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## A SYNOPSIS OF THE NORTH AMERICAN SPECIES OF SORBUS

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*With plates 226 and 227*

SORBUS, THE MOUNTAIN-ASH, is a genus of vascular plants belonging to the subfamily Pomoideae of the Rosaceae. In all, including CORMUS, ARIA and MICROMELES, there are approximately 80 species (Rehder, Man. Cult. Trees Shrubs, 1927) distributed throughout the northern hemisphere. Many are of economic importance as ornamental shrubs. They are attractive especially when in bloom, with large compound terminal corymbs of fragrant white flowers early in the season, and showy, usually red, fruits in the autumn and winter. A great deal of confusion exists as to the identity, specific limits, nomenclature, and geographical distribution of the North American species. It is the purpose in this paper to attempt a taxonomic revision in the form of the following short synopsis.

The subfamily Pomoideae Focke consists of a group of genera of ligneous plants with the ovary inferior and the fruit a pome. Many of the genera are very closely related to one another, and a number of natural hybrids are known to occur between them. Apparently they had a common origin, and it seems probable that all originated by genetic change within the basic set of 17 chromosomes, and that various degrees of chromosome differentiation now exist in the different genera (Sax, K., Jour. Arnold Arb. 1931). Hybrids are known to occur between *Aronia* and *Sorbus*, *Amelanchier* and *Sorbus*, and between *Pyrus* and *Sorbus*; a hybrid between *Malus* and *Sorbus* has been reported (*Bollwilleria malifolia* Zabel, Mitt. Deutsch. Dendr. Ges. 16: 76. 1907, nom. nud.) but no plants or specimens of such a hybrid seem to exist. There is no record of hybridism between *Malus* and *Pyrus*, although

these genera are morphologically very similar and have been cultivated side by side for thousands of years with the consequent ample opportunity for such hybrids to occur.

In view of the close relationship between these genera it is often a difficult matter to outline a satisfactory taxonomic arrangement. Each generic group, though sharing the well known characteristic of some other members of the Rosaceae in being rather deficient in those fundamental conservative morphological characters that are commonly accepted by botanists as of primary importance, is nevertheless very distinct in appearance and habit from its near relatives. *Sorbus* forms an extremely natural genus, and in view of the marked differences in the flowers, inflorescences, fruits, and foliage, it is difficult indeed to see why it should be included with the pears and apples. However, suggestion has been made recently that the Pomoideae be reduced to one genus, on account of this obvious close relationship, but both the demands of a practical taxonomy, as well as a sound basis in physiology and morphology, indicate that the various recognizable natural units in this subfamily are probably better maintained as separate genetic and generic entities, as they have been in the main for between one and two centuries. This conclusion has been accepted by the most eminent students of this group since the time of Linnaeus.

All the North American species of *Sorbus* belong to Section AUCUPARIA (Med.) K. Koch, of which most of the members are Asiatic. They are characterized by their odd-pinnate leaves, their 2–5 carpels which are not completely connate, and by the small, usually numerous, chiefly red, berry-like fruits, which lack or have only very few stone-cells.

In this paper 11 species and one variety of *Sorbus* are recognized, described and attributed to North America and Greenland. The important structural features used in the characterization of the species are the size and number of the flowers; the size, color, shape, and the number of the fruits; the size and shape of the inflorescence; the relative length of stamens and petals; the number and length of the styles; and the shape, size, and color of the seeds. The seeds of most species are distinctive and specifically recognizable, but their characteristics are difficult to describe in words. Although there is a certain amount of variation in the degree of flattening depending upon the number that mature in one pome, the size, shape, color, and dimensions of the mature seeds are apparently constant for a given species. This number varies from one to five in the material examined. The leaves furnish very good specific characters. The number, shape, size, texture, indument, and serration of the leaflets are definite. The glossiness or dullness of the upper



surface of the leaflets is a fundamental and fixed character of considerable diagnostic value, very useful in the identification of living plants. Although the lustre is to a great extent lost in herbarium specimens, the practised eye can detect its presence on specimens of those species which have it, and thus this character is of some value in studying dried material as well. Usually, the species with glaucescent fruits have dull leaflets, and conversely, those with glossy leaflets have lustrous scarlet pomes. There are a few exceptions to this rule, for example, *S. sambucifolia* has glossy leaflets, but glaucous fruits. However, as is remarked elsewhere, this is scarcely a North American type. Other characters used in differentiating species are the habit of the plant, whether arborescent or merely frutescent, and the presence, absence, and kind of pubescence on the pedicels, peduncles, rachises, and leaf-buds. The value of a taxonomic character increases with its constancy, and a character such as pubescence may have in certain groups a considerable, and perhaps unsuspected phyletic value. Differences in geographical distribution are of course not treated as taxonomic characters, but the species herein described are found to occupy definite and natural ranges and life-zones. Most of the North American "species" as treated in the past have exhibited discontinuous distribution and phytogeographical anomalies, suggesting to the competent phytogeographer the probability of more than one specific unit being involved in certain of these aggregates.

Intermediate between *Sorbus* and the closely related genus *Aronia*, and apparently representing intergeneric hybrids, are occasional specimens collected in the region between Newfoundland and Massachusetts. Similar hybrids have been known in European gardens for about 150 years. The leaves of these plants are pinnate, pinnatifid, or lobed, or merely serrate, the inflorescence is of the *Aronia* type, and the fruits are black, purple, or red. According to Schneider, and to Rehder, these plants belong to the hybrid genus  $\times$  *Sorbaronia* Schneid. Four such intergeneric hybrids between feral North American mountain-ashes and chokeberries are known. In this paper they are discussed or mentioned under *S. americana*, *S. aucuparia*, and *S. decora*. A single hybrid between *Sorbus* and *Amelanchier* is known from Idaho and Oregon. It has been described by Rehder as  $\times$  *Amelasorbus*, and is discussed in this paper under its *Sorbus*-parent, *S. scopulina*.

One or more species of *Sorbus* occur in nearly every part of the North American continent north of Mexico except the arctic regions, the area between long.  $95^{\circ}$  and  $102^{\circ}$ , and the southeastern part of the United States. No species occurs south of latitude  $32^{\circ}$  N. Only one mountain-ash, *S. decora* var. *groenlandica*, is known to be indigenous to Greenland.

The area from Newfoundland to Minnesota and southward to Michigan and North Carolina is occupied exclusively by the two native species, *S. americana* and *S. decora*, and the naturalized *S. aucuparia*. The remaining eight species are confined to the western half of the continent. *Sorbus scopulina* is the most widespread and abundant species in western North America, extending from British Columbia to New Mexico, and from South Dakota to eastern Washington, and eastern Oregon. *Sorbus dumosa* is a local, rather poorly known and much misunderstood species confined to Arizona and New Mexico. In the mountainous areas adjacent to the Pacific Coast there are three species, *S. californica*, *S. cascadenis*, and *S. occidentalis*. Extending from southern Alaska, across British Columbia, and southward to Glacier National Park, is *S. sitchensis*. *Sorbus alaskana* is a newly described species from Alaska. The Asiatic *S. sambucifolia* is scarcely a North American type, and is present in the western hemisphere, so far as is now known, on only four islands of the Aleutian chain. Thus it is apparent that each species has a natural and well-defined geographical area.

The principal recent works containing taxonomic studies of the genus *Sorbus* are by T. Hedlund in Kongl. Svenska Vetensk.-Akad. Handl., 1901; C. Schneider, Ill. Handb. Laubholz. vol. 2, 1907; and A. Rehder, Man. Cultivated Trees Shrubs, 1927. There are treatments of the species of eastern Asia by E. Koehne in volume 1 of Sargent, *Plantae Wilson*. (1913), and by A. Rehder in the second volume (1916) of the same work.

In the enumeration of specimens on the following pages, the name of the herbarium from which the specimen came is indicated by the following parenthetical letters: (A) Arnold Arboretum, (CA) California Academy of Sciences, (Can) National Museum of Canada, (G) Gray Herbarium, (NE) New England Botanical Club, (NY) New York Botanical Garden, (UC) University of California, and (US) United States National Herbarium. Acknowledgment is here made to the curators of these herbaria for their courtesies. Special thanks are due Dr. Theodor Just of the University of Notre Dame for photographs of certain type-specimens, and to Professor Alfred Rehder for innumerable useful suggestions and criticisms.

#### KEY TO THE NORTH AMERICAN SPECIES OF SORBUS

Fruits 4–11 mm. in diameter at maturity; flowers 5–10 mm. broad; calyx 2–4 mm. long at anthesis.

Winter-buds densely whitish-villous; rachises, pedicels, and calyces usually copiously whitish pilose-pubescent at flowering time.



- Tree, naturalized in North America; leaflets 11–15; inflorescence 75–100-flowered; fruit 9–11 mm. in diameter ....1. *S. aucuparia*
- Shrub, native in the mountains of Arizona and New Mexico; leaflets 9–11; inflorescence 40–60-flowered; fruit 6–8 mm. in diameter...  
.....2. *S. dumosa*
- Winter-buds glabrous or pilose, the trichomes whitish or ferrugineous. Leaflets 11–17; stipules caducous.
- Winter buds glabrous (or the inner scales sometimes sparsely ciliate toward the tips); leaflets narrowly oblong-lanceolate to lanceolate, acuminate, finely serrate; fruits 4–6 mm. in diameter; flowers 4–6 mm. broad; tree (or shrub) eastern North America...  
.....3. *S. americana*
- Winter-buds more or less pilose and ciliate; fruits 7–10 mm. in diameter at maturity; flowers 7–10 mm. broad.
- Lateral leaflets lanceolate or oblong-lanceolate, acuminate to acute, usually three to five times as long as broad, finely serrate almost to the base, glossy above (when living); seeds oblong, 3.5–4 mm. long; western American shrubs.
- Inflorescence normally flat-topped, 9–15 cm. broad, 80–200-flowered; species of the Rocky Mountain region.....  
.....4. *S. scopulina*
- Inflorescence rounded, 3–6 cm. broad, less than 40-flowered; species of northwestern Alaska .....5. *S. alaskana*
- Lateral leaflets oval or oblong, abruptly acute, seldom more than three times as long as broad, serrate to the middle or below, not glossy; seeds lanceoloid or fusiform, 4–5 mm. long; north-eastern America and southern Greenland .....6. *S. decora*
- Leaflets 7–11; stipules usually more or less persistent; shrubs, western America.
- Leaflets serrate from apex to middle or below; styles 1–2 mm. long at anthesis.
- Winter-buds greenish-brown, glutinous, glossy, glabrous or sparsely pilose; leaflets glossy above (when living); pedicels glabrous or sparsely pilose with short whitish trichomes.
- Pedicels sparsely pilose; mature leaflets normally 5–7 cm. long, 2–3 cm. wide; winter-buds 7–15 mm. long, ciliate or sparsely pilose with whitish trichomes; petals 5–6 mm. long; British Columbia to northern California .....7. *S. cascadiensis*
- Pedicels glabrous; mature leaflets normally 2–4 cm. long, 1–2 cm. wide; winter-buds smaller (3–8 mm. long), glabrous, or the inner scales sparsely rufous-ciliate; petals 3–4 mm. long; California .....8. *S. californica*
- Winter-buds dull, the reddish scales dorsally pilose with ferrugineous trichomes as well as marginally ciliate; pedicels ferrugineous-pilose at flowering time; leaflets dull; south-eastern Alaska to northwestern Montana and northern Idaho.  
.....9. *S. sitchensis*

Leaflets entire except near the apex (rarely with a few teeth near the middle), oblong, obtuse; pedicels, petioles, and rachises finely rufous-pubescent; styles 3 mm. long at anthesis; Cascade and Olympic mountains .....10. *S. occidentalis*

Fruits few, ellipsoid, glaucescent, 1–1.5 cm. in diameter at maturity; flowers 10–15 mm. broad; calyx 5–6 mm. long at anthesis; leaflets 7–9, lanceolate to ovate-lanceolate, acuminate, broadest at the base; shrub 1–2 m. tall; Aleutian Islands .....11. *S. sambucifolia*

1. ***Sorbus aucuparia* L.** Sp. Pl. 477. 1753; Hedlund, Svensk. Vet.-Akad. Handl. **35**: 46. 1901; Schneid. Ill. Handb. Laubholz. **1**: 672, f. 371, c-e, 1906; Britt. & Schafer, N. Am. Trees 428. f. 374, 1908; Mathews, Field Book Am. Trees Shrubs 202, f. opp. p. 202 (as *P. sitchensis*). 1915; Rehder in Bailey, Stand. Cyclop. Hort. **3**: 3195, f. 3649. 1917; Bailey, Man. Cult. Pl. 380. 1924; Wiegand & Eames, Fl. Cayuga Basin 246. 1926; Sudworth, Check List 133. 1927; Rehder, Man. Cult. Trees Shrubs 379. 1927; Rosendahl & Butters, Trees Shrubs Minn. 196, f. 1928; Schaffner, Field Man. Fl. Ohio 307. 1928; Rydberg, Fl. Prairies Plains 438. 1932; Marie-Victorin, Fl. Laurent. 319, f. 92. 1935; Jones, Univ. Washington Publ. Biol. **5**: 180. 1936.

*Pyrus Aucuparia* Gaertn. Fruct. Semin. Plant. **2**: 45. 1791; Ehrh. Beitr. Naturk. **6**: 94. 1791; Robins. & Fernald in Gray, Manual (ed. 7) 459. 1908; Henry, Fl. S. Brit. Col. 183. 1915; Mathews, Field Book Am. Trees Shrubs 202. 1915.

*Aucuparia silvestris* Medicus, Geschichte Bot. 86. 1793.

*Sorbus subvestita* Greene, Pittonia **4**: 131. 1900.

A small tree 6–10 m. tall, with stout, spreading branches; bark grayish, smooth; winter-buds conical, 5–10 mm. long, usually copiously whitish-villous, the pubescence rarely somewhat fulvous; young branchlets more or less pubescent, usually densely so, with grayish or whitish hairs, becoming glabrous in age; leaflets 11–15, oblong, acute, 3–5 cm. long, 1–1.8 cm. wide, somewhat asymmetrical at the base, dull green on the upper surface and more or less pilose when young, pale beneath and usually permanently whitish pubescent; margins coarsely serrate almost to the base, (or in some races to above the middle), the teeth ovate, abruptly mucronate, usually 35–40 on each leaflet, 4–5 per cm.; petioles and rachises whitish-tomentose, at least at flowering time, glandular at the bases of the leaflets; inflorescence 10–18 cm. broad, 75–100-flowered; pedicels and peduncles densely whitish-pubescent (at least in anthesis); flowers 8–9 mm. in diameter; calyx pubescent, the sepals triangular; petals orbicular, sparsely pubescent on the upper surface near the rounded base, 4 mm. long; stamens about as long as the petals; styles



3–4, 1.5–2 mm. long at anthesis, shorter than the stamens; ovary pubescent on top; fruit 9–11 mm. in diameter, scarlet, (glaucous in herbarium specimens), ripening in August; seeds oval, flattened, light brown, 4 mm. long, 2.5 mm. wide.

TYPE LOCALITY: European.

RANGE: native of Europe; frequently planted for ornament, and becoming naturalized in many places in North America. It has been well established for over half a century from Labrador to Pennsylvania, westward to North Dakota, Washington and southwestern British Columbia.

