Chaparral - 2023

Mo Katz-Christy

Botanical Nomenclature:

Larrea tridentata
Family: Zygophyllaceae

Syn *Larrea mexicana*[1], *Covillea glutinosa, C. tridentata, Larrea divaricata, Zygophyllum tridentatum*[2]

Common names:

- Chaparral -- name primarily used by herbalists
- Creosote bush -- name primarily used by botanists, because Chaparral can be used to describe an entire biome of Mediterranean vegetation[3]
- Greasewood
- Gobernadora -- Mexican name meaning The Governess, for its tendency to form a monoculture
- Hediondilla -- New Mexican name meaning Little Stinker[4]

Historical Context:

I have come to know and love chaparral when I spent time in the desert of Southeast California. It dominates that region and can be the only plant seen for miles. However, from fossil and genetic evidence, we know that at the end of the Ice Age (11,000-12,000 years ago), that region was predominantly grassland and juniper, who have now moved much higher in elevation. As the areas below 3,000ft became hotter and drier, chaparral has come to completely dominate the landscape.[5]

While chaparral no longer has “generally recognized as safe” (GRAS) status in the US, it was listed in the US Pharmacopoeia from 1842 to 1942 as a bronchial antiseptic and expectorant and was previously approved by the USDA as a preservative for animal shortenings.[6]

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[1] Gardner, Z. E., & McGuffin, M. (2013). *American Herbal Products Association's botanical safety handbook*. American Herbal Products Association, CRC Press.
[2] Duke, J. A., Bogenschutz-Godwin, M. J., & Ottesen, A. R. (2009). *Duke's Handbook of Medicinal Plants of Latin America*. CRC Press.
[3] Britannica, T. Editors of Encyclopaedia (2022, January 13). *chaparral*. *Encyclopedia Britannica*. https://www.britannica.com/plant/chaparral
[4] Moore, M. (1989). *Medicinal plants of the desert and Canyon West: A guide to identifying, preparing, and using traditional medicinal plants found in the deserts and canyons of the west and Southwest*. Museum of New Mexico Press.
[5] DeLisle, H. (2015, February 28). *Creosote bush*. National Parks Service. Retrieved January 20, 2023, from https://www.nps.gov/jotr/learn/nature/creosote.htm
[6] Aronson, D. (n.d.). *Chaparral monograph*. HerbRally. Retrieved January 20, 2023, from https://www.herbrally.com/monographs/chaparral

Part used: aerial parts in flower[7], leaves[8] and green stems[9]

Older plants are preferred for external use and younger plants preferred for internal use, though the difference is negligible.[10]

Identification:

Though *Larrea tridentata* is classified as a single species, it actually consists of three genetically distinct plants with different numbers of chromosomes in the Mojave, Sonoran, and Chihuahuan Deserts.[11]

Botanical information from the Lady Bird Johnson Wildflower Center:

> "Creosote-bush is a 3-5 ft., evergreen shrub which can reach 10 ft. and has numerous flexible stems usually arising from the base at an angle. Its slender, irregularly branching stems bear tiny, rich-green, aromatic leaflets. The small, compound leaves, 1/5-2/5 inch long, are composed of 2 leaflets. They are opposite, united at the base, pointed at the tip, dark to yellowish-green, strong-scented, and often sticky with resin. These provide a background for small but prolific, yellow, velvety flowers, followed by fluffy, white fruit. The flowers are inconspicuous except under favorable conditions, when they are prominent, giving the bush a yellowish cast. They are 1/4-1/2 inch long, with 5 petals, 10 stamens, and 1 pistil. Stems are gray with dark nodes, giving a jointed appearance.
>
> "Creosote Bush is the most characteristic species of the hot deserts of North America. Its pungence fills the air following rains…Many "bunches" of plants are actually clones. The foliage hides species of grasshoppers, praying mantids, and crickets that occur only on this plant. Leafy galls caused by a fly, the Creosote Gall Midge (*Asphondylia* spp.) are often numerous."[12]

