed in 1921 on *Ribes aureum, R. cereum, R. leptanthum, R. pinetorum, R. mescalerium, R. wolfii,* and cultivated currants and gooseberries in New Mexico and on *R. cereum* in Utah (Anonymous 1921). In New Mexico, pinyon pine is seldom damaged by this rust, but *Ribes cereum,* especially in the Sacramento Mountains and many miles from pinyon pine trees, usually bear abundant telia.

4. *Melampsora ribesii-purpureae*

Melampsora ribesii-purpureae appears to be typical of the many *Melampsora* rusts which alternate to (and probably overwinter on) willows and cottonwood (Ziller 1974). Although the rust is thought to have a wide distribution (including Utah and Wyoming), it is considered uncommon and not seriously damaging.

5–7. *Puccinia* spp.

The *Puccinia* rusts on ribes are similar and related. Although they occur infrequently, they not considered seriously damaging. *Puccinia micrantha* and *P. caricis* var. *grossulariata* (and var. *uniporula*) occur on the ribes as aecia composed of small cup-like clusters with white, irregular, notched margins (Arthur 1934 but see Ziller 1974 for illustration of similar species). *Puccinia parkerae,* however, is lacking an aecial stage and may be a microcyclic form derived from *P. caricis* var. *grossulariata* with only a telia stage (Arthur 1934). This rust appears as a crowded, naked, black to brown cluster of telia (see illustration of an similar appearing species in Ziller 1974; Figure 107).

Key to the Species of *Ribes* in Colorado and New Mexico

1a. Stems armed with nodal spines or internodal bristles 2
  2a. Stems armed with both nodal spines and internodal bristles 3
    3a. Nodal spines large (7 mm or more long)..... 4
      4a. Leaf blade mostly 5-lobed; leaf base cordate; often with single nodal spines or with single large nodal spines with two small satellite spines ..... **3. *Ribes leptanthum***
      4b. Leaf blade mostly 3-lobed; leaf base truncate; spines variable ..... **2. *Ribes inerme***
    3b. Nodal spines small (less than 7 mm long) 5
      5a. Leaf pubescent, about 2 cm wide; spines of variable size, nodal spines 1–3 in number; hypanthium shallow; mature fruit reddish ..... **4. *Ribes montigenum***
      5b. Leaf glabrous, about 4 cm wide: spines of uniform size, nodal spines 5–9 or more in number; hypanthium deep; mature fruit purplish ..... **5. *Ribes lacustre***
  2b. Stems armed with nodal spines; internodal bristles absent; leaf base cordate 6
    6a. Stems with sessile, black glands (generally with single nodal spines) **3. *Ribes leptanthum***
    6b. Stems without glands or glands rare (nodal spines generally in threes) **1. *Ribes pinetorum***
1b. Stems unarmed (nodal spines and internodal bristles absent)..... 7
  7a. Leaf blade deeply dissected, mostly 3-lobed; leaf base truncate or wedge-shaped 8
    8a. Stems (especially when young) white, pale, or ash-colored; leaf margin crenate; veins and petioles prominently pubescent ..... **2. *Ribes inerme***
    8b. Stems never white, pale, or ash-colored; leaf margin entire; blade glabrous..... ..... **15. *Ribes aureum***
  7b. Leaf blade not deeply dissected, mostly 5-lobed, sometimes 7-lobed, or rarely 3-lobed..... 9
    9a. Leaf blade with sessile or stalked glands 10
      10a. Leaf blade or petiole (especially when young) with stalked glands 11
        11a. Stems weak, trailing; hypanthium with long-stalked, reddish-purple glands .... **11. *Ribes laxiflorum***
        11b. Stems strong, erect 12
          12a. Leaf lobes pointed, distinct; margins dentate; blade with short-stalked, green, yellow, or clear glands ..... **13. *Ribes wolfii***
          12b. Leaf lobes rounded, not distinct; margins crenate 13
            13a. Leaf blade large, with abundant glandular hairs; calyx funnel-shaped.... ..... **6. *Ribes viscosissimum***
            13b. Leaf blade small, with glandular hairs; calyx tubular 14
              14a. Leaf blade thick, with short-stalked glands ..... **7. *Ribes cereum***
              14b. Leaf blade thin, with long-stalked glands ..... **8. *Ribes mescalerium***
      10b. Leaf blades with sessile glands, stalked glands absent..... 15
        15a. Leaf blade with glands on both upper and lower surface. **12. *Ribes americanum***
        15b. Leaf blade with glands only on lower surface 16
          16a. Native plant of moist locations from 5,000–7,000 ft elevation; racemes erect..... **10. *Ribes hudsonianum***
          16b. Cultivated or escaped plant; racemes pendant..... **9. *Ribes nigrum***
    9b. Leaf blade without glands..... **14. *Ribes rubrum***

1. *Ribes pinetorum* Greene
orange gooseberry (RIPI)

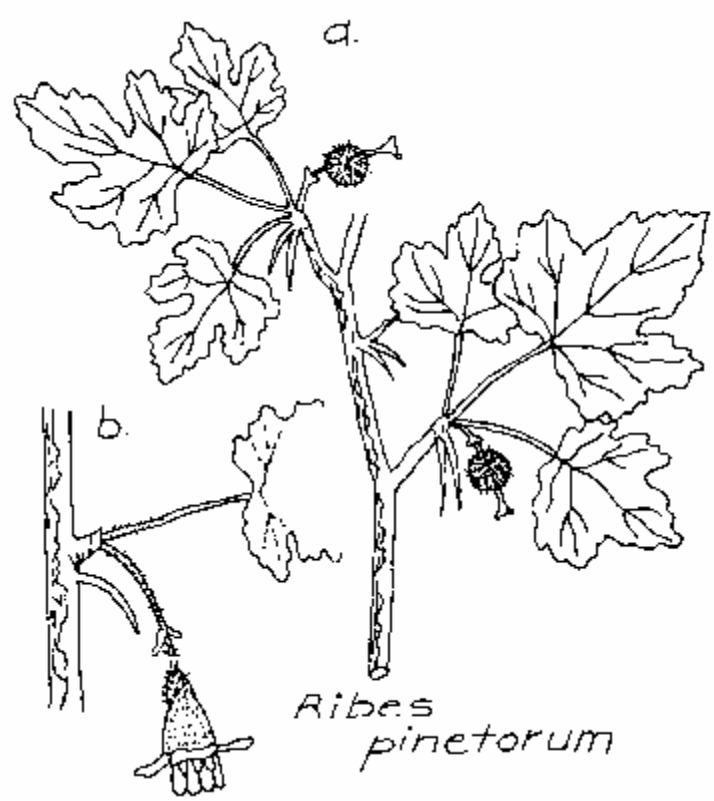

Figure 2. *Ribes pinetorum*. **a.** stem armed with nodal spines, leaf blade broadly angular, fruit spiny and with stalked glands; **b.** flower with tapered hypanthium, peduncle twice the length of the bractate pedicle both with stalked glands.

Stem: shrub armed with only nodal spines; spines (1)3(5), stout and often curved, 8–12 mm long; young shoots often orange, without black sessile glands.

Leaf: blade broadly angular, 5-lobed, deeply incised, 2 to 4 cm broad, margin crenate, base cordate; mature blade surface pubescent with abundant long-stalked glands or smooth and glabrous; veins often pubescent; petiole pubescent or with long-stalked glands.

Inflorescence: raceme few-flowered; peduncle about twice the length of the pedicel; pedicle bractate, bracts tapered, in pairs and with stalked glands.

Flower: calyx showy orange to orange-red, ca. 18 mm long; hypanthium tapered; flowering from April through May (rarely to September).

Fruit: berry orange to purplish-red at maturity, 8–15 mm diameter, spiny, with stalked glands.

Habitat: montane forests and meadows; occurs 8,000–11,500 ft; in some deep, north facing canyons as low as 7,000 ft and usually only to 10,000 ft. In the Gila ranges where all three species are present, *R. pinetorum* is generally above *R. leptanthum* and below *R. wolfii*.

Range: NM and AZ. In NM—Zuni, Mt. Taylor, San Mateo, Magdalena, Mogollon, Black Range, Capitan, Sierra Blanca, and Sacramento Mountains; Catron, Cibola, Lincoln, Otero, Socorro, Valencia counties.

Notes: *Ribes pinetorum, R. inerme*, and *R. leptanthum* may be confused unless mature fruit are present. Differences are described under *R. inerme*.

