Cannabinoids

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JULY 2019

Cannabis Sativa

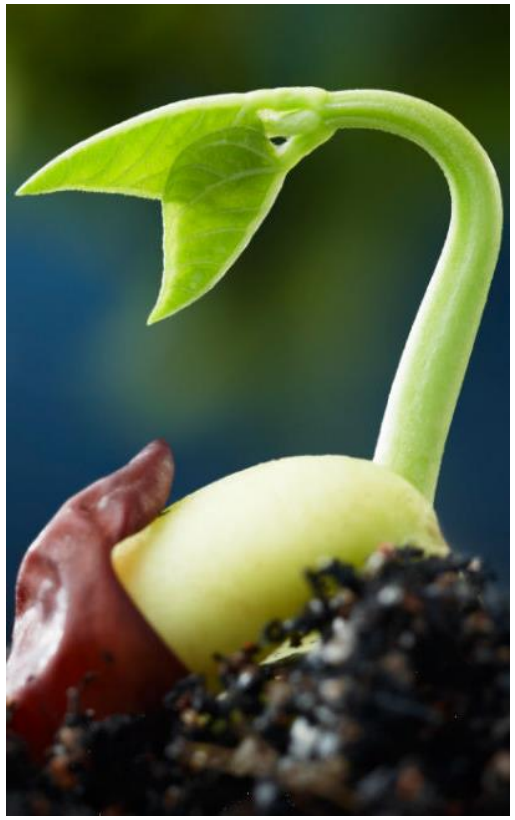
- Annual flowering plant
- Dioecious (distinct male vs. female plants)
- Palmate and serrate leaves
- Possible multiple varieties
  - Sativa, Indica, Rederalis
  - Modern literature is challenging the different subclassifications

Growth Cycle

4 stages

- Germination
- Seedling
- Vegetation
- Flowering

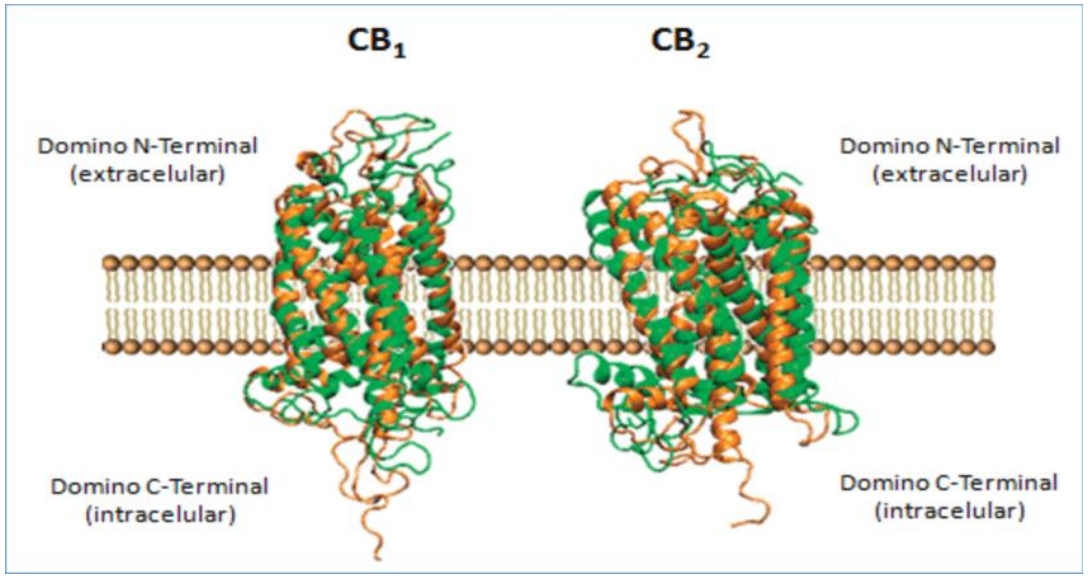
Typical full growth within 3 – 5 months

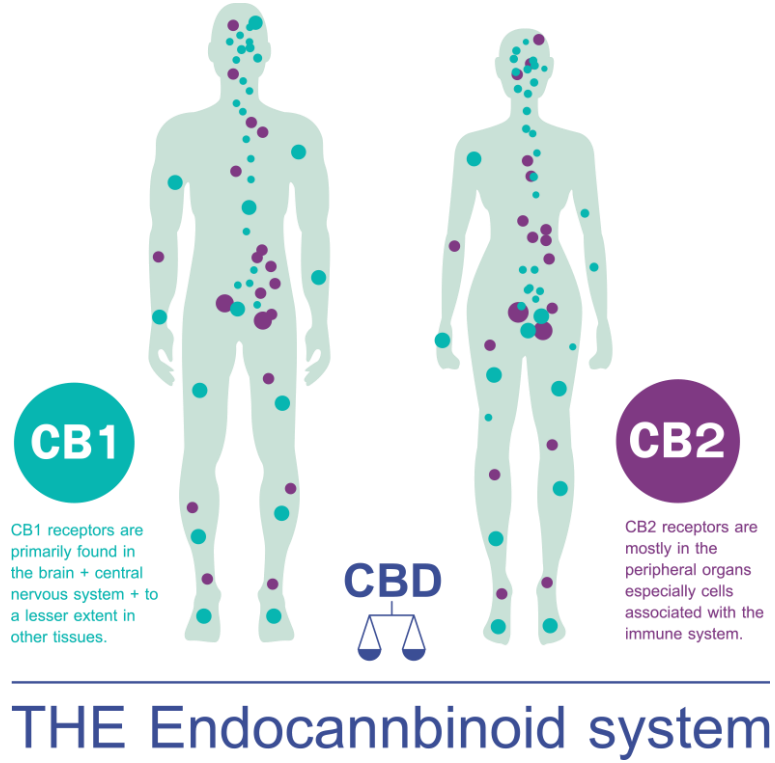


Indoor Grows

Outdoor Grows

Processing for Commercial Products


CB1
CB2
Domino N-Terminal
(extracelular)
Domino N-Terminal
(extracelular)
Domino C-Terminal
(intracelular)
Domino C-Terminal
(intracelular)