LABRADOR: Rigolet, July 20, 1921, *Wetmore* (Can). QUEBEC: La Trappe, *Louis-Marie* 60 (G). PRINCE EDWARD ISLAND: Brackley Point, *Fernald, Long & St. John* 7577 (G, A, Can), 8303 (A, US, NY, Can); Charlottetown, *Fernald & St. John* 7576 (A, US, Can). NOVA SCOTIA: Halifax, *Jack* 3672 (G, A); Truro, *Jack* 622, 631, 3534 (A); Pictou, *Jack* 3286 (A). MAINE: Orono, August 22, 1897, *Fernald* (G), *Ricker* 404 (US); York, *Bicknell* 4986 (NY); Rockland, *Long* 966 (NE); Hampden, *Fernald & Long* 13758 (NE); Sidney, *Fernald & Long* 13757 (NE); Topsham, August 29, 1912, *Furbish* (NE). VERMONT: Brattleboro, May 28, 1912, *Wheeler* (NE). MASSACHUSETTS: Belvidere, *Harris* 551 (NE); Indian Ridge, *Pease* 1945 (NE); Sherborn, *Loomis* 23 (G); Manchester, *Chamberlain* in 1899 (NY); Lexington, April 4, 1917, *Faxon* (A); Swampscott, July 15, 1895, *E. T. & S. A. Harper* (A); Pelham, May 25, 1880, *Minott* (US). CONNECTICUT: Berlin, *Marius Brandegee* (UC). RHODE ISLAND: Wickford, June 17, 1908, *Williams* (G, NE). NEW YORK: Oswego, May 27, 1887, *Coville* (US); Utica, *Haberer* 2309 (G). PENNSYLVANIA: Selinsgrove, *Moldenke* 2369 (NY). DISTRICT OF COLUMBIA: Washington, June 12, 1892, *Sudworth* (US). ONTARIO: Crystal Beach, June 6, 1926, *Davis* (US); Kingston, September 8, 1900, *Fowler* (US); Snelgrove, *White* 5 (G); Hamilton, *Macoun* 7841 (Can). MICHIGAN: Marl Lake, September 19, 1915, *Chandler* (US); Williamston, *Yuncker* 124 (US). WISCONSIN: Madison, August 24, 1893, *Rock* (US), *Humphrey* 89 (US), *Jensen* 518 (US). MINNESOTA: St. Louis Co., *Sandberg* in 1890 (isotype of *S. subvestita* Greene, UC); Fort Snelling, September 6, 1891, *Mearns* (G, US); Minneapolis, May 24, 1891, *Burglehaus* (US); Moore Lake, September 5, 1926, *Rydberg* (NY). IOWA: Claremont, *Pammel* 46 (US, NY). ILLINOIS: Evanston, *Price* (US); Napeville, May 25, 1898, *Umbach* (US); Jacksonville, May 1886, *Milligan* (US). INDIANA: South Bend, October 1, 1933, *Lyon* (NY, US, A); Laporte, *Deam* 9595

(NY), 17988 (A); Clear Lake, *Deam* 26407 (A); Springville, *Deam* 7992 (A); Wanatah, October 21, 1924, *Orahood* (NY). MANITOBA: Dropmore, July 1918 and August 1918, *Skinner* (A); Lake Winnepigosis, June 27, 1881, *Macoun* (US, Can). NORTH DAKOTA: Leeds, October 2, 1913, *Lunnell* (US). SOUTH DAKOTA: Brookings, May 25, 1891, *Williams* (US). NEBRASKA: Lincoln, June 10, 1889, *Williams* (US). IDAHO: Hailey, *Woods & Tidestrom* 2806 (US). WASHINGTON: Bingen, *Suksdorf* 10452 (A); Sequim, May 1915, *Grant* (NY). BRITISH COLUMBIA: Victoria, *Mrs. E. S. Kelley* (CA), *Macoun* 79785 (NY, Can). ALASKA: Wrangell, *Coville & Kearney* 425 (US), *Eastwood* 1010 (A).

*Sorbus aucuparia* has been a cause of much misunderstanding of the North American species of mountain-ash because specimens of that distinctive European species frequently have been mistaken for the native American *S. decora*, or for intermediates between that species and *S. americana*. It was also the basis for Greene's *S. subvestita*. Likewise, the record of *S. decora* as far west as Manitoba rests on misidentified specimens of *S. aucuparia*, the seeds of which are frequently carried by birds to localities surprisingly remote from human habitations. Complexity is added by the possible fact that *S. aucuparia* L. is a "collective species." Certainly Linnaeus' description of the leaves as "utrinque glabris" does not describe very accurately most of the specimens of the plants that are currently passing as *S. aucuparia*. However, the analysis of the European tree is scarcely within the province of the present study; the problem remains for European botanists to work out. Sterile specimens of *S. aucuparia* often may be identified by the peculiar thickened bases of the lower secondary veins on the back of the leaflet. These appear to be somewhat decurrent along the midvein. Sometimes this condition is not evident at first glance on account of the dense pubescence. Rarely are the leaflets glabrous beneath. The upper surface, usually described as 'pubescent,' in most instances quickly becomes glabrous as in the native species.

Several horticultural varieties of this well known species have been described from European material and many of them are cultivated in American gardens. These are briefly characterized in Rehder's Manual of Cultivated Trees & Shrubs. Hybrids between *S. aucuparia* and *S. americana* are sometimes cultivated. These are known by the name *S. splendida* Hedl. The only example that I have seen of what may be a natural hybrid between *S. aucuparia* and a native species is a collection that appears to represent *S. aucuparia*  $\times$  *S. decora*. A fruiting specimen (*Macoun* 21714) collected August 11, 1900 near Opeongo Lake, Algon-



quin Park, Ontario, seems to be intermediate in many respects between the two species. The fruits, as well as the pubescence of the buds and the underside of the leaflets, resemble those of the first species, while the shape, serration, and venation of the leaflets are more like those of *S. decora*. The later time of flowering of *S. decora*, and its montane habitat, no doubt prevent frequent crossings of this species with *S. aucuparia*.\* Sometimes specimens of *S. aucuparia* are confused with *S. decora*, but the densely pubescent buds of the former, as well as the pubescence of the pedicels and the lower leaf surface, and its larger fruits are fairly reliable differentiating characters. In addition, the shape and serration of the leaflets, and the size and shape of the seeds are distinctive. Even on specimens lacking fruits, flowers, or leaves, the densely-whitish pubescent winter buds will usually serve to identify *S. aucuparia* immediately.

There are two natural intergeneric hybrids with different species of *Aronia* reported from eastern North America. These are: *S. aucuparia*  $\times$  *Aronia arbutifolia* (L.f.) Elliot = *Sorbaronia hybrida* (Moench) Schneid. with the lower surface of the leaflets densely grayish pubescent, and the upper surface lacking any black glands along the midvein, represented by the following specimen: Truro, N. S., Jack 3267 (US); the other is: *S. aucuparia*  $\times$  *Aronia melanocarpa* (Michx.) Britt. = *Sorbaronia fallax* Schneid. with the lower surface of the leaves sparingly pilose to glabrous, and the upper surface often with a few black glands along the midvein toward the base of the leaf. The following Gray Herbarium specimens from Massachusetts apparently represent this hybrid: Andover, Pease 727, 1058, 3146; East Holliston, July 1909, and May 13, 1910, Loomis; Ipswich, May 26, 1908, Alcott; also Bangor, Maine, June 9, 1905, Knight.

The binomial *Pyrus aucuparia* was published by both Gaertner and Ehrhart in 1791, but if we accept the dates on the prefaces of their two works to decide the question of priority, Gaertner's name is sixteen days earlier, because his preface is dated April 6, while the date on Ehrhart's is April 22. In his list of synonyms, however, Ehrhart cited Ehrh. Plantag. 20, which refers to an earlier work, namely "Verzeichniss der Bäume und Sträucher, welche sich auf der Königl. Plantage zu Herrenhausen bei Hannover befinden." This was published anonymously by Ehrhart in 1787, and consists of a bare list of names.†

It will be noted that, contrary to custom, the specific name of this species is decapitalized. This is done because it appears that Linnaeus

\*See Dobzhansky, Genetics and the Origin of Species, 1937. Chapter 8, on isolating mechanisms.

†For a note on this obscure publication see p. 137.

was using the word in an adjectival sense rather than as a noun based on the generic name *Aucuparia* of Rivinus. This is indicated by the fact that he used a small initial.

2. ***Sorbus dumosa*** Greene, *Pittonia* **4**: 129. 1900; Hedlund, *Svenska Vet.-Akad. Handl.* **35**: 138. 1901; Rehder, *Man. Cult. Trees Shrubs* 378. 1927.

A shrub 2–3 m. tall, with slender, clustered stems; bark reddish; winter-buds densely whitish villous; young twigs densely whitish pubescent; lenticels few, small, inconspicuous, narrowly oval; leaves small, 6–15 cm. long; leaflets 9–11, rarely 13, thin, 2–4 cm. long, 1–1.5 cm. wide, oblong-lanceolate to oval, evenly serrate from the apex almost to the base, the teeth sharp, pointing forward, somewhat gland-tipped; apex sharply acute, the base rounded or cuneate, more or less oblique; upper surface dark green, somewhat glossy, glabrous; lower surface pale green, finely reticulate, glabrous except sometimes a few pilose trichomes along the midvein; petioles and rachises copiously pilose-pubescent or puberulent; inflorescence small, narrow, compact, round-topped, 3–7 cm. broad, 40–60-flowered; pedicels and peduncles densely villous with whitish hairs; calyx densely pubescent, 3 mm. long, the sepals broadly triangular, sharply acute, non-glandular, 1.5 mm. long, more or less ciliolate on the margins; petals about as long as the stamens, oval, cuneate at the base, 3–4 mm. long; styles 4, 2–2.5 mm. long, shorter than the stamens; anthers 1 mm. long; top of the ovary pubescent; fruit red, glossy, ellipsoid to subglobose, 6–8 mm. in diameter; seeds lanceoloid, light brown, 3–3.5 mm. long, 1.5–2 mm. wide.

TYPE LOCALITY: San Francisco Mountains, Arizona. Collected by Greene in 1889.

RANGE: A rather local subalpine species of Arizona and New Mexico.

ARIZONA: Mt. Lemmon, *Shreve* 5301 (A, G); Chiricahua Mts., July 1927, *Kusche* (A); Greenland Point, *M. E. Jones* 6056f (US); Baker Butte, *Coville* 1048 (US); Elden, September 30, 1910, *Percival Lowell* (A); North River, Grand Canyon Nat. Park, *U. S. Park Service* no. 2000 (US); Sabina Canyon, August 4, 1906, *Holmes* (US); Mt. Thomas, *Goldman* 2473 (US); White Mts., *Coville* 2010 (US), *Gooding* 1202 (US, NY), *Peebles & Smith* 12516 (US); Kendrick Peak, June 22, 1911, *Percival Lowell* (A), *Purpus* 8003 (A, US, UC), *Leiberg* 5657 (US), *Goldman* 2108 (US); San Francisco Mts., July 7, 1891, *MacDougal* 330 (A, US), *Leiberg* 5713 (US), *D. E. Palmer* in 1869 (US); Santa Catalina Mts., *Lemmon* 183 (UC), *J. A. Harris* C16448 (NY), *Livingston & Thornber* in 1906 (NY), *Peebles & Harrison*



2262 (US). NEW MEXICO: Pecos River National Forest, *Standley* 4446 (NY, US); Manzano Mts., *V. Bailey* 1426 (US); Zuni Mts., *Goldman* 1591, 1602 (US); Tunicha Mts., *Standley* 7733 (US, NY).

This is a relatively little known and rather obscure species of limited distribution in the mountains of Arizona and New Mexico. It is not closely similar to any other species, but evidently belongs to the *americana-scopulina* group, as is shown by the whitish pubescence and the acute leaflets. Geographically, and probably phylogenetically, it comes closest to *S. scopulina* Greene, but it differs considerably from that species, as is indicated by an examination of a photograph of the holotype, several topotypes, and a fairly good series of other specimens, in being a more slender shrub with fewer and smaller leaflets, a smaller, fewer-flowered, round-topped inflorescence, and a characteristic dense, whitish pilose pubescence or puberulence of the winter-buds, rachises, and pedicels. There seems to be a tendency for the stipules to be persistent.

3. ***Sorbus americana*** Marsh. Arbust. Am. 145. 1785; Willd. Enum. Pl. 1: 520. 1809; Schneider, Ill. Handb. Laubholzk. 1: 677, *f.* 371, *h-i*, 372, *g.* 1906; Hough, Handb. Trees N. U. S. Canada 239, *f.* 277-279. 1907; Britt. & Schafer, N. Am. Trees 427, *f.* 373. 1908; Britt. in Britt. & Brown, Ill. Fl. N. States (ed. 2) 2: 287, *f.* 2318. 1913; Mathews, Field Book Am. Trees Shrubs 201, *f. opp. p.* 202. 1915; Rehder in Bailey, Stand. Cyclop. Hort. 3195, *f.* 3648. 1917; Sargent, Man. Trees N. Am. (ed. 2) 390, *f.* 347. 1922; Bailey, Man. Cult. Pl. 380, 1924; Pease, Vasc. Pl. Coos Co., N. H., 266. 1924; House, N. Y. State Mus. Bull. 254: 408. 1924; Wiegand & Eames, Fl. Cayuga Lake Basin 246. 1926; Sudworth, Check List 133. 1927; Rehder, Man. Cult. Trees Shrubs 377. 1927; Rosendahl & Butters, Trees Shrubs Minn. 194, *f.* 1928; Miller & Tehon, Div. Nat. Hist. Surv. Illinois Bull. 18: 202, *pl.* 65. 1929; Rydberg, Fl. Prairies Plains 438, 1932; Small, Man. SE. Fl. 632, *f.* 1933; Coker & Totten, Trees SE. States, 190, *f.* 1934; Marie-Victorin, Fl. Laurent. 319, *f.* 92. 1935.

*Sorbus Aucuparia* var.  $\alpha$  Michx. Fl. Bor. Am. 1: 290. 1803.

*Sorbus micrantha* Dum.-Cours. Bot. Cult. (ed. 2) 5: 464. 1811.

*Sorbus microcarpa* Pursh, Fl. Amer. Sept. 1: 341. 1814; Roemer, Syn. Mon. 138. 1847; Hedlund, Svenska Vet.-Akad. Handl. 35: 41, *f.* 7g. 1901.

*Sorbus aucuparia* sensu Bigelow, Flora Boston. 119. 1814.

*Pyrus microcarpa* DC. Prodr. 2: 636. 1825; Spreng. Syst. 2: 511. 1825.

*Pyrus americana* DC.  $\beta$  *microcarpa* Torrey & Gray, Fl. N. Am. 1: 472. 1843; Nutt. N. Am. Sylva 2: 25, 27. 1853.

*Sorbus americana* Marsh. var. *microcarpa* Wenzig, *Linnaea* 38: 73. 1874; Rehder in Bailey, *Stand. Cyclop. Hort.* 3194. 1917.

*Aucuparia americana* Nieuwl. *Am. Midl. Nat.* 4: 175. 1915.

*Pyrus americana* sensu Watson & Coulter in Gray, *Man.* (ed. 6) 164. 1889; Sargent, *Silva N. Am.* 4: 79, *pl. clxxi, clxxii.* 1892; Chapman, *Fl. SE. U. S.* (ed. 3) 141. 1897; Dame & Brooks, *Handb. Trees New Engl.* 112, *pl. lvii.* 1902; Robins. & Fernald, in Gray, *Man.* (ed. 7). 459. 1908; Mathews, *Field Book Am. Trees Shrubs* 201, *f. opp. p. 202.* 1915; St. John, *Bot. Expl. Gulf St. Lawrence* 91, 1922. Non DC., 1825.

A small tree (or shrub) 4–10 m. tall, the trunk with a maximum diameter of 20–30 cm; branches slender, ascending or spreading; bark nearly smooth, gray, with some small irregular scales; winter-buds conical, glabrous or nearly so, 1–2 cm. long, glutinous; young branchlets glabrous or sparingly pilose, reddish brown, with numerous elongate lenticels; leaflets 11–17, lanceolate to narrowly oblong-lanceolate, acuminate, 5–9 cm. long, 1–2.5 cm. wide,  $3\frac{1}{2}$ –5 times as long as wide, the base cuneate or rounded, somewhat asymmetrical; margins sharply and finely serrate nearly to the base with lanceolate, acuminate, incurved teeth, or sometimes slightly double-serrate; upper surface bright green and glabrous; lower surface paler, usually becoming completely glabrous at maturity; terminal leaflet oval; petioles and rachises glabrous, except for several glands and frequently a few long trichomes at the bases of the leaflets; inflorescence flat-topped, 6–15 cm. broad, densely 125–200-flowered; pedicels and peduncles essentially glabrous; bracts caducous; flowers about 5–6 mm. in diameter; petals oval, 3–4 mm. long, cuneate at the base; sepals triangular, acute, 1 mm. long, sometimes with minute dark sessile marginal glands; stamens 15–20, shorter than the petals; ovary pubescent on top; styles 3, equalling or only slightly shorter than the stamens, 2 mm. long; fruit 4–6 mm. in diameter, globose, bright red, glossy, acid, ripening in August; seeds lanceoloid, asymmetrical, chestnut brown, 3 mm. long, 2 mm. wide.

