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*BACCHARIS MALIBUENSIS* (ASTERACEAE): A NEW SPECIES FROM THE SANTA MONICA MOUNTAINS, CALIFORNIA

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ABSTRACT

*Baccharis malibuensis* is described from the Malibu Lake region of the Santa Monica Mountains, Los Angeles County, California. It is closely related to *Baccharis plummerae* subsp. *plummerae* but differs in having narrow, subentire, typically conduplicate, sparsely villous to mostly glabrous leaves with glands occurring in depressions on the adaxial surface, more cylindrical inflorescences, and a distribution in open chaparral vegetation. The new taxon shares some characteristics with *B. plummerae* subsp. *glabrata* of northwestern San Luis Obispo County, e.g., smaller leaves, reduced vestiture, and occurrence in scrub habitat, but the two taxa appear to have developed independently from *B. p.* subsp. *plummerae*. As the new taxon is morphologically recognizable, occurs in a different habitat, and exhibits no introgression with subsp. *plummerae*, it is recognized as a distinct species.

Key words: Asteraceae, *Baccharis*, plant taxonomy.

INTRODUCTION

In August of 1988, Carl Wishner collected a distinctive narrow-leaved, glabrate, summer-flowering *Baccharis* in south-facing chaparral at the Salvation Army's camp near Tapia County Park in the Santa Monica Mountains, Los Angeles County, California. It was again collected by Wishner in October 1991 in similar habitats along Las Virgenes Canyon Road adjacent to and on Soka University of America property. Later in 1991 Beauchamp collected specimens in nearby Stokes Canyon and Henrickson found the taxon on a north-facing slope of a knoll undergoing development about 1 mi west of Malibu Lake. All of these localities are in the central portion of the Malibu Creek watershed, within 7.4 km (4.5 mi) of each other. These collections appeared to represent a new species that became known as "*Baccharis malibuensis*," a *nomen nudum* (Skinner and Pavlik 1994).

Initial studies showed the proposed new species was most similar to *B. plummerae* A. Gray, a species of coastal southern California that also occurs in the Santa Monica Mountains. The undescribed Malibu populations and *B. plummerae* A. Gray subsp. *plummerae* were found to be similar in growth habit, in involucre, flower, and leaf structure, and identical in fruit structure, but to differ primarily in leaf size, mar-

ginal toothing and vestiture. The Malibu collections have narrower, less-toothed, glabrate or nearly glabrate leaves, glabrous stems, and narrower, more cylindrical inflorescences.

Hoover (1970) named a glabrate, narrow-leaved derivative of *B. plummerae* from northwestern San Luis Obispo County as *B. plummerae* subsp. *glabrata* Hoover. With its reduced vestiture and smaller leaves, the Malibu populations appeared to fit well into subsp. *glabrata*. Hoover's subsp. *glabrata*, however, is known only from a small area in northwestern San Luis Obispo County near San Simeon (Keil and McLeod 1987), some 275 km (175 mi) northwest of the Malibu populations. This led to a comparison of the Malibu and the San Luis Obispo populations to determine if the glabrate, narrow-leaved populations are most closely related to each other or if they were derived independently from *B. plummerae*.

MATERIALS AND METHODS

The study is based on empirical observations of populations from the Santa Monica Mountains area and study of herbarium specimens at CSLA, RSA-POM, and OBI.

## RESULTS AND DISCUSSION

All three taxa are woody shrubs that bear many slender branches from the base. The branches have rather short internodes, alternate leaves and are initially erect, but with age the branches often arch outward. During subsequent years more branches develop from the older basal stems creating distinctive bushy plants to 12 dm in height. Older woody stems have a grayish anastomosing bark and can grow to 1(-3.5) cm in basal diameter. Plants of *Baccharis plummerae* subsp. *glabrata* from San Luis Obispo County (Fig. 1B, 2), however, are distinctly smaller, not exceeding 8 dm in height (D. Keil, pers. comm.).