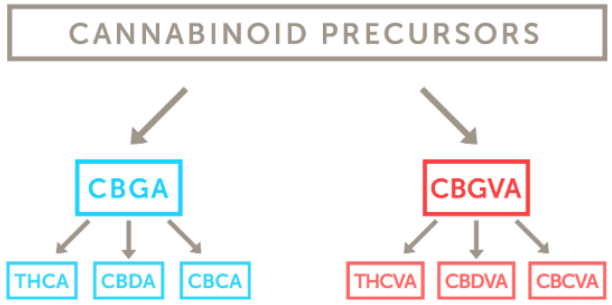

CB1
CB1 receptors are primarily found in the brain + central nervous system + to a lesser extent in other tissues.
CBD
CB2
CB2 receptors are mostly in the peripheral organs especially cells associated with the immune system.
THE Endocannbinoid system

Receptors

Chemistry

CANNABINOIDS

- **CBGA** (Cannabigerolic acid)
- **THCA** (Δ^9-tetrahydrocannabinolic acid)
- **CBDA** (Cannabidiolic acid)
- **CBCA** (Cannabichromenenic acid)
- **CBGVA** (Cannabigerovarinic acid)
- **THCVA** (Tetrahydrocanabivarinic acid)
- **CBDVA** (Cannabidivarinic acid)
- **CBCVA** (Cannabichromevarinic acid)



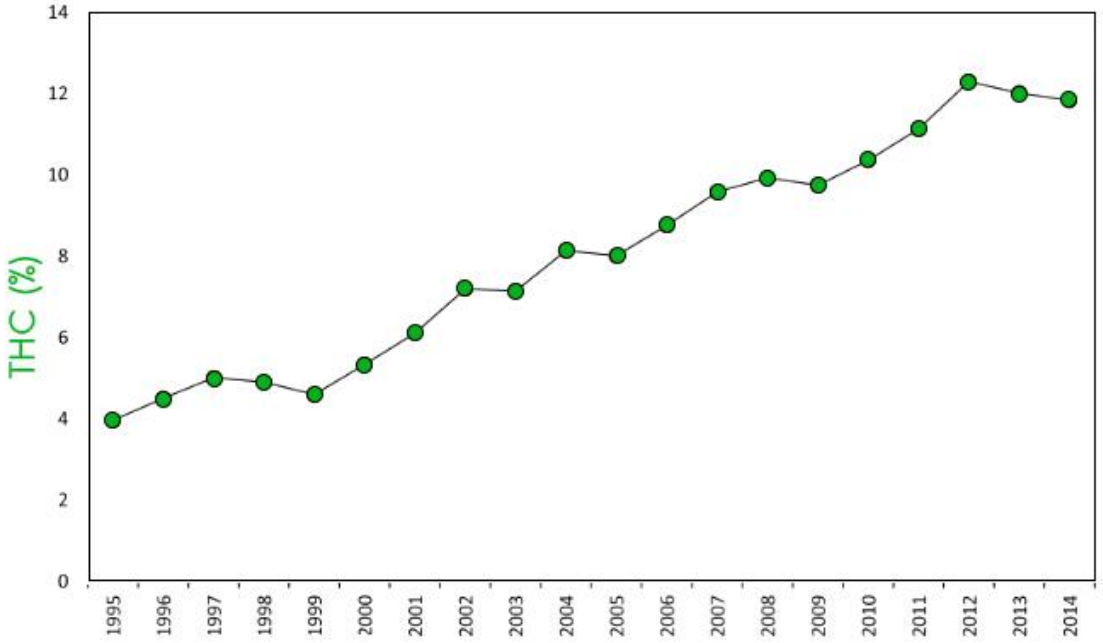
Leafly

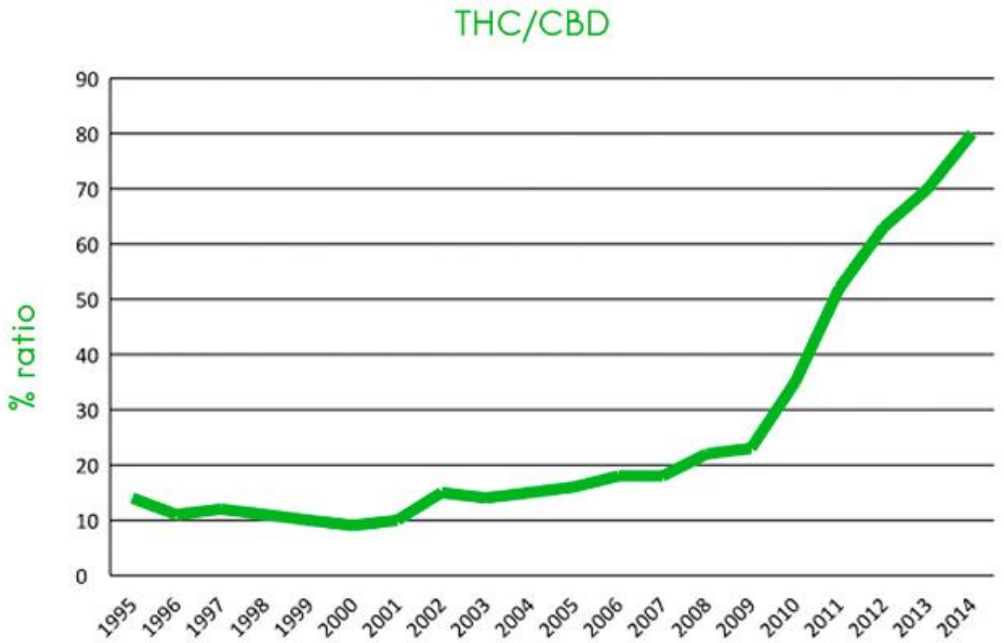
Figure 1: Biosynthetic pathway resulting in production of cannabinoid acids. Each cannabinoid acid can be subsequently decarboxylated into a corresponding cannabinoid, such as THC, CBD, or THCV.