TYPE LOCALITY: Northeastern North America, probably Pennsylvania. "This grows naturally upon the mountains towards Canada." (Marshall, l. c.)

RANGE: Newfoundland to northeastern Minnesota, southward across northern Illinois to eastern Tennessee and North Carolina.

NEWFOUNDLAND: Grand Falls, *Fernald & Wiegand* 5660 (G), 5657 (G, A, Can, NY); Frenchman's Cove, *Mackenzie & Griscom* 10322 (G); Bonne Bay, *Kimball* 106 (G); Channel, *Howe & Lang* 976 (G); Conception Bay, *Howe & Lang* 1202 (NY); Miller Junction, *Fernald & Wiegand* 5658 (G); Glenwood, *Fernald & Wiegand* 5659 (G); St.



Johns, July 16, 1902, *Dame* (G); Cow Head, *Fernald & Wiegand* 3550 (G); Bay of Islands, July 21, 1902, *Dame* (A); Brig Bay, *Fernald et al.* 28490 (G, A). QUEBEC: Harbour Island, *Abbe* 1239 (G); Lac Tremblant, July 21, 1922, *Churchill* (G); Ascot, July 29, 1923, *Chamberlain & Knowlton* (G); Black Lake, *Fernald & Jackson* 12105 (G); Riviere Romaine, *Marie-Victorin & Rolland-Germain* 20906 (G); Romaine, July 8, 1915, *St. John* (G, Can); Gaspé Bay, August 23, 1897, *Jack* (A); Lake St. John, August 22, 1895, *Jack* (A); Lac des Roches, *Marie-Victorin* 5516 (A); Anticosti Isl., *Marie-Victorin & Rolland-Germain* 27369 (A, G); Gatineau River, *Macoun* 4574 (NY); Calumet, *Macoun* 8189 (Can). PRINCE EDWARD ISLAND: Charlottetown, *Fernald & St. John* 7573 (A, Can, US). NEW BRUNSWICK: Fredericton, *Jack* 596 (A); Campobello Isl., *J. D. Smith* in 1888 (US). NOVA SCOTIA: Clementsport, *Jack* 3700 (A, G); Sissiboo River, *Fernald et al.* 21426 (G); Barasois River, Cape Breton Isl., *Nichols* 1178 (G); Baddeck, *Macoun* 19085 (G, Can); Folly Lake, September 29, 1917, *Jack* (A); Halifax, *Jack* 674, 3240 (A), *Howe & Lang* 1472 (G, NY); Salmon Lake, *Fernald, Long & Linder* 21428 (A, Can, G); Barton, *Jack* 3342 (A); Bedford, July 3, 1883, *Macoun* (Can), *Jack* 3320 (A); Pleasant Valley *Jack* 3163 (A); Fall River, *Jack* 3314 (A); Yarmouth, *Jack* 3872 (A); Shelburne, *Jack* 3459 (A); Digby, *Howe & Lang* 250 (NY); Springville, *C. B. Robinson* 505 (NY). MAINE: St. Francis River, August 12, 1902, *Eggleston & Fernald* (A, G, NE); Mt. Desert, June 27, 1890, *Redfield* (US); Pleasant Pond, August 18, 1902, *Collins & Chamberlain* (G, NE); Monhegan Isl., August 29, 1901, *Churchill* (G); *Jenney, Church & Hill* 3159 (NE); Grand Isle, *Fernald* 2304 (NE); Mount Katahdin, July 14, 1900, *Fernald* (NE); Mount Kineo, *Cushman* 1925 (NE); St. John Pond, *St. John & Nichols* 2331 (NY, NE); Brooklin, *Hill* 571 (NE); Duck Harbor, *Hill* 1737 (NE); South Poland, *Furbish* in 1893 (NE); Orono, *Briggs* in 1893 (NY). NEW HAMPSHIRE: Randolph, *Pease* 18085 (NE); Pittsburgh, *Pease* 10829 (NE); Mount Washington, *Jack* 2478 (A); Jaffrey, *Robinson* 624 (G, NE); Rindge, *Batchelder* in 1913 (NY); East Hebron, July 18, 1917, *Wilson* (NY). VERMONT: Chittenden, *Eggleston* 195 (US, G); Mt. Mansfield, August 6, 1902, *Rehder* (A); Long Pond, June 11, 1895, *Westmore* (G); Willoughby, June 16, 1898, *Williams* (G); Woodford, June 20, 1925, *Carpenter, Churchill & Knowlton* (NE); Middlebury, June 13, 1879, *Brainerd* (NY). MASSACHUSETTS: Princeton, *Pease* 724 (NE); Ashburnham, August 8, 1908, *Knowlton* (NE); Williamstown, September 8, 1897, *Churchill* (NE); Worthington, *Robinson* 670 (G); Mount Watatic, Ashby, August 9, 1908, *Knowlton* (G). CONNECTICUT: Dur-



ham, *Blewitt* 1775 (NE); Meriden, July 20, 1913, *Bissell* (NE); Winsted, July 5, 1912, *Blewitt* (NE); North Canaan, *Blewitt* 665 (NE). NEW YORK: Black Bear Mountain, *Killip* 7143 (A, US), 31783 (A); Lake Placid, August 9, 1902, *Rehder* (A); Lake George, July 31, 1900, *Burnham* (G); Long Lake, *House* 10217 (G); Plymouth, *Wiegand* 6581 (G); Colton, *Phelps* 1411 (NY, G); Rome, *Muenschner* 14768 (G); Olean, *Muenschner* 15584 (G); Hunter Mountain, *Muenschner et al.* 15566 (G); Turnwood, August 12, 1891, *Rusby* (NY); Slide Mt., May 31, 1901, *Britton* (NY); Catskill Mts., *Britton* in 1898 (NY). NEW JERSEY: High Point, *Mackenzie* 4652 (G, NY); Mt. Hope, *Tompkins* (NY). PENNSYLVANIA: Lenhartsville, *Long* 12894 (G); Pocono Plateau, August 1904, *Harshberger* (G), *Small* in 1889 (NY); Bangor, September 5, 1908, *Bartram* (A); Port Allegheny, September 7, 1928, *Gable* (A); Laporte, *Eggleston* 22696 (US). MARYLAND: Garrett Co., June 28, 1882, *J. D. Smith* (US); Oakland, *Tidestrom* 6436 (US). WEST VIRGINIA: Panther Mountain, *Rydberg* 9028 (A, NY); Aurora, August 18, 1898, *Steele* (A, NY, US); Cheat Valley, August 27, 1907, *Rehder* (A); Stony River Dam, *Core* 6776 (NY, G); mont. Virg. Carol. Sept., July 1841, *Gray & Carey* (G, US); Spruce Knob, *Rydberg* 9185 (NY), *Greenman* 148 (G), *Millsbaugh* 1624 (NY). VIRGINIA: Peaks of Otter, September 1, 1871, *Curtiss* (G), *Eggleston* 18636 (US); Stony Man Peak, *Steele* 136 (G, US, NY); Crescent Rocks, *Camp* 1260 (NY). NORTH CAROLINA: Grandfather Mountain, *Randolph* 1191 (G), *Small & Heller* 298 (US, NY), *Rydberg* 9348 (NY), *Curtis* (NY, the type of *Pyrus americana*  $\beta$  *microcarpa* Torr. & Gray); Craggy Mountain, *Biltmore Herbarium* 486 (G, A, US, NY); Roan Mountain, September 24, and September 27, 1885, *Sargent* (A); Highlands, *Harbison* 80 (A). TENNESSEE: New Found Gap, June 27, 1931, *Jennison* (US). MICHIGAN: Emerson, *Dodge* 15 (A); Pellston, *Gates* 14883 (A); Turin in 1901, *Barlow* (A, NY); Vermillion, *Dodge* 12 (A). ILLINOIS: Oregon, June 6, 1888, *Waite* (US). WISCONSIN: Newbold, *Palmer* 28692 (US, A); Rhinelander, *Palmer* 28703 (A, US); Wheeler, *Palmer* 28561 (A); Kilbourn, *Palmer* 28415 (A); Star Lake, September 1901, *Denniston & Timberlake* (G); Antigo, August 1898, *Cheney* (G); Sturgeon Bay, July 11, 1885, *Schuette* (G); Newport, June 24, 1883, *Schuette* (NY). MINNESOTA: Duluth, September 16, 1882, *Faxon* (A); Vermillion Lake, *Arthur, Bailey & Holway* B315 (G); Grand Marais, *Rydberg* 9612 (NY), *Butters & Buell* 477 (G, US, NY); Mineral Center, *Rosendahl & Butters* 4583 (G, NY); Crab Lake, *Butters* in 1918 (NY).

*Sorbus americana* is apparently the commonest eastern North American species. The flowering period is May and June. Fruits are ripe in



late August and September, persisting into the winter. It is abundant in rich rather moist soil along the borders of swamps, and on rocky hillsides. It grows also along riverbanks, and in cool mountain woods. In the autumn the tree is very attractive on account of the conspicuous yellowish leaves and red fruits. This species can be distinguished from *S. decora*, which has a similar range, and with which there has been some confusion in the past, by its smaller flowers with the stamens shorter than the petals, the smaller fruits and seeds, and by the narrow, linear-lanceolate to lanceolate, acuminate, finely toothed, usually glabrous leaflets. Hybrids between *S. americana* and *Aronia melanocarpa* are known in cultivation, although I have seen no specimens of spontaneous American plants. If a hybrid-genus name is used it would be written  $\times$  *Sorbaronia sorbifolia* (Poir.) Schneid. In this issue of the Journal of the Arnold Arboretum, p. 95, Professor Rehder describes a hybrid between *Sorbus americana* and *Aronia prunifolia*.

The nomenclatural history of this species, and of the somewhat distantly related *S. decora*, is rather complex. As previously noted, *S. americana* was first described by Marshall in 1785. André Michaux in 1803, overlooking or ignoring Marshall's work, characterized the two native northeastern American mountain ashes as varieties  $\alpha$  and  $\beta$  of *S. aucuparia* L. The variety  $\alpha$  was said to have "foliis acuminatis," and habitat "in excelsis montibus Carolinae." This is obviously *S. americana* Marsh. The var.  $\beta$  was characterized by "foliis sensim acutis," and the habitat "in Canada et circa lacum Ontario." Plainly, this is the northern shrub we now call *S. decora*. In 1809 Willdenow published as a new species *S. americana*, citing "*S. aucuparia* Mich." as a synonym and giving the habitat "in montibus excelsis Carolinae," evidently quoting from Michaux. In doing this possibly he was unaware of the earlier publication of *S. americana* Marsh., or at any rate he did not refer to it. The var.  $\alpha$  and var.  $\beta$  of Michaux were evidently regarded as identical, and in combining them he selected the var.  $\alpha$  as the principal element, as is indicated by his statement of habitat. From the description "*S. foliis pinnatis, foliolis subaequaliter serratis petioloque communi glaberrimus*" there is nothing more to be learned about the character of the specimens he may have had in hand, since the statement will apply equally to almost any species of *Sorbus*, and the supplementary remark "*Baccae purpureae nec coccineae*" is an attempt to contrast the color of the fruits with that of *S. aucuparia*. So far, then, the case is clear: *S. americana* Willd. 1809 = *S. Aucuparia* Var.  $\alpha$  Michx. 1803 = *S. americana* Marsh. 1785. Pursh in 1814 was the first to recognize the fact that there are two distinct species native to northeastern North

America, each entirely different from the other and from the European *S. aucuparia* L. The northern plant with acute leaflets and large fruits Pursh called *S. americana*, citing Willd. Enum. Plant. 520, from where he copied the description. To this description, however, he made the important addition "foliolis acutis," citing *S. Aucuparia* var.  $\beta$  Michx. as a synonym, and giving the habitat "In Canada and on some of the northern mountains." All this refers unmistakably, of course, to *S. decora* (Sarg.) Schneid., and confirms the fact that *S. americana* Pursh is not *S. americana* Marsh. It is interesting to notice that Pursh has copied from Willdenow the statement "Berries purple, not scarlet as in the European species." Pursh designates the other native eastern North American shrub (the one with acuminate leaflets, small fruits, and a more southerly range), by the new name *S. microcarpa*. He cites *S. Aucuparia*  $\alpha$  Michx. as a synonym, gives the habitat and range "On the peaks of high mountains: New Jersey to Carolina," and adds the comment "This species is very distinct from the Canadian *Sorbus*." i.e., his *americana*, which, as previously pointed out, is *S. decora* (Sarg.) Schneid., but not *S. americana* Marsh. In 1825 A. P. De Candolle transferred these species to *Pyrus*, but unfortunately the name *Pyrus americana* DC., designating the northern shrub with acute leaflets and large fruits, is based upon *Sorbus americana* Pursh, and therefore is not synonymous with *S. americana* Marsh.

Hedlund (l. c.) rejects the name *Sorbus americana* Marsh. as a nomen dubium and accepts instead *S. microcarpa* of Pursh. While Marshall's description is not as definite as might be desired, nevertheless there seems to be no compelling reason for upsetting the usage of more than a century and a half in order to adopt a name that is only slightly less vague in its exact application. In any event the name *S. microcarpa* is three years later than *S. micrantha* of Dumont de Courset. There is scarcely any doubt as to the identity of Marshall's species since it is the only native feral *Sorbus* occurring in Pennsylvania, where Marshall had his garden, and from where, presumably, he secured his specimens.

Perhaps it would not be out of place to parenthetically note the fact that many of the references in Sargent's *Silva* (l. c.) under *Pyrus americana* really belong to *S. decora*.

4. ***Sorbus scopulina*** Greene, *Pittonia* **4**: 130. 1900; Hedlund, *Svenska Vet.-Akad. Handl.* **35**: 138. 1901; Rydberg, *Fl. Colorado* 193. 1906; Schneider, *Ill. Handb. Laubholz.* **1**: 677, fig. 372 c-f. 1906; Coulter & Nelson, *New Man. Rocky Mt. Bot.* 269. 1909; Wootton & Standley, *Contr. U. S. Nat. Herb.* **19**: 324. 1915; Ryd-



berg, Fl. Rocky Mts. 448. 1917; Tidestrom, Contr. U. S. Nat. Herb. **25**: 284. 1925; Kirkwood, N. Rocky Mt. Trees Shrubs 197, f. 40, pl. 25. 1930; Rydberg, Fl. Prairies Plains 438, f. 291. 1932; Graham, Ann. Carnegie Mus. **26**: 244. 1937.

*Pyrus americana* sensu Cooper, Am. Nat. **3**: 406. 1870. Non DC., 1825.

*Pyrus sambucifolia* sensu Watson in U. S. Geol. Explor. **5**: 92. 1871; Porter & Coulter, Syn. Fl. Colorado 48. 1874; Coulter, Man. Bot. Rocky Mt. Region 89. 1885. Non Cham. & Schlecht., 1827.

*Sorbus sambucifolia* sensu Rydberg, Contr. U. S. Nat. Herb. **3**: 498. 1896, Mem. N. Y. Bot. Gard. **1**: 227. 1900; Standley, Contr. U. S. Nat. Herb. **22**: 366. 1921. Non Roemer, 1847.

*Pyrus sitchensis* Piper, Contr. U. S. Nat. Herb. **11**: 347. 1906, ex parte; Piper & Beattie, Fl. SE. Wash. Adj. Idaho 134. 1914.

*Sorbus angustifolia* Rydberg, Fl. Rocky Mts. 448. 1917; Rehder, Man. Cult. Trees Shrubs 377. 1927. *Synon. nov.*

*Sorbus sitchensis* var. *densa* Jepson, Man. Fl. Pl. Calif. 508. 1925.

*Pyrus scopulina* Longyear, Trees Shrubs Rocky Mt. Reg. 152. 1927.

*Sorbus dumosa* sensu Raup, Contr. Arnold Arb. **6**: 174. 1934. Non Greene, 1900.

*Sorbus sitchensis* sensu Raup, Jour. Arnold Arb. **17**: 264. 1936. Non Roemer, 1847.

*Pyrus dumosa* sensu St. John, Fl. SE. Wash. Adj. Idaho 205. 1937. Non Fernald, 1921.