Chaparral is exceptionally slow-growing, likely due to its ecological niche. A one-foot tall plant is probably over 10 years old! It reproduces primarily through cloning and forms large clonal rings, spread out in a circular or elliptical shape, surrounding a mound of sand. The largest of such clonal rings, "King Clone", has an average diameter of 45 feet, and is estimated to be 11,700 years old, meaning it germinated shortly after the last Ice Age.[13]

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[7] Moore, M. (1989).
[8] Chaparral. (2022). In *LiverTox: Clinical and Research Information on Drug-Induced Liver Injury*. National Institute of Diabetes and Digestive and Kidney Diseases.
[9] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005). Larrea tridentata (Creosote bush), an abundant plant of Mexican and US-American deserts and its metabolite nordihydroguaiaretic acid. *Journal of ethnopharmacology*, *98*(3), 231–239. https://doi.org/10.1016/j.jep.2005.02.002
[10] Moore, M. (1989).
[11] DeLisle, H. (2015, February 28).
[12] TWC Staff. (2017, August 8). *Larrea tridentata*. Lady Bird Johnson Wildflower Center - The University of Texas at Austin. Retrieved January 20, 2023, from https://www.wildflower.org/plants/result.php?id_plant=latr2
[13] DeLisle, H. (2015, February 28).

Commercial Sources and Handling:

Because it is so abundant, long-lasting, and relatively potent with low doses needed, chaparral can be respectfully wildcrafted. Do note, though, that chaparral is exceptionally slow-growing, so be sure to harvest in small quantities from areas where it is thriving so it can have time to regrow. Additionally, Mountain Rose sells bulk organic leaf from Mexico.

Michael Moore writes that the bulk herb lasts up to two years[14]; I have found it retains its smell and potency for much longer -- up to four years. Because of its strongly antioxidant and antimicrobial nature, medicine made from chaparral lasts much longer than that from other plants.

Growing and Harvesting:

Grows in USDA zones 7-11. Adult plants are very tolerant of heat and drought, and only need supplemental water every 4 months in drought conditions. Young plants should be watered extensively when first transplanted, then watered weekly for the first three years. They are prone to drought stress induced by heat, so require part shade (especially in the afternoons) for the first three years. Propagation from seed is complex and requires hulling, fumigating, and drying the seed before storage, and then scarifying and soaking the seed overnight before planting.[15]

The oils from chaparral inhibit the germination of other seeds, so be sure not to plant where you want anything else to grow.

Harvest from hearty-looking plants away from the roadside, in flower or when the leaves are bright green. Plants generally flower in May but can flower later on in the summer if rain comes.[16]

Processing: Beware of the smell. If you dry it in a dehydrator (no need -- it dries well by simply hanging!), the dehydrator will probably smell like chaparral for a very long time.[17] I ground it in my spice grinder, which remained sticky with resin months later.

Taste: bitter and generally unpalatable

Odor: I say fragrant, but my in-laws make me dry it in the garage when I harvest it on my way to visit them! Smells like the desert, or the desert smells like chaparral -- chicken or egg!

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[14]Moore, M. (1989).

[15] *Growing Larrea tridentata: Creosote Bush*. Growing Larrea tridentata: Creosote bush. (2022, January). Retrieved January 20, 2023, from https://gardenoracle.com/images/larrea-tridentata.html

[16] Marshall, K. Anna. 1995. Larrea tridentata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.usda.gov/database/feis/plants/shrub/lartri/all.html [2023, January 20].

[17] 7Song. (2018, November 13). *Plant Medicine Notes-Chaparral (larrea tridentata)*. Northeast School of Botanical Medicine - Fostering and expanding knowledge of botanical medicine. Retrieved January 21, 2023, from https://7song.com/plant-medicine-notes-chaparral-larrea-tridentata/

Energetics: cooling[18] and drying

Physiological Actions:

- alterative
- antibiotic[19]
- antimicrobial - active against bacteria, viruses, fungus, and parasites[20]
- antioxidant
- antiseptic
- antitumor[21]
- digestive bitter[22]
- diuretic
- expectorant
- parasiticide[23]

Specific Indications:

Michael Moore:

- Dry skin, brittle hair and nails, and cracks in the hands or feet with difficulty digesting fats
- Arthritis, allergies, and hypersensitive IgE conditions aggravated by stress and diet[24]

Topically as an antimicrobial wound wash or salve.