TERPENES

5 Biggest Cannabis Terpenes and Their Benefits

Name	Scent	Benefits	Strains that have it
Myrcene	Earthy and musky	Reduces inflammation and chronic pain	Skunk XL, White Widow, and Special Kush
Limonene	Citrusy	Improves mood and relieves stress	O.G. Kush, Sour Diesel, Super Lemon Haze, Durban Poison, Jack Herer, and Jack the Ripper
Linalool	Spicy and floral	Relieves inflammation and depression	Amnesia Haze, Special Kush, Lavender, LA Confidential
Caryophyllene	Spicy and peppery	Relieves inflammation and anxiety	Super Silver Haze, Skywalker and Rock Star
Pinene	Pine	Anti-inflammatory	Jack Herer, Strawberry Cough, Blue Dream





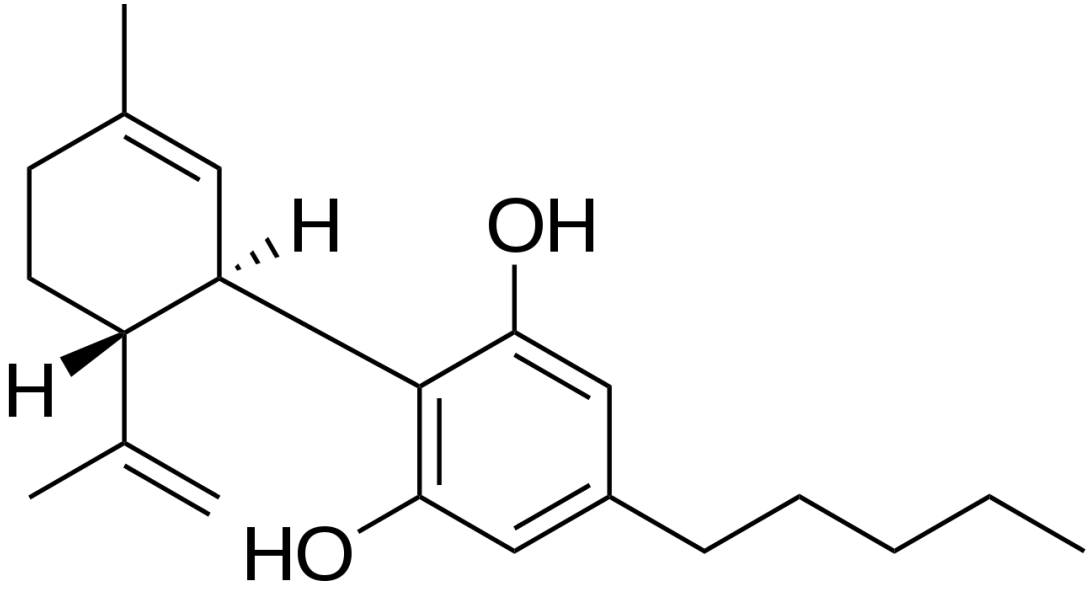
How has marijuana changed over time?

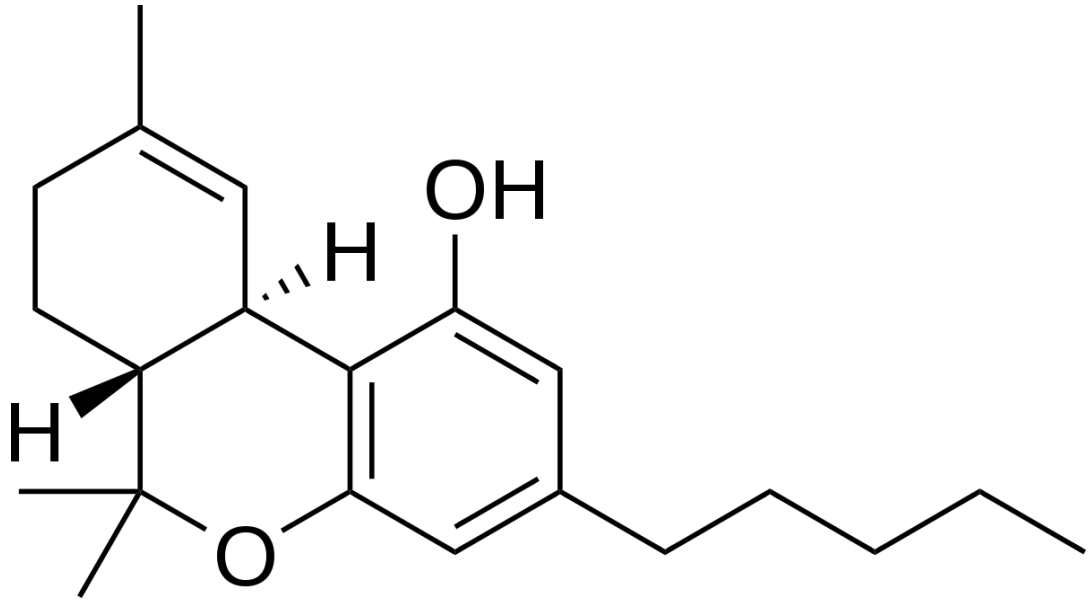
Butane Honey oil (BHO)