Pathology: the most important ribes in its range for the spread and intensification of WPBR (Class A); susceptibility and infection capability similar to *Ribes nigrum*. Reported as infected by pinyon leaf rust in Sacramento and Capitan Mountains in 1921 (Anonymous 1921).

References: Ivey (2003), Martin and Hutchins (1980), Vines (1960).

2. *Ribes inerme* Rydb.
whitestem gooseberry (RIIN2)

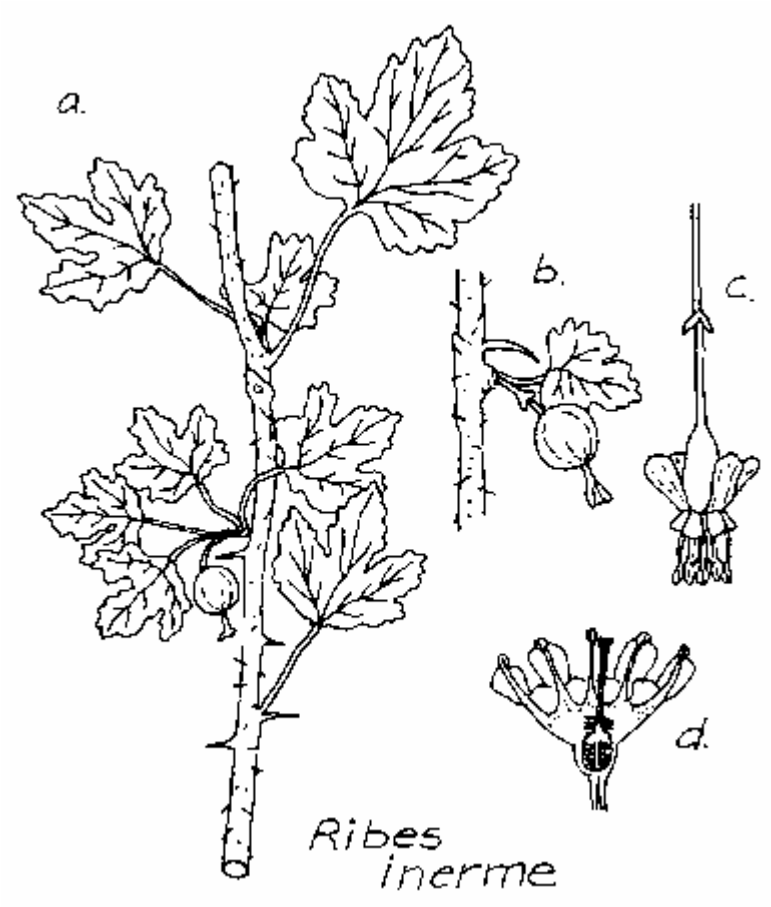

Figure 3. *Ribes inerme*. **a.** stem with nodal spines and internodal bristles, leaf 3-lobed; **b.** fruit a smooth berry **c.** flower with reflexed sepals and stamens extending about twice as long as petals; **d.** dissected flower with pilose pistil.

Stem: shrub sprawling to erect; lightly armed or not; nodal spines if present usually three; internodal bristles present or not; bark of some stems white, orange, or light gray, but exfoliating to reddish-brown; young twigs with black sessile glands.

Leaf: blade 3(5) lobed, margin ciliate; base usually truncate or wedge-shaped; upper surface smooth to slightly pubescent, lower surface slightly pubescent; veins prominent and pubescent; petiole tomentose to pilose or glandular pubescent. Numerous, well-distributed, small clear glands on underside of leaf may be present or not.

Inflorescence: peduncle about same length as pedicel; bracts paired, with stalked glands.

Flower: calyx translucent to greenish-white; pistil pilose-villose; sepals reflexed; stamens glabrous, extend beyond petals.

Fruit: berry smooth; relatively large (~10 mm); green, maturing to red.

Habitat: riparian, grassy meadows, under willows, and cool, rocky seeps. Colorado usually 6,000–10,000 ft; New Mexico 8,000–10,500 ft.

Range: BC to MT and s from to CA. CO—common in mountain counties. NM—mostly in the central mountains: abundant in upper Rio Pecos Canyon and the Sangre de Cristo Mountains, found in the Zuni Mountains ands the Brazos Mountains, the only species on Gallinas Peak, and uncommon in the Sacramento Mountains and Sandia Crest; Bernalillo, Cibola, Lincoln, Otero, Rio Arriba, Sandoval, Taos counties.

Notes: *Ribes inerme* can be confused with *R. leptanthum* and *R. pinetorum*; but these species can be distinguished using stems alone. *Ribes inerme* is the least spiny of the three; nodal spines may be absent and when present are finer than those of the other species. *Ribes inerme* occasionally has fine internodal bristles; *R. leptanthum* may have a dense mat of internodal bristles on young twigs but usually not on older twigs; *R. pinetorum* lacks internodal bristles at all ages. *Ribes inerme* and *R. leptanthum* have small, sessile, black glands on young twigs. The leaves of *R. inerme* are more strongly 3-lobed, those of *R. pinetorum* more angular and pentoid, those of *R. leptanthum* smaller and more finely dissected. There are a number of other species which may be confused with *R. inerme*, including *R. oxyacanthoides* var. *setosum*, *R. divaricatum* Dougl., *R. hirtellum* Michx., and *R. niveum* Lindl. (see discussions under Other *Ribes*). These other ribes, however, are more common outside our range.

Pathology: moderately important for WPBR (Class B), capable alone of supporting a WPBR outbreak on Gallinas Peak, New Mexico and important inoculum source in Colorado and southern Wyoming. Also moderately important for pinyon blister rust.

References: Harrington (1954), Holmgren (1997), Jennings (personal communication), Mesler and Sawyer (1993), Smiley (1921), USDA (2001), Weber (1987, 1990), Welsh and others (1993).

3. *Ribes leptanthum* Gray
trumpet gooseberry (RILE)

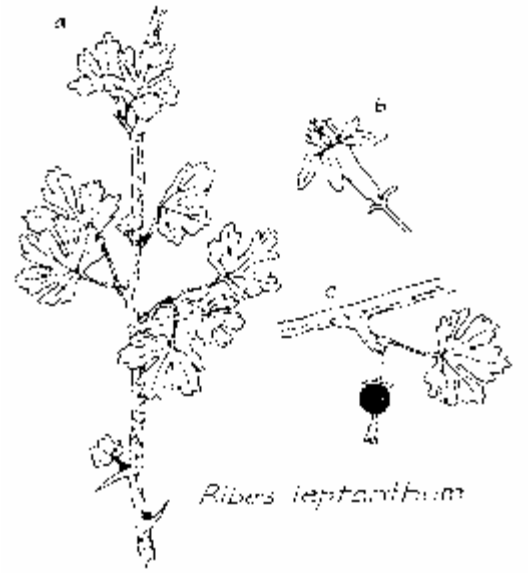

Figure 4. *Ribes leptanthum.* **a.** stem with prominent nodal spines, leaves orbicular, deeply cleft; **b.** flower calyx white and cylindrical; **c.** fruit a smooth, lustrous berry maturing to black.

Stem: nodal spines 1(3–5), prominent (7 to 15 mm); internodal bristles often cover young shoots; young twigs ridged, with black, sessile or short-stalked glands; bark straw, orange, gray or rust-colored, exfoliating to brown or gray.

Leaf: blade orbicular; (3)5(7)-lobed, deeply cleft, middle lobe usually prominent and strongly tapered; base cordate, sometimes truncate; margin dentate; blade and veins glabrous or sparsely glandular-pubescent, underside without clear glands; leaf ciliate; petiole with stalked, dark glands, pubescent.

Inflorescence: bracts prominent, close to hypanthium, with clear hairs and long-stalked glands.

Flower: calyx white, cylindrical; sepals pubescent, with long-stalked glands; stamens purple and equaling petals; styles glabrous.

Fruit: berry smooth, lustrous, red, maturing to black.

Habitat: generally well-drained slopes, canyon-sides in lower valleys; pinyon–juniper woodlands to montane forests. The distributions of *R. leptanthum* and *R. pinetorum* overlap; *R. leptanthum* is more common at lower elevations (6,000–8,500 ft) and *R. pinetorum* at higher elevations. On the Sandia and Manzano Mountains, New Mexico, *R. leptanthum* is common at 8,000 ft and occurs as isolated individuals on limestone mountaintop outcrops above 9,000–10,000 ft.

