Leading the Science of Cannabis
Our Mission Statement

Steep Hill Labs, Inc. seeks to protect public health through the development of infrastructure and analytical services for legally-authorized distributors, producers, and regulators of cannabis.
# Table of Contents

3  Cannabinoids & Terpenoids  
4  Understanding Cannabinoids  
5  Therapeutic Values of Cannabinoids  
6  Understanding Terpenoids  
7  Types of Cannabis Products  
8  Cannabis Contaminants  
9  The Lab Services We Offer  
10  The Products We Offer  
11  Steep Hill Verification  
12  Steep Hill Milestones  
13  Steep Hill Locations  
14  A Message From The Co-Founder & CEO
Cannabinoids and Terpenoids

Cannabis contains various compounds - some are believed to possess medicinal qualities, others remain benign, and few expose the consumer to potential risk.

Cannabinoids

Cannabinoids are found predominately in the cannabis plant, and activate cannabinoid receptors found throughout the body. Dozens of cannabinoids exist within each unique plant at varying levels, and most develop from Cannabigerol Acid (CBG-A).

THCA vs. DELTA-9-THC

Decarboxylation is the conversion of a cannabinoid from its acid form to its neutral form, which occurs during heat exposure. For example, Delta-9-THC is the result of THC-A ('A' for acid) decarboxylating. The difference? Only Delta-9-THC causes the euphoric sensation associated with cannabis! THC-A is not psychoactive!

Delta-9-THC is the best way to measure a cannabis product’s psychoactive potency. A typical cannabis flower contains between 13% and 25% THC.

Terpenoids

Terpenoids are the compounds responsible for a plant’s fragrance. They are found within the resin glands (or trichomes). They interact with cannabinoids, called ‘entourage effect’ which helps define a given strain’s unique effect.

Our Lab Quantifies:

17 Cannabinoids

Cannabigerolic Acid (CBG-A)
Cannabigerol (CBG)
Tetrahydrocannabinolic Acid (THC-A)
Tetrahydrocannabinol-A-C4
Tetrahydrocannabivarinic Acid (THCV-A)
Delta-9-Tetrahydrocannabinol (Δ9THC)
Delta-8-Tetrahydrocannabinol (Δ8THC)
Tetrahydrocannabivarin (THCV)
Cannabinolic Acid (CBN-A)
Cannabinol (CBN)
Cannabidiolic Acid (CBDA)
Cannabidivarinic Acid (CBDV-A)
Cannabidiol (CBD)
Cannabidivarin (CBDV)

Cannabinol Acid (CBC-A)
Cannabinol (CBC)
Cannabicyclol Acid (CBC-A)

10 Terpenoids

Linalool
Citronellol
Carophyllene Oxide
Myrcene
Terpinolene
Limonene
Alpha Pinene
Alpha Humulene
Beta Carophyllene
Phytol
Understanding Cannabinoids

Use this reference guide to better understand the relationships between the most prevalent cannabinoids. As you can see, most of the cannabinoids develop from cannabigerolic acid (CBGA).

Raw Homologues:
- CBG-A: Cannabigerivarinic Acid (CBGV-A)
- THC-A: Tetrahydrocannabivarinic Acid (THCV-A)
- CBD-A: Cannabidivaric Acid (CBDV-A)
- CBC-A: Cannabichromivaric Acid (CBCV-A)

Heated Homologues:
- CBG: Cannabigerivarin (CBGV)
- THC: Tetrahydrocannabivarin (THCV)
- CBD: Cannabidivarin (CBDV)
- CBC: Cannabichromivarin (CBCV)
## Therapeutic Properties of Cannabinoids

This list offers a brief glance at the associated medical benefits of each cannabinoid that Steep Hill quantifies in the lab. Visit steephill.com to download our bibliography.

**CBGA**
- Analgesic
- Anti-inflammatory

**THC-A**
- Anti-cancer
- Anti-inflammatory
- Anti-spasmodic

**CBD-A**
- Anti-cancer
- Anti-inflammatory

**CBC-A**
- Anti-fungal
- Anti-inflammatory

**CBG**
- Analgesic
- Anti-bacterial
- Anti-cancer
- Anti-depressant
- Anti-inflammatory

**CBD**
- Analgesic
- Anti-anxiety
- Anti-bacterial
- Anti-cancer
- Anti-convulsive
- Anti-depressant
- Anti-emetic
- Anti-inflammatory
- Anti-insomnia
- Anti-ischemic
- Anti-psychotic
- Bone stimulant
- Neuroprotective