Extraction of marijuana using butane

Not new, but encountered more often

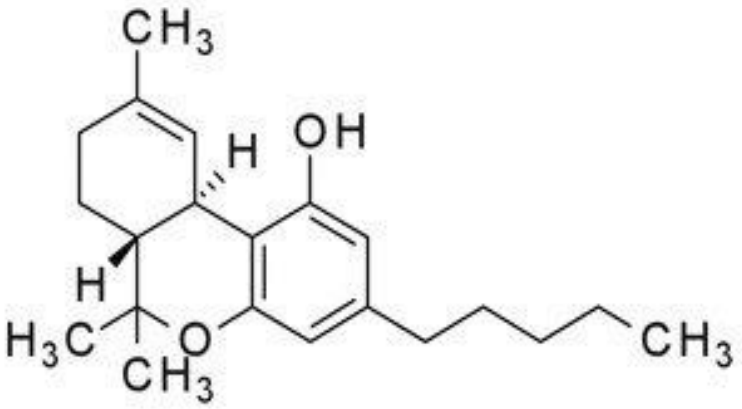
Shatter – almost crystalline





CBD VS THC

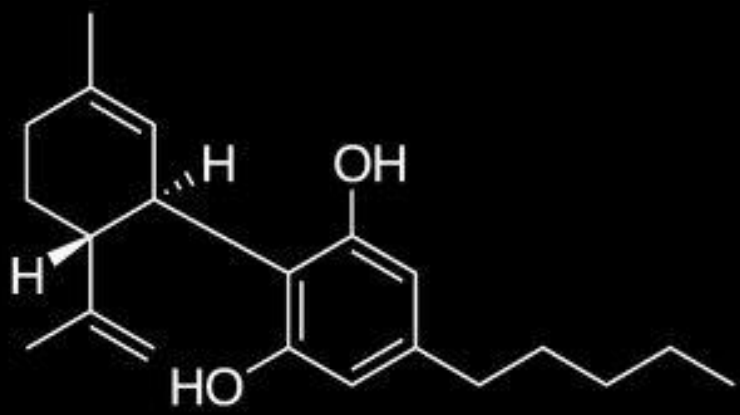
THC



Medical Benifits

- Psychoactive. Create the high! Eupho
- Relieves pain and inflammation
- Causes anxiety
- Create sense of relaxation and wellbeing
- Induces sleep
- Appetite stimulant

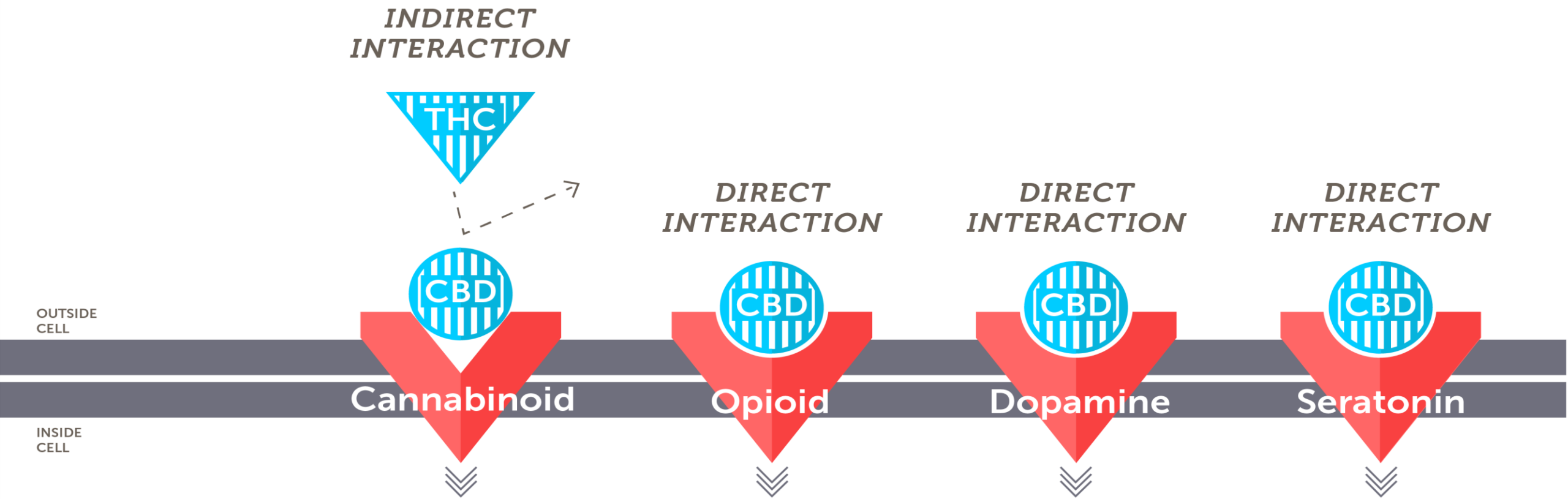
CBD



Medical Benifits

Non-psychoactive -
Combats inflammation and pain -
Combats anxiety and depression -
Suppresses Seizure activity -
Combat neurodegenerative diseases -
Combat psychosis -
Combats tumors and cancer cells -
Appetite suppressant -

www.MonroeBlvd.com



AILMENTS CBD MAY DECREASE:

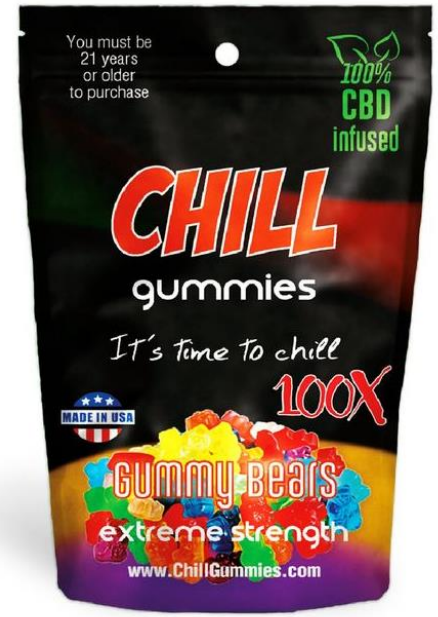
- side effects of THC, e.g. anxiety

- pain
- addiction

- addiction
- depression

- addiction
- anxiety
- depression

Leafly



CBD Products

Potency Test Tested

Show Less

Full spectrum cannabinoid profiling and analysis utilizing High Performance Liquid Chromatography (HPLC/UV)

