

REVISION OF THE CALIFORNIAN SPECIES OF
ARCTOSTAPHYLOS

WILLIS LINN JEPSON

(concluded from page 86)

Var. *VIRGATA* Jepson n. comb. (*A. virgata* Eastw.), a shrub with somewhat willow-like leaves growing in Marin Co. (Rock Spr., *Jepson* 6804; Bill Williams trail, *Jepson* 9513).

Refs.—*ARCTOSTAPHYLOS GLANDULOSA* Eastw. Proc. Cal. Acad. ser. 3, 1:82 (1897), type loc. Mt. Tamalpais, *Eastwood*. Var. *VESTITA* Jepson. *A. vestita* Eastw. in Sarg. Trees and Shrubs, 1:205, pl. 97 (1905) type loc. Monterey, *T. Brandegee*, *Eastwood*. Var. *CRASSIFOLIA* Jepson. Var. *VIRGATA* Jepson. *A. virgata* Eastw. l. c. 1:203. pl. 96 (1905), type loc. Bootjack Trail, Mt. Tamalpais, *Eastwood*.

A. NISSEANA Merriam, Proc. Biol. Soc. Wash. 31:102 (1918), type loc. 2 or 3 mi. n. of Louisville, El Dorado Co., *Merriam*. Leaves 10 to 12 lines long; branchlets, peduncles and bracts hispid; flowers and fruit unknown (ex char.).

18. *A. TOMENTOSA* Lindl. This species was first published by Pursh as *Arbutus tomentosa* and founded upon a specimen by Menzies from the "Northwest Coast." Hooker and Arnott in the Botany of the Beechey, 144, comment upon the various forms which they include under *Arbutus tomentosa* Pursh, and cite the original plant as collected by Menzies on the Columbia River.¹ This specimen is in the Herbarium of the British Museum and is labeled "Mr. Menzies and Dav. Nelson." Pursh, however, quotes only Menzies. The type specimen is finely pubescent or even whitish woolly on the under surface of the leaves which are broadly oblong, bluntish, 1 to 1½ in. long, 7 to 10 lines broad; petioles short, 1 to 3 lines long. In addition to the fine pubescence the stems and petioles are furnished with hispid hairs, although not quite as pronounced as in Lindley's figure (Bot. Reg. t. 1791) which rests on a plant grown in England from seed presumably collected by Douglas.

The herbarium specimen of Douglas (British Museum) is somewhat more hairy than the Menzies specimen, with the leaves longer and more pointed. The stems are tomentulose and very hispid; the leaves are entire, acute or rounded at base, very shortly acute at apex, on petioles 2½ lines long. The bracts are foliaceous, linear (or slightly obspatulate), 5 lines long.

A. tomentosa as it occurs in California is a medium-sized erect shrub. It has always been my opinion, gradually confirmed, that it kills outright under fire and does not crown-sprout. This opinion

¹The Menzies type is said by Piper to have been collected at Monterey. The *A. tomentosa* of authors he names *A. columbiana* Piper. However this may be the latter certainly does not range "throughout much of California" as he states (Fl. Nw. Coast 279).

was verified once more last summer. While on a botanical expedition with my former student, Mr. J. P. Tracy, we turned off the coast road at the south end of Big Lagoon on the Humboldt coast. At that point the woods on the upper slopes thin down to the edge of a "fern prairie" and are succeeded by a border of brush, which contains *Arctostaphylos tomentosa*. A fire had burned a strip through this brush area, perhaps five years before, and a few individuals of *A. tomentosa*, that had been killed by the fire, were still standing. One dead shrub was particularly striking, as showing the lethal effect of intense heat on this species. Its hue and aspect were quite different from the fire-killed bodies of *A. sensitiva* on Mt. Tamalpais.

It is clear that *A. tomentosa* cannot be made to include such species as *A. canescens* Eastw. and *A. glandulosa* Eastw. which occupy so different a place in the chaparral society and show such different reactions to fire. *A. tomentosa* with its single trunk is in a different category from *A. canescens* and *A. glandulosa*, each of which exhibit a cluster of low rigid stems arising from a depressed or flattened woody base.

Locs.—North Coast Ranges: Inverness, *Jepson* 502a; Fort Bragg, *W. C. Mathews*; Kenny's, nw. Mendocino Co., *Jepson* 2155; Redwood Creek, Humboldt Co., *Jepson* 1953; Big Lagoon, *Jepson*. The following plants from the South Coast Ranges are included here with some reserve: San Luis Obispo, *J. E. Roadhouse*; Los Gatos, *Bioletti*; Santa Cruz Mts., *Jepson*; Saratoga, *Jepson* 5633; Kings Mt., San Mateo Co., *C. F. Baker* 327.

Refs.—*ARCTOSTAPHYLOS TOMENTOSA* Lindl. Bot. Reg. t. 1791 (1836). *Arbutus tomentosa* Pursh, Fl. 1:282 (1814), type from the Northwest Coast, Menzies.