Range: UT, AZ, CO, NM, w TX. In CO—central and southwestern mountains, rare or absent from Rocky Mountain National Park and north. NM—from Torrance Co. north and west of Rio Grande, Sandia (abundant), Manzano (abundant), San Andres Mountains, and Carrizo Peak (where it is the only ribes and is especially lush and abundant). Not found at Gallinas Peak and in Capitan Mountains.

Notes: *Ribes leptanthum*, *R. pinetorum*, and *R. inerme* may be confused unless mature fruit are present. Ciliate leaf edges of *R. leptanthum* have shorter and fewer hairs than seen on *Ribes inerme.* Other differences are described under *R. inerme*.

Pathology: very low susceptibility to blister rust infection (Spaulding 1922) and rated among the least important species for WPBR in our region (Class D). Highly susceptible to pinyon blister rust (Hedgcock and others 1918). Reported as host of pinyon leaf rust in Manzano Mountains (Anonymous 1921).

References: Carter (1988, 1997), Correll and Johnston (1970), Holmgren (1997), Ivey (2003), Martin and Hutchins (1980), McMinn (1939), Vines (1960), Weber (1987, 1990).

4. *Ribes montigenum* McClatchie
gooseberry currant (RIMO2)

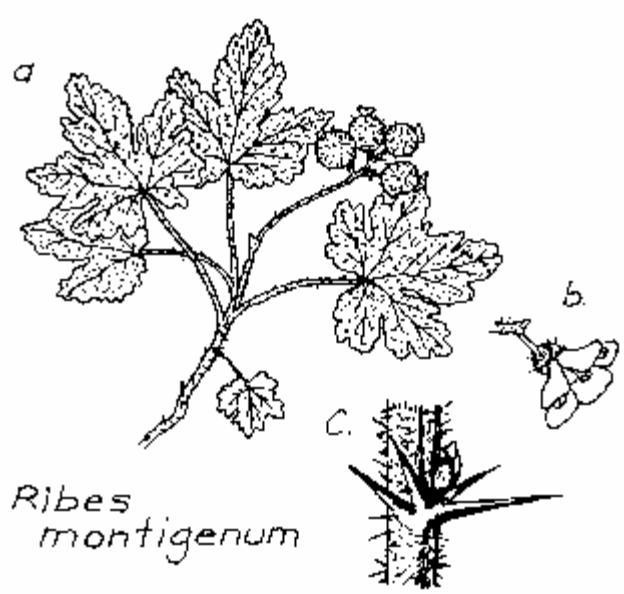

Figure 5. *Ribes montigenum*. **a.** leaf pubescent, raceme with few fruits; **b.** hypanthium shallow, with stalked glands; **c.** spines several per node, internodal bristles.

Stem: shrub armed with 1(3) nodal spines, variable in size; internodal bristles abundant; winter buds pointed; young stems glabrous; pith light tan, less than ½ diameter of stem.

Leaf: blade 1–2 cm broad, pentagonal, lobes 3–5, irregular, deeply dissected; base cordate; margin crenate-dentate, glandular; blade surfaces densely pubescent-glandular (sticky); petiole shorter than blade, with stalked glands.

Inflorescence: raceme 3–7 flowered; tending to upright.

Flower: calyx yellowish; hypanthium shallow, saucer-shaped; styles glabrous; with prominent, stalked glands, flowering mid to late June–July (e.g., 6/17/51 on Mt. Taylor at 11,000 ft)

Fruit: berry bright red to purplish-red, bristled with stalked glands; maturing August–Sept.

Habitat: subalpine and alpine; open slopes and spruce-fir forests; in our area, usually above 8,500 ft.

Range: western mountains. CO—mountain counties (we have no record for Jackson Co.). NM—northern mountains and high peaks: Sangre de Cristo and Brazos Mountains, Sierra Blanca, Mt. Taylor, Redondo Peak; Cibola, Rio Arriba, Socorro, Valencia counties.

Notes: *Ribes montigenum* and *R. lacustre* both have long, purple-tinged glands on a saucer-shaped hypanthium, but they can be distinguished by several distinct features. The leaf blades of *R. montigenum* are pubescent to very pubescent and the mature fruits are bright red. The leaf blades of *R. lacustre* are glabrous to sparsely pubescent and the mature fruits are dark purple. Other differences are for *R. montigenum* compared to *R. lacustre* that nodal spines are fewer and stouter, leaves smaller and more deeply dissected, the petiole shorter than the blade, the raceme fewer flowered, and the hypanthium more shallow.

Pathology: for WPBR, this ribes is rated Class B, Although a high percent of leaves may infected, usually only a small area of leaf bears telia. This ribes can be responsible for significant pine infection in Wyoming (Newcomb 2003). Reported a host for pinyon blister rust in California (Anonymous 1921).

References: Goodding (1926), Harrington (1954), Hitchcock and Cronquist (1973), Holmgren (1997), Ivey (2003), Martin and Hutchins (1980), McMinn (1939), Mesler and Sawyer (1993), Morris and others (1952), Vines (1960), Weber (1987, 1990)

5. Ribes *lacustre* (Pers.) Poir.
prickly currant (RILA)

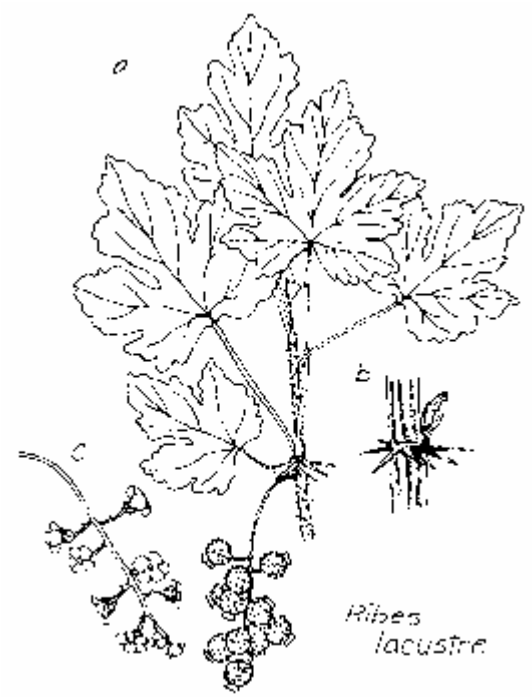

Figure 6. *Ribes lacustre*. **a.** stem with nodal spines and internodal bristles, leaf lustrous, fruits with stalked glands; **b.** spines many per node; **c.** raceme with several to many flowers.

Stem: shrub spreading to sprawling; young shoots with dense short pubescence; stems ridged; nodal spines 5–9, of uniform size; internodal bristles present; winter bud tip round; bud scale margins ciliate; pith white, less than ¼ the diameter of the stem.

Leaf: blade 2–4 cm broad, pentagonal; lobes 3–5, irregular, dissected; base cordate; blade surface lustrous, glabrous or appearing so but with widely-spaced stalked glands; veins and margins sparsely pubescent.

Inflorescence: raceme long, 7–16 flowered, drooping, bractate.

Flower: calyx diameter 2.5 to 5 mm; hypanthium cup-shaped, with prominent, long-stalked, red to purple glands; styles glabrous.

Fruit: berry red when young, black or dark purple when mature, with long-stalked, red to purple glands.

Habitat: moist woods, boggy, stream banks, and sheltered montane forests with Douglas-fir or subalpine slopes; usually below 8,500 ft.

Range: Newfoundland and AK to Northeastern and Lake states, CO and n CA. CO—west slope mountains and northern Front Range including Boulder, Larimer, and Jackson Co. NM—High mountain peaks: Redondo Peak, Mt. Taylor, Sangre de Cristo Mountains, Brazos Mountains; Cibola, Lincoln, Otero, Rio Arriba, San Miguel, Sandoval, Santa Fe, and Taos counties.

Notes: this northern species overlaps in distribution with a Rocky Mountain species, *R. montigenum*, leading to some difficulty in identification. *Ribes lacustre* and *R. montigenum*, however, can usually be distinguished (see discussion under *R. montigenum*).

Pathology: in Lake States, Pacific Northwest, and northwestern Wyoming may be heavily infected (Class B); uncommon in our region and pathology not observed.