A shrub 1–4 m. tall, sometimes forming dense clumps; bark thick, reddish; winter-buds glossy, glutinous, the scales brown, glabrous or sparsely whitish-pilose dorsally, ciliate on the margins; young twigs sparingly pilose; stipules membranous, glabrous; leaflets 11–13, the lateral lanceolate or oblong-lanceolate, 3–6 cm. long, 1.2–2 cm. wide, 3–5 times as long as wide, cuneate at the base and slightly oblique, sharply acute or shortly acuminate at the apex, the margins finely and sharply simply or doubly serrate from the apex almost to the base, the teeth ovate-lanceolate, sharply acuminate, not at all glandular or callose at the tips; glabrous on both surfaces at least when mature, the upper surface dark green and glossy, perfectly glabrous, reticulate-rugose when fresh, paler beneath; terminal leaflet oval; petioles and rachises glabrous or nearly so, except for a few glands and several long trichomes at the bases of the leaflets; inflorescence dense, flat-topped, 9–15 cm. broad, 80–200-flowered; pedicels and peduncles sparingly pilose; flowers fragrant, about 1 cm. in diameter; calyx pilose, the sepals triangular, acute, 1.5 mm. long; petals oval, 5–6 mm. long, about as long as the stamens; styles 3–4, 2–2.5 mm. long, about half the length of the stamens; top of the ovary pubescent; fruit orange or scarlet, glossy, not glaucescent, globose, 8–10 mm. in diameter, bitter; seeds oblong, almost symmetrical, light brown, 3.5–4 mm. long, 1.5–2 mm. wide.

TYPE LOCALITY: Near Pagosa Peak, altitude 9000 feet, Colorado. Collected by C. F. Baker, August 10, 1899.

RANGE: British Columbia and Alberta to South Dakota, eastern Washington and southward to New Mexico.

BRITISH COLUMBIA: Cariboo, *Macoun* 8215 (Can); Yale, *Macoun* 8209 (Can); Yellowhead Pass, *Macoun* 19335 (Can); Chilliwack Lake, *Spreadborough* 79775 (Can); Moose Pass, *Hollister* 47 (US); Donald, July 18, 1887, *Macoun* (NY); Glacier, August 12, 1897, *Sargent* (A), *Brown* 256 (US, NY), *Snyder* 545 (US, NY), *Butters & Holway* 727 (G); Emerald Lake, *Shaw* 69 (US, NY), *Shaw* 1114 (G, NY, US), *Peterson* 132 (US, NY); Revelstoke, *Shaw* 813 (US, NY, G); Rocky Mt. Canyon, *Raup & Abbe* 3750 (A, Can); Stikine River, July 10, 1919, *Swarth* (UC); Lake Atlin, September 7, 1930, *Setchell & Parks* (UC); Waldie Creek, *MacFadden* 13892 (UC); Klappan River, *Preble & Mixter* 655 (US). ALBERTA: Assineau River, *Brinkman* 4395 (NY); Atauwau River, *Brinkman* 4181 (NY); Vermilion Mt., *McCalla* 2099 (US, NY), August 1899, *Sanson* (CA, Can); Lake Athabaska, *Raup* 4470, 4584, 4659 (G); Little Slave Lake, *Macoun* 1574 (Can); Kicking Horse Pass, *Macoun* 1575a (Can). SASKATCHEWAN: Lake Athabaska, *Raup* 6425, 6799, 6930 (G), *Laing* 210 (US). SOUTH DAKOTA: Deadwood, *Hayward* 247 (NY), *Palmer* 37611 (A, NY); Strawberry Gulch, *Murdoch* 3090 (G, NY); Lawrence Co., *Over* 13687 (US); Watertown, *Over* 15917 (A). MONTANA: Bridger Mts., *Flodman* 546 (NY, US), *Rydberg & Bessey* 4427 (G, NY, US), June 27, 1901, *W. W. Jones* (A, US, UC), *Blankinship* 159 (US); Neihart, *Williams* 851 (US); Sinyaleamin Lake, *MacDougal* 328 (NY, US); Midvale, *Umbach* 96 (NY, US); Two Medicine Lake, *Standley* 15027 (US); Glacier Park Station, *Standley* 17706 (US); Belton, *Standley* 18641, 18642 (US), *Jack* 1607 (A); Many Glacier, August 25, 1921, *Susan D. McKelvey* (A), *Jack* 2003 (A); Lake McDonald, *Jack* 2338 (A), September 16, 1921, *Susan D. McKelvey* (A), July 16, 1909, *M. E. Jones* (NY); Gunsight Lake, *Jack* 2244 (A); Grant Creek, *Kirkwood* 31 (A); Marshall Gulch, *Kirkwood* 31a (A); MacDougal Peak, July 30, 1908, *Mrs. J. Clemens* (G, A), *M. E. Jones* 8141 (US); Flathead Lake, August 10, 1908, *Mrs. J. Clemens* (G, A); Avalanche Lake, July 17, 1896, *Sargent* (A), *Jack* 2292 (A); Logan Pass, *C. L. Hitchcock* 1944 (G); St. Mary, *Jack* 1522 (A); St. Mary Lake, *Standley* 17070 (US); Livingston, September 20, 1892, *Kelsey* (NY); Helena, *Kelsey* (UC); Columbia Falls in 1894, *Williams* (G, NY); Bozeman, June 26, 1900, *Blankinship* (UC). IDAHO: Cedar [Moscow] Mt., *Sandberg*, *MacDougal & Heller* 421 (G, US, NY),



*Elmer* 350 (US, NY, A), August 1896, *Elmer* (A), *Abrams* 664 (UC, NY, A), *Jack* 1265 (A), *Henderson* 2688 (G, US), *Eggleston & St. John* 21984 (US), July 1898, *Piper* 1527 (TYPE of *S. angustifolia* Rydb., NY; ISOTYPE, G); Bohannon Creek, *Henderson* 4037 (US); Wiessners Peak, *Leiberg* 1381 (US); Alturas Lake, *Evermann* 497 (US); Bascom's Ranch, Elmore Co., *Macbride* 629 (G, NY, US, UC); Silver City, *Macbride* 1013 (NY, US, UC, G); Pinehurst, *Macbride* 1677 (US, G, UC); Beaver Canyon, *Shear* 3131 (US, NY); Seven Devils Mts., August 5, 1899, *M. E. Jones* (NY); Quartzburg, July 24, 1892, *Mulford* (NY, A); St. Maries, *House* 4921 (US); Sohons Pass, *Leiberg* 1381 (G, NY, A, UC); Hope, *Munson & Hopkins* in 1889 (US); Little Skeleton Creek, *Woods & Tidestrom* 2572 (US); divide between St. Joe & Clearwater rivers, *Leiberg* 1194 (NY, A, UC, US); Kootenai Co., *Sandberg* 4326 (NY); Little Dry Creek Canyon, *Rust* 675 (CA); Elk Butte, *Jack* 1333 (A); Elk River, *Jack* 1300 (A); Lake Waha, *Heller* 3275 (NY, US, A, UC); Priest Lake, July 28, 1896, *Sargent* (A), *MacDougal* 154 (NY); Pend Oreille River, *D. Lyall* in 1860 (G). WYOMING: Copperton, *Tweedy* 4182 (US, NY); Leighs Lake, *Merrill & Wilcox* 987 (US); Piney Creek, August 28, 1900, *Jack* (A); Hidden Falls, *Williams* 866 (NY, CA); South Spring Creek, *Eggleston* 11290 (US); Centennial, *Nelson* 10114 (UC); Lander, *Nelson & Nelson* 360 (UC); Battle Lake, *Nelson & Nelson* 350 (NY, G, UC); Teton Pass, *Merrill & Wilcox* 981 (G, NY); Bighorn Mts., *Tweedy* 2538 (NY); Teton Mts., *Nelson* 982 (NY, G, US); Green River, October 1870, *Hayden* (G, NY); Elk Mountain, Carbon Co., *Goodding* 553 (A, G, US, UC, NY); Gros Ventri River, *Tweedy* 198 (NY); *Yellowstone National Park*: Firehole River, September 3, 1904, *Rehder* (A); Yellowstone Lake, July 20, 1902, *Scheuber* (US), *A. Nelson & E. Nelson* 6333 (US, G, NY); Mammoth Hot Springs, *Mearns* 4602 (US, NY); 12 miles east of Old Faithful, *Maguire* 1177 (UC); without definite locality, *Mearns* 4238 (G, US). UTAH: east of Gunnison, *Ward* 668 (G, US); Peterson, *Pammel & Blackwood* 3819 (G, A); Sierra la Sal, *Purpus* 7039 (US, UC); Mt. Timpanogos, *Maguire* 3648 (UC); Timpanogos Canyon, *Palmer* 38092 (A); Mt. Nebo, *Rydberg & Carlton* 7576 (US, NY); Mt. Pleasant, *Tidestrom* 1868 (US); Salt Lake, *Eastwood* 7748 (A, CA); Wasatch Mts., *Watson* 351 (US, G, NY); Immigration Gap, *House* 5045 (NY); Provo, *M. E. Jones* 5583 (US, UC, NY, A), *Goodding* 1153 (US, G, UC, NY); Ogden, *A. S. Hitchcock* 1449 (US); Logan, August 9, 1895, *Rydberg* (NY), *Shear* 3173 (NY); American Fork Canyon, *M. E. Jones* 1369 (A, NY); East Bountiful, September 22, 1909, *Mrs. J. Clemens* (CA, NY); Red Butte,



June 9, 1908, *Mrs. J. Clemens* (A); Big Cottonwood Canyon, *Rydberg & Carlton* 6611 (G, NY), *Garrett* 1346 (G). COLORADO: Pagosa Peak, *Baker* 403 (A, G, US TYPE, UC, NY); Columbine, *Cary* 77 (US); Rabbit Ear Range, *Goodding* 1578 (A, US, G, UC, NY); Rabbit Ear Pass, *Nelson & Nelson* 340 (UC); Telluride, *Tweedy* 221 (US); Tolland, *Palmer* 31401 (A); Mt. Carbon, *Eggleston* 5737, 6184 (US), *Tidestrom* 3809, 4060 (US); Victoria, *Tweedy* 4181 (US, NY); Elk Mts., *Brandegee* in 1881 (UC); Minnehaha, *Johnston* 2547 (UC); Wolf Creek Pass, *Eggleston* 20540 (NY), *Wolf* 3068 (G, CA), *Susan D. McKelvey* 4727 (A); Dry Creek, Uncompahgre Nat. Forest, *Tidestrom* 1543 (US); Uncompahgre Plateau, *Maguire* 12821 (UC); Buffalo Pass, *Shear & Bessey* 3937 (NY); Four Mile Hill, Routt Co., July 22, 1896, *Baker* (NY); Sierra La Plata, *Brandegee* 1148 (UC); Empire, *Tweedy* 5762 (NY); Palmer Lake, August 12, 1896, *Crandall* (NY); Douglas Creek, *Graham* 9697 (US); Upper La Plata Canyon, *Baker, Earle & Tracy* 653 (A, G, US, NY); Granite Peaks, *Susan D. McKelvey* 4688 (A); Ouray, *Baker* 757 (NY, G, US), *Underwood & Selby* 107 (NY), June 22, 1892, *Crandall* (G, NY), *Shear* 4147 (NY, US). NEW MEXICO: Rio Medio, *H. P. Baker* in 1906 (US); Brazos Canyon, *Standley & Bollman* 10808 (US). WASHINGTON: Nason Creek, *Sandberg & Leiberg* 683 (US, CA), 638 (A, UC, NY); Scotia, *Jack* 1475 (A); east of the Cascade Mts., *Wilkes Expedition* 489 (US); Mt. Stuart, *Elmer* 1269 (A), *Whited* 811 (US); Easton, *Whited* 424 (US), *Roell*, June 8, 1888 (A); Fish Lake, Kittitas Co., *Thompson* 10658 (US, A, CA, G); Swauk River, *Sharples* 109 (G); Mica Peak, *Suksdorf* 8818 (A); Mt. Carleton, *Kreager* 265 (US, G, NY); Blue Mts., *Horner* 181 (US), *B181* (G), *Sargent*, July 31, 1896 (A); Mt. Adams, October 1, 1881, *Suksdorf* (US), 7096 (A); Yakima region *Brandegee* in 1882 (UC). OREGON: Hood River, September 1896, *Langille* (A); Mt. Hood, August 20, 1896, *Sargent* (A), *Heller* 14721 (US, NY); between north and south Umpqua Rivers, alt. 5000 ft., *Applegate* 2686 (US); Bone Springs, Wenaha Nat. Forest, *Lawrence* 199 (US); Strawberry Range, *Mason* 3526 (UC); Fish Lake, *Applegate* 2496 (US); Huckleberry Mt., *Applegate* 390 (A, US), 375, 1438 (US); Four Mile Lake, *Coville & Applegate* 253 (US); Upper Metolius River, *Coville & Applegate* 697 (US); Elgin, *Sheldon* 8736 (A, US, NY); Crater Lake, *Gorman* 41 (US), *Thompson* 12298 (CA, US, A); John Day River, September 10, 1896, *H. E. Brown* (US, NY); Cornucopia, *Thompson* 13414 (A, NY); Steins Mts., *Leiberg* 2518 (UC, NY, US); Black Butte, *Cusick* 2690 (US, UC); Lost Creek Valley, *Gorman* 1823 (US). CALIFORNIA: Shackleford Creek, *Butler*



1681 (UC, US); Woolly Creek, *Butler* 281 (UC, paratype of *S. sitchensis* var. *densa* Jeps.); Cliff Creek, *Culbertson* 4674 (A, CA, UC, US, NY); Gold Lake, August 1919, *Mrs. E. C. Sutcliffe* (US, CA); Kaweah River, July 20, 1913, *Rixford* (A, CA); Grass Lake, *McGregor* 98 (US, NY); Lassen Buttes, *Brown* 660 (NY, US).

This is the species that was called *Sorbus sambucifolia* or *Pyrus sambucifolia* by the botanists of the nineteenth century. It is the commonest one in the western part of North America. Its habitat is chiefly canyons and wooded hillsides, and it is frequent up to an altitude of 10,000 feet. Throughout most of its range it occurs chiefly in the Canadian zone. It has the most extensive distribution of any western North American species.

Certain specimens from northern Idaho show a tendency to have slightly narrower and somewhat longer leaflets; these have been treated by Dr. Rydberg as a separate species, *S. angustifolia*. It is illustrated in Schneider's Ill. Handb. Laubholz. fig. 372f. The type locality of this species is [Cedar] Moscow Mountain, so-called, one of the Thatuna Hills in Latah County, northern Idaho. At first glance this *S. angustifolia* appears to be a distinctive entity but close observation and an examination of a larger series of specimens than were available to Rydberg, shows that the leaflet character breaks down completely, and the plants intergrade with typical *S. scopulina*. This conclusion is based on the study of a large series of specimens, and Rydberg's type, as well as personal collections of material in the type region over a period of several years.

The herbarium specimen *Allen* 291 (distributed as *Pyrus sambucifolia*) contains a mixture of *S. scopulina* and *S. cascadiensis*. The flowering specimens belong, evidently, to *S. scopulina*; the fruiting specimen is of *S. cascadiensis*. This mixture was noted by Schneider in 1906 (Bull. Herb. Boiss. II. 6: 314), but he erroneously ascribed the specimens with oval leaflets to *S. californica*, a species endemic to California, with smaller leaflets, glabrous pedicels, and the ciliations of the bud scales somewhat ferrugineous. The specimens of *S. scopulina* distributed with *Allen* 291 are almost certainly not from native plants from Mount Rainier, but came, probably, from the eastern slope of the Cascade Mountains, or possibly from Mr. Allen's garden, situated between Longmire and Ashford, Washington. I found several different kinds of cultivated plants persisting near the remains of the Allen cabin as late as 1935, and among them were two or three species of *Sorbus*. On the lower slopes of the eastern watershed of the Cascade Mountains *S. scopulina* is conspicuous and not uncommon, and is in fact the only

species of the genus occurring there, but no authentic collections have come to hand from the region west of the summit of that range, neither has their existence been disclosed by personal field work in that region during a period of ten years.