19. *A. ANDERSONII* Gray is remarkable for its cordate or even auriculate leaves which are commonly sessile. It favors the summits of ridges, mostly in the central coast region. In relationship it is very close to *A. tomentosa* and it has been debated in my mind if it were not better to dispose it as a variety of that species, but at present it is retained as a valid species. It kills completely under chaparral fire. In the Oakland Hills it flowers in February, usually one month earlier than *A. glandulosa* Eastw., with which it is associated.

Locs.—Antioch, *K. Brandegees*; Mt. Diablo, *C. F. Baker* 3161; Oakland Hills, *Jepson* 5715, 6229; Pilarcitos Lake, San Mateo Co., *C. T. Blake*; Kings Mt., San Mateo Co., *C. F. Baker* 271; Sur River, *Davy* 7408; trail betw. Lucia and San Antonio River, *Hall* 9998; San Luis Obispo Co., *Ida M. Blochman*.

Var. *AURICULATA* *Jepson* n. comb. (*A. auriculata* Eastw.). Pubescence as in the species but more canescent or glabrate; leaves cordate at base, subsessile—Mt. Diablo. It forms pure colonies a few yards square and does not crown-sprout. Good examples of it occur in the rocky cañon at the head of Sycamore Creek, *Jepson* 9662, 9737.

Var. *PECHOENSIS* Jepson n. comb. Branchlets and leaves finely or sparsely tomentose; pedicels nearly or quite glabrous (ex char.). —Pecho Mts., San Luis Obispo Co.

Refs.—*ARCTOSTAPHYLOS ANDERSONII* Gray, Proc. Am. Acad. 11:83 (1876), type loc. Ben Lomond near Santa Cruz, *Anderson*; Jepson, Fl. W. Mid. Cal. 371 (1901). Var. *AURICULATA* Jepson. *A. auriculata* Eastw. Bull. Torr. Club 32:202 (1905), type loc. trail above the Boyd Ranch, Mt. Diablo, *Eastwood*. Var. *PECHOENSIS* Jepson. *A. pechoensis* Dudley; Abrams, N. Am. Fl. 29:98 (1914), type loc. head of Wild Cherry Cañon, San Luis Obispo Co., *Dudley*.

20. *A. INSULARIS* Greene is one of the peculiar insular species of the Santa Barbara group. It has been little studied in the field.

Ref.—*ARCTOSTAPHYLOS INSULARIS* Greene; Parry, Bull. Cal. Acad. 2:494 (1887), type loc. Santa Cruz Isl., *Greene*.

21. *A. PARRYANA* Lemmon. In the original description Lemmon makes the statement that this new shrub was discovered four miles west of Keene sta., Tehachapi Range. Four miles west of Keene sta. brings one to the slopes and summit of Bear Mt. which I have searched without finding any *Arctostaphylos* at all. It is very easy, however, to lose one's orientation in the Tehachapis and Lemmon may have been in error. Since he doubtless followed the wagon road his station probably is southerly from Keene, or Woodford as it is known in the postal guide. I have examined the type specimens in the Lemmon Herbarium and I regard the species as valid.

Refs.—*ARCTOSTAPHYLOS PARRYANA* Lemmon in Greene, Pitt. 2:68 (1889), type loc. Tehachapi Mts. near Keene sta., *Lemmon*, June 23 and Aug. 5, 1888.

22. *A. DRUPACEA* McBr. is a well-marked species of Southern California, essentially confined to the cismontane region.

Locs.—Seven Oaks, San Bernardino Mts., *Parish* 3709; San Bernardino Valley, *Jepson* 5588; Strawberry Valley, Mt. San Jacinto, *Jepson* 1305; Hot Springs Mt., *Jepson* 8744; Julian, *T. Brandegee*.

Refs.—*ARCTOSTAPHYLOS DRUPACEA* McBr. Contrib. Gray Herb. 53:16 (1918). *A. pringlei* Parry, var. *drupacea* Parry, Bull. Cal. Acad. 2:495 (1887), type loc. mts. e. of San Diego, *Orcutt* 543.

23. *A. BICOLOR* Gray is a highly distinctive species which has no near allies in California.

Locs.—San Diego, *Jepson* 6670; Encinitas, *K. Brandegee*; Fallbrook, *Parish*; Foster, *Hall* 3881; San Pasqual grade, *Jepson* 8506; Witch Creek, *Alderson*; Santa Catalina Isl., *Blanche Trask*.

Refs.—*ARCTOSTAPHYLOS BICOLOR* Gray, Proc. Am. Acad. 7:366 (1868), type loc. San Diego, *Cooper*. *Xylococcus bicolor* Nutt. Trans. Am. Phil. Soc. ser. 2, 8:259 (1843), type coll. by Nuttall, obviously San Diego, not "Monterey." *A. clevelandi* Gray, Syn. Fl. N. Am. 2:29 (1878).

ARCTOSTAPHYLOS Adans. MANZANITA.