References: Carter (1988), Goodding (1926), Harrington (1954), Hitchcock and Cronquist (1973), Holmgren (1997), McMinn (1939), Mesler and Sawyer (1993), Van Bruggen (1986), Weber (1987, 1990).

6. *Ribes viscosissimum* Pursh
sticky currant (RIVI3)

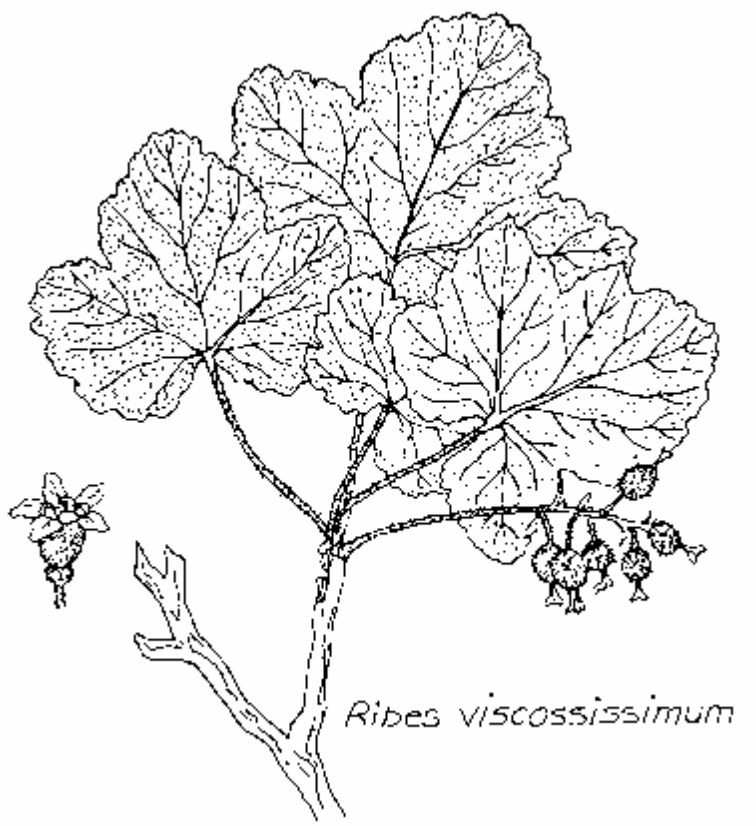

Figure 7. *Ribes viscosissimum*, leaf petiole and blade pubescent and glandular, raceme with 3 to 8 fruits; flower with wide, funnel-shaped hypanthium.

Stem: shoots with short-stalked, red-pigmented glands.

Leaf: petiole and blade with abundant sessile or long-stalked, clear glands.

Inflorescence: raceme 3–8 flowered; bracts large, very glandular, on short pedicels midway from stem to hypanthium.

Flower: calyx white; wide, funnel-shaped.

Fruit: berry black without bloom; glandular-bristly.

Habitat: montane and subalpine; moderately moist canyon bottoms and slopes, especially with aspen and disturbed sites (road cuts); in Colorado and New Mexico 7,500–8,500 ft.

Range: BC to MT and south to CO to n CA. CO—rare, Routt and Grand Co. NM—rare Union Co. [AZ—Kaibab Plateau.]

Notes: *Ribes viscosissimum* is the most glandular of our three sticky currants. The calyx of *Ribes viscosissimum* forms a wide funnel in contrast to the tubular flowers of *R. cereum* and *R. mescalerium.*

Pathology: Kimmey (1938) and Lachmund (1934) assessed this ribes as moderately susceptible to infection by WPBR; the species is common and an inoculum source in the Greater Yellowstone area; but very infrequent in our region. We rate it here as Class B. Graham (1966) reported a collection of pinyon blister rust on this ribes from Grand Teton National Park.

References: Harrington (1954), Hitchcock and Cronquist (1973), Holmgren (1997), Martin and Hutchins (1980), McMinn (1939), Mesler and Sawyer (1993), Vines (1960), Weber (1987, 1990).

7. *Ribes cereum* Dougl.
wax current (RICE)

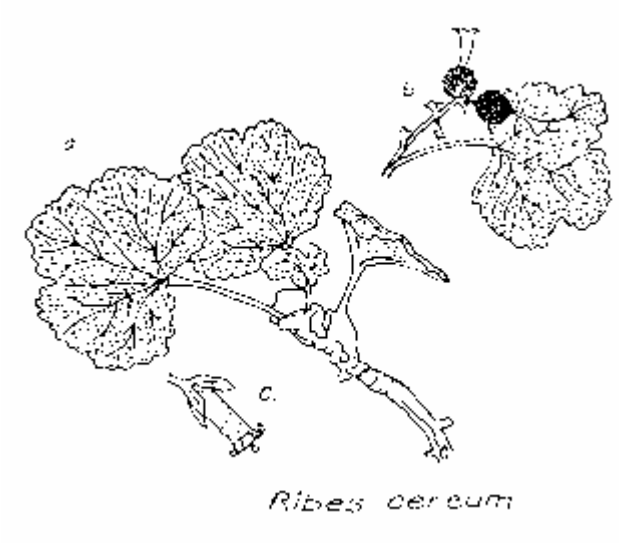

Figure 8. *Ribes cereum*. **a.** stem unarmed, leaves with upper surface waxy; **b.** fruit a red-orange berry, sparingly glandular-pubescent; **c.** flower calyx tubular, bearing short stalked glands.

Stem: shrub unarmed; shoots with short-stalked glands.

Leaf: blade lower surface, veins, and petiole with abundant short-stalked glands; upper surface waxy, glabrous or with few short-stalked glands, thick.

Inflorescence: bracts toothed, adjacent to hypanthium, glandular.

Flower: calyx pink to white with a pinkish tinge, tubular, with short-stalked glands (stalk length 3–4x diameter of gland). Although Vines (1960) reports that styles are usually hairy, we have not observed this feature.

Fruit: berry red-orange, glabrous to sparingly glandular-pubescent, fleshy but tasteless; seeds few.

Habitat: open fields and partial shade; may be on dry sites; low to very high elevations; in Colorado and New Mexico more abundant at lower elevations (5,000–9,000 ft) but can occurs at high elevation (9,000–12,000 ft).

Range: BC to CA, e to MT and NM. CO—widespread in mountains, plateaus, and high plains. NM—mountains and plateaus of north, west, and south central.

Notes: includes several named varieties. *Ribes inebrians* Lindl. is treated here as a synonym. There is wide variation in the morphology of *R. cereum* across its range; our descriptions pertain to its appearance as found in Colorado and New Mexico. In the limited region where *Ribes cereum* and *R. mescalerium* both occur, these species can be easily distinguished (see Notes under *R. mescalerium*).

Pathology: in our area exhibits very low susceptibility to WPBR (Class D): however, reported, and observed by us, to be susceptible in other regions (for example, California and Montana). Susceptible to *Coleosporium ribicola* (Sacramento and Manzano Mountains, New Mexico).

References: Harrington (1954), Holmgren (1997), Ivey (2003), Martin and Hutchins (1980), McMinn (1939), Mesler and Sawyer (1993), Van Bruggen (1986), Vines (1960), Weber (1990).

8. *Ribes mescalerium* Coville
Mescalero currant (RIME2)

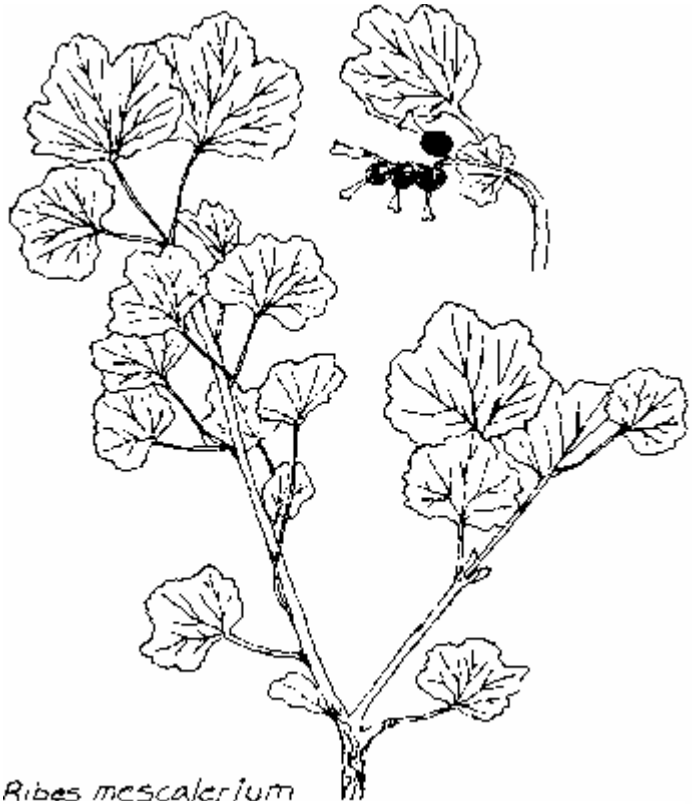

Figure 9. *Ribes mescalerium*, stem unarmed, leaf lobes rounded and shallow, fruit black.