Traditional Uses:

Travelers in Mexico chew the leaves to alleviate extreme thirst.[25] For arthritis, a person is immersed in a tub of chaparral tea, or poultices of the leaves are applied topically.[26]

Sam Hicks documents the use by indigenous people of the Southwest US and Mexico of the tea for coughs, colds, and even body odor. Additionally, hot baths of dilute tea ("steam baths") are used for flu, arthritis and rheumatism, and generally for cleanliness and good health. These steam baths cause the skin to tingle and become red, and need to be done with care, especially for a sick person. Indigenous people recommend no more than two steam baths each year.[27]

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[18] Aronson, D. (n.d.). *Chaparral monograph*. HerbRally. Retrieved January 20, 2023, from https://www.herbrally.com/monographs/chaparral
[19] Aronson, D. (n.d.).
[20] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).
[21] Aronson, D. (n.d.).
[22] 7Song. (2018, November 13).
[23] Aronson, D. (n.d.).
[24] Moore, M. (1989).
[25] Sturtevant, E. L. (1981). *Sturtevant's notes on edible plants*. A.J. Reprints.
[26] Hicks, S. (1971). *Desert plants and people*. Naylor.
[27] Hicks, S. (1971).

Dr. Duke documents the use by Mexican people of 10g leaf in 1L of water for dysuria, bladder and kidney stones, and as a rub for rheumatism. He also writes that Mexican people use 6g leaf in 250mL of water for excoriations (frequent picking of wounds) and wounds.[28]

In Mexico, an infusion drunk throughout the day is used to dissolve gallbladder and kidney stones, and as a diuretic for urinary tract infections. It is used as a liver tonic and for liver disease.[29]

A sitz bath of the leaves is used to promote fertility, whereas an infusion of the root is used as a contraceptive.[30]

Pima people as well as Mexicans use chaparral to treat diabetes. It has also been used for anemia and altered blood pressure.[31]

N'dee people chew and swallow a small piece of the branch for diarrhea. Other documented uses include using the resin from leaf nodes to soothe bruises and wounds, and as a tea with honey for kidney pain.[32] It has also been used by Indigenous people for chicken pox, menstrual cramps, snake bites and as an emetic.[33]

Externally, it has also been used for acne, psoriasis, dandruff, hemorrhoids, chicken pox, and hair growth.[34]

Clinical Use:

Antioxidant:

- Inhibits free radical damage to the liver and lungs.
- With milk thistle, chaparral decreases oxidative damage from dietary lipid peroxides on liver hepatocytes.[35] Michael Moore thus uses it for inflammatory conditions such as arthritis, allergies, joint pain, autoimmune diseases, and premenstrual syndrome, especially when the diet aggravates these conditions.

GI/Liver:

- Gut infections - use with activated charcoal if you know someone ate or drank contaminated food or water[36] (separate applications by 2 hours).

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[28] Duke, J. A., Bogenschutz-Godwin, M. J., & Ottesen, A. R. (2009). *Duke's Handbook of Medicinal Plants of Latin America*. CRC Press.

[29] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).

[30] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).

[31] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).

[32] DeLisle, H. (2015, February 28).

[33] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003). Chaparral monograph:a clinical decision support tool. *Journal of herbal pharmacotherapy*, *3*(1), 121–133. https://doi.org/10.1080/j157v03n01_08

[34] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).

[35] Moore, M. (1989).

[36] 7Song. (2018, November 13).