**CBGV, THCV-A, CBDV-A, CBCV-A**
- Anti-inflammatory

**CBG**
- Analgesic
- Anti-bacterial
- Anti-cancer
- Anti-depressant
- Anti-fungal
- Bone stimulant

**Δ-8-THC**
- Anti-anxiety
- Anti-emetic

**CBN**
- Analgesic
- Anti-bacterial
- Anti-convulsive
- Anti-inflammatory
- Anti-insomnia

**Δ-9-THC**
- Analgesic
- Anti-bacterial
- Anti-cancer
- Anti-inflammatory
- Anti-spasmodic
- Appetite stimulant
- Bronchodilator
- Neuroprotective

**CBDV**
- Anti-convulsive
- Bone stimulant

**CBC**
- Analgesic
- Anti-bacterial
- Anti-cancer
- Anti-depressant
- Anti-fungal
- Anti-inflammatory
- Anti-insomnia
- Bone stimulant

**CBN-A**
- Anti-inflammatory

**CBL**
- Unknown

**CBL-A**
- Anti-inflammatory
**Therapeutic Properties of Terpenoids**

<table>
<thead>
<tr>
<th>Terpenoid</th>
<th>Properties</th>
<th>Plant/Flower</th>
</tr>
</thead>
<tbody>
<tr>
<td>α-PINENE</td>
<td>Anti-bacterial, Anti-fungal, Anti-inflammatory, Bronchodilator</td>
<td>Pine needles</td>
</tr>
<tr>
<td>β-CARYOPHYLLENE</td>
<td>Anti-bacterial, Anti-cancer, Anti-fungal, Anti-inflammatory, Anti-Septic</td>
<td>Black Pepper, Clove, Camphor</td>
</tr>
<tr>
<td>BORNEOL</td>
<td>Analgesic, Anti-insomnia, Anti-septic, Bronchodilator</td>
<td>Camphor</td>
</tr>
<tr>
<td>CARYOPHYLLENE OXIDE</td>
<td>Anti-fungal, Anti-ischemic</td>
<td>Eucalyptus</td>
</tr>
<tr>
<td>CINEOL</td>
<td>Anti-bacterial, Anti-depressant, Anti-inflammatory, Anti-ischemic, Bronchodilator</td>
<td>Tea Tree</td>
</tr>
<tr>
<td>CITRONELLOL</td>
<td>Anti-cancer, Anti-inflammatory, Anti-insomnia, Anti-spasmotic</td>
<td>Rose</td>
</tr>
<tr>
<td>HUMULENE</td>
<td>Anorectic, Anti-cancer, Anti-bacterial, Anti-inflammatory</td>
<td>Hops</td>
</tr>
<tr>
<td>LIMONENE</td>
<td>Anti-anxiety, Anti-bacterial, Anti-cancer, Anti-depressant, Anti-fungal, Bronchodilator</td>
<td>Citrus</td>
</tr>
<tr>
<td>LINALOOL</td>
<td>Anti-anxiety, Anti-bacterial, Anti-convulsive, Anti-depressant, Anti-insomnia</td>
<td>Lavender</td>
</tr>
<tr>
<td>MYRCENE</td>
<td>Analgesic, Anti-cancer, Anti-inflammatory, Anti-insomnia, Anti-spasmodic</td>
<td>Lemongrass, Mango</td>
</tr>
<tr>
<td>NEROLIDOL</td>
<td>Anti-fungal, Anti-insomnia</td>
<td>Wood, Citrus rind</td>
</tr>
<tr>
<td>PHYTOL</td>
<td>Anti-insomnia</td>
<td>Green Tea</td>
</tr>
<tr>
<td>TERPINOLENE</td>
<td>Anti-bacterial, Anti-fungal, Anti-insomnia, Anti-septic</td>
<td>Lilac</td>
</tr>
</tbody>
</table>

Terpenoids & Cannabinoids:

Mankind has been infatuated with terpenes for thousands of years, enjoying the aromas and flavors in beer, candy, perfumes, fruits, incense, and much more. In addition to the smells and tastes, we have continuously benefited from the diverse array of the medicinal and nutritional aspects found in terpenes. Terpenoids likely make up the single largest family of chemical compounds available, from across the planet, to herbalists and apothecaries alike for use in compounding remedies and medicine.