Stem: shrub unarmed; shoots with stalked glands.

Leaf: blade surfaces and veins with long-stalked glands, thin.

Inflorescence: raceme bractate; bract adjacent to hypanthium, pedicle with long-stalked glands (stalk length 8–10x diameter of gland).

Flower: calyx white, tubular; hypanthium with long-stalked glands; style glabrous.

Fruit: berry black.

Habitat: widespread; open areas; in New Mexico 6,600–10,400 ft.

Range: NM and w TX. NM—Sacramento Mountains, Magdalena Mountains, San Mateo Mountains; Catron, Lincoln, Otero, Socorro, and Torrance counties.

Notes: the Southwestern endemic *Ribes mescalerium* is often confused with the broadly distributed and greatly variable *R. cereum. Ribes mescalerium* has thinner, larger leaves, deeper lobes, and its glands have longer stalks; *R. cereum* has thicker, smaller, waxy leaves, shallower lobes, and its glands have shorter stalks. The glands of either species may be clear or red pigmented.

Pathology: this ribes has a very low susceptibility to WPBR. In one case, 5 percent of leaves were infected with blister rust when 100 percent of the leaves of *Ribes pinetorum* were infected; usually it is even not infected (Class D). There is some pinyon needle rust on *R. mescalerium*, but only a small percentage of leaves on a small percentage of bushes.

References: Carter (1997), Correll and Johnston (1970), Martin and Hutchins (1980), Vines (1960).

9. *Ribes nigrum* L.

European black currant (RINI)

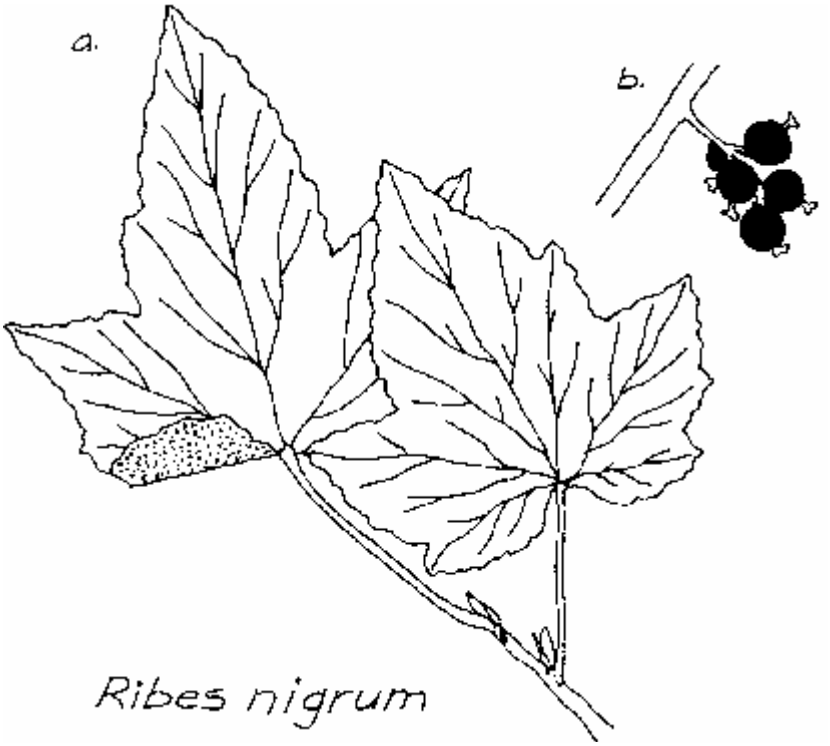

Figure 10. *Ribes nigrum.* **a.** leaf distinctly pointed, lower surface with golden resin glands; **b.** raceme drooping, fruits 4 to 10 per raceme.

Stem: twigs and shoots with strong odor when broken or crushed.

Leaf: blade broader than long; lobes 3–5, distinctly pointed, dentate; lower blade surface with small golden resin glands; strong odor when crushed.

Inflorescence: raceme 4–10 flowered, drooping.

Flower: calyx bell- or saucer-shaped, tomentose; sepals purplish; petals white to reddish.

Fruit: berry smooth, mature black with whitish bloom, glandular; taste pungent but pleasing.

Habitat: cultivated; rarely escapes. Occasionally re-introduced from Europe or Canada by tourists.

Range: natural distribution in Europe.

Notes: cultivated to produce telia used to screen white pines for resistance to WPBR.

Pathology: the susceptibility of this to WPBR is usually very high (Class A); but there are resistant cultivars. *Ribes nigrum* is the standard by which others species are rated.

References: Hitchcock and Cronquist (1973), Rehder (1940).

10. *Ribes hudsonianum* Richards.
northern black currant (RIHU)

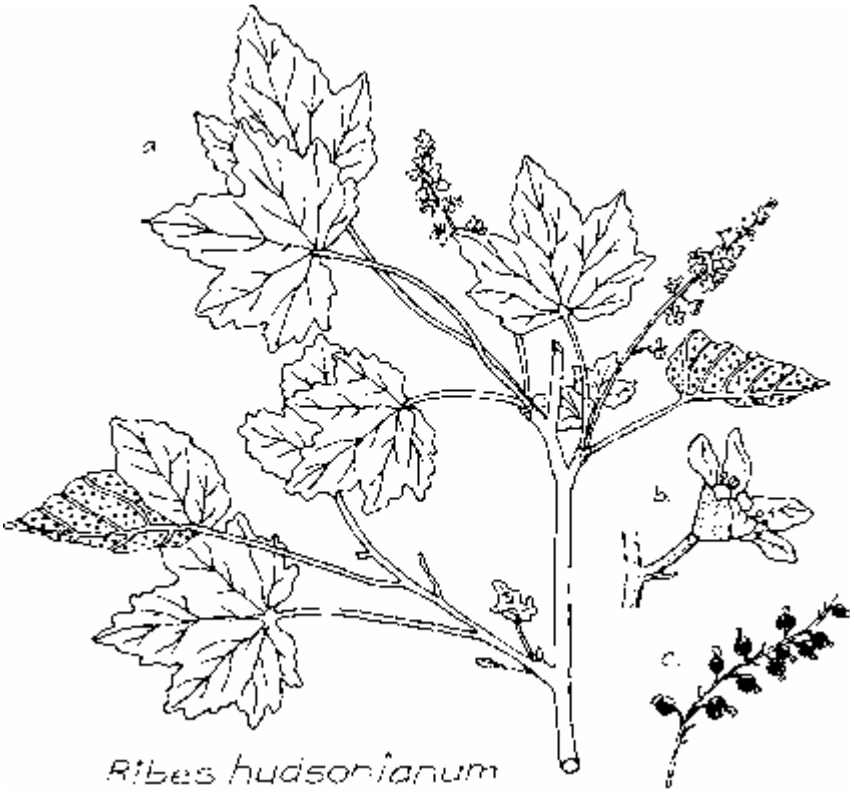

Figure 11. *Ribes hudsonianum*, **a.** leaf blade lower surface with glands, racemes erect; **b.** flower calyx bell-shaped; **c.** raceme, erect and bearing numerous smooth, black berries.

Stem: twigs and shoots with strong odor when broken or crushed.

Leaf: blade usually broader than long; lower surface glandular.

Inflorescence: raceme erect.

Flower: calyx white; bell-shaped.

Fruit: berry smooth, black when ripe.

Habitat: moist locations and free-flowing swamps; may be associated with *Ribes lacustre* but more restricted.

Range: Hudson Bay to AK, s to MN. Reported for northern UT and observed in northeast NV (Jarbidge Mountains), and an important ribes in WY and ID as a potential inoculum source for WPBR. There is one sample in the Colorado State University herbarium from the southern extremity of the Sangre de Cristo Range in Colorado. *Ribes hudsonianum* is not known to be present in New Mexico, and is of doubtful occurrence in Colorado.

