



## Material review

# In Search of Rocky Mountain Juniper

The characteristics and uses of a unique botanical extract

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**F**irst impressions: My journey to visit the still room of Alfred Savinelli began years before we met, when my dear friend and mentor Krishna Madappa, a researcher and ethnobotanical educator, sent me my first sample of *Juniperus scopulorum* essence. Upon inhalation, the oil both cleared my lungs and mind and went straight to my heart. Trained as a clinical aromatherapist with a passion for natural perfumery, it was the type of experience that alters one — enough so, to lead me to the hills of Taos where I visited the distiller and the lands of this most unique member of the cypress family. There I observed Alfred pour one of the most gracious juniper essential oils, in physical demeanor, I had ever seen — a pale blue liquid silk. The aromatic waters were so dense and complex, they were befitting the holiest of sacred shrines, while the concrete could have rivaled a beautiful immortelle, with under-lacings of honey, hay, coffee, leather and a tad of fruitiness.

Alfred has been a distiller for seven years, and possesses a drive to produce essence materials that are not generally available in the marketplace. He was not drawn to be a commercial producer, but rather walked the path of an artisan, with a desire to produce eloquent distillations of essential oil from unique plant species. Today, along with the Rocky Mountain juniper, he wild crafts and successfully distills the native plants of white sage (*Salvia alpina*), desert sage (*Artemisia tridentata*) and smaller vintage botanical batches. He is in constant discovery of the environmental and growing needs of each plant, while seeking to perfect his techniques and apparatus. With his 1,000 L stainless still, he uses a live steam process to capture the fullest aromatic material possible without the use of solvents.

In my talks with Alfred, I discovered that Rocky Mountain juniper is a plant whose domain has spread rapidly, due to the last 40 years being the wettest in New Mexico allowing the evergreen to thrive. This abundance has enabled the plant to become a sustainable aromatic, which is quite impressive in a time of harsh envi-



courtesy of the USDA-NRCS PLANTS Database

Rocky Mountain juniper berries.

ronmental impact, particularly with forestry products being used for the aroma trade marketplace. In the industry where I have made my career for nearly two decades, the oil of an aromatic plant is often referenced aesthetically as its soul. In the case of Rocky Mountain juniper, this indeed has been my experience. Through inhaling the aroma alone, it stepped beyond the parameters of what one would expect to experience from the generally accepted emotional associations of a juniper oil. I would come to discover it to be particularly beneficial for clients with complaints of the aftermath of acute stress, such as exhaustion and mind confusion, anxiety, nervousness, emotional

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imbalance, mild vertigo and eurythmea. Overall, I was searching for a better understanding of this beautiful oil, its potential in therapy, but more importantly, it's potential to the world of perfumery.

### History and Uses

The first alcohol distillation of “juniores” — juniper’s etymology from Latin, translated as “younger berries” — was at the hands of the physician Francisco Sylvius for use in medicine.<sup>3</sup> Genévrier, the fragrant fumigator of hospital wards in France and room sweetener of the college rooms at Oxford, soon gave its French and Celtic nomenclature to a far more recognizable product, that of gin.<sup>12</sup> With a strong reputation as a digestant, the use of gin and tonic became a recommended aperitif and spread its reputation to India where it was added to quinine to make it more palatable. Interestingly, today the essential oil of the juniper berry is noted as a remedy the morning after too much indulgence.

When we search through the historical records of many cultures, we find multiple medicinal and spiritual uses of juniper. Across the planet, juniper has been a most honored plant of rich cultural contribution and spiritual practice. It was in fact the plant of the Greek and Arabic physicians, who planted it by the doorways of apothecaries to create an essence of purification and protection. In addition, juniper is one of the smudge and protection plants of the Pueblo people; it is used to not only cleanse and bless their community spaces and homes but is prized as a valuable medicinal accouterment. The berries are dried and ground for coffee and flour, in addition to being chewed before meals to simulate the stomach and aid in digestion. They are also stuffed in travel pouches for protection and woven into tiny bracelets, called “ghost beads,” to ward off bad dreams for their children.<sup>7</sup> In Tibet, rooftop bsangs-thabs waft pummels of juniper’s fragrant wood to encircle the air and greet the dawn. Wizeden Siberian shamans prize the same fragrant smokes to move them beyond this earth towards enlightenment. Old world Germany touted juniper as its “tree of life,” while for centuries the material has been a mainstay in the perfumeries and pharmacies of Egypt and China.