Cannabinoids are a subset of 80-100 terpene-derived molecules found only in cannabis plants. Thus, all cannabinoids are terpenoids, but not all terpenoids are cannabinoids. They all have similar structures, but have been shown to have very different effects. Most cannabinoids are found in both an acid and a neutral form, with acids being the most prevalent.
Types of Cannabis Products

The most active chemicals - cannabinoids - are found in highest concentrations within the trichomes (or resin glands) found predominately on the female flowers. These cannabinoids are processed into various consumer products.

Raw Flowers
Flowers are dried and cured female flowers cultivated from the cannabis plant. They contain cannabinoids in their acid forms, as well as a variety of terpenes.

Concentrates
Concentrates use solvents like Supercritical Co2 or Nitrogen to extract the cannabinoids from the cannabis plant into a substance with substantially higher concentrations. While most raw flowers test below 20% THC, some concentrates contain over 80% THC. Concentrates contain cannabinoids in their acid and decarboxylated forms as well as some terpenes.

Edibles
Edibles are food products infused with active cannabinoids. They are available as baked goods, beverages, and everything you can imagine! Manufacturers usually make a cannabinoid extract using butter or a variety of oils, which they then use as an enhanced ingredient in their recipes.

Tinctures
Tinctures are infusions of alcohol, oil, or glycerin. They contain various levels of cannabinoid acids and their decarboxylated counterparts.
Cannabis Contaminants

Potency is important, but safety is our priority.

Pesticides
Pesticides are common in most agricultural settings. Cannabis is no different. Testing for these residues help protect the consumer from consuming hazardous chemicals like abamectin, bifenazate, and bifenthrin.

Microbes
Microbes are molds and bacteria that, when present in high concentration, may pose a especially high risk to consumers with suppressed immune systems.

Residual Solvents
Residual Solvents are the leftover chemicals used to make various cannabinoid extracts. This process allows the lab to identify the extraction process and subsequent quality of any cannabis extract.

Mycotoxins
Mycotoxins are incredibly toxic by-products of some molds and fungi.
The Lab Services We Offer
Steep Hill provides analytical services for legally-authorized distributors, producers, and regulators of cannabis. Since 2008, Steep Hill has focused on measuring the purity and safety of all types of products containing active cannabinoids.

Testing & Analysis
We take the mystery out of medical cannabis. Through rigorous quality-standard protocols, we help cultivators, dispensaries, manufacturers, and consumers prove the safety, consistency, and potency of all cannabis products that pass through our lab.

Genetic Services
Steep Hill offers genetic testing services to help our customers gain a better understanding of all aspects of cannabis genetics. We provide the cannabis industry -- from growers and breeders to dispensaries and end users -- with a suite of identification and diagnostic tools that help identify important genetic markers that can be used in breeding unique strains and in choosing the correct strain for medical purposes.

Consulting
We offer consulting services in the areas of cannabis safety, regulation, testing methodology, packaging and labeling, scientific development, processing and regulatory management.
The Products We Offer

Since 2008, Steep Hill has been providing unique and innovative solutions to businesses and consumers in the cannabis industry. In addition to our core business, Steep Hill is also an innovative R&D lab that develops and commercializes highly-differentiated and proprietary products.

QuantaCann2™
QuantaCann2 produces laboratory-grade THC-A, D9THC, CBD, CBD-A, and moisture levels for cannabis flower and leaf samples from any location in the world (with an internet connection) in under 60 seconds.

GenKit™
Using proprietary techniques and technology, Steep Hill scientists can swiftly and efficiently identify the males in any grow. We provide growers with plant sex ID within 14 days, so they can eliminate males from their gardens.

Strain Fingerprint™
Values and graphics are produced using cluster analysis of samples tested at Steep Hill, resulting in a composite average chemical makeup and unique strain-identifying iconography. Ranges take into account standard deviation to provide the most accurate models possible.
Steep Hill “Verified By” Program

Steep Hill Verified is the highest level of quality assurance we offer for cannabis flowers, concentrates, and infused products. The program combines all of our tests offered at a discounted rate to help collectives and product producers provide customers with the best quality products possible.

Certification sticker seals and graphics are made available to those clients whose products have undergone all of our tests (as applicable), and which have passed local regulatory standards. These seals verify that the product has passed all required safety and potency tests.