Notes: very closely related to *Ribes nigrum* (Messinger and others 1999).

Pathology: well known as *Ribes petiolare* Dougl. in early blister rust literature as most susceptible to blister rust (McMinn 1939); we assign it to Class A.

References: Hitchcock and Cronquist (1973), Holmgren (1997), Mesler and Sawyer (1993), Rehder (1940).

11. *Ribes laxiflorum* Pursh
trailing black currant (RILA3)

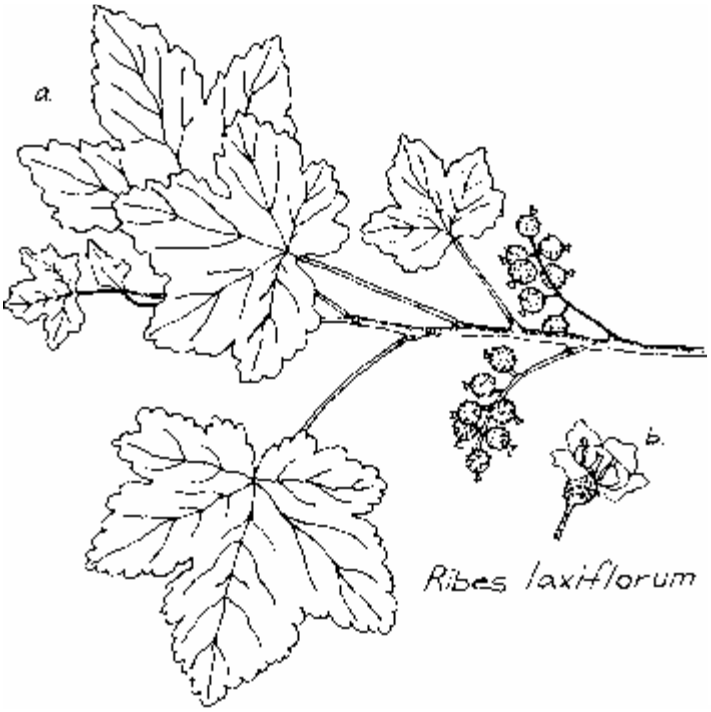

Figure 12. *Ribes laxiflorum,* **a.** stem trailing, leaf 5-lobed, raceme borne on 1-year-old stem, fruits with bloom and stalked glands; **b.** flower calyx saucer-shaped, hypanthium with long-stalked glands.

Stem: shrub trailing or erect to 1–1.5 m and ascending only near the ends (then trailing stems may exceed 1.5 m).

Leaf: blade 5–10 cm broad, 5-lobed; veins of young leaf pubescent.

Inflorescence: raceme born on 1-year-old stems, bractate, 8–15 flowered.

Flower: calyx inconspicuous, saucer-shaped; hypanthium with long-stalked, reddish-purple glands.

Fruit: berry black, with a bloom, with reddish-purple stalked glands.

Habitat: damp areas in subalpine (spruce-fir) timbered and burned-over areas; in Colorado and New Mexico above 9,500 ft.

Range: AK to n CA and e to west side of Cascades, n ID and disjunct in w UT, w CO, and n NM. CO—mostly Continental Divide counties. NM—north central mountains; Bernalillo, Sandoval, Torrance counties.

Notes: *Ribes laxiflorum* usually refers to a taxon of ribes in the Northwest and *R. coloradense* Coville to a similar current in Colorado. There is, however, for a bridging population in western Utah (Deep Creek Range) and the status of these taxa requires additional study (Holmgren 1997). We have chosen in this case to follow the taxonomic lead of Holmgren (1997) rather than Hartman and Nelson (2001) and treat *R. coloradense* as a synonym of *R. laxiflorum*. In our area, *Ribes laxiflorum* may be confused with *R. wolfii* which may be somewhat procumbent as well. These species can best be distinguished by the long-stalked, reddish-purple glands on the hypanthium of *Ribes laxiflorum* in contrast to the short-stalked, green or clear glands of *R. wolfii*; *R. laxiflorum* is uncommon in our region.

Pathology: moderate to low susceptibility to WPBR (Class B).

References: Carter (1988, 1997 as *R. coloradense*), Harrington (1954 as *R. coloradense*), Hitchcock and Cronquist (1973), Holmgren (1997), Martin and Hutchins (1980 as *R. coloradense*), McMinn (1939), Mesler and Sawyer (1993), Vines (1960 as *R. coloradense*), Weber (1987 as *R. coloradense*).

12. *Ribes americanum* Mill.
American black currant (RIAM2)

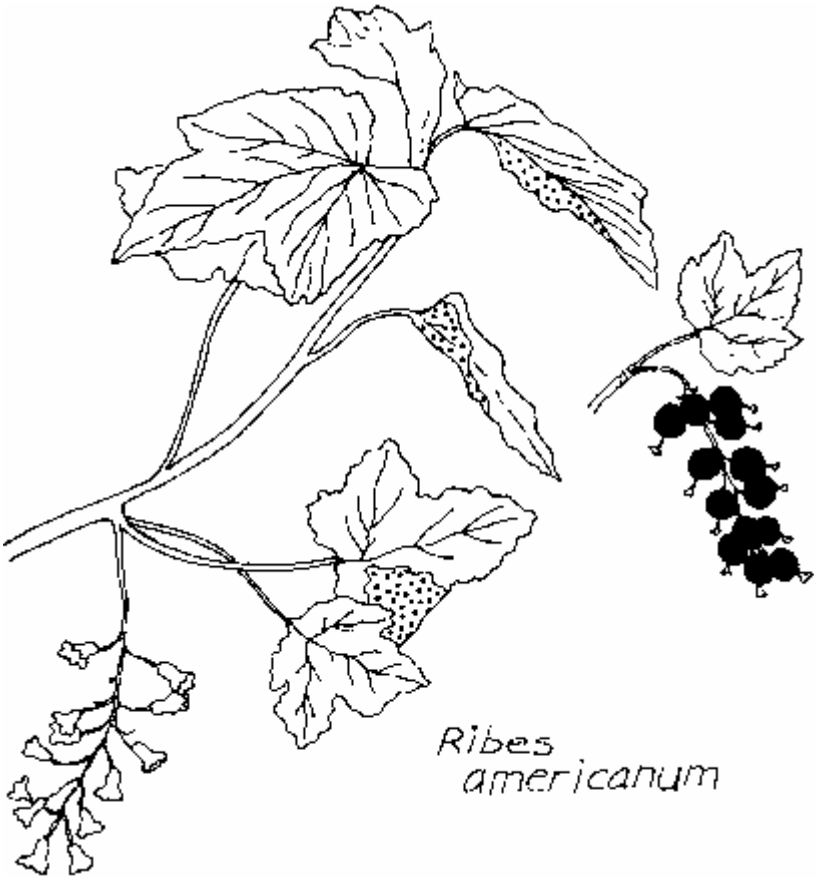

Figure 13. *Ribes americanum*, racemes pendent, leaves with golden glands numerous on lower surface, sparse on upper surface.

Stem: shrub usually erect and tall but some prostrate and layering; young twigs more or less ridged and angled (square); bark yellowish-green and glandular.

Leaf: both surfaces of blade with golden glands, more numerous on lower surface.

Inflorescence: raceme drooping and many flowered; each pedicle bractate; bracts linear to lanceolate.

Flower: calyx greenish-yellow or yellow, comparatively large, bell- or funnel-shaped.

Fruit: berry smooth, black when ripe, spherical.

Habitat: in Colorado, flood plains such as Cache la Poudre and South Platte at about the 6,000 ft level. In New Mexico at 6,000 ft in Tajique Loop canyon, east side of Manzano Mountains.

Range: Nova Scotia to VA, w to Manitoba, along western edge of high plains to NM. CO—rare; central, Arapahoe, Denver, Douglas, El Paso, Jefferson, Larimer. NM—rare but locally abundant in Tajique Canyon on east slope Manzano Mountains.

Pathology: low blister rust susceptibility to WPBR (Class C).

References: Harrington (1954), Hitchcock and Cronquist (1973), Martin and Hutchins (1980), Van Bruggen (1986), Vines (1960), Weber 1990.