% | mg/g | mg/Unit

Cannabinoid Summary

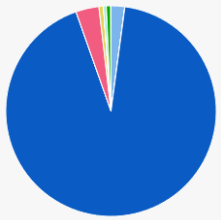
Total THC	Δ9THC+0.877*THCa	0.054 mg/Unit
Total CBD	CBD+0.877*CBDa	2.368 mg/Unit

Full Cannabinoid Profile

Tetrahydrocannabinol	THC	0.054 mg/Unit
Tetrahydrocannabinolic Acid	THCa	ND
Cannabidiol	CBD	2.368 mg/Unit
Cannabidiolic Acid	CBDa	ND
Cannabinol	CBN	0.018 mg/Unit
Delta 8 Tetrahydrocannabinol	Δ8THC	ND
Cannabichromene	CBC	0.091 mg/Unit
Cannabigerol	CBG	0.018 mg/Unit
Cannabigerolic Acid	CBGa	ND
Tetrahydrocannabivarin	THCV	ND
Cannabidivarin	CBDV	0.011 mg/Unit
Cannabidivarin Acid	CBDVa	ND
Tetrahydrocannabivarin Acid	THCVa	ND
Cannabicyclol	CBL	<LOQ
Cannabichromene Acid	CBCa	ND
Sum of Cannabinoids		2.560 mg/Unit

EcoDrip Gold Batch# 9D156133

Cannabinoid Ratio



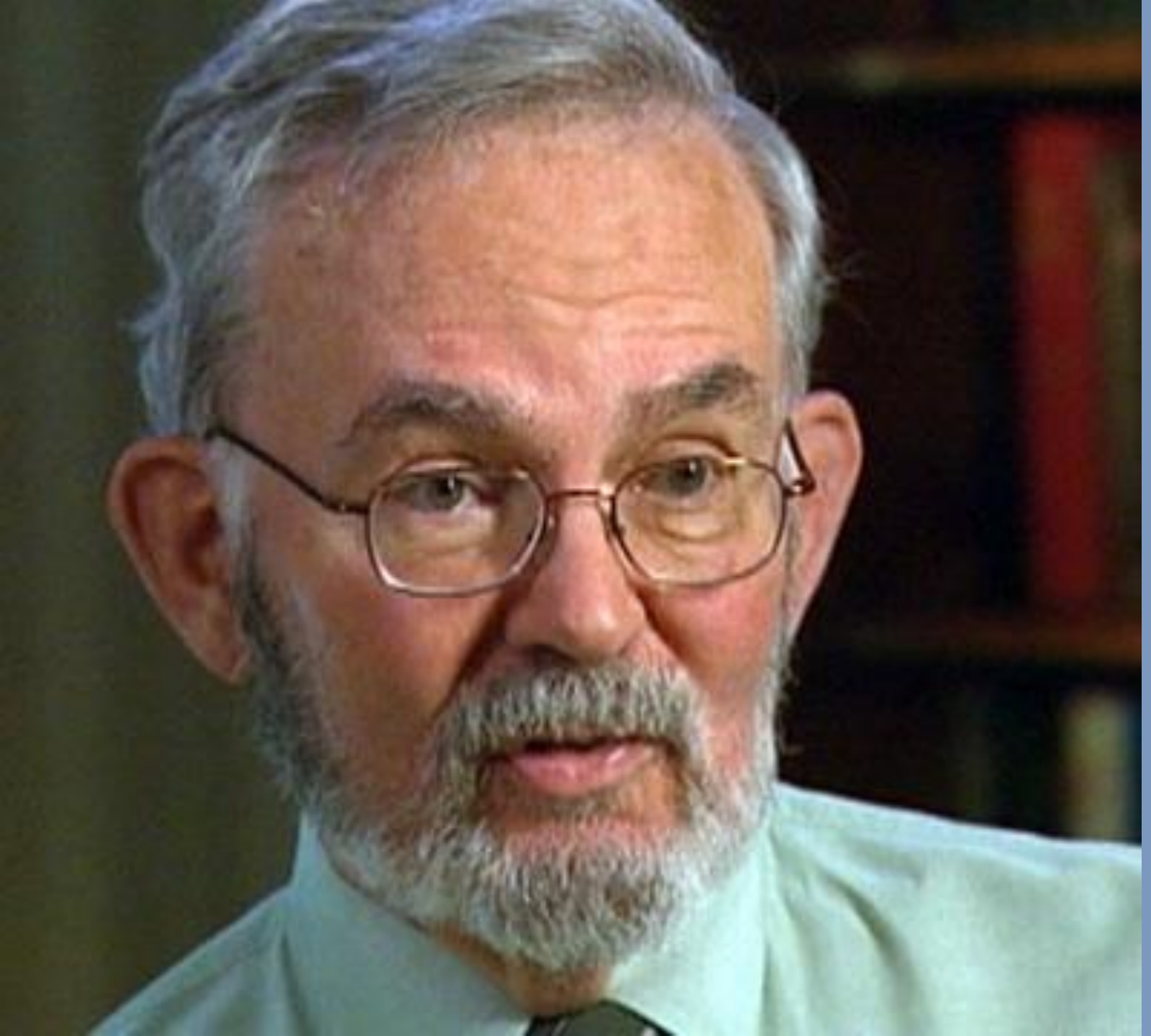
THC 0.054 mg/Unit | THCa 0 mg/Unit | Δ8THC 0 mg/Unit | CBD 2.368 mg/Unit | CBDa 0 mg/Unit
CBC 0.091 mg/Unit | CBG 0.018 mg/Unit | CBGa 0 mg/Unit | THCV 0 mg/Unit | CBDV 0.011 mg/Unit
CBDVa 0 mg/Unit | CBN 0.018 mg/Unit | THCVA 0 mg/Unit | CBL 0 mg/Unit | CBCA 0 mg/Unit

Regulation requirements?