To Qualify, Each Sample Must Undergo and Pass:

Cannabinoid & Terpenoid Profiling
Microbiological/Residual Solvent Analysis
Mycotoxin Screening
Pesticide Screening
As the first analytical laboratory established in the California medical cannabis marketplace, Steep Hill remains at the forefront of research and a leading voice in an ever-changing industry. Here are the highlights from our first day of business to now.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>JANUARY 2008</td>
<td>Steep Hill opens first non-federal cannabis lab in the United States.</td>
</tr>
<tr>
<td>JUNE 2008</td>
<td>Steep Hill markets first marijuana potency test in California.</td>
</tr>
<tr>
<td>OCTOBER 2008</td>
<td>Steep Hill creates first microbiological safety screen for cannabis.</td>
</tr>
<tr>
<td>MARCH 2009</td>
<td>Steep Hill identifies first high-CBD strain in CA medical marijuana supply.</td>
</tr>
<tr>
<td>AUGUST 2010</td>
<td>Steep Hill officially authorized as inspector for 9.31 Exempt-ed Grows.</td>
</tr>
<tr>
<td>MARCH 2011</td>
<td>Steep Hill develops QuantaCann, the first remote instant on-site potency test.</td>
</tr>
<tr>
<td>NOVEMBER 2012</td>
<td>Colorado and Washington legalize recreational cannabis use.</td>
</tr>
<tr>
<td>NOVEMBER 2014</td>
<td>Steep Hill and UTech Jamaica sign MoU opening 3-year partnership.</td>
</tr>
<tr>
<td>JUNE 2015</td>
<td>Steep Hill presents to CA Lt. Governor Newsom’s Blue Ribbon Commission.</td>
</tr>
<tr>
<td>JUNE 2013</td>
<td>Steep Hill merges with Halent Scientific.</td>
</tr>
<tr>
<td>APRIL 2013</td>
<td>Steep Hill hired by WA for regulatory consultation and method evaluation.</td>
</tr>
<tr>
<td>MARCH 2014</td>
<td>Steep Hill opens lab in Washington state for I-502 regulatory testing.</td>
</tr>
<tr>
<td>JUNE 2015</td>
<td>Steep Hill opens lab in Nevada for 453A regulatory testing.</td>
</tr>
<tr>
<td>JULY 2015</td>
<td>Steep Hill opens lab in New Mexico for regulatory testing.</td>
</tr>
</tbody>
</table>
Steep Hill Lab Locations

Berkeley, CA (Headquarters)
1005 Parker St. Berkeley, CA 94710
(510) 562-7400

Steep Hill California provides extensive cannabis testing services to any cultivators, processors, dispensaries, collectives and Proposition 215-compliant medical cannabis patients with a valid recommendation and state-issued photo ID. Steep Hill California works with its customers to ensure product quality and optimize production methods.

Denver, CO
4890 Ironton St. Unit I Denver, CO, 80239
(303) 375-9533

The Steep Hill laboratory in Denver, Colorado was the company’s second testing and research facility. Located at the heart of the cannabis legalization movement and serving the largest population of legal cannabis consumers, Steep Hill Colorado provides extensive cannabis testing services to MED-licensed companies.

Seattle, WA
720 Industry Dr. Tukwila, WA, 98188
(253) 277-8936

The Steep Hill laboratory in Seattle, Washington was our third testing and research facility. Steep Hill Washington is a fully licensed I-502 testing facility, with state of the art equipment and the best testing methodology in the industry.

Las Vegas, NV
2009 Western Ave. Las Vegas, NV, 89102
(800) 427-7036

The Steep Hill laboratory in Las Vegas, NV is a high-throughput facility designed to meet the intensive demands of the Nevada medical cannabis market. Recognized as Nevada’s premier testing facility, Steep Hill earned one of the initial licenses for compliance testing.

Albuquerque, NM
8917 Adams N.E. Albuquerque, New Mexico 87103
(800) 658-0955

The Steep Hill laboratory in Albuquerque, NM was awarded the first testing license by the NM Department of Public Health. Steep Hill New Mexico is designed to meet and exceed the testing requirements set by the state.
Steep Hill is the country’s leading cannabis science and technology firm. Steep Hill opened the first commercial cannabis lab in the United States in 2008, and now has company-owned labs in Berkeley, CA, Seattle, WA, and Albuquerque, NM, with licensed labs in Denver, CO and Las Vegas, NV. We will open a licensed location in Portland, OR in late 2015.

Steep Hill’s core business is testing and analyzing medical and recreational marijuana to ensure compliance with public safety standards.

In addition to its core business, Steep Hill also functions as an innovative R&D lab that has developed and commercialized two highly-differentiated and proprietary products: the QuantaCann™, which conducts instant potency tests, and the GenKit™, which identifies the sex of cannabis plants for growers.