Although the twigs and branchlets are often included in a distillation for essential oil, it is the berries that are preferred and maintain the therapeutic reputation of juniper. The oil from the berries of *J. communis*, more recognizable as a phyto-remedy for the modality of aromatherapy, has acquired a pronounced reputation as a warming tonic and rubefa-



*Rocky Mountain juniper essential oil.*

cient, with particular benefit to congestive conditions and pathologies associated to the joints, genito-urinary, lymphatic and nervous systems. In Chinese medicine it is a popular application for kidney-yang and strengthening the spleen-pancreas. In ayurveda, known as “hapusha,” it is a valuable tridoshic remedial for warming of the tissues, muscle, bone, blood, nerve and lymph, diminishing imbalance of excessive fluid to kapha conditions and revered as a pungent action, which clears substances by increasing metabolism.<sup>4,20</sup> In a more commercial evaluation, juniper essential oils are being sought as a fragrance enhancement for a variety of cosmetic uses, which include perfumery, as an oil, resinoid and concrete.<sup>12</sup>

### Characteristics and Profile

In New Mexico today, Rocky Mountain juniper thrives in an admirable co-operative relationship with the pinon pine, loving a siliceous soil mixed with limestone, to an elevation of 1,500-8,000 ft. In nature, the fragrant evergreen is deeply rooted, and when growing independently can appear nearly cherubic at an average of 4-6 ft. The tree is covered with thickly feathered branchlets imbued with tight emerald to gray green leaf structure that maintains its color through the winter months. Ascending branches set themselves against a russet bark that with age mellows to a powdered gray and is attached to aromatic heartwood core that rises to be topped by a round, yet irregular, crown. Flowering, it is filled with small opalescence dioecious flowers, the male extended and oblong

enhanced by subtle yellow hues, the female round and tinged slightly crimson or green. When the female bushes burst forth in fleshy berry, or “cones,” their blue gray coloring nearly mimics that of its distilled oil. Harvesting the berries is no easy task and may be the origin of the expression “beating about the bush” for one way of harvesting is to lay sheets upon the ground to capture the berries as one beats upon the bush with sticks.<sup>3</sup>

One of the finite variables of aromatic composition for most junipers is the age of the materials. It is noted that a preferred age has been set at about 65 years old, since the older the tree, the more heartwood will be available. Alfred looks for what he labels, “environmentally distressed mature trees,” generally above 8 ft with abundant vegetation. He has acquired a lovely balance within his process, distilling on the average 1,000 lb of botanical material annually and procuring about a 5 percent yield from carefully selected fresh green material, berries included. From 100 lb of material he is able to capture approximately 500 mL to 1L of essential oil. Along with the essential oil, the aromatic water is being looked at for potential in natural insecticide and scent cosmetic usage.<sup>7</sup>

### Olfactory Impressions

The olfactory journey that Rocky Mountain juniper offers resonates far beyond the general organoleptic profile a nose may expect of this evergreen. Instead of feeling as if I were climbing down a ladder with my nose, as is generally the case with juniper, I felt as if I had landed, right in the middle, at the heart. It was a heart that emanated a multitude of luscious coniferous variables, including the sweetness of fruit, which was intriguing because this particular distillation was predominately leaf and branch material. I experienced an exquisite berry fruitiness, with enough of a “fatty” quality to resonate a rich depth while lightly radiating to meld into an even creaminess with the prevailing top notes of the more atypical terpinic pine and camphoraceous eucalyptol. This lay evenly above a succinct resin base layered with specks of greener balsamic wood, presenting a sublime aromatic ending, with an eventual dry out of a round, sweet cedarwood note.

### Organoleptic Notes

Studying the organoleptic profile of the essential oil, one finds top notes that are piney, fresh and green, igniting a sense of energy, dispersion and cleansing. The middle to base notes portray both sweet wood and resin, eliciting a sense of warmth, calm and fortitude. The oil is most prolific within the bush at the onslaught of cool weather, which, in complement to anthro-morphological medicine perspectives, indicates to me its potential as an effective essence for colds and fluid imbalance within the body.