- Is 0.3% THC requirement appropriate for oils?
- Proof of hemp origin?
- **What are the requirements??**

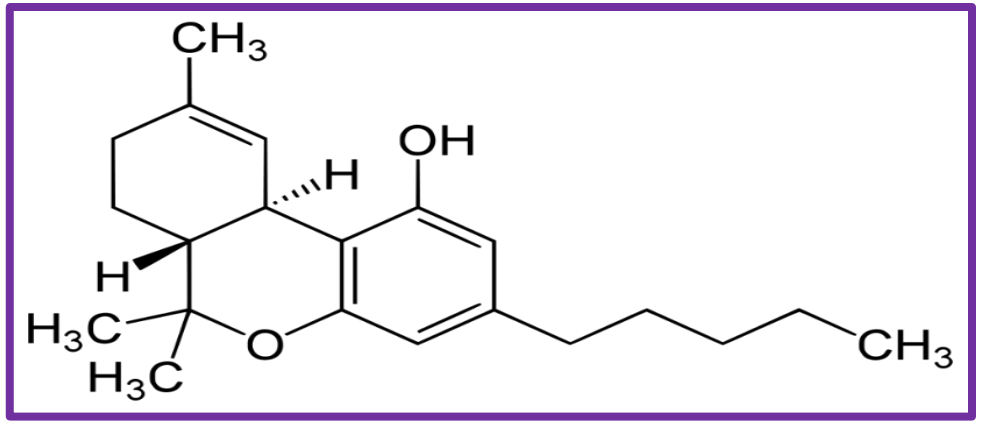
Plants vs. Medicines

- Isolation of specific compounds
  - Removes “synergistic effect”
- Accurate and repeatable dosing
- Decreased exposure to side effects associated with smoking/vaping

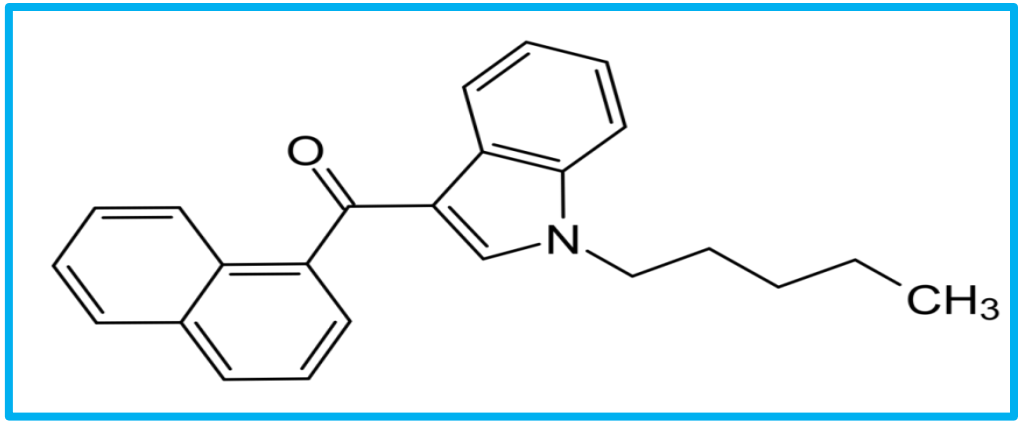


Synthetic Cannabinoids

Comparison of THC and JWH-018



Δ9-THC



JWH-018

Please DO NOT call it
“Synthetic Marijuana”

Synthetic Cannabinoids History

Originally developed for medical investigations	Smoking blends first observed in 2006	JWH-018 first identified in a smoking blend in 2008	Popular due to drug testing
• No human or animal studies started			• Military, Probation, School, Employment

Brick and mortar drug dealers

User Effects

Symptoms that are similar to cannabis intoxication:

- Tachycardia
- Reddened eyes
- Anxiousness
- Mild sedation
- Hallucinations
- Acute psychosis
- Memory deficits

Symptoms not typically seen after cannabis intoxication:

- Seizures
- Hypokalemia (low K^+)
- Hypertension
- Nausea/vomiting
- Agitation
- Violent behavior
- Coma

Source: Addiction Technology Transfer Center Network www.uclaisap.org/slides/synthetic-drug-training-package.html