- Liver metabolism: reduces LDLs and VLDLs[37], thereby potentially supportive in preventing atherosclerosis
- Sluggish liver, presenting as chronic biliousness
- Dyspepsia, especially aggravated by fats and proteins
- Morning nausea or vomiting after eating fats
- Undigested fat in stool
- Dry eczema from poor fat digestion
- Elevated blood levels of SGOT and SGPT with elevated bilirubin without active hepatitis
- Hangover with dark circles under the eyes[38]

Other:

- Use internally and as a throat spray for strep throat.[39]

Topical uses:

- Staph infections - as a compress, soak, or wound wash. Chaparral slows down the rate of bacterial growth and kills bacteria off.[40]
- Foot fungus: hot chaparral tea soaks and topical tincture[41], or sprinkle a small amount of powder into socks daily.[42]
- Chaparral is moderately effective as a sunblock[43]
- Use as a mouthwash to prevent cavity formation and gum disease, or for toothaches.[44]
- Excess vaginal discharge causing itching and pain, esp with Yerba mansa as a sitz bath.
- External for mild skin cancer[45]

Flower essence:

- To protect and clear the mind, body and spirit when the psyche is feeling barraged and overstimulated by the modern world.[46]

Cancer:

- The evidence for use of chaparral in cancer is limited. Michael Moore does not recommend its use, as he claims it has been found to help some types of cancer but aggravates other neoplasias, but does not document his source.[47][48]
- A 1969 case report was published of an 85 year old man with metastatic malignant melanoma. He ingested approximately 3.5-6g of chaparral tea a day for a year, and

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[37] Moore, M. (1989).
[38] Moore, M. (1989).
[39] Aronson, D. (n.d.).
[40] Moore, M. (1989).
[41] 7Song. (2018, November 13).
[42] Aronson, D. (n.d.).
[43] Moore, M. (1989).
[44] Aronson, D. (n.d.).
[45] Moore, M. (1989).
[46] Aronson, D. (n.d.).
[47] Moore, M. (1989).
[48] Moore, M. (1994, October 12). *Re: Chaparral*. from https://www.henriettes-herb.com/archives/best/1994/larrea.html

refused other medical treatment. Within the year the 3-4 cm diameter lesion on his face reduced 1cm in diameter and a 5-7 cm submandibular lesion completely resolved.
- A 1970 case series of 59 patients with cancerous tumors of undocumented types were treated with either 16-24oz of chaparral tea or 250-3000mg of nordihydroguaiaretic acid (NDGA) daily for four weeks. Four patients' tumors decreased by 25% or more, while other patients experienced no change or growth. Many GI side effects were documented, as well as rash and fever.
- In rats given a carcinogenic chemical to induce bowel tumors, only 5 out of 14 of the rats given NDGA developed tumors versus 13 out of 14 in the control group.[49]

Key Constituents:

- flavones and flavonol aglycones
- dihydroflavonol
- larreic acid
- nordihydroguaiaretic acid (NDGA) and one other guaiuretic acid lignan
    - 1-1 ½ % of dry plant
- quercitin bioflavonoids[50]
- saponins and sapogenins
- essential oils
- halogenic alkaloids -- bark and roots, not leaves and flowers
- waxes and tannins
- vinyl amd methyl ketones -- odor
- sterols - campesterol, stigmasterol, sitosterol[51]

Pharmacology:

Most of the studies are on NDGA, though there are some studies on whole chaparral extract. The most robust research points to its antibiotic and antiinflammatory actions, and more research is needed in other areas.

NDGA:
- Thought to be a strong antioxidant and block cellular respiration, demonstrated by limited in vitro evidence.[52]
- Antiinflammatory action likely due to its ability to inhibit induction of ornithine decarboxylase (lipoxygenase inhibitor) in mice and in vitro.[53]

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[49] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).
[50] Moore, M. (1989).
[51] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).
[52] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).
[53] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).

- Decreased plasma glucose concentrations in mice without any change in insulin concentration. Improved glucose tolerance and responsiveness to insulin.[54] NDGA inhibits insulin-like growth factor receptors in vitro.[55]
- Diminishes and delays onset of platelet aggregation caused by collagen or adenosine diphosphate,[56] pointing to its possible use as an anticoagulant.
- Hydroxyl groups of NDGA may play a role in inhibiting monooxygenase activity of cytochrome P450, pointing to its potential antimutagenic and/or anticarcinogenic activity.[57]
- Derivatives of NDGA were shown to inhibit HIV, HSV, and HPV virus production. This appears to be from disrupting the Sp1 transcription factor's activities.[58]

NDGA metabolism:

- In rats, NDGA is metabolized in the ileum, absorbed into the bloodstream, filtered by the glomeruli, and retained and accumulated in the proximal tubule.[59]

Potential Uses Extrapolated from Pharmacology: cancer, diabetes, anticoagulation

Clinical Research:

Limited clinical trials identified. Many case reports and one retroactive clinical study (see safety).