### Composition

As for the chemical composition of Rocky Mountain juniper, research has revealed a general chemical portrait highlighting the active principals of  $\alpha$ -pinene, cadinene,

camphene, terpineol, borneol and camphor. Monoterpenes are the main components highlighted in most of the more recognized medicinal junipers, such as *J. communis* (at about 60 percent of the oil), and have gained it a reputation for being anti-infectious, stimulating and analgesic. The next main compound is sesquiterpenes at about 20 percent, which indicates application as an anti-inflammatory. The minimal ester and sesquiterpenol proportions support Rocky Mountain juniper's tonic and nervous system application, while adding potential for antispasmodic and microbicide application, and suggest effectiveness in treating the proliferation of fungus and yeast in the body.<sup>9,10</sup> However, in my search to validate this I found that in most lab trials to date it was the *J. macropoda* that was most favorable for both Gram-positive and Gram-negative bacteria and as an antifungal.<sup>11</sup> Compared with other essential oils of similar therapeutic disposition, juniper oils registered quite low as an antibacte-

Rocky Mountain juniper possesses an olfactive heart that emanates a multitude of luscious coniferous variables, including the sweetness of fruit, which was intriguing because the distillation was of leaf and branch.

rial, and although the berry oil showed good promise as a therapeutic, the leaf oil was low in comparison.<sup>11</sup> Also, *J. chinensis* showed a measurable activity as an antimicrobial.<sup>11</sup> However, in another research study on the alteration of perceived

Chemical constituents in the oil of *Juniperus scopulorum* by order of their retention times

T-1

Constituent	RT	Identification	Percent
tricyclene	11.56	Ref, Lib	t
α-thujene	11.97	Ref, Lib	0.76
α-pinene	12.14	GC/MS, GC/FID, Ref, Lib	3.50
camphene	12.42	Ref, Lib	1.25
sabinene	12.54	Ref, Lib	49.91
myrcene	12.59	GC/MS, GC/FID	t
β-pinene	12.69	Ref, Lib	0.23
α-phellandrene	12.94	Ref, Lib	t
α-terpinene	13.03	GC/MS, GC/FID, Ref, Lib	9.95
limonene/β-phellandrene	13.1	GC/MS, GC/FID, Ref, Lib	4.77
1,8-cineole	13.2	GC/MS, GC/FID, Ref, Lib	2.93
linalool	13.59	GC/MS, GC/FID, Ref, Lib	0.68
thujone	13.8	GC/FID, Ref	0.77
β-ocimene	13.97	Ref	t
cis-sabinene hydrate	14.02	Ref, Lib	0.33
eucarvone	14.29	Ref, Lib	0.25
camphor	14.35	GC/MS, GC/FID, Ref, Lib	3.55
4-terpineol	14.49	GC/MS, GC/FID, Ref, Lib	6.79
α-terpineol	14.58	Ref, Lib	0.55
unknown acetate	14.78		0.88
geranyl acetate	14.91	Ref	0.38
4-terpinyl acetate	15.14	Ref	0.46
bornyl acetate	15.25	Ref, Lib	0.45
unknown acetate	15.33		0.45
β-cubebene	16.01	Ref	t
germacrene D	16.68	Ref	0.33
α-murolene	16.79	Ref, Lib	0.24
α-amorphene	16.96	Ref, Lib	0.41
elemol	17.15	Ref	1.41
bisbolene	17.68	Ref	0.76
δ-salinene	17.89	Ref	0.44
?-cadinene	18.01	Ref	t

GC/FID = comparison with the GC/FID of standard; GC/MS = comparison with the GC/MS of standard; Ref = comparison with GC and MS literature values; Lib = computer library identification; t = trace





Rocky Mountain juniper.



Alfred Savinelli's still room.

fragrance in relationship to work environment, juniper, with no specific species highlighted, was listed as a most favorable response for mental work.<sup>11</sup>

The oil of Rocky Mountain juniper prominently resides within a plant composition of resin, sugar, gum, water, lignin, wax and salines. The oil is most abundant just before the fruit alters its hues, from lightly powdered to iridescent blue,

at which time it has reached prime ripeness. Most cedarwood essence, which includes Rocky Mountain juniper, a red cedar, is produced from the remnants of the commercial industry. However, Alfred harvests his material fresh and wild. Also, unlike many general distillations and extractions of juniper, there are no solvents introduced to the process, merely steam and recycled, regenerated still waters. There are no harmful solid wastes and no liquid runoff. Spent wood is burned for energy conservation in well-maintained boilers and after distillation the additional exhausted botanical material is used as an aromatic mulch and effective weed deterrent.