Cannabinoids by Generation

Generation 1
- Includes: JWH-018, JWH-019, JWH-073

Generation 2
- Includes: AM 2201, RCS-4, JWH-122

Generation 3
- Includes: AKB48, STS-135

Generation 4
- Includes: UR-144, 5-Fluoro-UR-144

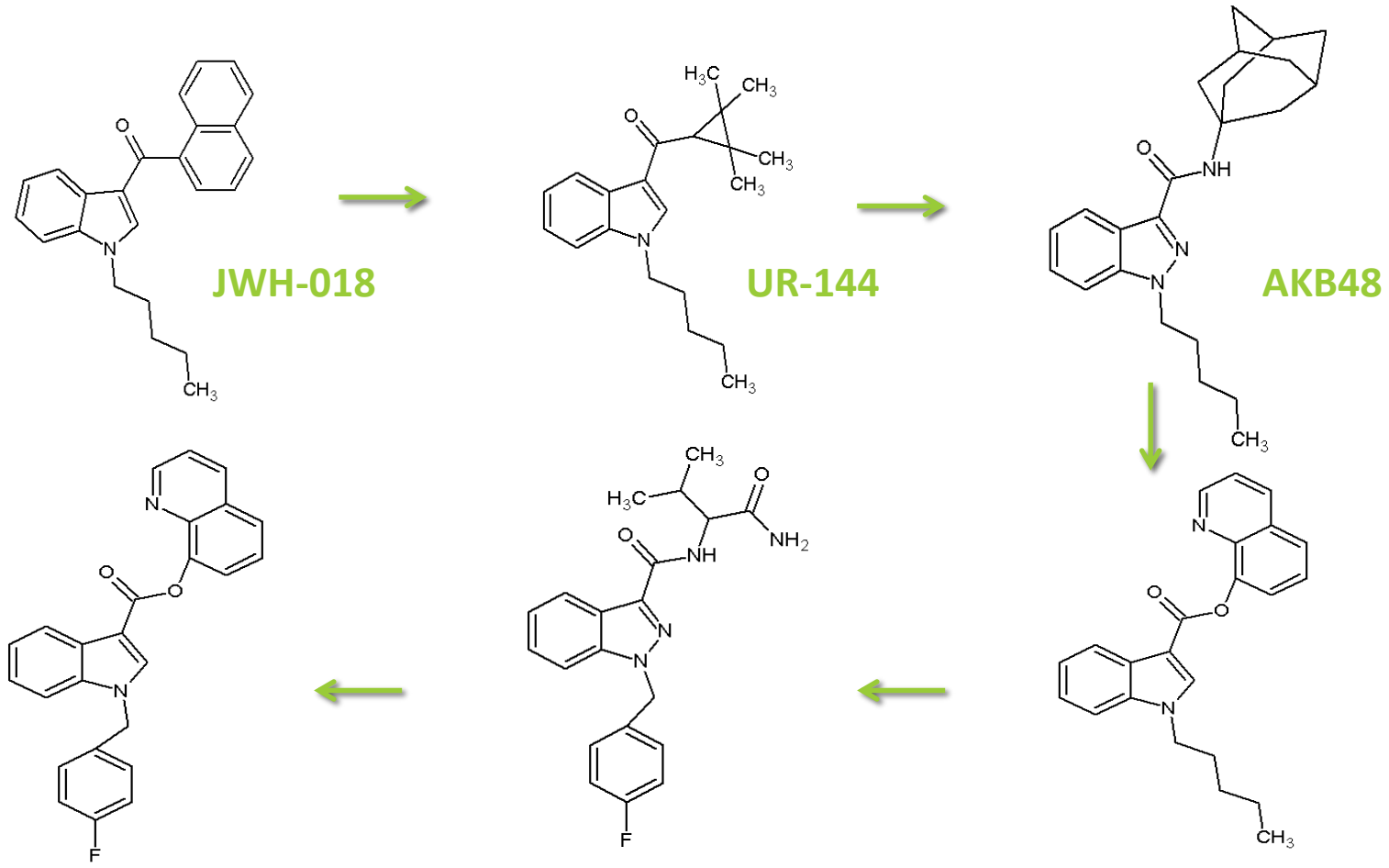
Generation 5
- Includes: PB-22, 5-fluoro-PB-22, BB-22

Generation 6
- Includes: AB-PINACA, AB-FUBINACA, ADB-FUBINACA

Generation 7
- Includes: THJ-018, FUB-PB-22, THJ-2201

Generation 8
- Includes: EG-018, AMB, 5F-AMB

The Evolution of Synthetic Cannabinoids



What are those letters and numbers?

Materials named after developer/institution

- JWH = John W. Huffman
- AM = Alexandros Makriyannis
- HU = Hebrew University
- URB = Urbino, Italy

Materials named after website selling it

- RCS-4 (SR-19, BTM-4)
- RCS-8 (SR-18, BTM-8)

Materials developed by pharmaceutical companies

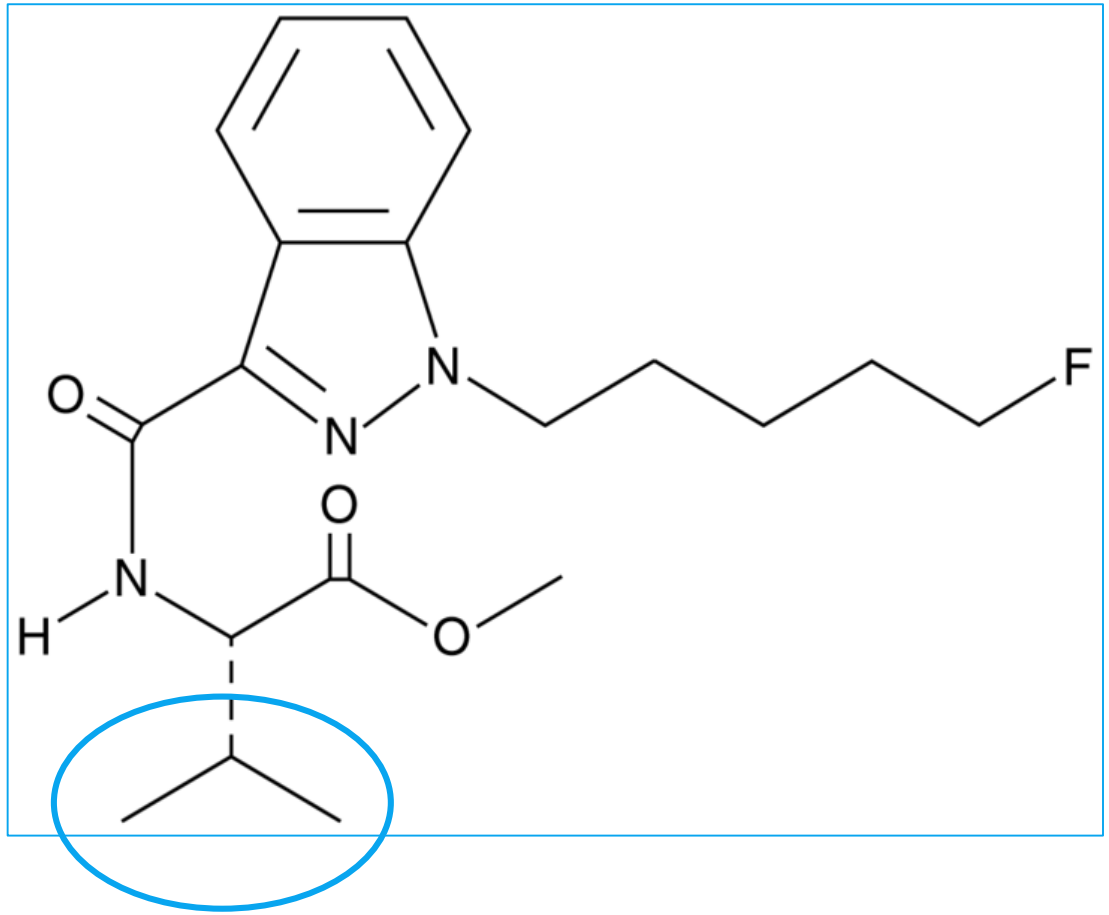
- A = Abbott Laboratories
- KM-X1 (UR-144) = Abbott Laboratories
- WIN = Sterling Winthrop