Evergreen shrubs with very crooked branches, the bark dark red or chocolate-colored, smooth and polished. Leaves entire (rarely serrate), more or less vertical by twisting of the petiole. Flowers white or pink, in a terminal usually subglobose nodding cluster or panicle composed of few to several short racemes. Flower parts usually in 5s. Bracts commonly scaly. Sepals distinct. Corolla urn-shaped. Stamens twice as many as the corolla lobes; anthers with a pair of reflexed awns on the back; filaments more or less hairy, dilated toward the base. Ovary seated on a hypogynous disk, 4 to 10-celled, with one ovule in each cell, maturing into a dry brown berry-like fruit with an outer pulp covering several stony 1-seeded nutlets. Surface of the berry smooth, the pulp at first fleshy, at maturity usually mealy or powdery. Nutlets distinct, or irregularly united in 2s or 3s, or sometimes consolidated into a single stone.—Wood hard but brash, warping and cracking excessively in seasoning. (Greek arktos, a bear, and staphule, a grape; bears feed on the berries.)

A.—Leaves plane or nearly so, often more or less vertical.

1. Ovary glabrous (except in no. 3); leaves and branchlets glabrous or essentially so.

Erect robust shrubs 4 to 8 (or 14) ft. high.

Pedicels glandular; foliage very white-glaucous.

Berry with solid stone; pedicels viscid-glandular, sometimes glandular-pubescent; S. Cal. and South Coast Ranges..... 1. *A. glauca*.

Berry with separate nutlets; pedicels glandular-hairy; branchlets and peduncles very glaucous; Sierra Nevada foothills chiefly.

Ovary glabrous; branchlets and peduncles very glabrous 2. *A. viscida*.

Ovary glandular hairy; branchlets and peduncles glandular-hairy..... 3. *A. mariposa*.

Pedicels not glandular or only obscurely or minutely so; berry not glandular (except in *A. elegans*).

Panicles very dense; peduncles and rachises minutely glandular, not pubescent; leaves dark green; higher forest belt, chiefly Sierra Nevada..... 4. *A. patula*.

Panicles more open; peduncles and rachises not glandular.

Branches disposed to be erect and straightish; peduncles and rachises glabrous or nearly so; leaves bright green.

Berry not glandular; Napa Range n. to Lake and Mendocino Cos..... 5. *A. stanfordiana*.

Berry all over glandular; Lake Co..... 6. *A. elegans*.

Branches crooked, spreading widely.

Leaves abruptly acute, mucronate, less than 1 in. long; mountains of S. Cal..... 7. *A. pungens*.

Leaves obtuse or acute, more than 1 in. long; mountains of central and northern Cal.

Peduncles and rachises canescently puberulent; panicles drooping; leaves light green; North Coast Ranges and northern Sierra Nevada foothills..... 8. *A. manzanita*.

Peduncles and rachises glabrous or minutely puberulent; panicles erect or only half-drooping; leaves pale or whitish; Sierra Nevada..... 9. *A. pastillosa*.

Dwarf or procumbent or low shrubs; pedicels glabrous or nearly so.

High Sierra species; plants forming a rough mat..... 10. *A. nevadensis*.

Coastal or seashore species.

Leaves ovate or obovate, shortly acute at apex, both sides alike..... 11. *A. hookeri*.

Leaves mostly obovate, rounded or obtuse at apex.

Leaves both sides alike; berry mostly pink or red..... 12. *A. uva-ursi*.

Leaves green above, paler beneath; berry brown..... 13. *A. pumila*.

2. Ovary pubescent; leaves and branchlets pubescent or usually so.

Bracts brown or herbaceous; mostly Coast Ranges, and near the coast.

Nutlets distinct or united into sets of 2 or 3.

Calyx with entire sepals.

Leaves mostly 4 to 7 lines long; berry glabrous; nutlets thin-shelled.

Apex of leaves obtuse or bluntish; Mendocino coast and Amador Co..... 14. *A. nummularia*.

- Apex of leaves abruptly short-acute, curved or deflexed; central coast region...
 Leaves mostly 1 to 1½ (or 2) in. long; nutlets thick-shelled; berry minutely short-hairy.15. *A. sensitiva*.
 Leaves rarely cordate, short-petioled.
 Branchlets not hispid; ovary densely white hairy, not glandular.....16. *A. canescens*.
 Branchlets or some of them more or less hispid; ovary white hairy.
 Ovary hairs glandular; berry glandular17. *A. glandulosa*.
 Ovary hairs not glandular; berry not glandular.....18. *A. tomentosa*.
 Leaves mostly cordate, thickly clothing the branchlets, sessile.....19. *A. andersonii*.
 Calyx with fimbriate edge to sepals; Santa Barbara Isls.....20. *A. insularis*.
 Nutlets united into a solid stone; Tehachapi Mts. to the San Gabriel Mts.....21. *A. parryana*.
 Bracts pink, petal-like; stone solid; S. Cal.....22. *A. drupacea*.

B.—Leaves strongly revolute, not at all vertical.

- Stone solid; S. Cal. coast23. *A. bicolor*.