Leaves and stems of *B. plummerae* have two types of trichomes: (1) rather conspicuous, whitish or yellowish, sessile or subsessile, multicellular, globular glands and (2) an overstory of elongate, slender, crinkled, multicellular, biseriate trichomes to 0.4-0.7 mm long that form a loose, coarse, villous vestiture. Intermediate hairs also occur, these consisting of glandlike or thickened bases that terminate in crinkled, biseriate hairs. The distribution of these hair types varies in the three taxa considered here. In subsp. *plummerae* the elongate, biseriate hairs are moderately common on the lower (abaxial) leaf surfaces, but are sparse on the upper (adaxial) surfaces often persisting only along the impressed veins. Subsessile glands are scattered, but relatively inconspicuous in the understory of the lower surface, but are fewer or lacking on the upper leaf surface. In subsp. *glabrata* the elongate, biseriate hairs are much less frequent and they diminish in extent on both surfaces over time, while subsessile glands are much more abundant and conspicuous on the lower leaf surface. The upper surface is largely glabrous, although glands may occur along the impressed midveins. In the new taxon, the lower leaf surface is usually glabrous, but may occasionally have widely scattered elongate hairs and glands, while the upper leaf surface typically has many glands imbedded in depressions in the epidermis with few or no biseriate hairs.

Differences between the three taxa become apparent from the leaf-size data presented in Table 1. These data show the leaves of subsp. *plummerae* (Fig. 1A) are broader and more strongly toothed than the other two taxa. Those of subsp. *glabrata* (Fig. 1B) are shorter and narrower, but usually retain strong marginal tooth- ing (though they are entire in some collections) and are generally broader in the distal portion being more

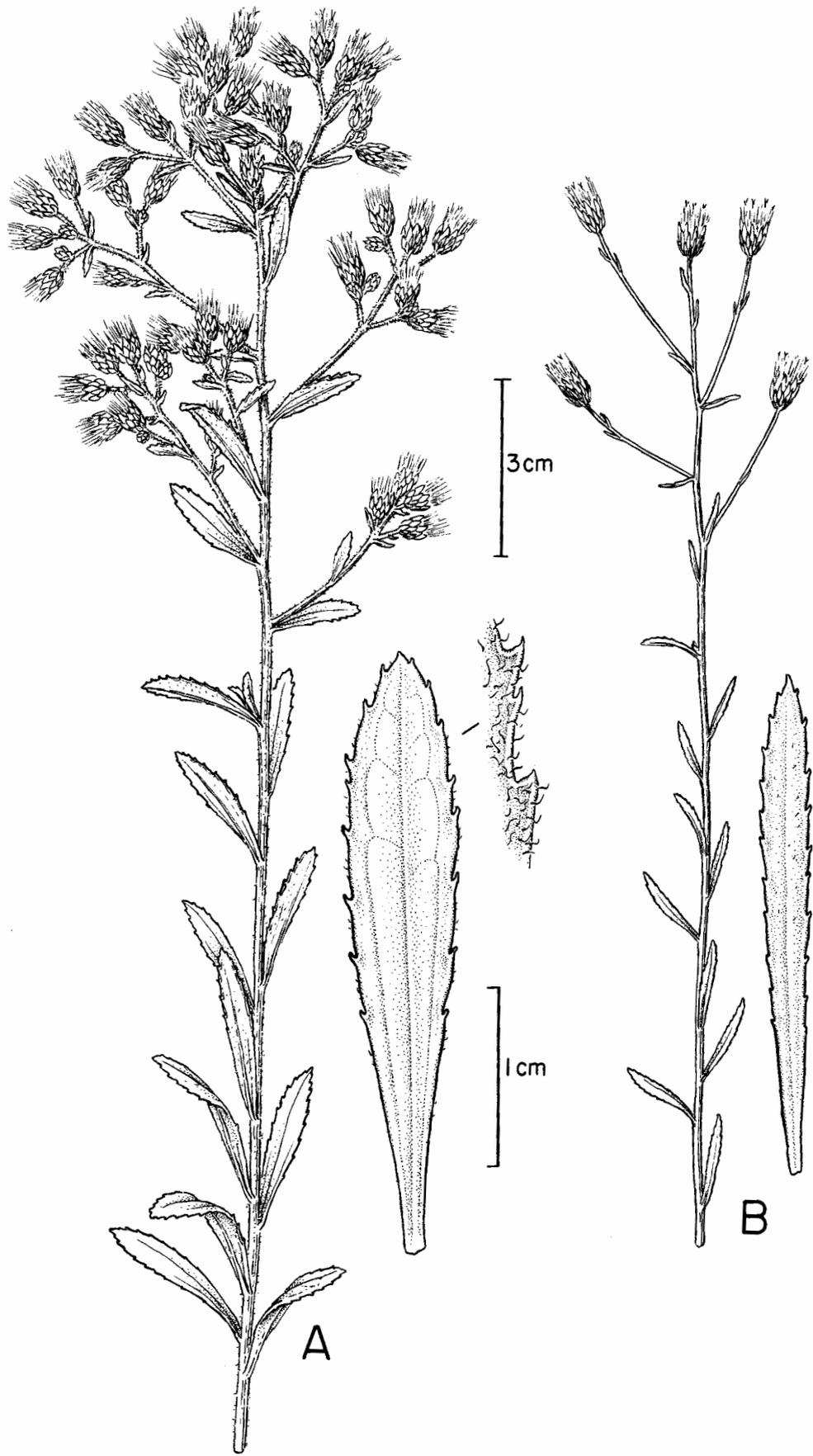
linear-oblongate in outline. Leaves of the new Malibu Lake taxon are generally as long as those of subsp. *plummerae* (sometimes longer) but are narrower (leaves to 8 mm in width occurred on strongly shaded plants) and have strongly reduced marginal tooth- ing. In contrast, the leaves of subsp. *glabrata* often appear as miniature subsp. *plummerae* leaves. These basic dif- ferences, we believe, indicate that the Malibu popu- lations are distinct, and have been derived indepen- dently of subsp. *glabrata*.