13. *Ribes wolfii* Rothrock
Wolf's current (RIWO)

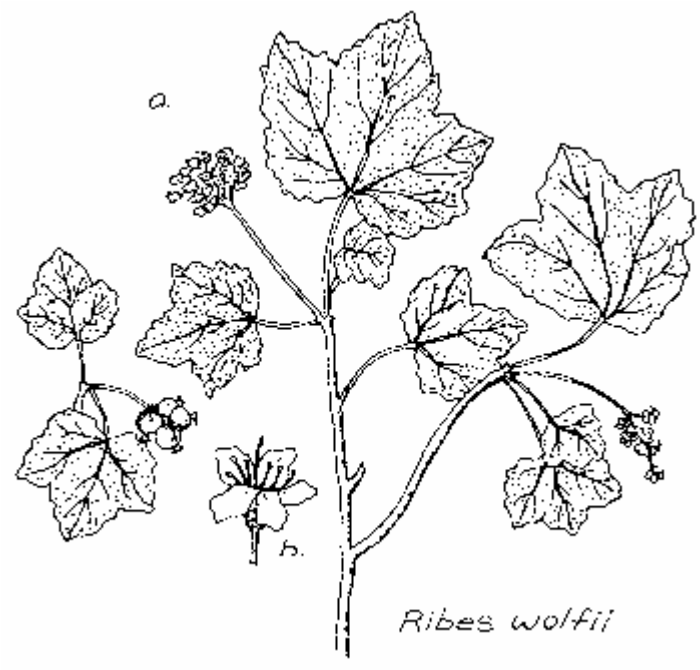

Figure 14. *Ribes wolfii.* **a.** racemes borne on current years growth, flattened or elongate; **b.** flower calyx cup-shaped, fruit berries blue-black, with a bloom and short stalked glands.

Stem: green stems with stalked glands; bark maturing from tan to gray, with abundant black sessile glands.

Leaf: blade 5-lobed; lobes pointed, distinct but not deeply dissected; margins dentate and not ciliate; base cordate; upper blade surface often sparsely glandular with clear glands or occasionally glabrous and smooth; lower surface with evenly-spaced, clear, sessile glands; veins pubescent with scattered, clear, sessile and stalked glands (especially on younger leaves); base of petiole with stalked glands.

Inflorescence: raceme bractate, flattened or elongate; pedicles bractate; bract elliptical-lanceolate, persistent, with yellow-white or reddish stalked glands.

Flower: calyx white, cup-shaped; hypanthium with short-stalked, green, yellow, or clear glands.

Fruit: berry blue-black, sometimes with a bloom; with short-stalked yellow or green glands.

Habitat: wet or moist areas; upper montane to subalpine; in Colorado and New Mexico usually above 8,000 ft.

Range: UT, AZ, CO, NM. CO—western and southern counties. NM—western and central mountains; in all of the central mountain ranges from the Sacramento Mountains north to the Colorado border, including the Manzano, Sandia, Sangre de Christo, and Brazos Mountains; Bernalillo, Catron, Cibola, Los Alamos, Rio Arriba, San Miguel, Sandoval, Socorro, and Taos counties.

Notes: in our area *Ribes wolfii* may be confused with *R. laxiflorum*. *Ribes wolfii* tends to be more erect and its hypanthium has short-stalked, green, yellow or clear gland. *Ribes laxiflorum* is procumbent and the hypanthium glands are long-stalked and reddish-purple. Our treatment of *Ribes wolfii* includes *R. mogollonicum* Greene as a synonym.

Pathology: low susceptibility to WPBR (Class C). Reported as host for pinyon leaf rust in Sacramento and Manzano Mountains, New Mexico.

References: Hitchcock and Cronquist (1973), Harrington (1954), Holmgren (1997), Ivey (2003), Martin and Hutchins (1980), Vines (1960), Weber (1987, 1990).

14. *Ribes rubrum* L.
cultivated currant, red currant (RIRU80)

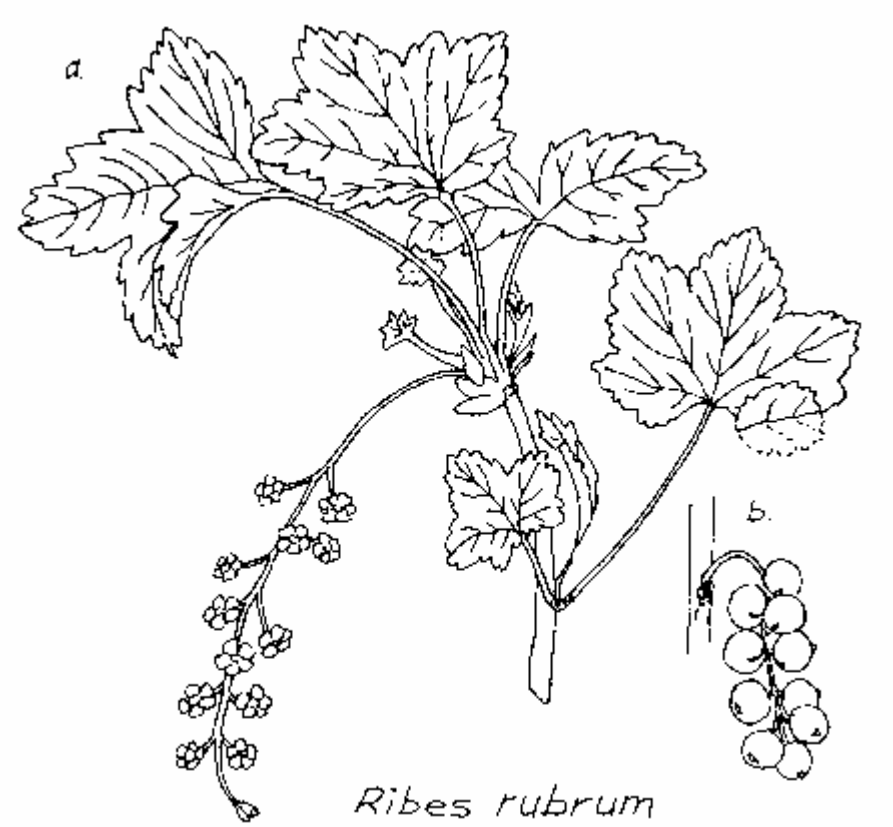

Figure 15. *Ribes rubrum,* **a.** leaf blade 3-lobed, not deeply cleft, base cordate, raceme drooping; **b.** fruits smooth, shiny, red or white when ripe.

Stem: bark of young twigs gray; buds often cluster at the end of a thick stem.

Leaf: blade 3-lobed, not deeply dissected, dark green, rather thick; base cordate.

Inflorescence: raceme drooping, many flowered.

Flower: calyx greenish-yellow; sepals as at least as broad as long; anther sacs separated.

Fruit: berry smooth, shiny, red or white when ripe; taste tart.

Habitat: cultivated but may escape.

Range: natural distribution Europe.

Notes: like the European black currant, there are numerous cultural varieties of red currant; these red currants include *Ribes sativum* Syme.

Pathology: usually not very susceptible to WPBR (Class D) or to pinyon blister rust.

References: Hitchcock and Cronquist (1973), Rehder (1940), Welch and others (1993).

15. *Ribes aureum* Pursh
golden currant (RIAU)

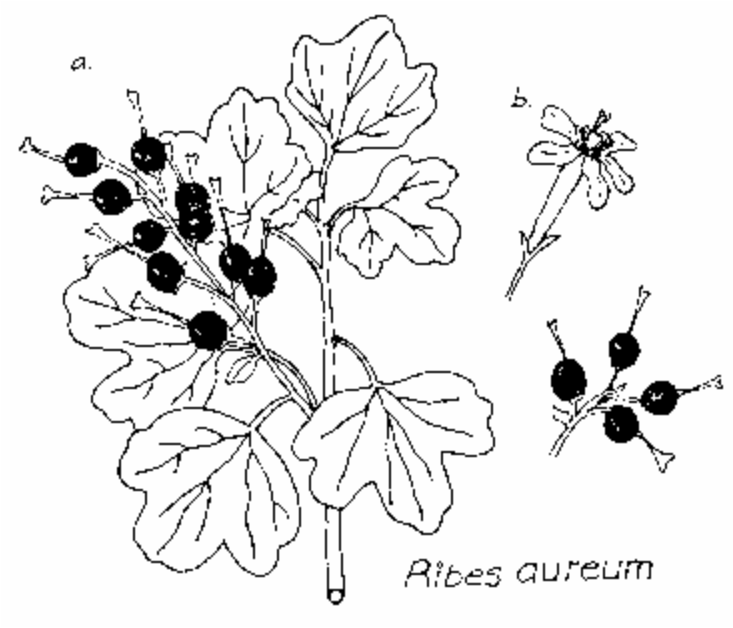

Figure 16. *Ribes aureum,* **a.** leaf 3-lobed, often cruciform, surface glabrous; **b.** flower calyx salverform, yellow.