1. **A. gláuca** Lindl. GREAT-BERRIED MANZANITA. Shrub 6 to 8 ft. high, or almost arborescent and 15 ft. high with a trunk 6 to 13 in. in diameter; leaves glaucous and glabrous, roundish or elliptical to broadly ovate, obtuse or acute at apex, obtuse, truncate or subcordate at base, 1¼ to 1¾ in. long; petioles 3 to 7 lines long; panicle broader than high, frequently very compact; rachis glabrous, sometimes a little glaucous; pedicels glandular; flowers white, rather large; berry rather densely covered with minute glands and very viscid, globose, 5 to 8 lines broad; pulp scanty; stone solid, smooth.—Cismontane S. Cal., ranging n. to Monterey Co. and Mt. Diablo. Var. *EREMICOLA* Jepson. Leaves purple-veined; berry elliptic in outline.—Piñon Well Mts., n. Colorado Desert.

2. **A. víscida** Parry. WHITE-LEAF MANZANITA. Shrub 4 to 10 ft. high, with very striking contrast between the white foliage and deep red crooked branches; branchlets and peduncles glaucous and very glabrous, usually reddish, the rachis of the raceme or panicle glandular; leaves very white-glaucous, glabrous, elliptic, varying to orbicular or round-ovate, obtuse or abruptly acute, rounded at base, ¾ or 1 to 1½ (or 2) in. long; flowers in simple or forked racemes; pedicels 4 to 6 lines long, with short spreading glandular hairs; bracts small, ovate-lanceolate, acuminate; calyx-lobes reflexed over summit of pedicels; corolla light pink; berry deep red, globose, 3 to 4 lines broad, the surface very glandular, cohering in sticky masses when gathered, or often non-glandular; nutlets distinct or 2 or 3 united.—Foothills of the Sierra Nevada (often the only manzanita in the upper portion of the chaparral belt): Tulare Co.; Calaveras Co. to Butte Co.; and extending around the head of the Sacramento Valley into the inner North Coast Ranges and s. to the Napa Range. Remarkable for its white-glaucous branchlets and peduncles.

3. **A. maripòsa** Dudley. Shrub 4 to 8 ft. high with spreading branches and very white-glaucous foliage; branchlets and inflorescence glandular-pubescent or puberulent, the hairs mostly spreading; leaves glabrous or nearly so, very rigid, oval to elliptic, shortly acute or at least mucronulate, 1 to 1¾ in. long; panicle many-flowered, small, compact; pedicels with glandular hairs; ovary glandular-hairy; berry bright red, glandular-viscid, sometimes covered with minute stipitate glands.—Sierra Nevada, higher foothill region from Tuolumne Co. s. to Fresno Co. Very closely allied to *A. viscida* and sometimes difficult to distinguish from it. Var. *BIVISUM* Jepson. Leaves dark green, 1½ to 2½ in. long; branchlets glandular-hairy and somewhat dusky; berry whitish or somewhat lucent.—Hetch-Hetchy to Wawona.

4. **A. pátula** Greene. GREEN MANZANITA. Widely or diffusely branching, 3 to 5 (or 8) ft. high; peduncles and rachis of inflorescence, and commonly the branchlets, minutely glandular-puberulent; leaves bright green, glabrous, typically orbicular or broadly elliptic, mostly rounded at apex, or obscurely acutish, rounded or subcordate at base, 1 to 1½ (or 2¼) in. long; panicle corymbose, very

dense; bracts ovate, abruptly attenuate; pedicels glabrous, 2 to 3 lines long; sepal tips white-scarious; corolla deep pink; berry commonly dark or black when half-grown, when mature globose or commonly depressed, glabrous, often very hard, 4 to 5 lines broad; nutlets smooth on sides and back, not channeled.—Open pine woods, 4500 to 9000 ft. or 2500 to 5000 ft. at the north: Sierra Nevada from Shasta Co. to Tulare Co.; high North Coast Ranges from the Siskiyou Mts. and Mt. Shasta s. to Mt. Hull; San Gabriel, San Bernardino and San Jacinto mountains. W. Nev.; Ore. The dominant and usually the only species in its area in the Sierra Nevada. The panicle is commonly broad and flattish and its glandular-puberulent rachis is often dark, while the bracts are commonly ovate-attenuate. The berries when three-fourths grown are sometimes rather hard with the nutlets and pulp as if concreted.

5. **A. stánfordiana** Parry. Erect shrub 3 to 6 ft. high with slender dark red stems; leaves glabrous, bright green on both faces, narrowly ovate to oblanceolate, most frequently acute at both ends, 1 to 1½ in. long, very erect; branchlets, peduncles and rachis glabrous or obscurely or minutely glandular-puberulent; flowers light pink to lilac; corolla 2 to 3 lines long, very frequently with an obscure constriction just below the middle; berry very small, usually much depressed and commonly unsymmetrical or irregular, or sometimes globose, glabrous, usually a bright apple-red when first mature, about 1½ lines high and twice as broad; nutlets broader than high.—Mountain summits and ridges, Mendocino and Lake Cos., s. to the Napa Range and Mt. Diablo. Apr.-June.