- Psoriatic plaques - topical use flattened some plaques, but reversed after NDGA was discontinued.[60]

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[54] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).

[55] Friedlander, T. W., Weinberg, V. K., Huang, Y., Mi, J. T., Formaker, C. G., Small, E. J., Harzstark, A. L., Lin, A. M., Fong, L., & Ryan, C. J. (2012). A phase II study of insulin-like growth factor receptor inhibition with nordihydroguaiaretic acid in men with non-metastatic hormone-sensitive prostate cancer. *Oncology reports*, *27*(1), 3–9. https://doi.org/10.3892/or.2011.1487

[56] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).

[57] Agarwal, R., Wang, Z. Y., Bik, D. P., & Mukhtar, H. (1991). Nordihydroguaiaretic acid, an inhibitor of lipoxygenase, also inhibits cytochrome P-450-mediated monooxygenase activity in rat epidermal and hepatic microsomes. *Drug metabolism and disposition: the biological fate of chemicals*, *19*(3), 620–624.

[58] Grossman, S. A., Ye, X., Peereboom, D., Rosenfeld, M. R., Mikkelsen, T., Supko, J. G., Desideri, S., & Adult Brain Tumor Consortium (2012). Phase I study of terameprocol in patients with recurrent high-grade glioma. *Neuro-oncology*, *14*(4), 511–517. https://doi.org/10.1093/neuonc/nor230

[59] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).

[60] Szmurło A. (1990). Miejscowe stosowanie inhibitora leukotrienów--NDGA w łuszczycy [Local use of leukotriene inhibitor--NDGA in psoriasis]. *Przeglad dermatologiczny*, *77*(4), 269–271.

- A cream made from a NDGA derivative (terameprocol) was found safe for intervaginal use with only mild self-limiting adverse events, and no absorption of terameprocol.[6162]
- A phase one study of sixteen acute myeloid leukemia or myelodysplastic syndrome patients found IV injection of terameprocol safe and possibly supportive, though further research is needed.[63]
- NDGA was administered orally to patients with non-metastatic hormone-specific prostate cancer. It lengthened prostate specific antigen doubling time but did not significantly reduce prostate specific antigen.[64]

Safety:

AHPA:
- Safety class 2b, 2d -- not for use in pregnancy or preexisting kidney disease or liver conditions
- Interaction class A[65]

As mentioned above, Sam Hicks writes that native people of the Southwest recommend no more than two baths of chaparral per year.[66]

The USDA removed chaparral's GRAS status in 1970.[67] From 1990 to 2005 there have been over two dozen case reports of clinically apparent liver injury attributed to chaparral intake. There have been no case reports of injury published after 2005, for reasons unknown.[68] Some cases of liver injury resolved after cessation of chaparral though one patient required a liver transplant. The amount of chaparral taken ranged from .3g to 6g daily, for 20 days to many years.[69]

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[61] Khanna, N., Dalby, R., Tan, M., Arnold, S., Stern, J., & Frazer, N. (2007). Phase I/II clinical safety studies of terameprocol vaginal ointment. *Gynecologic oncology*, *107*(3), 554–562. https://doi.org/10.1016/j.ygyno.2007.08.074

[62] Khanna, N., Dalby, R., Connor, A., Church, A., Stern, J., & Frazer, N. (2008). Phase I clinical trial of repeat dose terameprocol vaginal ointment in healthy female volunteers. *Sexually transmitted diseases*, 35(6), 577–582. https://doi.org/10.1097/OLQ.0b013e31816766af

[63] Tibes, R., McDonagh, K. T., Lekakis, L., Bogenberger, J. M., Kim, S., Frazer, N., Mohrland, S., Bassett, D., Garcia, R., Schroeder, K., Shanmugam, V., Carpten, J., Hagelstrom, R. T., Beaudry, C., Von Hoff, D., & Shea, T. C. (2015). Phase I study of the novel Cdc2/CDK1 and AKT inhibitor terameprocol in patients with advanced leukemias. *Investigational new drugs*, *33*(2), 389–396. https://doi.org/10.1007/s10637-014-0198-y

[64] Friedlander, T. W., Weinberg, V. K., Huang, Y., Mi, J. T., Formaker, C. G., Small, E. J., Harzstark, A. L., Lin, A. M., Fong, L., & Ryan, C. J. (2012).