Stem: shrub unarmed; shoots glabrous or puberulent.

Leaf: blade 3-lobed, sometimes cruciform; surface mostly glabrous but when young may be finely pubescent with margin ciliate; petioles may be pubescent.

Inflorescence: raceme 5–15 flowered.

Flower: calyx salverform, glabrous, yellow.

Fruit: berry smooth, black or purplish-brown, rarely orange (southeast ID).

Habitat: common on stream sides and wet ditches in the lower valleys and on the plains (Colorado and New Mexico 4,000–8,000 ft); native and commonly cultivated.

Range: WA to MT and s from NM to CA. CO—widespread outside high mountains. NM—uncommon; Otero, San Miguel, and Torrance counties.

Notes: here we include *Ribes odoratum* H. Wendl. as a synonym (Hartman and Nelson 2002).

Pathology: reported as susceptible to WPBR, but generally grows at a much lower elevation than most white pines and where the climate is too warm and dry for *Cronartium ribicola* infection (5,000–7,000 ft); rated as Class C. *Ribes aureum* (includes *R. odoratum*) is a major host of pinyon blister rust in Colorado, Utah, and Arizona. Reported as a host to pinyon leaf rust in Sacramento and Capitan Mountains, New Mexico (Anonymous 1921).

References: Correll and Johnston (1970), Harrington (1954), Hitchcock and Cronquist (1973), Holmgren (1997), Ivey (2003), Martin and Hutchins (1980), McMinn (1939), Mesler and Sawyer (1993), Vines (1960), Weber (1987, 1990).

Other *Ribes*

Ribes coloradense Coville: collections of a prostrate black current in Colorado are usually referred to *Ribes coloradense* as distinct from the Northwestern species *R. laxiflorum*. We accept the argument of Holmgren (1997) that these taxa may be synonymous.

Ribes divaricatum Dougl.: this west coast species is only known recently and rarely collected from Colorado. Identification of specimens from riparian or other moist habitats which resemble *Ribes inerme* (greenish sepals) but with sepals whitish (*R. niveum*) or purple-tinged (*R. divaricatum*) requires flowers. See Hitchcock and Cronquist (1973), McMinn (1939), Rehder (1940), Weber (1987, 1990).

Ribes hirtellum Michx.: this species of the eastern and Lake states is imported to Colorado as an ornamental. *Ribes hirtellum* and *R. inerme* are similar. One of us (Van Arsdel) after noting the variation in examined specimens from Michigan, Colorado, and New Mexico felt that it is all the same species. The variation in leaf shape, the amount of glands, and pubescence patters found in the Sangre de Cristo Mountains (a small area) include all of those found in the Michigan samples and conversely all the Michigan samples include the variation seen in the Colorado and New Mexico samples. The ranges overlap in the Black Hills (Thilenius 1971), abut in Montana (Morris and others 1960; Van Bruggen 1986), and overlap in southern Alberta. We are uncertain whether they should be segregated; but for the present time, we list *Ribes inerme* as the proper name for the common, native species of Colorado and other western states. Cultivated plants with leaf base wedge-shape are likely to be *Ribes hirtellum*; wild plants with leaf blades truncate base are likely to be *R. inerme*.

Ribes inebrians Lindl.: treated here as synonym of *R. cereum*.

Ribes mogollonicum Greene: we concur with Holmgren (1997) and treat *Ribes mogollonicum* as a synonym of *R. wolfii*.

Ribes niveum Lindl.: Colorado. Chumley and Hartman (2000) report a single, small but well-established population of ribes near Canon City, Colorado (Fremont county) as *Ribes niveum*. This population is a small disjunct from a species common in the Pacific Northwest and Nevada.

Ribes ochrocentrum ?: one doubtful specimen collected in 1935 known from El Paso Colorado.

Ribes odoratum Wendl.: a commonly cultivated taxon of the eastern states, included here as a synonym of *Ribes aureum*.

Ribes oxyacanthoides L., (including "*R. setosum* and *R. saximontanum*"): a single collection at Colorado State Herbarium and other early reports may represent very rare plants or confusion with *R. inerme*. *R. oxyacanthoides* and varieties present in adjacent regions (see Sinnott 1985 and Holmgren 1997).

Ribes quercetorum Greene. Arizona: Kearney and Peebles (1964), McMinn (1939), Mesler and Sawyer (1993), Rehder (1940); a species of pine-oak-woodlands not in proximity to white pines.

Ribes velutinum Greene. Arizona, Utah, and Nevada: Hayes and Garrison (1960), Hitchcock and Cronquist (1973), Holmgren (1997), Kearney and Peebles (1964), McDougall (1973), McMinn (1939), Mesler and Sawyer (1993), Welch and others (1993); a species of pinyon-juniper woodlands. Its presence has not been noted in Colorado or New Mexico.

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Glossary

aecium (plural aecia). a cup-like fungal reproductive structure with or without a peridium of the first (I) stage of a rust.

anther. the terminal portion of the stamen which produces pollen.

axillary. between the leaf and stem.

bloom. a fine, powdery film.

bract. a small, specialized leaf of an inflorescence.

bristle. a small, sharp appendage on a stem internode, derived from epidermis.

calyx. a collective term for sepals.

ciliate. with a fringe of marginal hairs.

cordate. shaped with a central notch such as a stylized heart at the point of attachment.

corolla. the inner portion of the perianth composed of petals.

crenate. a margin with rounded teeth.

cruciform. cross-shaped.

cuneate. wedge-shaped or triangular, narrow at point of attachment.

decurrent. with attached wing or margin extending down the stem below the point of attachment.

dentate. a margin with pointed teeth.

filament. an elongated portion of the stamen which supports the anther.

glabrous. smooth, without hairs (trichomes) or glands.

gland. an appendage on the surface or end of a trichome which produces a sticky, greasy, or viscous substance.

hypanthium. a structure derived from the united lower portions of the sepals, petals, stamens and ovary which appears as a saucer, bell or tube.

inflorescence. a cluster or flowers on a common axis.

node. a section of the stem where a leaf is or had been attached.

ovary. the lower portion of pistil containing the ovules which develop into seeds.

pedicel. a stalk of an individual flower (or telium).

peduncle. a stalk of an entire inflorescence or single flower.

perianth. an outer, sterile portion of a flower, composed of calyx and corolla.

peridium. the outer, sterile membrane of a reproductive structure of a rust; usually white; persistent or not.

petal. a member of the second set of modified floral leaves internal to the outer set of sepals.

petiole. a leaf stalk.

pilose. covered with short, weak hairs.

pistil. the female flower organ, consisting of ovary, style, and stigma.

pubescent. bearing hairs (trichomes) of any kind.

pycnium (plural pycia). the fungal reproductive structure of the initial, (0) stage of rust.

raceme. an unbranched inflorescence of pediceled flowers that open from bottom to top.

rachis. an elongate axis of an inflorescence.

reniform. shaped as a stylized kidney.

salverform. having a slender tube and flaring sepals.

sepal. a member of the outer set of modified floral leaves external to the petals.

spine. a sharp-pointed projection derived from a leaf or other organ.

stamen. the male flower organ, consisting of anther and filament.

stigma. the terminal section of the pistil receptive to pollen.

stipitate. on a stalk.

stipule. one of a pair of small, specialized leavers at the base of a petiole.

style. a slender stalk connecting a stigma and ovary.

taxon (plural taxa). a taxonomic unit of any rank, such as genus, species subspecies, etc.

telium (plural telia). the fungal reproductive structure of the third stage (III) of a rust.

trichome. a hair-like outgrowth of the epidermis.

tomentose. covered with dense, short, rigid hairs (trichomes).

truncate. shaped with a straight margin (as if cut off).

uredium (plural uredia). the fungal reproductive structure of the second stage (II) of a rust; also termed uredinium.

villosus. covered with long, weak hairs (trichomes).