*Baccharis plummerae* subsp. *plummerae* is the most wide ranging taxon of the three, known from the Santa Monica Mountains (Trancas, Cold Creek, Tuna, and Topanga canyons east to Cahuenga Pass) in Los Angeles County, from Matilija Canyon near Ojai in Ven- tura County, from the west slopes of the Santa Ynez Mountains and on Santa Cruz Island in Santa Barbara County, and in southern San Luis Obispo County (Fig. 2). On the mainland, *B. plummerae* tends to occur in moist, protected canyons (C. Wishner, T. Thomas, pers. comm.; Raven et al. 1986), while on the strongly mar- itime Santa Cruz Island the species occurs in more exposed habitats in chaparral.

*Baccharis plummerae* subsp. *glabrata* is restricted to northwestern San Luis Obispo County in the Santa Lucia Range (Fig. 2) where it is known from coastal scrub in association with *Salvia mellifera* Greene, *Ar- temisia californica* Less., *Baccharis pilularis* DC., *Er- iophyllum staechadifolium* Lag., and various perennial grasses (Keil and McLeod 1987). The plants are gen- erally smaller in all parts than subsp. *plummerae*, growing to about 8 dm in height, having smaller leaves and smaller heads with fewer flowers and the leaves have fewer elongate hairs and more subsessile glands on their lower surfaces. The taxon appears much like a xeric derivative of subsp. *plummerae*. There are her- barium specimens at Rancho Santa Ana Botanic Gar- den (RSA) that show this very well. One is a seed- collection voucher (*E. K. Balls & E. R. Blakley* 23622) of typical subsp. *plummerae* from Santa Cruz Island with broadly oblanceolate hairy leaves. The other (*E. K. Balls* 23899) is of a plant grown from the Santa Cruz Island seed at Rancho Santa Ana Botanic Garden in Claremont. This plant is similar to subsp. *glabrata* in both plant height and leaf size. It has some large basal leaves typical of subsp. *plummerae*, but most up- per leaves are of reduced size similar to those found only in the inflorescence of the Santa Cruz Island col- lection. The plant, however, has a stronger vestiture on

