Quercus palmeri Engelm., PALMER'S OAK. Small tree (1–4-stemmed) to large shrub, evergreen, with conspicuous basal burl, sharply spinescent, sclerophyllous, canopy closed, in range to 6 m tall; monoecious; shoots with stiff, tough, 2-colored leaves, initially densely glandular with branched Harris becoming glabrescent; bark of trunk fissured into narrow plates, gray, of small branches gray to grayish brown, smooth. Stems: initially ridged, with ridge descending from leaf, densely nonglandular-tomentose and glandular-tomentose, the nonglandular hairs generally transparent, septate, and ± straight to curly, sometimes T-shaped, or ± scalelike with ciliate margins, the "glandular" hairs (may contain wax precursors, not aromatic compounds) initially whitish becoming light yellow to orangey or amber, scalelike or umbrellalike with marginal arms (uniseriate) composed of easily detached, spheroid to ellipsoid cells (moniliform). Leaves: helically alternate, simple, petiolate, with stipules; stipules 2, attached at base of petiole and ± axillary, lanceolate to linear-oblanceolate, 1.7–3 mm long, yellowish tan to orange-brown but sometimes greenish at base, ± villous and glandular-hairy, early-deciduous; petiole subcylindric, 2–7.5 mm long, initially tomentose with nonglandular and glandular hairs becoming glabrescent; blade broadly elliptic, 15–65 × 15–54 mm, truncate to truncate-tapered or broadly subcordate at base, broadly and acutely toothed on wavy margins having teeth ± alternately spreading or incurved, each tooth with spine tip 1.2–1.8 mm long, pinnately veined with principal veins raised on lower surface, initially densely glandular, upper surface dark green aging glabrescent, lower surface aging light green to grayish green with minute waxy spheres and retaining some orange to brownish glandular hairs. **Staminate inflorescence:** catkin, (1–)3–6 arising on lower nodes of new axis emerging from winter buds, spikelike, arching to spreading, 20–30 mm long, 12–18-flowered, flowers helically alternate in clusters of 2–4, bracteate or not, with hairs like shoots; bractlet subtending flower oblanceolate to lanceolate, 0.7–1.3 × 0.2–0.6 mm, tannish to brownish, early-deciduous. **Staminate flower:** ± radial, 1–1.6 mm across; **perianth (calyx)** unevenly 5–6-lobed, sometimes tube splitting in 1 or more places to base; tube bowl-shaped, 1–1.6 mm wide and 0.5–0.8 mm deep; lobes acute to truncate at tip, 0.25–0.8 × 0.25–0.65 mm, golden brown, villous-ciliate on margins, sparsely villous on faces, pale yellow on margins and golden yellow at center; **stamens** 7–12, free; filaments 0.3 mm long, pale green or yellowish green, glabrous; anthers exserted, basifixed, dithecal, 0.7–1.4 mm long, greenish yellow to yellowish gray-brown, longitudinally and sideways dehiscent; pollen light yellow, dry, copious. **Pistillate inflorescence:** spike of 2(–3) flowers, axillary at upper nodes on leafy early summer shoots, tomentose, bracteate; peduncle 0.5–2.5 mm long, thick, with nonglandular and glandular, forked and stellate hairs; each flower partially enclosed in an involucre (cupule); **involucre** of helically alternate and overlapping bractlets, at anthesis 0.5–2.5 × 0.8–1.7 mm and ca. 24 bractlets increasing to ca. 300 in fruit, bractlets densely hairy. **Pistillate flower:** ca. 1.2 mm long; **perianth (calyx)** apparently absent; **stamens** ca. 12, concealed by involucre, lacking filaments and sterile; anthers ca. 0.3 × 0.2 mm; **pistil** 1; ovary 0.7–0.8 × 0.6–0.7 mm, dark green, with sparse ascending hairs on outer surface, 3–4-chambered with 2–3 ovules per chamber; styles 3–4, fused at base, ascending to spreading, light yellowish green, grooved on inner face, expanded into stigmatic tip, persistent on early fruit; stigmas ± terminal but decurrent on inner side, dark brown grading to orange brown at expanded top. **Fruit:** acorn (glans), subsessile, typically

paired, maturing in late summer of year 2 (< 8 mm diameter at flowering); involucre generally covering basal 1/3 of nut, top-shaped to saucer-shaped, 10–25–35) mm diameter and 6–12 mm deep, scales strongly appressed, often appearing fused to adjacent scales in concentric rings with only tip of scales visible, not warty be thicker at base, densely glandular and having golden-tomentose hairs on tip of scale; nut oblong to fusiform, 20–30 × 10–15 mm, brown, acute at tip, basal scar circular, convex, gray, nut shell internally densely woolly. Mid-May–mid-June.

Native. Spinescent, sclerophyllous tree first recorded in range in 2011 from a small, monospecific grove of about twenty-five trees along Sunset Hills hiking trail (Erbes Road) above Bard Reservoir, Thousand Oaks (SH), surrounded by *Salvia* chaparral. *Quercus palmeri* is the last native oak to begin flowering locally, amazingly entering summer drought, and its wickedly spinescent leaves cannot be easily confused with other local species. The largest individual has a trunk thirty-five centimeters in diameter above a well-developed burl, which indicates this stand has lived at that locality for a long time and has been exposed to numerous fire cycles. Pubescence of this species is very complicated and difficult to observe, termed nonglandular and "glandular," whereas the glandular hairs appear to be involved with producing waxy deposits on leaves.

Quercus palmeri has also been treated as a variety of *Q. chrysolepis*, and this is still an unresolved issue requiring broader study. That similarity may help to explain an environmental impact report in Calabasas, which determined that *Q. chrysolepis* occurred there.
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