Our testing took us to Sandia Laboratories in New Mexico and the outside independent lab of Larry Jones, *Spectrix Analytical*.<sup>8,18</sup> It was the latter, with more intensive mass-spectrometer analysis, that disclosed a larger profile of trace elements, which included a small proportion of sabinyl acetate (see Safety Concerns). Sandia disclosed that the concentrations of Rocky Mountain juniper, *J. scopulorum* were similar to those of *J. oblonga*. Both species demonstrated high concentrations of the compounds  $\alpha$ -pinene, sabinene and 4-terpineol, and contained several uncommon constituents such as linalool and verbenene. In summation, 25 compounds were fully identified accounting for 92.43 percent of the oil. Primary constituents were sabinene at 49.91 percent,  $\alpha$ -terpinene at 9.95 percent and 4-terpineol at 6.79 percent. See T-1 for a complete list of constituents. For the genus *Juniperus*, myrcene typically composes between 5 and 10 percent of the total oil. The sample tested by Sandia contained only trace amounts co-eluting with sabinene. All three primary components were classified non-toxic and non-sensitizing, although 4-terpineol is documented to be mildly irritating for individuals with sensitive skin.<sup>8</sup>

### Safety Concerns

With the rise in popularity of essential oils, there has also been a rise in skepticism of proposed therapeutic values and safety worry with potential, yet unidentified and qualified, toxic compounds. In the case of juniper oil, with the more tested *J. communis*, it was the tepinen-4-ol that drew first attention with concern as a potential distress to the kidneys. Further research and testing revealed that the diuretic action primarily created a loss of water, rather than sodium ions, thereby not irritating the tissues, in contrast to the other terpenes.<sup>5, 9, 11</sup> It remains the opinion of this author, through clinical observation and personal experience, that juniper oil should be avoided when there is kidney infection or chronic weakness. However, from a direct personal health journey and for the enhancement of this article, it feels valuable to add that I have found the Rocky Mountain juniper to be far less invasive when the kidneys are weak.

Although juniper oil is recognized by the US Food and Drug Administration as non-hazardous for flavor and fragrance, there has been some concern rising over the potential for toxicity from the trace component

mentioned previously, sabinyl acetate, as abortifacient and a potential “embryotoxic, fetotoxic and teratogenic.”<sup>5,17</sup> It became this particular component that led me explore several the chemical composition of Rocky Mountain juniper. Also, there was a reference to limonene isomers and other variables in refractive indexing that gave an interesting observation in terms of distillation technique. With the International Fragrance Association code of manufacturing practice, it has been recommended that an anti-oxidant, such as the tocopherols of vitamin E, should be added at the time of distillation with the oils of the Pinaceae family as a preventative to potential skin sensitivity issues arising from the proportion of terpenes.<sup>16,17</sup> Perhaps this too would be a consideration for the juniper, and other essential oils of the Cypressaceae family? This in kind becomes a significant controversy in a day when purity and non-additives are a primary conversation and desire amongst therapists and practitioners, as well as natural perfumers, using essential oils in their practice and art.

### **The Natural Trend**

For more than a decade, there has been a continually growing interest by consumers in utilizing essential oils for improving and assisting their health and lifestyle. Today we are moving beyond the arena of small therapeutic settings into a variety of health and beauty frontiers. The corridors of hospitals as they seek new formulas for disease prevention, the design products of Salon and Spa, the selective cosmetic care lines such as Nu Skin and into the mainstream products of larger corporations such as Colgate Palmolive.<sup>8</sup>

In a time when perfumery has entered the advanced and fascinating realm of headspace technology and scent replication of exotics, it is encouraging to discover new botanical extracts that are phenomenally aromatic and readily accessible in whole extraction form, such as the Rocky Mountain juniper. These are the wild, free-range scents of plants and trees that so readily connect us to the earth, effectively enhance our physicality and sustain us emotionally. To some that may sound a rather

aesthetic “hypothesis,” but I do find it interesting that, when looking through historic and cultural documentation on the uses for juniper, most of my hypothesis correlates and becomes more substantial. With these aspects guiding me, in tandem with succinct chemistry analysis and safety precautions to support, I have indeed found Rocky Mountain juniper a most beneficial clinical oil. For the artistry of natural perfumery I find it a fragrance complement that is superlative and distinctive.

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