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Fig. 1. *Baccharis plummerae* subsp. *plummerae* and subsp. *glabrata*.—A. *B. plummerae* subsp. *plummerae*. Habit showing broad leaves and broad, rounded, corymbose inflorescence, upper view of leaf showing characteristic 3 basal veins, marginal teeth, inset shows hairs of lower leaf surface (*Smith* 1627, RSA).—B. *B. plummerae* subsp. *glabrata*. Flowering stem, showing characteristic small leaves, sparse, more cylindrical inflorescence, and typical leaf showing oblanceolate shape, strong tooth- ing (*Keil* 15659, SLO). (Magnifications: the 3 cm scale holds for stems, 1 cm scale holds for leaves).



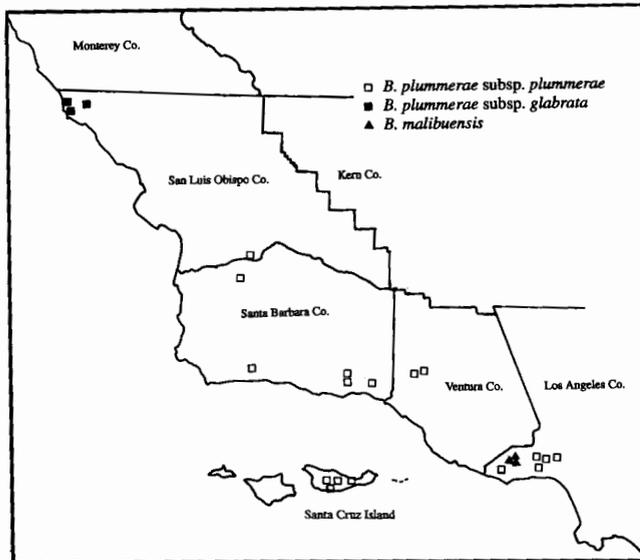


Fig. 2. Map of southern California showing distributions of *Baccharis plummerae* subsp. *plummerae*, *B. plummerae* subsp. *glabrata*, and *B. malibuensis*.

stems and leaves, as in subsp. *plummerae*. The reduced size of the cultivated plant, grown in more arid, probably more exposed conditions, indicates that some of the size characteristics found in subsp. *glabrata* may be induced by xeric environments.

The Malibu Lake populations also occur in more arid habitats than those occupied by subsp. *plummerae*, but are distinguished by their narrowly linear, distinctly conduplicate, weakly toothed leaves of a type not found in subsp. *plummerae*. Furthermore, the glands are largely confined to the upper leaf surface where they occur in distinct depressions—a feature not occurring in the other two taxa. While the Malibu Lake plants are largely glabrous to weakly villous, some shaded plants, occurring under oaks, have larger leaves