Specimens of *S. scopulina* have been frequently misidentified as the wholly different *S. sitchensis*, which occurs in the United States only in northern Montana and adjacent Idaho. *Sorbus scopulina* can be readily distinguished by its acute or acuminate, glossy, oblong-lanceolate or elongate-oval leaflets with the serrations extending almost to the base, and by the glossy, bright scarlet, globose fruits. The pubescence of the pedicels and leaf-buds consists of whitish trichomes. In *S. sitchensis*, the oval, usually obtuse or obtusish leaflets are dull, the fruits are ellipsoid or subglobose, dull and glaucescent, and the pubescence is ferrugineous. In addition, the inflorescence is smaller, convex rather than flat-topped, and the stamens are shorter than the petals.

Following is an account of two natural intergeneric hybrids between *S. scopulina* and *Amelanchier florida* Lindl.

× **Amelasorbus Jackii** Rehder, Jour. Arnold Arb. 6: 154. 1925. *Amelanchier florida* Lindl. × *Sorbus scopulina* Greene. IDAHO: summit of Elk Butte, Clearwater Co., alt. about 2000 m., September 4, 1918, Jack 1329. Professor Rehder's comments on this bigeneric hybrid are as follows: "In general appearance the original specimens as well as the plants growing in the Arnold Arboretum have the aspect of a vigorous plant of *Amelanchier*, and only on closer inspection one may notice the presence of partly pinnate leaves and the compound inflorescence. The flowers, too, with their oblong upright petals look much like those of *Amelanchier*, but the styles are distinct, and the false partitions of the fruit extend only to about the middle of the locule and are abnormally thick in the sterile cells."

"The parents of the hybrid are apparently *Sorbus sitchensis* Roem. and *Amelanchier florida* Lindl. of which specimens were collected on the same date at the same locality; the first species being represented by Jack's no. 1333 and the second by his no. 1332. From *Sorbus sitchensis* the hybrid is easily distinguished by the mostly simple leaves, smaller, not viscid, winterbuds, the smaller paniculate inflorescence with racemose not corymbose branches, the oblong petals, 4-5 styles, and by the dark colored pruinose fruit with long ovate-lanceolate sepals. From *Amelanchier florida* the hybrid differs chiefly in the larger, more coarsely serrate and occasionally partly pinnate or lobed leaves, in the villous apex of the bud-scales, in the compound inflorescence, shorter petals, distinct styles and in the larger fruit with upright or nearly up-



right sepals, with shorter false partitions and with dry flesh of poor flavor as noted by the collector."

The type specimen and several additional sheets of  $\times A. Jackii$  have been studied by the present writer; also a living plant in the Arnold Arboretum. Mr. Jack's specimen of the *Sorbus* that is presumably one of the parents of the hybrid (*Jack* 1333) also has been available for study. A critical examination of this specimen leads to the conclusion that it is better referred to *S. scopulina* Greene, rather than to *S. sitchensis* Roem. It is true that the leaflets are somewhat broader than those of most specimens of *S. scopulina*, but the large, flat-topped cluster of bright red, globose fruits, the glabrous petioles and rachises, and the glossy leaflets all demonstrate the specimen to belong to *S. scopulina*, the common species in the State of Idaho.

Additional specimens of  $\times Amelasorbus Jackii$  Rehd. have been collected in the Wallowa Mountains of Oregon. These were discussed and illustrated by Rydberg in 1927 (*Jour. N. Y. Bot. Gard*, 28: 227-228), but apparently he overlooked Rehder's article since no mention was made of it, nor were the specimens named. Dr. Rydberg's description is quoted in part as follows: "The sheet bears the number 1380 and is erroneously labeled *Pyrus sambucifolia*. . . . It is probably a hybrid between the Western Mountain Ash, *Sorbus occidentalis*, and a species of Juneberry, *Amelanchier*. The leaves have the light green color of *S. occidentalis*, but are thinner. Some of the earlier leaves are simple, but the rest are pinnate below, with 2 or 3 pairs of leaflets, which are like those of *S. occidentalis*, entire-margined below and dentate towards the apex. The terminal leaflet is much larger, broader, more toothed, and often lobed. The inflorescence is compound as in *Sorbus*, but the young fruit resembles that of *Amelanchier*." Rydberg then concludes, and probably correctly, that the *Amelanchier*-parent is *A. florida* Lindl. It is almost certain, however, that the *Sorbus*-parent is *S. scopulina* rather than *S. occidentalis*, since the latter species is not known to occur in the Wallowa Mountains, or indeed anywhere within a distance of more than one hundred miles of them, whereas *S. scopulina* is common in that locality. Furthermore, the kind of pubescence, and the shape, texture, and serration of the leaf-segments of the Cusick specimens in the United States National Herbarium point unmistakably to *S. scopulina* and bring out more clearly than is done in Rydberg's illustration the obvious *scopulina*-character of the plants. The following specimen has been examined. OREGON: mountainsides near Cornucopia, *W. C. Cusick* 1380 (US). Rydberg says (l. c.) that there is a duplicate sheet in the herbarium of the University of Minnesota.

5. *Sorbus alaskana* n. sp.

Plate 226

Frutex; gemmae et ramuli juniores pilosi; folia 5–6-juga; foliola oblongo-lanceolata, 2–3-plo longiora quam lata, acuta, 3–5 cm. longa, 1–2 cm. lata, argute serrata, glabra; petioli rhachidesque glabri vel parce pilosi; corymbi circiter 3–6 cm. lati, convexi, ramis pilosis pilis brevibus albidis, flores 20–40, 6–8 mm. lati; hypanthium campanulatum, 3 mm. longum, sparse pilosum, sepala triangularia acuta ciliata 1 mm. longa; petala ovalia 5 mm. longa; stamina petala subaequantia; styli quatuor, 2 mm. longi; ovarium apice hirsutum; fructus globosi, 8–10 mm. crassi, coccinei; semina ovalia badia 4 mm. longa.

A shrub; winter-buds conical, glutinous, the outer scales ciliate, the inner pilose with whitish trichomes, as are also the young twigs; lenticels elliptical, scattered; leaflets 11–13, completely glabrous on both surfaces at maturity, the lateral ones widely spreading from the rachis at about a right angle when mature, firm, oblong-lanceolate, acute, 3–5 cm. long, 1–2 cm. wide, 2–3 times as long as wide, the lowermost pair usually somewhat smaller; margins sharply and regularly serrate almost to the base; upper surface dark green, glossy, glabrous at maturity, lower surface very slightly paler; terminal leaflet oval; petioles and rachises very sparsely pilose, or usually glabrous except for a few glands and often a few whitish trichomes on the upper side of the grooved rachis at the base of the leaflets; inflorescence roundish, compact, 3–6 cm. broad, less than 40-flowered; pedicels and peduncles pilose with whitish trichomes at flowering time; flowers 6–8 mm. in diameter; calyx sparsely pilose, the sepals triangular, acute, sparsely ciliate, 1 mm. long; petals oval, 4 mm. long, about the length of the stamens; styles 3–4, 2 mm. long, about half the length of the stamens; top of the ovary copiously pubescent; fruit bright red, subglobose, 8–10 mm. in diameter, less than 25 in a corymb; seeds oval, brown, 4 mm. long.

TYPE LOCALITY: Lake Iliamna, Alaska. Collected by M. W. Gorman in 1902.

RANGE: Alaska, from the head of Lynn Canal, westward to the upper Alaska Peninsula, northward to the lower Yukon valley.

ALASKA: Haines, *Scheuber*, July 1909 (US), *Anderson* 828 (NY); Talkeetner Mts., *Anderson* 1072 (US); Kussilof, *W. H. Evans* 720 (US); Lake Iliamna region, *Gorman* 85, 255 (TYPE US, A); Nushagak, *McKay* in 1881 (US); Kokrines, *Miller* 1621 (US); Totanilla Mt., *Collier* 132 (US); between Cook Inlet and Tanana River, *Glenn* in 1899 (US); Cook Inlet, *Coville & Kearney* 2433 (US); Golovin, *L. J. Palmer* 1063 (US); Alaska, without definite locality, *A. Kellogg* in 1867 (US);



Hyder, June 9, 1924, *Whited* (NY); Naknek Lake, July 17, 1919, *A. E. Miller* (US).

This species occurs on hillsides and in open woods. It is very similar in appearance to *S. scopulina* of the Rocky Mountains, especially in its leaf characters. The leaflets are almost identical with those of that species except that they are less glossy. However, the distinctive character that sets *S. alaskana* off at once from *S. scopulina* is its small, compact, rounded, fewer-flowered inflorescence, which in most specimens shows the calyces, pedicels, and peduncles to be much more pubescent than those of the Rocky Mountain shrub. *Sorbus scopulina* is not known to occur in Alaska. The two other Alaskan species are *S. sambucifolia* and *S. sitchensis*. The former is known to occur only on the westernmost islands of the Aleutian Archipelago. It is very distinct from *S. alaskana* in its ferrugineous pubescence, larger fruits and flowers, and the fewer, lanceolate or ovate-lanceolate, acuminate leaflets. *Sorbus sitchensis* has ferruginous pubescence, fewer, oval, obtuse, dull leaflets, a larger inflorescence, and glaucous fruits.

Mr. M. W. Gorman notes that the Kenai Indians use the branches for brooms in and about their houses, caches, and igloos. Also, "The branchlets are heated on hot rocks and used to beat the body in the sweathouses." The fruit is eaten and the bark chewed as a cure for coughs and colds. The native name is "buk-thilsh-nay." Gorman's no. 255 consists of two sheets, one of which contains a sterile specimen with very abnormal foliage. The other one is taken as the type.

6. ***Sorbus decora*** (Sarg.) Schneider, Bull. Herb. Boiss. II. 6: 313. 1906, Ill. Handb. Laubholz. 1: 676, f. 371 f-g. 1906; Rehder in Bailey, Stand. Cyclop. Hort. 3195. 1917, Man. Cult. Trees Shrubs 377. 1927.

*Sorbus Aucuparia* var.  $\beta$  Michx. Fl. Bor. Am. 1: 290. 1803.

*Sorbus americana* Pursh, Fl. Bor. Am. 1: 341. 1814; Roemer, Syn. Mon. 138. 1847. Non Marsh. 1785.

*Pyrus americana* DC. Prodr. 2: 637. 1825; Spreng. Syst. 2: 511. 1825; Torrey & Gray, Fl. N. Am. 1: 472. 1840 (excl. var.  $\beta$ ); Nuttall, N. Am. Sylva 2: 25, pl. L. 1853; Gray, Man. Bot. N. U. S. (ed. 1) 130. 1848.

*Sorbus riparia* Raf. New Fl. 3: 15. 1836, nomen dubium.

*Pyrus sambucifolia* sensu Watson & Coulter in Gray, Man. (ed. 6) 164. 1889; Sargent, Silva N. Am. 4: 81, pl. clxxiii, clxxiv. 1892; Dame & Brooks, Handb. Trees New Engl. 113, pl. lviii. 1902. Et auct. mult., non Cham. & Schlecht. 1827.

*Sorbus sambucifolia* sensu Dippel, Handb. Laubholz. 3: 368, f. 191. 1893. Non Roem. 1847.

*Pyrus americana* DC. var. *decora* Sargent, Silva N. Am. 14: 101. 1902.

- Sorbus americana* Marsh. var. ["Hauptform"] *macrocarpa* Zabel, Handb. Laubholz-Ben. 195. 1903.
- Sorbus americana* Marsh. var. *decora* Sargent, Man. Trees N. Am. 357, f. 281. 1905; (ed. 2) 391, f. 348. 1922.
- Sorbus scopulina* sensu Hough, Handb. Trees U. S. Canada 241, f. 280–281. 1907; Britt. in Britt. & Brown, Ill. Fl. N. States (ed. 2) 2: 287, f. 2319. 1913; Schaffner, Field Man. Fl. Ohio 307, 1928, Ohio State Univ. Bull. 36: 155. 1932. Non Greene 1900.
- Pyrus sitchensis* sensu Robins. & Fernald in Gray, Manual (ed. 7) 459. 1908; Mathews, Field Book Am. Trees Shrubs 202 (excl. f. *opp. p.* 202). 1915. Non Piper, 1901.
- Aucuparia subvestita* Nieuwl. Am. Midl. Nat. 4: 175. 1915.
- Pyrus dumosa* Fernald, Rhodora 23: 266. 1921; Pease, Vasc. Pl. Coos Co. N. H. 266. 1924; Wiegand & Eames, Fl. Cayuga Basin 246. 1926. Non *S. dumosa* Greene, 1900.
- Sorbus dumosa* sensu House, N. Y. State Mus. Bull. 254: 409. 1924. Non Greene, 1900.
- Sorbus americana sitchensis* Sudworth, Check List 133. 1927.
- Sorbus subvestita* sensu Rosendahl & Butters, Trees Shrubs Minn. 195, f. 1928; Deam, Shrubs Indiana (ed. 2) 148, pl. 56. 1932; Rydberg, Fl. Prairies Plains 438. 1932. Non Greene, 1900.
- Pyrus subvestita* Farwell, Am. Midl. Nat. 12: 60, 122. 1930.

A small tree or shrub 6–12 m. tall and 30–40 cm. in diameter, with spreading branches and dark gray bark; winter-buds conical, the outer scales glutinous, reddish brown, dorsally glabrous, the inner scales merely ciliate with whitish or (when old) somewhat fulvous trichomes, or sometimes moderately pilose dorsally; young twigs glabrate; lenticels elliptical, scattered; leaflets 11–15, the lateral ones spreading from the rachis at about a right angle when mature, elliptical or oblong, acute, or abruptly short-acuminate, asymmetrical at the base, 4–8 cm. long, 1.5–2.5 cm. wide, 2–3 times as long as wide, the lowermost pair usually smaller; margins coarsely serrate to the middle or below, the teeth ovate, abruptly mucronate, 30–45 on each leaflet, 3–4 per cm.; upper surface dull, dark green, glabrous at maturity, lower surface paler, completely glabrous or sometimes more or less persistently sparsely pilose, at least along the midvein; terminal leaflet often obovate; petioles and rachises sparsely pilose or entirely glabrous, except for a few glands and often several long trichomes on the upper side of the grooved rachis at the base of the leaflets; inflorescence flat-topped, 8–15 cm. broad; pedicels and peduncles sparsely pilose with whitish trichomes; flowers about 1 cm. in diameter, fragrant; calyx sparsely pilose, the sepals triangular, sharply acute, 1 mm. long, sparingly ciliate, and sometimes with a few minute, dark marginal glands; petals broadly oval, 4 mm. long, somewhat truncate or slightly tapering at the base, about the same length



as the stamens; anthers 0.8 mm. long; styles 3–4, about 2 mm. long, much shorter than the stamens; top of the ovary pubescent; fruit bright scarlet or vermilion red, 8–10 mm. in diameter, subglobose; seeds lanceoloid, light brown, 4.5–5 mm. long, 1.5–2 mm. wide.

TYPE LOCALITY: "in Canada et circa lacum Ontario." (Michaux, l. c.).

RANGE: Newfoundland to Minnesota and southward to Iowa and New York.