6. **A. elegáns** Jepson. Similar to *A. stanfordiana*; inflorescence nearly glabrous; flowers unknown; berry all over minutely stipitate-glandular.—Mt. Konocti, Lake Co.

7. **A. púngens** H. B. K. Shrub (2 or) 3 to 8 ft. high; branchlets canescent or white tomentulose; leaves oblong to elliptic, abruptly or somewhat obscurely short-acute, mucronate, finely pubescent or minutely tomentulose, eventually glabrate or often rather glossy, 8 to 10 lines (rarely to 1¼ in.) long; pedicels glabrous; panicles small; berries usually somewhat depressed-globose and 3 to 4 lines broad, but variable in size and sometimes eccentric in shape, glabrous, dark-brown or terra-cotta, shining.—San Bernardino and San Jacinto mountains, 5000 to 6000 ft., n. in the inner Coast Ranges to San Benito Co., thence to Marin Co., about 1600 to 2200 feet. E. to Ariz., s. to Mex.



1. *Arctostaphylos manzanita* Parry.
Fl. branchlet, x 1.

8. **A. manzaníta** Parry. **PARRY MANZANITA.**
(Figure 1.) Shrub 6 to 12

ft. high, commonly very erect, sometimes widely branched from the base with long straggling crooked branches, sometimes becoming almost elephantine in its proportions and up to 22 ft. high; branchlets, peduncles, and rachis finely and somewhat canescently puberulent; pedicels glabrous; leaves pale green, thick, glabrous or minutely puberulent, elliptic or oblong, acute or subacute at apex, acute or obtuse at base, 1 to 1½ in. long; panicles drooping; flowers white, some-

times pink tinged; bracts triangular-acute, small and dry; berry dull white in early summer, becoming deep reddish brown in late summer and autumn, smooth and glabrous, 4 to 5 lines in diameter; nutlets irregularly coalescent or separate, keeled or ridged and roughened on back, and often with 2 small lateral ridges.—North Coast Ranges (only or mostly the middle and inner ranges), n. to Tehama Co., thence s. in the Sierra Nevada foothills to Tuolumne Co.; also on Mt. Diablo. Reaches its greatest development in the Napa Range and in central Mendocino Co. about Long Valley where it is dominant locally.

9. **A. pastillòsa** Jepson. Shrub 3 to 6 ft. high; leaves and pedicels glabrous, the peduncles and rachises glabrous or minutely puberulent; foliage light-green; leaves elliptic-oblong, or -obovate, varying to oblong-lanceolate and somewhat willow-like, mostly acute, glabrous and glaucous, 1 to $1\frac{3}{4}$ or $2\frac{1}{2}$ in. long; pedicels glabrous; panicles loose, erect or only half-drooping; ovary depressed, roughened but glabrous; berry elevated-globose or globose, dull white or later light brown, 4 to 6 or 8 lines broad; nutlets 4 or 5, or sometimes coalescing into one channeled or ribbed stone, the stone forming tardily.—Sierra Nevada, higher foothills, 2500 to 4500 ft., chiefly in a belt between *A. viscida* and *A. patula*.

10. **A. nevadénsis** Gray. PINE-MAT MANZANITA. Plants gregarious and roughly carpeting the forest floor, the main stems creeping or trailing, rooting, the erect branches 3 to 6 or 9 in. high; leaves obovate or oblong-oblancoate, obtuse and mucronate, or abruptly acute, glabrous or minutely puberulent, reticulate with dark veins, 7 to 12 lines long; pedicels glabrous, 1 to 2 lines long; berry dark carmine, smooth, glabrous, 2 to 3 lines in diameter.—Open pine woods 7000 to 9000 ft.: Sierra Nevada from Tulare Co. to Shasta Co.; high North Coast Ranges from n. Lake Co. to Siskiyou Co.

11. **A. hoókeri** Don. Procumbent or low shrub $\frac{1}{2}$ to 2 ft. high; branchlets and peduncles puberulent or minutely canescent; leaves bright green, shining, thinish, glabrous or nearly so, ovate or elliptic, shortly acute, mucronate, 7 to 12 lines long; flower-clusters small; pedicels glabrous; corolla $1\frac{1}{2}$ lines long; berry globose or depressed, glabrous, 2 to $2\frac{1}{2}$ lines broad.—Forming small colonies on sand-dunes or in open woods near the coast: San Francisco; Pajaro Hills; Monterey; San Simeon. Mar.

12. **A. uva-úrsi** Spreng. RED BEAR-BERRY. SAND-BERRY. Stems several, trailing, prostrate or buried beneath the sand (all from a single main root), giving rise to erect branching stems 4 to 6 in. high; bark dark brown or somewhat reddish, becoming roughish; leaves oval or obovate, rounded at apex, rarely retuse or subacute, often reticulate-veiny, puberulent or nearly glabrous, especially in age, $\frac{1}{2}$ to 1 in. long; corolla ovoid, white or pinkish, $2\frac{1}{2}$ to 3 lines long; berry typically brilliant red or pink, smooth and glabrous, 3 to $4\frac{1}{2}$ lines in diameter; nutlets 1 or sometimes 3-nerved on the back, obscurely roughened or reticulate on the sides.—Sand-dunes along the ocean shore: Mendocino Co.; Humboldt Bay; n. to B. C. and Alas., thence round the earth in arctic and northern regions.