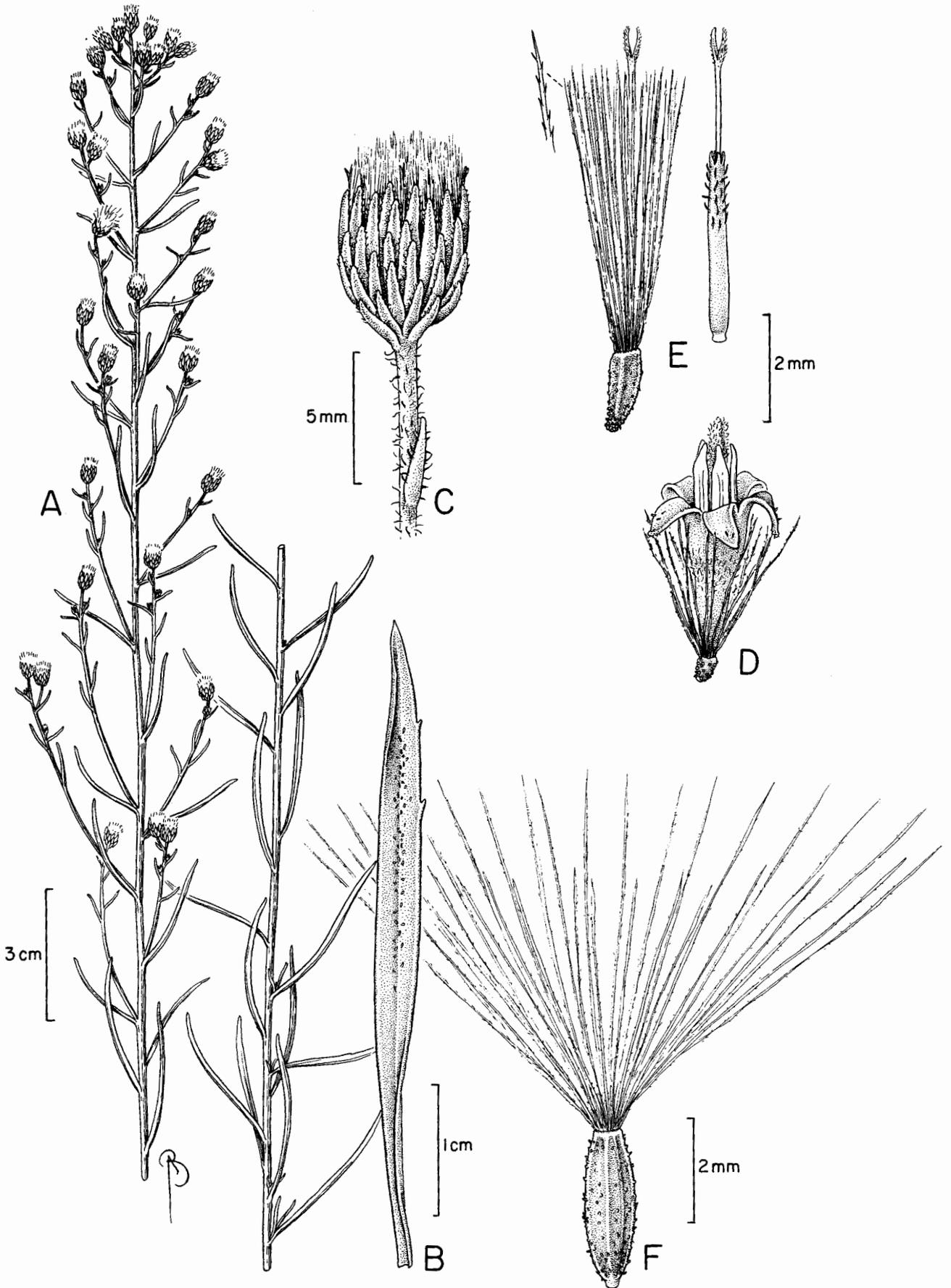
that are slightly more villous and contain glands and scattered biseriate hairs on both leaf surfaces. The larger leaves also are more uniformly toothed (with 3–4 teeth per cm of margin) and have three basal veins as in subsp. *plummerae*. It is not known if these broad-leaved plants are just shade forms that developed in response to the local shaded environment, or represent selections of broad-leaved individuals from the normal variation of the taxon that are more capable of surviving in the light-reduced local environment. While these broad-leaved plants show characteristics of subsp. *plummerae*, they are never as broad, as strongly toothed, or as strongly vestitured as is typical subsp. *plummerae*. They also are surrounded by plants typical of the Malibu Lake taxon in adjacent chaparral habitats. These plants are therefore considered part of the normal variation of the Malibu Lake taxon, rather than an indication of introgression with subsp. *plummerae*.

The Malibu Lake plants (Fig. 3) represent a taxon separate from *B. plummerae* subsp. *plummerae* and subsp. *glabrata* (Fig. 1). The plants are distinct in their narrower leaves, their vestiture, inflorescence shape, and their association with open chaparral. Cases can be made for recognizing the taxon as either a subspecies of *B. plummerae*, to which it is most closely related and perhaps derived, or as a distinct species. While the new taxon and subsp. *plummerae* both occur in the same region of the Santa Monica Mountains (Fig. 2), the taxa are allopatric and ecologically isolated, with subsp. *plummerae* restricted to canyons and the new Malibu Lake taxon occurring in open chaparral. While shaded plants of the Malibu Lake taxon produce broader, three-veined leaves that approach those of subsp. *plummerae* in size, they still retain their vestiture differences and the leaves are still narrower, less toothed, and recognizably distinct from those of

Table 1. Leaf shape, size, toothings, and vestiture characteristics of three *Baccharis* taxa.