NEWFOUNDLAND: Glenwood, *Fernald & Wiegand* 5655 (G); Millerton Junction, *Fernald & Wiegand* 5654 (G); Bay of Islands, *Fernald & Wiegand* 3547 (A), 3548 (G), *Waghorne* 41 (G); Bonne Bay, *Fernald & Long* 1787 (G); Savage Cove, *Fernald, Pease & Long* 28494 (G); St. Johns, *Bishop* 369 (G, Can, A); Quarry, *Fernald & Wiegand* 5653 (A, Can, NY); Grand Falls, *Fernald & Wiegand* 5656 (A); Octagon, July 1902, *Dame* (A); Channel, *Howe & Lang* 976 (NY); Whitbourne, August 15, 1894, *Robinson & Schrenk* (NY, Can, US); Port a Port, *Mackenize & Griscom* 10323 (US). QUEBEC: Little Metis, July 6, 1906, *Fowler* (US); Sillery, *Adrien* 1907 (Can); St. Agathe des Monts, August 26, 1902, *Jack* (A); Lake St. John, August 22, 1895, *Jack* (A); Seven Islands, *C. B. Robinson* 877 (NY); St. Pierre Island, *Arsène* 276 (NY), 307 (G); Cap à l'Aigle, *Macoun* 67144 (NY, Can); Notre Dame du Lac, *Northrop* 228 (NY); Ile au Marteau, *Marie-Victorin & Rolland-Germain* 18700 (G); Bic, *Rousseau* 26342 (A), *Fernald & Collins* 1098 (Can); Montmorency Falls, *Macoun* 67145 (Can). PRINCE EDWARD ISLAND: Charlottetown, *Fernald & St. John* 7576 (A, US); Brackley Point, July 3, 1888, *Macoun* 8183 (NY). NEW BRUNSWICK: Dalhousie, June 30, 1905, *Fowler* (US); Campobello Isl., *J. D. Smith*, 888, 889 (US); Campbellton, June 4, 1876, *Chalmers* (Can). NOVA SCOTIA: Sandy Cove, *Fernald & Long* 21427 (G, Can); St. Paul Isl., *Perry & Roscoe* 240 (G, Can); St. John Lake, *Fernald, Bartram & Long* 23928 (G); Yarmouth, *Jack* 3781 (A); Clementsport, *Jack* 3337 (A); Westville, *Jack* 3279 (A); Port Bevis, *Fernald & Long* 21430 (Can). MAINE: St. Francis, *Fernald* 36 (NY, UC, US, NE); Mt. Desert Island, *Stebbins* 238 (NE); Schoodic Mt., *Stebbins* 435 (NE); Grand Isle, *Fernald* 2306 (NE); Island Falls, *Fernald* 2305 (NE). NEW HAMPSHIRE: Connecticut Lake, September 1895, *Mrs. A. F. Stevens* (US); White Mountains, June 13, 1879, *Pringle* (A); Mt. Willard, July 18, 1891, *Faxon* (A); Franconia, August 31, 1902, *Jack* (A); Mt. Lafayette, July 1879, *Sargent* (A); Mt. Washington, July 14, 1891, *Faxon* (A);

Moose River, *Pease* 13651 (NE); Randolph, *Pease* 18084 (NE); Mt. Moosilauke, *Underwood* 2190 (NE); Woodstock, *Fernald* 11718 (NE). VERMONT: Mt. Mansfield, *Pringle* in 1877 (UC, NY, US), *Greenman* 951 (G), *Pringle* in 1879 (A). MASSACHUSETTS: Mt. Greylock, August 4, 1920, *Hoffman* (A). NEW YORK: Smith's Lake, August 22, 1879, *Ward* (US); Clear Lake, August 30, 1892, *Britton* (NY); Chazy Lake, August 22, 1922, *Susan D. McKelvey* (CA, A); Mt. Whiteface, August 8, 1894, *Jack* (A), August 10, 1902, *Rehder* (A); Oswego, *Fernald, Wiegand & Eames* 14301 (G); Harris Lake, *Muen-scher & Lindsey* 3396 (G); Caroline, *Eames, Randolph & Wiegand* 12149 (G). ONTARIO: Port Arthur, September 6, 1889, *Britton & Timmerman* (NY); Bruce Peninsula, *Dearnness* in 1912 (Can); Whitefish Island, *Macoun* 34401 (Can); Moose Factory, July 15, 1904, *Spreadborough* (Can). MICHIGAN: Fields, *Farwell* 189 (G); Goose Island, *Gates* 15241 (US), *Ehlers* 428 (US, G); Hamlin Lake, *Chaney* 254 (US, NY, G); Sault Ste. Marie, *McCullough* 8261 (US); Cliff, *Hermann* 7722 (US, NY); Neguanee, June 1902, *Rydberg* (NY); Vermillion, *Dodge* 11 (A); Munising, *Gleason* 952 (A). OHIO: Granville, October 25, 1902, *Condit* (UC). INDIANA: Laporte Co., *Orahood* 40966 (A); Pokagon State Park, *Deam* 54564 (A). IOWA: Fayette, *Gardner* 33 (NY). WISCONSIN: Kilbourn, *Fassett* 3450 (A, G), *Palmer* 28415 (UC, US); Port Wing, *Fassett* 10359 (G); Wyoming, *Fassett* 12586 (US). MINNESOTA: Big Rice Lake, *Hotchkiss & Jones* 451 (G, US); Knife River, June 1893, *Sheldon* (G, US, NY); Duluth, August 20, 1911, *Sargent* (A), *Olga Lakela* 1422, 1834 (US, NY), *F. W. Johnson* 1102 (US, NY); Itasca Park, *Moyle* 390 (G, US, NY, UC); Itaska Lake, *Sandberg* 1046 (US); Two Harbors, *Butters & Rosendahl* 4470 (NY, G); Pokegama Lake, *Sandberg* 199 (A); Bear Lake, May 25, 1912, *Rosendahl* (A).

This species has a range similar to that of *S. americana*, but it occurs at somewhat higher altitudes and has a more northerly distribution. It is common in montane woods and along riverbanks and lake shores from Newfoundland to the mountains of northern New England, and westward along the shores of the Great Lakes to Minnesota, and southward to Iowa and New York. It is, however, absent from the Coastal Plain. There are several published records of it from as far west as Manitoba, but all these rest on erroneous determinations of *S. aucuparia*, which is frequently cultivated and has a strong tendency to take to the woods, often in places somewhat remote from the nearest human settlement, the seeds carried by birds. *Sorbus decora* is to be distinguished from *S. americana* by its larger and later flowers, the broader,



acute leaflets, and its much larger fruits. In herbarium specimens these often have a glaucescent appearance. It has been confused with several other species, including *S. sambucifolia* (Cham. & Schlecht.) Roemer, which is an entirely distinct low shrub of eastern Asia and the westernmost islands of the Aleutian chain. Some authors have identified the arborescent eastern shrub with one or more of the shrubby species of the Rocky Mountain region, particularly *S. scopulina* and *S. dumosa*. It is, however, quite different from any of those plants. Some other students have misapplied the name *S. subvestita* Greene to this species. It is perfectly clear, however, that Greene's rather meager description does not apply to *S. decora*. Any lingering suspicion of doubt on this point is immediately dispelled by a glance at a photograph or at an isotype of the specimen cited as *S. subvestita*. It is a typical sample of the European *S. aucuparia* L. found growing wild in the woods of Minnesota. Even the name *subvestita* is not appropriate for *S. decora*, since mature leaflets of the majority of the specimens of this species are almost glabrous except for some sparse pubescence along the lower part of the midvein on the lower or abaxial surface of the leaflet. Old leaves usually are completely glabrous throughout.

The name *S. riparia* Raf. is here rejected as a nomen dubium. Although it is possible that Rafinesque actually had seen a tree of the species we now name *S. decora*, his description is vague and uncertain and it seems undesirable to attempt to revive a doubtful name that has been dormant for over a century, and to try to establish it in preference to one based on an adequate foundation.

I have seen no conclusive evidence of hybridization between *S. decora* and any other species of *Sorbus*, although such hybrids may possibly occur. There are, however, specimens that have been described as hybrids between this species and members of the closely related genus *Aronia*. These were said originally by the describer, Bro. Louis Arsène, to represent a natural hybrid between *S. americana* Marsh. and *Aronia atropurpurea* Britt. [*A. prunifolia* (Marsh.) Rehd.], but later he identified the *Sorbus*-parent as the plant we now call *S. decora*. Following Schneider, and Rehder, and using a binary name instead of a formula for these plants, a new combination becomes necessary, and the synonymy is as follows:

× **Sorbaronia Arsenii** (Britt.) n. comb. *Sorbus decora* (Sarg.)  
Schneid. × *Aronia prunifolia* (Marsh.) Rehd.

*Sorbus Arsenii* Britt. ex Arsène, Rep. Bot. Exch. Club Brit. Isles 7: 961.  
1926.

*Pyrus Arsenii* Arsène, Rhodora 29: 177. 1927.

Shrub 1–2.5 m. tall; leaves 2–7 cm. long, pinnate below, cleft or lobed above, the terminal segment largest; inflorescence resembling that of *Aronia*, the branches ascending.

Many of the leaves of this bigeneric hybrid are pinnatifid, or pinnate with 1–3 pairs of dentate or lobed, acute, mostly glabrous leaflets (or segments). The following specimens have been examined: Miquelon Isl., July 20, 1902, *Arsène* (G, NY), also July 25, 1902, *Arsène 308* (G, NY), *LeHors 292a* (G); Ethel Lake, St. Paul Isl., Nova Scotia, July 22, 1929, *Perry & Roscoe 242* (G).

6a. ***Sorbus decora* var. *groenlandica*** (C. Schneid.) n. comb.

*Pyrus Aucuparia* sensu E. Mey., Pl. Labrador. 81. 1830, ex parte. Non L. 1753.

*Sorbus americana* Marsh. var. *groenlandica* C. Schneid., Bull. Herb. Boiss. II. 6: 314. 1906.

Shrub 1–3 m. tall; winter-buds somewhat glutinous, the outer scales reddish brown, nearly glabrous dorsally, the inner scales whitish-pilose; leaflets (11–) 13–17, oblong, sharply acute, 2–3 times as long as wide, sharply and somewhat irregularly simply or doubly serrate to below the middle; the upper surface dark green and glabrous at maturity, the lower surface pale green, glabrous or often sparsely pilose, at least along the midvein toward the base of the leaflet; terminal leaflet elliptical, petiolulate, the lateral ones nearly sessile; inflorescence 5–10 cm. broad; pedicels and peduncles whitish-pilose to glabrous; flowers 5–8 mm. broad; hypanthium glabrous or nearly so; sepals triangular, acute, 1.5–2 mm. long in anthesis, glabrous on the back, sparsely ciliolate to glabrous on the margins; petals about as long as the stamens, orbicular, 3–4 mm. long, the base truncate; styles 3, shorter than the stamens, 1.5 mm. long; fruits ellipsoid or subglobose, 5–7 mm. long, 5 mm. thick (in herbarium specimens), red, glossy or slightly glaucous; seeds lance-oid, 4 mm. long, 2 mm. wide, brown.

TYPE LOCALITY: South Greenland.

RANGE: South Greenland and Labrador.

GREENLAND: Neria, July 26, 1923, *J. Eugenius* (G), July 24, 1926 (G), August 6, 1928 (Can), September 24, 1928 (Can), June 29, 1934 (Can); Tasermint, September 4, 1889, *Hartz* (Can); Kranifjord, August 18, 1922, *M. P. & A. E. Porsild* (G, Can); Kangikitsup Quinga, July 4, 1925, *M. P. & A. E. Porsild* (G, Can). LABRADOR: Deepwater Creek, September 17, 1892, *Waghorne* (Can); Battle Harbour, *Hitchcock 23854* (US), August 9, 1911, *Williamson* (NY); Hamilton River, *A. P. Low 4989* (Can); Cartwright, July 1928, *Malte* (Can); Georges



River, *Spreadborough* 16312 (Can); Rigolet, September 24, 1926, *J. D. Soper* (Can); Hopedale, *Potter & Brierly* 3087 (G), *Bishop* 367 (G, A, Can); Windy Tickle, *Bishop* 366 (G, A, Can); Salmon Bight, *A. E. Porsild* 44 (Can, US); Turnavik, *A. E. Porsild* 136 (Can); Assizes Island, *Potter & Brierly* 3086 (G); Anatolak, *Sewall* 501 (G, US); Aillek, *Sornborger* 123 (NY, US); Esquimeaux River, July 27, 1882, *Allen* (G).

This plant is restricted to coastal Labrador and southern Greenland. It has been reported as *S. americana* and as *S. decora*, but it is somewhat different from each of those plants. It is said by Schneider (l. c.) to be more closely related to the former species ("Aehnelt in Serratur etc. der *americana* mehr als der *decora*, doch sichere Verwandtschaft fraglich"). However, the leaves, including the shape and pubescence of the leaflets, indicate a closer affinity with *S. decora*; likewise the structure of the flowers, the shape of the petals, and the relative length of the petals and stamens, and the size of the anthers, show a closer connection with the latter than with the former species. According to various published notes, and dates on herbarium sheets, *S. groenlandica* flowers during July and August. M. P. Porsild (Meddel. om Groenl. 77:18, 1930) reports it as occurring in Greenland "in all *Alnus* and *Betula* thickets visited but nowhere dominant." It occurs between 60° and 64° N. latitude in Greenland. In Labrador it grows at least as far north as latitude 56° N.

7. ***Sorbus cascadiensis*** G. N. Jones, Univ. Washington Publ. Biol. 7: 174. 1938. Plate 227

*Sorbus sambucifolia* sensu Howell, Fl. NW. Am. 164. 1898. Non Roemer, 1847.

*Pyrus sitchensis* Piper, Mazama 2: 107. 1901, Contr. U. S. Nat. Herb. 11: 347. 1906, ex parte; Henry, Fl. S. Brit. Col. 183. 1915; Gilkey, Handb. NW. Flow. Pl. 148. 1936.

*Sorbus sitchensis* sensu Benson, Contr. Dudley Herb. Stanford Univ. 2: 101. 1930. Non Roemer, 1847.

*Sorbus dumosa* sensu G. N. Jones, Univ. Washington Publ. Biol. 5: 180. 1936. Non Greene, 1900.

Shrub 2–5 m. tall, forming clumps, the branches suberect, with smooth, gray bark; winter-buds and young twigs pubescent; lenticels numerous, roundish; leaves odd-pinnate, 15–20 cm. long; petioles and rachises sparsely pilose to completely glabrous; leaflets 9–11, nearly equal, oval, abruptly acute at the apex, obliquely acute to somewhat rounded at the base, glabrous on both surfaces, dark and somewhat glossy green above, pale green beneath, coarsely and sharply serrate from the apex to below the middle, 5–7 cm. long, 2–3 cm. wide; terminal

leaflet obovate, abruptly apiculate-acute; inflorescence 7–12 cm. broad, 30–60-flowered, somewhat convex, the pedicels and peduncles sparsely pilose with short, white trichomes; flowers white, fragrant, 8–10 mm. in diameter; calyx-tube campanulate, 3 mm. long, glabrous to sparsely pilose; sepals triangular, acute, ciliate, 1.5 mm. long; petals orbicular, 5–6 mm. long, longer than the stamens; styles usually 4, 2 mm. long, much shorter than the stamens; anthers 1 mm. long; fruit globose, scarlet, 8–10 mm. in diameter; seeds ovoid, flattened, dark brown, 4 mm. long, 2 mm. wide.

TYPE LOCALITY: Mount Rainier, Washington.

RANGE: Southern British Columbia, southward in the Olympic and Cascade mountains to northern California.

BRITISH COLUMBIA: Sproat, *Macoun* 8217 (Can); Chilliwack Lake, *Spreadborough* 79775 (NY); near Shawnigan Lake, *Canby*, *Sargent & Muir* 66 (US, G). WASHINGTON: Mt. Angeles, July 6, 1921, *Taylor* (CA); Dosewallips River, July 30, 1921, *Taylor* (CA); Skagit Pass, August 24, 1892, *Lake & Hull* (NY); Copper Mt., *Gorman* 726 (US); Billygoat Pass, *Eggleston* 13525 (US); Stehekin, *Griffiths & Cotton* 204 (NY, US); Chiwaukum Creek, *Eggleston* 13537 (US); Ashford, *Allen* (A); Mt. Rainier, *Jones* 9924 (G, TYPE), *Piper* 1990 (G, US, A); Bear Prairie, Mt. Rainier, *Allen* 291 in part (US, G, NY, UC); Fort Colville to the Rocky Mts., *Lyall* in 1861 (G); Cascade Mts., lat. 49° *Lyall* in 1859 (G); Mt. St. Helens, *Coville* 791 (US), *Walpole* 25 (US); Cascades, *Kellogg & Harford* 227 (NY). OREGON: Cascade Mts. August 4, 1880, *Engelmann & Sargent* (A); Mt. Hood, *Benson* 2517 (NY, UC, US), *Henderson* 890 (G), *Coville* 891 (US); Lost Lake, *Henderson* 889 (G); Deadner Mt., near Weiner, *Walpole* 85 (US); Crater Lake, *Heller* 12950 (NY, US, G, CA), *Henderson* 1764, 1533 (G), *Thompson* 12298 (NY); Klamath Lake, August 29, 1896, *Sargent* (A); Ashland, August 27, 1896, *Sargent* (A). CALIFORNIA: Hilt, October 1912, *L. E. Smith* (CA); Hatchet Creek Mts., May 24, 1894, *Baker & Nutting* (UC); Butte Creek, *Heller* 14706 (NY, US); Sisson, *Eastwood* 2083 (A, US, CA); Salmon Mts., *Eastwood & Howell* 5039 (A, CA); Castle Lake, *Eastwood* 10761 (A, CA), July 27, 1911, *Condit* (CA); Lake City Canyon, *Austin & Bruce* 2356 (NY); Trinity Summit, *Tracy* 5292 (UC); Taylor Creek, *Baker* 475 (UC); Colby, *Austin* 751 (US); Warner Mts., *Griffiths & Hunter* 450 (US).