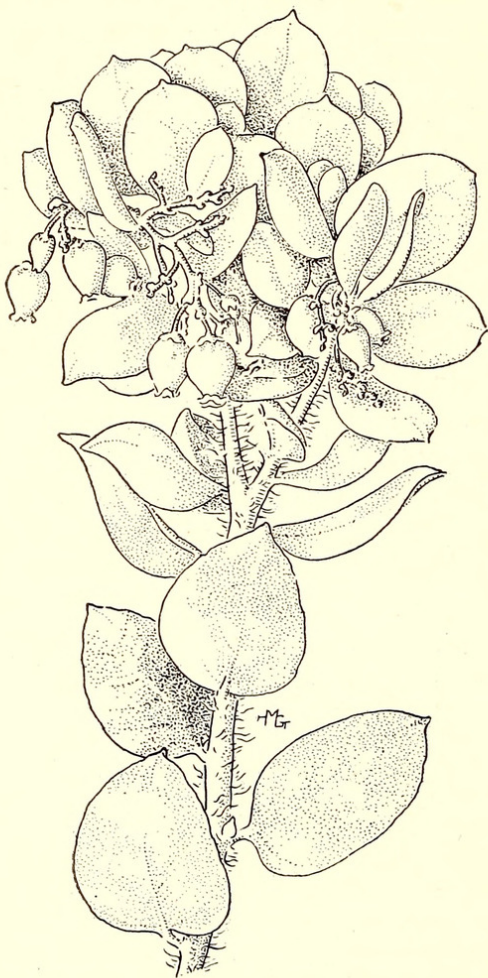
13. **A. pùmila** Nutt. Stems prostrate with ascending branches 4 to 8 in. high, forming somewhat coarse or rough mats 2 to 5 ft. broad; branchlets and leaves finely pubescent or downy, or the leaves above quite glabrate; leaves dull green, obovate, acutish, 5 to 9 lines long; pedicels nearly glabrous; corolla $1\frac{1}{2}$ lines long; ovary somewhat 5-lobed, seated in a saucer-shaped disk; berries reddish or red-brown, globose or globose-oblong, smooth, glabrous, 2 to 3 lines in diameter.—Sand hills and mesas e. of Monterey near the shores of Monterey Bay.

14. **A. nummulária** Gray. Dwarf bush $\frac{1}{2}$ to 1 ft. high, the stems ascending or diffuse; branchlets pilose-pubescent; leaves thickly clothing the branches, elliptic to ovate or oblong, glossy, veiny below, glabrous, or the margins ciliate, 4 to 7 (or 9) lines long, on petioles $\frac{1}{2}$ to 1 line long; corolla white, 1 to 2 lines long.—Mendocino coastal plain. Var. *MYRTIFOLIA* Jepson. Bark shreddy; leaves narrowly ovate, sometimes elliptic or oval, mostly obtuse at base, acute (or rarely

obtuse) and mucronate at apex, 3 to 6 (or 9) lines long: otherwise like the species.—Sierra Nevada foothills in Amador Co. Feb.

15. **A. sensitiva** Jepson. Slender erect shrub 2 to 5 ft. high; branchlets and petioles puberulent and bristly-hirsute; leaves roundish, abruptly acute or apiculate, finely reticulate-veiny beneath, nearly glabrous or sparingly bristly-ciliate, 5 to 7 (or 10) lines long, on petioles $\frac{1}{2}$ to 1 line long; flowers 2 lines long; ovary pubescent; berry oblong, 2 lines long.—Mt. Tamalpais; Santa Cruz Mts.; distribution restricted but locally abundant.

16. **A. canescens** Eastw. Shrub 3 to 6 ft. high; leaves ovate, rounded at apex or obscurely acute, $\frac{3}{4}$ to 3 in. long; branchlets, peduncles and leaves minutely and closely white-pubescent or canescent; pedicels more or less densely short-hairy and somewhat glandular, 2 to 4 lines long; bracts lanceolate, small, or sometimes large (3 to 6 lines long); ovary densely woolly; berry depressed-globose, 4 lines broad, faintly pubescent with very short spreading hairs.—Humboldt Co. s. to the Santa Cruz and Santa Lucia mountains, and far s. to the San Gabriel Mts. Commonly not in the immediate vicinity of the coast, nor reported thus far from the inner coast ranges.



2. *Arctostaphylos glandulosa* Eastw.
Fl. branchlet, x 1.