	<i>Baccharis plummerae</i>		
	subsp. <i>plummerae</i>	subsp. <i>glabrata</i>	<i>B. malibuensis</i>
Leaf shape:	oblong-ob lanceolate	linear-ob lanceolate	linear
Leaf length, mm:	(15–)20–42(–55)	(11–)13–20(–29)	(15–)20–45(–68)
Leaf width, mm:	(3.5–)5–10(–13)	1–2(–2.5)	1–3(–8)
Teeth/1 cm:	(2–)4–6(–8)	3–5(–6)	0–3(–4)
Leaf surfaces:			
Upper:	few–no glands few biseriate	few–no glands few biseriate	common glands rare biseriate
Lower:	moderate glands many biseriate	many glands few biseriate	rare glands few biseriate

Fig. 3. *Baccharis malibuensis*.—A. Stem tip showing characteristic narrow leaves, and cylindrical inflorescence.—B. Mid-stem leaf showing conduplicate nature and glands on upper surface near midvein.—C. Pistillate capitulum showing hairs on peduncle and nature of involucre.—D. Staminate flower.—E. Pistillate flower showing immature fruit, pappus, and hairs at tip of corolla.—F. Fruit with pappus. A, B, D from Henrickson 22451; C, E, F from Beauchamp (holotype). (Magnifications as indicated).



true subsp. *plummerae*. If the taxa are to be recognized as subspecies, we would expect to find some degree of introgression. As the two taxa are, so far as known, completely allopatric, the opportunity for introgression may be limited by distribution. Common garden studies would be expected to show some degree of convergence between the taxa in those characteristics effected by environment. However, as shown in the parent versus the garden-grown plants of subsp. *plummerae* discussed above, plant size and leaf shape varied, but the vestiture patterns remained constant. While the Malibu Lake taxon may indeed be closely related to subsp. *plummerae*, the new taxon is morphologically distinct, occurs in a different habitat, and shows no introgression with subsp. *plummerae*, and for these reasons is recognized as a distinct species.

**Baccharis malibuensis** R. M. Beauch. & Henr., sp. nov. (Fig. 3)

Differt a Bacchari *plummerae* subsp. *plummerae* caulibus glabris-glabratis (non puberulenti-pilosis), foliis angustioribus glabris plerumque uninerviatis (non latioribus pubescenti-pilosis trinerviatisque), et inflorescentiis cylindricioribus (non corymbosis).

TYPE.—U. S. A. CALIFORNIA: Los Angeles Co., Santa Monica Mountains, Stokes Canyon, on south-facing slope in coastal sage scrub/chaparral ecotone on Calabasas Formation, NE quarter of the SE quarter of section 6, R17W, T1S, 700 ft, 26 Nov 1991, R. M. Beauchamp s.n. (holotype: RSA; isotypes: SD, NY).

Dioecious shrubs 4–13(–21) dm tall; young stems green, (1.5–)2.5–3.5(–4.5) mm in diameter, striate, glabrous to very sparsely pubescent, the internodes 20–30 mm long below, 4–20 mm long above; older plants with 30–100 stems radiating from at or near the plant base, the stems tending to arch outward when not crowded, forming a rounded shrub, or the stems few (2–6) and erect when the plants grow within dense chaparral, the stems branched mostly near the base, the lateral branches 1–1.5 mm thick, the basal stems 5–10(–43) mm in diameter with a gray, corky, anastomosing periderm. Leaves alternate, sparse; leaf blades linear to linear-oblongate, (15–)20–45 mm long, 1–4(–5) mm wide, reduced and crowded in the upper stems, to 68 mm long and 8 mm wide in lower leaves of strongly shaded plants, narrowly attenuate at the base, acuminate and tapering to a conical, sometimes crustose apiculation at the tip, entire or often weakly and irregularly serrate-dentate with ascending teeth 0.5–1(–3) mm long each terminating in a slender to conical, sometimes crustose apiculation, 1-veined, the largest leaves 3-veined, the midrib strongly raised below and impressed above, the lateral veins evident, but much raised or impressed, the blades green, glabrous, occasionally sparsely pilose with biseriate erect hairs to 1.5 mm long, the lower surface closely papillate