This species is closely related to *S. californica* Greene. It is, however, a more robust shrub with larger, abruptly acute, oval leaflets; the pedicels are white-pilose, and the petals larger. It occurs from northern



California to the Cascade and Olympic Mountains of Washington, and adjacent British Columbia. It has been erroneously ascribed to several other, distantly related species, particularly to *S. sambucifolia* (Cham. & Schlecht.) Roemer, and *S. sitchensis* Roemer. In 1901 Piper pointed out that it is not conspecific with the Asiatic *S. sambucifolia* (at that time not known to occur in North America); instead, he stated that it is identical with the Alaskan plant described by Roemer as *S. sitchensis*. Since that time most botanists have been more or less content to follow his lead, and no less than four totally different species have been called "*sitchensis*." Recently, however, the identity of Piper's *Pyrus sitchensis* with Roemer's *Sorbus sitchensis* has been questioned, and the present writer (Univ. Wash. Publ. Biol. 5:180. 1936) concluding that the shrub of the Cascade and Olympic Mountains could not be the latter species, assumed on the basis of wholly inadequate evidence, that it is conspecific with *S. dumosa* Greene of Arizona. This is, however, not correct. Neither is it the *Pyrus dumosa* of Fernald, which turns out to be the quite distinct arborescent *S. decora* of eastern North America.

In Washington and Oregon *Sorbus cascadiensis* has much the same distribution as *S. occidentalis*, but the two species seldom grow together in the same habitat. It is almost entirely a species of the Canadian zone, while the latter is definitely Hudsonian. Its usual altitudinal level in the northern half of its range is about three thousand feet, but it ascends to six thousand feet in the vicinity of Crater Lake in the Cascade Mountains of southern Oregon. The two species are entirely distinct phylogenetically, and it is difficult to see how botanists ever could have confused them. *Sorbus occidentalis* has a near affinity with *S. sitchensis*, as indicated by the glaucescent fruits, shape and size of the inflorescence, ferrugineous pubescence, the shape of the leaflets, and the shape of the petals and the relative length of petals and stamens, while *S. cascadiensis* is connected with *S. scopulina* of the Rocky Mountains through *S. californica*.

As noted above, *S. cascadiensis* frequently has been confused with *S. sitchensis*. That species is quite distinct, however, in its glaucescent fruits, dull, usually more obtuse and more coarsely serrate leaflets, the teeth usually fewer, the smaller inflorescence, and the pubescence of the pedicels and bracts tawny or rufous; in addition it has a more northerly and easterly range.

In many respects *S. cascadiensis* closely resembles, and is doubtless nearly related to, *S. scopulina* which occurs on the eastern slope of the Cascade Mountains and ranges eastward to the Black Hills of South Dakota. The shrub of the region west of the summit of the Cascade

Mountains differs in its usually fewer flowers and fruits, in its shorter stamens, more convex inflorescence, and its broader, less glossy, usually more coarsely serrate leaflets. These are oblong-oval, abruptly acute (instead of linear-lanceolate or oblong-lanceolate and acuminate as in *S. scopulina*), and at maturity are spreading at right angles from the rachis in the manner of those of the eastern American *S. decora*.

8. ***Sorbus californica*** Greene, *Pittonia* 4: 131. 1900; Schneider, Ill. Handb. Laubholz. 1: 671, f. 366, i-k. 1906.

*Pyrus sambucifolia* sensu Brewer & Watson, Bot. Calif. 1: 189. 1876. Non Cham. & Schlecht. 1827.

*Sorbus occidentalis* sensu Greene, Fl. Franciscana 54. 1891; Coville, Contr. U. S. Nat. Herb. 4: 97. 1893. Non Greene 1900.

*Sorbus sitchensis* sensu Hedlund, Svenska Vet.-Akad. Handl. 35: 40. f. 4. 1901, ex parte. Non Roem. 1847.

*Pyrus occidentalis* sensu H. M. & C. C. Hall, Yosemite Flora 124. 1912. Non Wats. 1888.

*Pyrus sitchensis* Piper var. *californica* Smiley, Univ. Calif. Publ. Bot. 9: 233. 1921.

*Pyrus sitchensis* sensu Jepson, Man. Fl. Calif. 508, f. 506. 1925, Fl. Calif. 2: 230. 1936. Non Piper 1901.

A many-stemmed shrub 1–2 m. tall; winter-buds glutinous, the inner scales sparsely ferrugineous-ciliate; young twigs glabrous, the lenticels inconspicuous, oval; leaflets 7–9 or –11, oblong-oval, obtuse or acutish, sharply and coarsely singly or often doubly serrate to below the middle, 1–2 cm. wide, 2–4 cm. long, glabrous on both sides, somewhat glossy above, paler beneath, the terminal leaflet obovate; petioles and rachises glabrous; inflorescence few-flowered, 4–10 cm. broad, somewhat convex on top; pedicels and peduncles glabrous; calyx glabrous, campanulate, 3 mm. long, the sepals ciliolate, triangular, acute, 2 mm. long; petals orbicular, 3–4 mm. long; stamens shorter than the petals, longer than the styles; anthers 1 mm. long; styles four 1.5–2 mm. long; ovary pubescent on top; fruit scarlet or coral-red, ellipsoid or somewhat pyriform, not glaucescent, 7–10 mm. in diameter; seeds oval, slightly flattened, light brown, acute at one end, 4 mm. long, 2 mm. wide.

TYPE LOCALITY: Sierra Nevada, California.

RANGE: California and western Nevada.

CALIFORNIA: Big Meadows, August 27, 1904, *Rehder* (A), *Butler* 282 (UC); Marble Mt., *Chandler* 1633 (UC); Medicine Lake, *Baker* 471 (UC); Union Lake, *Hall* 8621 (US); Trinity Summit, *Davy & Blasdale* 5835 (UC); Lasseck Peak, *Goddard* 694 (UC); Lassen Butte region, *Eastwood* 1760 (CA); Mt. Lassen, Sept. 6, 1931, *Jussel* (CA); Long Lake, *Bacigalupi* 1655 (A); Soapstone Ridge, *Heller* 12059 (CA,



G, A); Feather River Region, August 2, 1921, *Head* (CA); Long Valley, *Eastwood* 14638 (CA, A); Mineral King, *Coville & Funston* 1425 (US), July 28, 1892, *Brandeggee* (A, UC); Mt. Elwell, *Hall* 9340 (UC, US); Jamison Lake, *Rose* 32624 (CA); Greenville, October 20, 1919, *Mrs. J. Clemens* (CA); N. Fork Stanislaus River, June 28, 1930, *Jussel* (CA); Crystal Lake, *Mary Strong Clemens* in 1920 (CA); Lake Lucille trail, *Eastwood* 1031 (A, CA); toward Summit, July 1897, *Sonne* (A); near Summit, *Heller* 7026 (A, US, G, UC, NY), July 1876, *Edwards* (NY), *Heller* 9835 (A, G, NY), July 9, 1870, *Kellogg* (CA), *Brandeggee* (CA); Cisco, *Walker* 1445 (UC); Ebbet's Pass to Summit, *Brewer* 2091 (SYNTYPE UC, US); Deer Park, *Eastwood* 314 (CA); Grass Lake, July 23, 1923, *Blasdale* (UC); Emerald Bay, Lake Tahoe, September 22, 1925, *Louise Bartholomew* (CA); Heather Lake, *Wolf* 2406 (UC); Rubicon Springs, August 1924, *Mrs. Engel* (CA); Pyramid Peak, *Smiley* 76 (G); Mt. Tahoe, *Abrams* 4814 (G, NY); summit of Sierra Nevada, *Bolander* in 1873 (US); Sierra Nevada Mts., *Lemmon* in 1875 (US); Marble Fork, *G. B. Grant* 1518 (US); Ralston Peak, *Smiley* 416 (G); Huntingdon Lake, July 1926, *Alice Griffin* (CA); Vidette Lake, July 1916, *Mrs. M. L. Campbell* (CA); without locality, *Bolander* 2091 (UC); Glen Alpine, *J. T. Howell* 1317 (CA), September 1904, *Catherine Chandler* (UC), *Abrams* 12758 (NY, G, UC), July 1, 1898, *W. W. Price* (UC); Tioga Pass, September 15, 1923, *Mason* (UC); Gaylor Lakes, August 9, 1923, *Mason* (UC); Tuolumne region, July 25, 1889, *Chestnut & Drew* (UC); Dog Lake, *Smiley* 837 (G); Pine Ridge, *Hall & Chandler* 333 (UC); Tamarack Beach Camp, July 1914, *Wieslander* (UC); Shut Eye Pass, *Abrams* 4943 (A, G, NY); Shuteye Mt., *Murdoch* 2520 (NY); Isberg trail, *Zentmyer* 2002 (UC); between Lake Tenaya and Cathedral Lake, *Eastwood* 444 (CA); Buck Canyon, Kaweah River region, *Hopping* 54 (UC); Emerald Lake, Sequoia Nat. Park, July 25, 1932, *Darland* (UC); Farewell Gap, Tulare Co., *Culbertson* 4527 (G, CA); Fallen Leaf Lake, *Wolf* 1715 (CA). NEVADA: Washoe Co., *Kennedy* 1461 (NY, UC, US); Snow Valley, *Baker* 1281 (NY, UC, CA, US, A); Slide Mt., *Nordstrom* 979 (UC), *Heller* 10929 (NY, UC, US, A); Donner Lake, July 10, 1902, *Diehl* (CA, A).

*Sorbus californica* is restricted to California and western Nevada. In California it grows along streams or on moist steep slopes in the Canadian and Hudsonian zones of the Sierra Nevada from Tulare County to Modoc County at altitudes of 5000–10,000 feet, and in the North Coast Ranges from Humboldt County to Siskiyou County. From *S. scopulina*, which occurs in California only along the eastern border

of the state from Modoc County to Tulare County, it is to be distinguished by its fewer, oval, obtusish, less finely serrate leaflets, the sparsely ferrugineous-ciliate inner scales of the winter-buds, the fewer-flowered, round-topped inflorescence with glabrous peduncles, the shorter styles and the oval, slightly broader seeds. *Sorbus cascadiensis* extends southward as far as the northern part of the state of California, and is found chiefly in Siskiyou, Humboldt, Modoc, and Butte counties. It is a more robust shrub with usually 11, larger, more coarsely serrate, abruptly acute leaflets, pilose peduncles, larger inflorescence, longer petals, and larger, more pubescent winter-buds.

9. ***Sorbus sitchensis*** Roemer, Syn. Mon. **3**: 139. 1847; Hedlund, Svenska Vet.-Akad. Handl. **35**: 41. 1901, ex parte; Standley, Contr. U. S. Nat. Herb. **22**: 366. 1921; Rehder, Man. Cult. Trees Shrubs 378. 1927; Raup, Contr. Arnold Arb. **6**: 173. 1934.

*Pyrus sambucifolia* sensu Bong. Mém. Acad. St. Pétersb. VI, **2**: 134. 1832 (repr. Veg. Sitcha 16); Henshaw, Mt. Wild Fls. N. Am. 336, pl. 91. 1906. Non Cham. & Schlecht. 1827.

*Sorbus occidentalis* sensu Coville, Contr. U. S. Nat. Herb. **3**: 339. 1895; Rydberg, Fl. Rocky Mts. 448, 1917; Kirkwood, Rocky Mt. Trees Shrubs 199. 1930. Non Greene, 1900.

*Sorbus Tilingii* Gandoger, Bull. Soc. Bot. France **65**: 25. 1918, ex parte.

A shrub 1–4 m. tall; winter-buds ellipsoid, rufous pubescent; young twigs rufous puberulent; lenticels linear or oval; stipules linear-lanceolate, 6–9 mm. long, rufous pubescent; leaflets 9–11, oval or oblong, 4–7 cm. long, 1.5–3 cm. wide; apex obtuse or acutish; margins rather coarsely and sharply serrate to the middle or below; teeth usually 16–40 on each leaflet; upper surface dull, glabrous; lower surface somewhat paler, glabrous at maturity, or pubescent along the midvein; petioles and rachises finely pubescent or pilose, glabrate in age; inflorescence round-topped, 5–9 cm. broad, 40–60-flowered; pedicels and peduncles rufous pubescent to nearly glabrous; flowers 6–9 mm. broad, fragrant; calyx 3–3.5 mm. long, glabrous on the back, campanulate; sepals ciliate; petals oval, 5 mm. long, longer than the stamens; styles 1.5–2 mm. long; top of the ovary pubescent; fruit subglobose to ellipsoid, red, becoming orange and finally purplish, glaucescent, 8–10 mm. in diameter; seeds dull brown, ellipsoid or ovoid, 3–4 mm. long, 2–2.5 mm. wide.

TYPE LOCALITY: "In insula Sitcha ad oram occidentalem Americae borealis." Collected by Mertens.

RANGE: Alaska and Yukon through British Columbia to northwestern Montana and adjacent Idaho.

ALASKA: Port Etches, *Macoun* 19930 (Can); McDonald Lake,



*Burcham* 107 (US); north of Mt. St. Elias, *D. W. Eaton* 2; Seldovia Bay, July 12, 1913, *Griggs* (US); Halibut Cove, *Coville & Kearney* 2433 (US); Yes Bay, *Gorman* in 1894 (UC), *Gorman* 41 (NY, US); Juneau, *Walpole* 1234 (US), *Jepson* 477 (US); Yakutat Bay, *Coville & Kearney* 1157 (US); Muir Inlet, *Coville & Kearney* 690 (US); Amalik Bay, *Henning* 554 (US); between Skagway and White Pass, *Coville & Kearney* 502 (US); Wrangel, *Coville & Kearney* 445 (US), *Evans* 64 (US); Sitka, *Coville & Kearney* 875, 915 (US), *Anderson* 118 (US), *Canby*, *Sargent & Muir* 64 (UC); New Metlakatla, September 2, 1897, *Sargent* (A); Disenchantment Bay, *Funston* 92 (US, UC, Can); Ketchikan, July 6, 1909, *Kellogg* (US); Heather Island, *Coville & Kearney* 1348 (US); Loring, *Chamberlain* 71, (US); Prince William Sound, *Edmund Heller* 45 (UC), *Evans* 294 (US); Orca, *Coville & Kearney* 1319 (US); Kukak, July 1899, *Kincaid* (A); Nakuk Lake, July 17, 1919, *A. E. Miller* (US); Alaska Mts., *Bayne Beauchamp Exped.* 30 (UC). BRITISH COLUMBIA: Bennett, August 25, 1899, *Williams* (US); Lake Bennett, *Dawson* 8210 (Can); Glacier, *Canby*, *Sargent & Muir* 63 (G, US), July 29, 1909, *Rusby* (NY), August 14, 1904, *Jack* (A), August 13, 1904, *Rehder* (A), August 1897, *Sargent* (A), July 30, 1916, *Hunnewell* (G); Cumshiwa Inlet, Queen Charlotte Islands, *Osgood* in 1900 (US); Dawson Harbour, June 24, 1897, *Newcombe* (Can); Skagit River, *Macoun* 69919 (Can); Chilliwack Valley, *Macoun* 34379, 34381 (Can, US, G, NY), 34380 (US, G, NY, Can); Great Northern Mountain, August 2, 1904, *Scheuber* (US); Asulkan Valley, August 14, 1904, *Rehder* (A); Talliser, August 13, 1904, *Rehder* (A); Mt. Selwyn, *Raup & Abbe* 4043, 4070 (A, Can); White Pass, (Yukon) *Eastwood* 904 (A). ALBERTA: Whistlers Mt. Jasper Park, *Jack* 2701 (A); Lake Louise, *Macoun* 65116 (NY, Can, G), July 24, 1916, *Hunnewell* (G). MONTANA: Lake McDonald, *Umbach* 328 (NY); MacDougal Peak, *MacDougal* 815 (NY, US, A); Essex, *Williams* 1069 (NY, US, G); Mt. Silcox, *Butler* 5097 (NY); Snyder Lake, *Standley* 17961 (US); Grinnell Lake, *Standley* 15226 (US), *Jack* 2107 (A); Grinnell Glacier, August 31, 1921, *McKelvey* (A); Sperry Glacier, *Standley* 18082 (US); Granite Park Chalets, *Standley* 16131 (US); Gunsight Pass, *Standley* 18210 (US); Iceberg Lake, *Standley* 15381 (US); Glacier National Park, *Hitchcock* 11945 (US); Gunsight Lake, *Jack* 2245 (A). IDAHO: Divide between St. Joe and Clearwater River, *Leiberg* 1248 (A, NY, G, US); Bear Creek Canyon, *Leiberg* 2967 (US); Upper Priest River, *Epling* 7931 (US); Weissners Peak, *Leiberg* 1668 (US).