17. **A. glandulosa** Eastw. EASTWOOD MANZANITA. (Figure 2.) Medium-sized shrub 2 to 3 (or 7) ft. high with many stems arising from a widely spreading root-crown; branchlets, peduncles and pedicels with a dusky more or less glandular indument or tomentum, the branchlets bearing also scattered and usually short bristles which are more or less glandular; leaves ovate to elliptic or oblong, mostly acute, rounded or subcordate at base, dark or yellowish green and often somewhat glandular, most commonly glabrous or apparently so, or sometimes with a fine pubescence, 1 to $1\frac{3}{4}$ in. long; pedicels glandular-hairy, the hairs not dense, often scattered; flowers in rather small compact clusters, white or pinkish; bracts lanceolate, the lower foliaceous; anther awns red; ovary hairy with glandular hairs, usually densely so; berry globose or more commonly depressed, glabrate or under a lens usually showing very short very scattered white hairs.—On broken sandstone: San Diego Co. and San Gabriel Mts., n. to the Oakland Hills and Marin and Mendocino Cos. The most abundant species on the e. and s. slopes of Mt. Tamalpais. At other

stations commonly less or scarcely at all glandular. Var. **VESTITA** Jepson. Bark shreddy; leaves oblong-ovate, mostly acute, mostly truncatish at base, 1 to $1\frac{1}{2}$ in. long, green and glabrous above, with a fine tomentum or close felt-like pubescence beneath.—Santa Cruz Mts. to Monterey and the Santa Lucia Mts. Var. **CRASSIFOLIA** Jepson. Leaves elliptic, thick, 8 to 12 lines long.—San Diego coast. Var. **VIRGATA** Jepson. Leaves thin, somewhat willow-like, ovate to broadly lanceolate, mostly acute, serrulate or rough-edged, $1\frac{1}{2}$ to 2 in. long.—Mt. Tamalpais north to Tomales Bay.

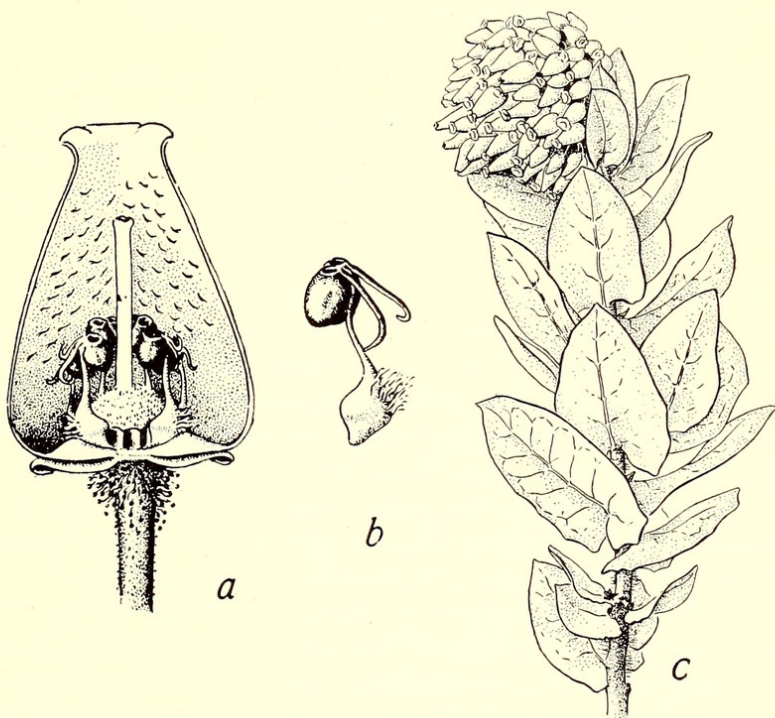
18. **A. tomentosa** (Pursh) Lindl. HAIRY MANZANITA. Shrub 4 to 8 ft. high; branchlets very foliaceous; branchlets and petioles with two kinds of pubescence, long spreading bristly hairs arising from a fine tomentum, usually glandular; leaves sparingly pubescent or nearly glabrous, green or pale, ovate to narrowly or broadly oblong, acute, obtuse to subcordate at base, entire or rarely spinulose-serrulate, 1 to 2 in. long, typically on very short petioles; bracts linear-lanceolate, the lower or all foliaceous, $\frac{1}{4}$ to 1 in. long; pedicels glandular-puberulent; flowers white, in compact clusters; berry depressed, 3 to 4 lines in diameter; minutely and sparingly white-hairy under a lens; nutlets distinct or more or less united.—Immediate neighborhood of the coast from Marin Co. to Humboldt Co.; n. to Wash. Extending s. to the Santa Cruz Mts. and San Luis Obispo Co., though apparently not in typical form.

19. **A. andersøinii** Gray. (Figure 3.) Four to 8 (or 14) ft. high; branchlets with copious straight spreading hairs or bristles and with glandular indument; leaves

crowded or almost imbricated on the branchlets, oblong or ovate, cordate at base or even auriculate, serrulate below the middle, puberulent or densely tomentulose, or becoming glabrous, 1 to $2\frac{1}{2}$ in. long, commonly sessile, or sometimes with a petiole 1 to 2 or 3 lines long; bracts mostly foliaceous, 2 to 6 lines long; pedicels glandular-puberulent; corolla 3 lines long, truncatish at base; filaments glabrous; anther awns white; berry viscid-pubescent.—Antioch and Mt. Diablo to the Oakland Hills, Santa Cruz Mts. and Santa Lucia Mts.