with the stomata appearing as whitish dots, often glabrate, the upper surface with many glands, mostly sunken in surface depressions, the elongate biseriate hairs few, when drying the leaves strongly folded along the midrib with the margins somewhat revolute. Heads turbinate, borne in cylindrical racemose panicles 6–36 cm long, 3–6 cm wide, in clusters of 2–3 near the tips of slender, ascending lateral branches (1–)2–4(–10) cm long, 0.5–1 mm wide with reduced leaves 2–18 mm long, the distal peduncles typically bearing thick-based, extruded glands that may terminate in minute biseriate slender hairs; *pistillate heads*: phyllaries 34–42, linear-lanceolate to oblong-lanceolate, imbricated in 3–4 series, 2–5 mm long, 0.5–1 mm wide, green medially, yellow-white marginally, with the true margins scarious and ciliate in the distal half with biseriate hairs, the phyllary tips often becoming brown with age, all phyllaries reflexing as the fruits disperse; *pistillate flowers* 35–38; corollas narrowly tubular, 2.2–4.2 mm long, the distal portion often appressed villous, the lobes absent or with one lobe present and 0.4–0.7 mm long, erect; style-stigmas 4.2–5.5 mm long, stigmas lanceolate, 0.9–1.2 mm long, glabrous; fruiting receptacles somewhat flattened, yellowish, epaleate, the middle portion with raised alveolae developed around the fruit bases; *staminate heads*: phyllaries 30–38, similar to those on the pistillate involucre; staminate flowers (6–)23–36; corollas 3.7–4.5 mm long, whitish, the tube 1.5–1.7 mm long, the expanded throat 0.6–0.8 mm long, the lobes 5, 1.2–1.8 mm long, 0.4–0.6 mm wide, acute, spreading; anthers 1.5–2 mm long, the tips oblong, obtuse, 0.35–0.4 mm long, incurved; filaments 2–2.7 mm long; style lobes 0.7–1 mm long, densely hispidulous with ascending hairs 0.06–0.1 mm long on the outer surface, the pappus of 24–32 tawny-white, barbellate capillary bristles 3.7–4.2 mm long, ovary rudimentary. Mature fruit dull, light brown, somewhat compressed, obovoid, 2.4–3 mm long, 0.8–1 mm wide, about 0.5 mm thick, with 5 yellowish veins, the surface with thick, irregular, appressed or erect, sometimes pilose-tipped glandlike hairs; pappus tawny-white, of 65–84, spreading, barbellate, capillary bristles 6.5–7.5 mm long in 2–3 series.

*Additional collections*.—CALIFORNIA: Los Angeles Co., Santa Monica Mountains, T1S, R18W, NE 1/4 of NE 1/4 S. 13, Salvation Army's Camp Gilmore-Mountain Crags, Malibu Creek near Tapia Co. Park, 500 ft, 28 Aug 1988, *Wishner 1508* (RSA); same area T1S, R17W, SW 1/4 of NE 1/4 of S. 7, Soka University, Diamond X Ranch, 800 ft, 12 Aug 1991, *Wishner 1993* (RSA); same locality, 5 Dec 1991, *Henrickson, Thomas, & Wishner 20453* (RSA, and to be distributed); same area but T1S, R17W, N half of S. 7, on divide between Soka Univ. and Cottontail Ranch, adjacent to Las Virgenes Cyn. Rd., 800 ft, 30 Oct 1991, *Wishner 1996* (RSA); same locality, 5 Dec 1991, *Henrickson, Thomas, & Wishner 20452* (RSA and to be distributed); ca. 6 (air) miles NW of Malibu, 1/2 mile NW of west end of Malibu Lake on north slopes of flat-topped hill, 850 ft, 11 Sep 1991, *Henrickson 20450* (RSA); same locality, 27 Sep 1991, *Henrickson 20451* (RSA, and to be distributed).