Although this is one of the most distinctive species in the genus, and

bears no close resemblance to any other except *S. occidentalis*, it has been persistently misunderstood, probably on account of inadequate herbarium material for study, and the rather unsatisfactory original description by Roemer. Hedlund, the monographer of *Sorbus*, completely misinterpreted it, and had it confused, not only with *S. occidentalis*, but with *S. californica* as well. As an example of his almost complete lack of knowledge of this plant, he says that it "scheint der *S. americana* am nächsten zu stehen." Schneider, although recognizing the distinctness of *S. californica* and *S. occidentalis*, reduces the latter to a synonym of *S. pumila* (*S. sitchensis*). Piper was even further from the mark when he mistook the shrub of the Cascade Mountains, herein called *S. cascadiensis*, for *S. sitchensis*, which differs in its ellipsoid, dull, glaucescent fruits, smaller, convex inflorescence, ferrugineous pubescence, shape and serration of the smaller, dull, usually obtusish leaflets, and the wholly separate geographical distribution. *Sorbus cascadiensis* has globose, scarlet, glossy fruits in denser, flat-topped clusters, the acute, glossy, somewhat larger leaflets serrate almost to the base, and the sparse pubescence of whitish trichomes. Rydberg, in his usually critical *Flora of the Rocky Mountains* (1917), came nearer than any of his predecessors to an understanding of *S. sitchensis*, but even he called it *S. occidentalis*, giving as a possible synonym: "(?) *S. sitchensis* Roem." Standley (*Flora of Glacier National Park*, 1921) appears to have been the first modern botanist to interpret correctly this species, which ranges from southern Alaska, across British Columbia, and southward to northern Montana and adjacent Idaho. As far as is known, it is the only species of mountain-ash occurring at Sitka, Alaska, the type locality.

*Sorbus sitchensis* is most closely related to *S. occidentalis*, from which it may be readily distinguished by the thicker, coarser, somewhat coriaceous, sometimes acutish leaflets that are serrate to the middle or below, and the glabrous or nearly glabrous rachises. In addition, the inflorescence is more densely flowered, and the styles are fewer (3-4) and shorter (1.5-2 mm. long).

Occasional specimens from Glacier National Park, Montana (*Standley* 15747, 17566, 18452, US), have acute, less coarsely serrate leaflets and larger inflorescences, suggesting a hybrid origin with *S. scopulina*, which is a common shrub in that region.

In 1918, M. Gandoger proposed *Sorbus Tilingii*, basing it upon one specimen from Sitka, Alaska, collected by Tiling, and four other specimens from various parts of the United States, as well as three from northeastern Asia. Through the courtesy of M. Douin of the Univer-



sité de Lyon, and the co-operation of Dr. Leon Croizat of the Arnold Arboretum, I have been able to examine Gandoger's herbarium material of this proposed species. The holotype turns out to be a topotype and a typical specimen of *S. sitchensis*. The four North American paratypes consist of two sheets of *S. scopulina* (Montana: *Williams*; Colorado: *Crandall*), one of *S. decora* (Vermont: *Pringle*); and one of the European *S. aucuparia* (Illinois: *Bross*) that has become naturalized in that State. The three Asiatic specimens are labelled *S. sambucifolia*; they belong, however, to some other oriental species, possibly *S. discolor* Maxim. Thus it is plain that Gandoger has not described a new species, but has merely applied a new name to a group of miscellaneous herbarium specimens belonging to no less than five different species, of which four are already well known North American plants. The name *S. Tilingii* becomes accordingly a synonym of *S. sitchensis*.

Bongard (l. c.) reports from Sitka a small-leaved variety as follows: "Huic adjungimus varietatem *microphyllam*, foliis quam in praecedente triplo minoribus insignem, quam autem, floribus fructibusque deficientibus definire nequimus." The significance of this reference has not been ascertained. As previously noted, the only species of *Sorbus* known to occur at Sitka is *S. sitchensis* Roemer.

10. ***Sorbus occidentalis*** (Wats.) Greene, *Pittonia* 4: 131. 1900; Howell, Fl. NW. Am. 164. 1898; Benson, Contr. Dudley Herb. Stanford Univ. 2: 102. 1930; Jones, Univ. Washington Publ. Biol. 5: 180. 1936, op. cit. 7: 108. 1938.

*Sorbus pumilus* Raf. Med. Fl. 2: 265. 1830, *nomen subnudum*; Hedlund, Svenska Vet.-Akad. Handl. 35: 39. 1901; Schneider, Ill. Handb. Laubholzk. 1: 669, f. 366 g-h. 1906, excl. syn. *S. sitchensis*; Rehder, Man. Cult. Trees Shrubs 378. 1927.

*Sorbus humifusa* Wats. Bibliogr. Index 290. 1878 (error in transcription).

*Pyrus occidentalis* Wats. Proc. Am. Acad. 23: 263. 1888; Piper, Contr. U. S. Nat. Herb. 11: 347. 1906; Henry, Fl. S. Brit. Col. 183. 1915; Gilkey, Handb. NW. Flow. Pl. 148. 1936.

*Sorbus sambucifolia* Roemer var. *Grayi* Wenzig, Bot. Centralbl. 35: 342. 1888.

*Pyrus sambucifolia* var. *pumila* Sargent, Silva N. Am. 4: 82. 1892.

*Sorbus sambucifolia* Roemer var. *pumila* Koehne, Deutsche Dendrol. 247. 1893.

Shrubs 1-3 m. tall, with gray bark; winter-buds ellipsoid, 5-7 mm. long, rufous pubescent; young twigs finely pubescent or puberulent; lenticels numerous, oblong; leaflets 7-11, thin, perfectly glabrous at maturity, oblong to oval (rarely somewhat lanceolate), 2-6 cm. long,

8–25 mm. wide, acutish at the base, the apex always rounded or obtuse, or even truncate, frequently minutely apiculate by the shortly excurrent midvein; margins entire except at or near the apex, or sometimes with a few teeth toward the middle; teeth 0–15, usually 6–12, obliquely lanceolate, acuminate, incurved, 3–4 per cm.; upper surface of leaflets dull, pale bluish-green, lower surface paler, reticulate; terminal leaflet oval; petioles and rachises finely pubescent, less commonly nearly glabrous; inflorescence 3–6 cm. broad, compact, convex on top, 15–40-flowered, the flowers about 1 cm. in diameter; pedicels, peduncles, and bracts more or less rufous pubescent to nearly glabrous, the bracts tardily deciduous, linear, acute, 2–10 mm. long; calyx campanulate, glabrous, 3–4 mm. long, the sepals 1–1.5 mm. long, ciliate; petals oval, very shortly clawed, 3–4 mm. long, often slightly pubescent on the upper surface near the base; stamens much shorter than the petals; anthers 0.5–0.7 mm. long; styles 5, about 3 mm. long; top of the ovary pubescent; fruit red, glaucescent, ellipsoid, 6–8 mm. in diameter, 7–10 mm. long; seeds castaneous, oval or ovoid, acute at the base, slightly flattened and oblique, 3.5 mm. long, 2.5 mm. wide when mature.

TYPE LOCALITY: Cascade Mountains, 49° N. latitude. Collected by David Lyall.

RANGE: Southwestern British Columbia to Oregon in the Cascade Mountains and the Coast Range, at altitudes of 4000 to 7500 feet, and one known station in Siskiyou County, California. Chiefly Hudsonian.

BRITISH COLUMBIA: Skagit Valley, *Macoun* 69916, 69917, 69918 (NY, Can); Chilliwack Valley, *Macoun* 34373, 34374, 34377, 34378, (US, Can, G, NY), 34375, 34376 (US, Can). WASHINGTON: Cascade Mountains, lat. 49°, *Lyall* in 1859, TYPE (G); Olympic Mountains, August 18, 1896, *Sargent* (A), *Piper* 423 (A), *Elmer* 2509 (A, US, NY); Mt. Baldy, *Lamb* 1365 (A, NY), *Conard* 304 (US, G, NY); Bridge Creek, *Elmer* 663 (NY, US, A); Lake Chelan, *Dr. Kuhn* in 1856 (NY); Yakima region, *Brandeggee* in 1882 (UC); Mt. Shuksan, *Benson* 2413 (NY, US); Mt. Baker, *Gorman* 2514 (UC), *Hitchcock* 12274 (US); Welcome Pass, *Thompson* 8071 (G, UC); Skagit Pass, August 1892, *Lake & Hull* (NY); Stevens Pass, *Benson* 2352 (NY, US, UC), *Sandberg & Leiberg* 750 (A, G, CA, US, UC, NY), *Whited* 1429 (US); Horseshoe Basin, *Gorman* 795 (US); Mt. Dickerman, *Thompson* 8876 (US, A); headwaters of the Stehekin River, October 5, 1904, *Sudworth* (US); Tye, *Otis* 709 (CA); Mount Rainier, *Allen* 125 (NY, UC, US), 125a (NY, G, UC, US, A), *Benson* 2324 (US, UC, NY), July 1897, *Flett* (US), *Mrs. Bailey Willis* in 1883 (NY), August



20, 1904, *Jack* (A), same date, *Rehder* (A), August 8, 1896, *Sargent* (A), *Grant* in 1925 (CA), *M. Baker* 675b (CA), *Eastwood* 1060 (CA), *C. H. Merriam* in 1897 (US), *Piper* 1988 (A, US), *H. E. & S. T. Parks* 21008 (US, UC), 21054 (G, UC), *Esther Perry*, August 1931 (UC), *Munz* 9933 (G), *G. N. Jones* 6099, 10264, 10285 (G); Mt. St. Helens, *Walpole* 24 (US), *Coville* 789, 790, 812 (US), *Thompson* 12667 (NY, A); Mt. Adams, August 7, 1894, *Lloyd* (NY); Skamania Co., *Suksdorf* in 1886 (G). OREGON: Mount Hood, August 20, 1896, *Sargent* (A), *C. H. Merriam* in 1896 (US), *Langille* 115 (US), *Walpole* 96 (US), *Applegate* 2874, 2809 (US), *Thompson* 4923 (US), *Mrs. E. C. Van Dyke* in 1928 (CA), *Benson* 2518 (NY, US), July 22, 1894, *F. E. Lloyd* (NY), *Thomas Howell* 1497 (US, UC, NY); Marion Lake, *Coville & Applegate* 1155 (US); Three Sisters, *Coville & Applegate* 558 (A, US), *Gorman* 1715 (US); Mt. Jefferson, *Peck* 9177 (NY), *Coville & Applegate* 1178 (US), *J. C. Nelson* 2876 (G); Metolius trail, near Ann Lake, *Coville & Applegate* 1161 (US).

This very distinctive shrub is most closely related to *S. sitchensis* Roem., and frequently has been mistaken for that species. It is attributed to the Rocky Mountain area by Rydberg but it does not extend that far eastward. The Rocky Mountain material so described and identified is *S. sitchensis*. The leaflets of *S. occidentalis* are different from those of any other North American species in being entire for most of their length. Occasionally they are entire throughout. The teeth are seldom more than about fifteen, the usual number ranging from six to twelve. They are confined to near the apex of the obtuse, or sometimes truncate, leaflet. Rarely does the serration extend to the middle of the leaflet.

Watson's name is used in preference to that of Rafinesque on account of the doubtful application of the latter name. Rafinesque's whole description is: "*S. pumilus* Raf. of Oregon mountains, has large edible fruits, eaten and dried by the Shoshonis." Where the "Oregon" mountains may be, and which species of mountain-ash were used by the "Shoshonis", if any species was used at all by the tribe of Indians presumably indicated by that title, is very obscure. If by Oregon mountains is meant the Rockies, and that would coincide with the range of the Shoshone Indians, *Sorbus occidentalis* is definitely excluded since it is not known to occur east of the Cascade Mountains of Washington and Oregon. If *S. occidentalis* was really the species intended, which, as indicated above, is very doubtful, the mention of large fruits is scarcely definitive, since the fruits of that species are not

larger than those of any other western American *Sorbus*. It appears therefore that Rafinesque's name must remain a *nomen dubium*.

*Sorbus occidentalis* is attributed to California on the basis of a specimen collected in 1937 in the Salmon-Trinity Alps, Siskiyou County, California, by Mr. John Thomas Howell (no. 13519). This specimen is not, however, typical *S. occidentalis*; the inflorescence is somewhat larger, and the leaflets are more serrate than in material from Oregon and Washington. In certain respects it approaches the northern *S. sitchensis*. Additional collections are needed to determine the status of *S. occidentalis* in California.

Hedlund (l. c.) ascribes this species to northeastern Asia and Kamtchatka. However, this is not correct because, as previously noted, *S. occidentalis* is confined to a small area in the western part of North America. Evidently some Asiatic species with oligodontous leaflets has been confused with it. The fact that this species does not occur in Kamtchatka is confirmed by Hultén in his scholarly study of the flora of that region (Svenska Vet.-Akad. Handl. 8: 49. 1929).

11. ***Sorbus sambucifolia*** (Cham. & Schlecht.) Roemer, Syn. Mon. 3: 139. 1847; Hedlund, Svenska Vet.-Akad. Handl. 35: 37. 1901; Schneider, Ill. Handb. Laubholz. 1: 667, fig. 366 a-b. 1906; Rehder, Man. Cult. Trees Shrubs 378. 1927; Hultén, Svenska Vet.-Akad. Handl. 8: 46. 1929; Tatew. & Kobay. Contrib. Fl. Aleutian Isl. 54. 1934; Hultén, Fl. Aleutian Isl. 220. 1937.

*Pyrus sambucifolia* Cham. & Schlecht. Linnaea 2: 36. 1827; Torrey & Gray, Fl. N. Am. 1: 472, 1840.

A shrub 1–2 m. tall; bark gray, smooth; winter-buds glutinous, glossy, slightly rufous pubescent; lenticels few, oval; stipules adnate to the petioles, rufous pilose, membranaceous, lanceolate, deciduous; leaflets 7–11, 3–7 cm. long, lanceolate to ovate-lanceolate or oval, acuminate, usually broadest at the asymmetrical base, dull lustrous green above, paler beneath, soon quite glabrous on both sides; margins sharply serrate almost to the base, the teeth 45–55 on each leaflet; terminal leaflet oval; rachis pilose or glabrate; inflorescence round-topped, 3–5 cm. broad, 8–15-flowered; pedicels and peduncles sparingly rufous pubescent; flowers 1–1.5 cm. in diameter; calyx 5–6 mm. long, the sepals sparingly ciliolate, erect in fruit, rather large, triangular, pubescent within, glabrous on the back; petals oval or roundish 4–5 mm. long; stamens about as long as the petals; styles 5, 1.5 mm. long; top of the ovary pubescent; fruits few, ellipsoid, glaucescent, 1–1.5 cm. in diameter; seeds lanceoloid, symmetrical, dark brown, not flattened, 4 mm. long, 2 mm. wide.





SORBUS ALASKANA G. N. Jones





SORBUS CASCADIENSIS G. N. Jones



TYPE LOCALITY: Petropavlovsk, Siberia.

RANGE: Japan and the Commander Islands to Kamtchatka and the westernmost Aleutian Islands.

ALASKA: Attu Isl., August 29, 1891, *J. M. Macoun* (Can, US), *Dall* (G), *Hultén* 6112 (G, NY), 6809 (NY).

This is a very distinctive species, not closely related to any other in North America. It occurs in the western hemisphere only on some of the westernmost islands of the Aleutian archipelago, and all the numerous references in botanical literature to *S. sambucifolia*, or *Pyrus sambucifolia*, from continental North America apply to other wholly different species. Hultén (l. c.) reports it to occur on Buldir, Alaid, and Agattu islands as well as Attu.

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HARVARD UNIVERSITY.



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