Var. **AURICULATA**

Jepson, Leaves usually conescent.—Mt. Diablo. Var. **PECHOENSIS** Jepson. Pedicels mostly glabrous.—San Luis Obispo Co.



3. *Arctostaphylos andersøinii* Gray.

a, long. sect. fl. $\times 4$; *b*, stamen, $\times 6$; *c*, fl. branchlet, $\times \frac{1}{2}$.

20. **A. insularis** Greene. Shrub 4 to 7 ft. high; branchlets glandular-puberulent and with short spreading glandular bristles; leaves ovate, bright green, nearly glabrous, $\frac{1}{4}$ to 2 in. long; peduncles and rachises puberulent, the pedicels not puberulent but rather densely clothed with spreading glandular hairs; flowers in a large panicle of elongated racemes, leafy-bracteate at base; sepals with fimbriate margins; corolla white; berry yellowish-brown, nearly glabrous, 3 to 6 lines broad, 2 to 3 lines high.—Santa Cruz and Santa Rosa islands.

21. **A. parryana** Lemmon. Three to 5 ft. high; leaves ovate to elliptic, thickish, minutely purple-veined, and microscopically glandular, $\frac{3}{4}$ to $1\frac{1}{8}$ in. long; branchlets and rachis canescently puberulent; bractlets deltoid-acute, the upper half deciduous; flowers not seen; pedicels glabrous; berry glabrous or nearly so, the stone solid, obscurely about 6-ridged or -angled.—Tehachapi Mts. and s. to the San Gabriel Mts.

22. **A. drupacea** McBr. Diffuse shrub 3 to 9 (or 15) ft. high; leaves elliptic, obtuse but abruptly mucronate, glaucous, minutely pubescent or subglabrous, $1\frac{1}{4}$ to $2\frac{1}{4}$ in. long; branchlets and inflorescence glandular short-pilose and pubescent; pedicels and bracts pink; pedicels 6 to 7 lines long; bracts membranous, lanceolate, 2 to 4 lines long, deciduous; sepals whitish, glandular-ciliate; berry red, oval, 3 lines long, the surface rugose and glandular short-hairy; stone solid.—Mts. and mesas of S. Cal. from the San Bernardino Mts. to the Cuyamaca Mts., 2000 to 7500 ft.; s. to L. Cal.

23. **A. bicolor** (Nutt.) Gray. Shrub 3 to 6 (or 10) ft. high; leaves coriaceous, brittle, oblong or elliptic, tapering to base and apex, tending to be revolute, dark green, shining and glabrous above, white-tomentose or felt-like beneath, 1 to $2\frac{1}{2}$ in. long; pedicels and calyx at first densely tomentose; calyx dark red; corolla rose-color, 4 lines long; ovary a little hairy at summit; berry reddish, eventually with smooth highly polished dark red or almost black surface, 3 to $3\frac{1}{2}$ lines broad; style-base persistent as a sort of short beak or papilla; stone solid, smooth.—W. San Diego Co.; Santa Cataline Isl.; L. Cal.

TWO BOTANISTS ON SIBIJAK VOLCANO¹

ALICE W. YATES

Brastagi, Sumatra,
Dutch East Indies,
May 10, 1922.

A few days ago Mr. Yates and I climbed the volcano "Sibijak." It is such an interesting trip from a botanical point of view that it occurred to me you might like to hear about it. The jungle always reminds me of the illustrations in Schimpfer. When I struggled through that book in your Forest Botany course in college, I never thought I should see those scenes myself.

The mountain is only 7500 feet high, while the surrounding country is 4500 feet. But it is a very hard climb, for a steep ridge must be crossed before reaching the mountain.

"Sibijak" is an active volcano and is quite the most wonderful sight I have ever seen. The top has been entirely blown off, leaving the jagged edge surrounding the crater. A huge crack extends almost to the base, containing many fumeroles giving off steam and sulphur; so that the rocks on either side of the crack are colored bright yellow. In the bottom of the crater is a sulphur lake. There are innumerable small fumeroles in the crater besides three large ones. One opening is about five feet across, the sulphur fumes roaring out of it with tremendous force. Another smaller opening gives off steam with a roar like that of a steam engine. The top of the mountain is covered with the crystallized sulphur, which makes a beautiful picture.

The variation in the vegetation from the foot of the mountain to the top is very noticeable. First, the trail leads through dense tropical jungle, with the trees close together and very high, covered with lianes, birds' nest ferns and mosses. We occasionally caught a glimpse of the monkeys swinging from one tree to another. We saw

¹Extracted from a letter. Dr. and Mrs. Yates have been for some years in the Philippines but are now stationed in Sumatra.—W. L. JEPSON.



Jepson, Willis Linn. 1923. "REVISION OF THE CALIFORNIAN SPECIES OF ARCTOSTAPHYLOS." *Madroño; a West American journal of botany* 1, 87-96.

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