The new species is known only from the central portion of Malibu Creek drainage in the Santa Monica Mountains about 8 km (5 mi) north of the City of Malibu where it is known from five localities all within an area 7.3 km (4.5 mi) in the east–west direction and about 2.5 km (1.5 mi) in the north–south direction (Fig. 2). The largest concentration occurs within the hills in the southeastern portion of Soka University where it occurs in grassy openings and in stands of chaparral with *Adenostoma fasciculatum* Hook. & Arn., *Ceanothus megacarpus* Nutt., *C. crassifolius* Torr., *Eriodictyon crassifolium* Benth., *Salvia mellifera*, *Eriogonum fasciculatum* Benth., *Yucca whipplei* Torr. subsp. *intermedia* Haines, *Lotus scoparius* (Nutt.) Otley, *Haplopappus squarrosus* Hook. & Arn. subsp. *grindelioides* (DC.) Keck, as well as *Heteromeles arbutifolia* M. Roem., *Cercocarpus betuloides* Torr. & Gray, and *Rhamnus ilicifolia* Kell. It is known from north-, west-, and south-facing slopes, in clearings, in dense chaparral, and under coast live oaks (*Quercus agrifolia* Née) on sedimentary substrates of the Calabasas Formation (Stokes Canyon site) and Conejo Volcanic Formation (all other sites).

When growing in openings in the chaparral the new taxon commonly forms a radiating shrub 6–13 dm high and 11–20 dm wide, with many branches extending from near the base. In dense chaparral it is limited to a slender growth habit consisting of a few branches to 10–12 dm tall. The largest plants have basal woody trunks to 35 mm in diameter with a gray, corky bark. The stems typically remain green until they reach the diameter of about 5 mm. In late fall the leaves, particularly of male plants, may be lost giving the plants a broomlike appearance. The largest plant observed had a height of 21 dm.

The species is easily cultivated from both cuttings and seed and has been grown by Pacific Southwest Nursery and Soka University Botanical Gardens. Establishment in native habitats may prove difficult as the root system must be well established to support summer flowering.

The new species is highly restricted in its distribution and all localities thus far known are on private land. It has not been observed in the nearby Malibu State Park. The population west of Malibu Lake, consisting of 13 plants, is highly vulnerable to extirpation by development. Approximately 23 plants are known from the Stokes Canyon site; 57 plants are known from the Soka University site, and two from the Salvation Army Camp. It is urged that the new species be listed as endangered on both state and federal listings.

This is the second taxon of linear-leaved, chaparral-inhabiting *Baccharis* described from southern California. Beauchamp (1980) described *Baccharis vanessae* from western San Diego County. The two taxa are similar in having glabrous, narrow conduplicate leaves, narrow ciliate phyllaries, and long fruit. However, *B. vanessae* has more slender, more highly branched stems that turn brown much earlier, entire leaves, heads with fewer (about 25 female, 15 male) flowers, and receptacles strongly alveolate throughout, not just near the center as in *B. malibuensis*. In addition the fruits of *B. vanessae* are glabrous, 10-nerved, more cylindrical, and the pappus is in one series, all characteristics contrasting with those of *B. malibuensis*. As noted by Beauchamp (1980), *B. vanessae* also grows in dense chaparral rather than disturbed or riparian habitats as do many other species of *Baccharis*.

Beauchamp (1980) compared *B. vanessae* to *B. sarothroides* A. Gray and Nesom (1990) recently included *B. vanessae* within sect. *Sergilae* DC. along with *B. sarothroides* and *B. sergiloides* A. Gray. Nesom (1990) placed *B. plummerae* in his new sect. *Aristidentes* Nesom, characterized, in part, by having serrate-margined leaves and glabrous achenes with 5–6(–8) ribs. *Baccharis malibuensis* would fit into this latter section.

#### ACKNOWLEDGMENTS

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