[65] Gardner, Z. E., & McGuffin, M. (2013).

[66] Hicks, S. (1971).

[67] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).

[68] Chaparral. (2022).

[69] Gardner, Z. E., & McGuffin, M. (2013).

One retroactive clinical study of 13 patients prescribed low doses (less than 10% of formula) of chaparral tincture for internal use and 23 patients prescribed topical chaparral oil found no cases of adverse effects.[70]

Case reports of contact dermatitis in six men, confirmed with patch testing, from moist compresses, baths, burning the bushes, and the live plant.[71]

There is one case report of renal damage from a patient who consumed three to four cups of chaparral tea daily for three months, but it is not clear that chaparral was the causative agent. (How they were able to stomach that much chaparral tea, I'm not sure.) Chaparral has also been observed to cause renal cysts and partial nephron obstruction in rats.[72]

One case report of autoimmune hemolytic anemia diagnosed from positive direct antiglobulin test was attributed to consumption of four tablets of chaparral daily. The anemia resolved when chaparral was discontinued and returned when consumption resumed.[73]

Traditional use indicates that chaparral may modify glucose levels, which has been corroborated in rodent studies.[74]

Studies show a theoretical concern with anticoagulant conditions and medications, as NDGA has been shown to decrease platelet aggregation. [75]

In general, herbs with documented case reports of any kind of toxicity should not be used in pregnancy and lactation, especially when there is no known mechanism of such toxicity. There is one study from 1987 that demonstrated anti-implantation activity in rats fed chaparral extracts.[76] However, it is also used in Mexico for post-parturient infection as a sitz bath.[77]

Preparation and Dosage:

Michael Moore:

- Tincture: 1:5 75% alcohol, 20-60 drops up to TID
- #00 capsules: 1-2 up to TID[78]

Combinations and Similars:

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[70] Heron, S., & Yarnell, E. (2001). The safety of low-dose Larrea tridentata (DC) Coville (creosote bush or chaparral): a retrospective clinical study. *Journal of alternative and complementary medicine (New York, N.Y.)*, *7*(2), 175–185. https://doi.org/10.1089/107555301750164262

[71] Gardner, Z. E., & McGuffin, M. (2013).

[72] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).

[73] Gardner, Z. E., & McGuffin, M. (2013).

[74] Gardner, Z. E., & McGuffin, M. (2013).

[75] Ulbricht, C., Basch, E., Vora, M., Sollars, D., Rogers, A., Basch, S., Smith, M., Moffet, H., & Hammerness, P. (2003).

[76] Gardner, Z. E., & McGuffin, M. (2013).

[77] Arteaga, S., Andrade-Cetto, A., & Cárdenas, R. (2005).

[78] Moore, M. (2011). *Medicinal plants of the Pacific West*. Museum of New Mexico Press.

Michael Moore: With milk thistle and puncture vine for high LDLs or VLDLs.[79]

7Song: for infections combine with antibacterials, antiinflammatories, astringents, and vulneraries

- antibacterials: echinacea, boneset, osha, goldenseal, oregon grape root, barberry, yarrow
- antiinflammatories: arnica, yarrow, willow, turmeric, licorice
- astringents: Yerba mansa, oak, witch hazel, geranium
- vulneraries: calendula, yarrow, St. John's wort[80]

Dana Aronson:

- Mouth Health: Myrrh, Spilanthes, and Oregon Grape Root
- Wound Wash: Usnea, Yarrow, Echinacea, and Rose
- Strep Throat (streptococcal pharyngitis): Myrrh, Oregon Grape Root, Yerba Mansa and Usnea[81]

[79] Moore, M. (1989).
[80] 7Song. (2018, November 13).
[81] Aronson, D. (n.d.).