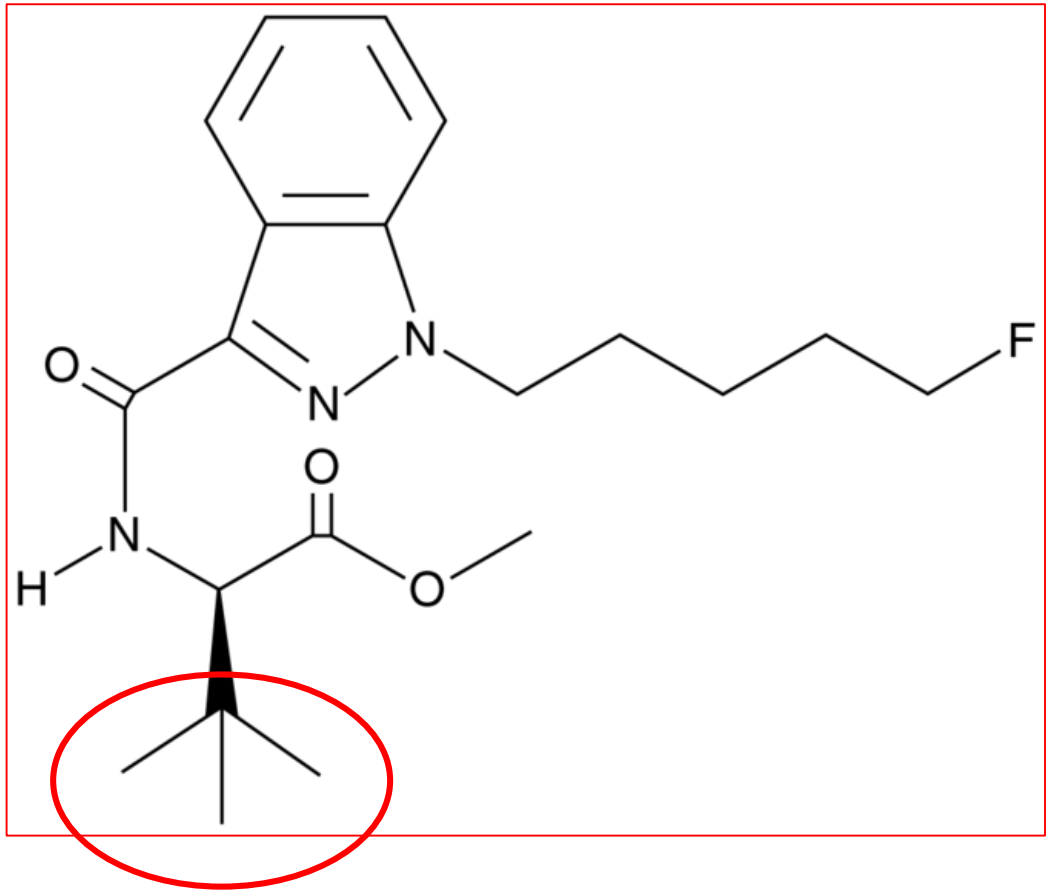
Materials named after other things

- 2NE1 (girl band)
- AKB48 (girl band)
- STS135 (rocket ship)
- XLR11 (rocket engine)

AKB48

AMB vs ADB

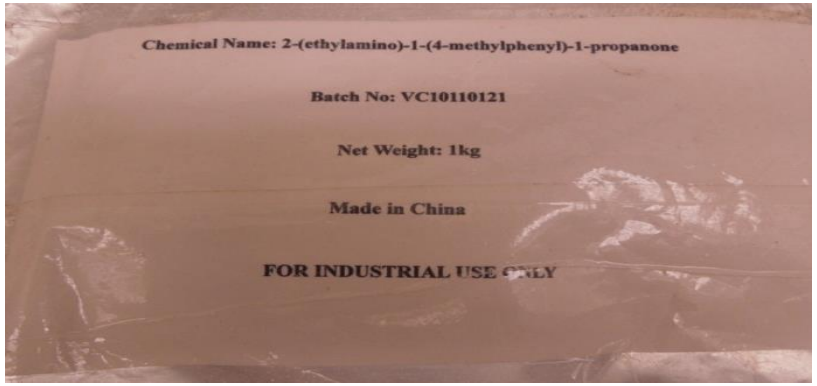


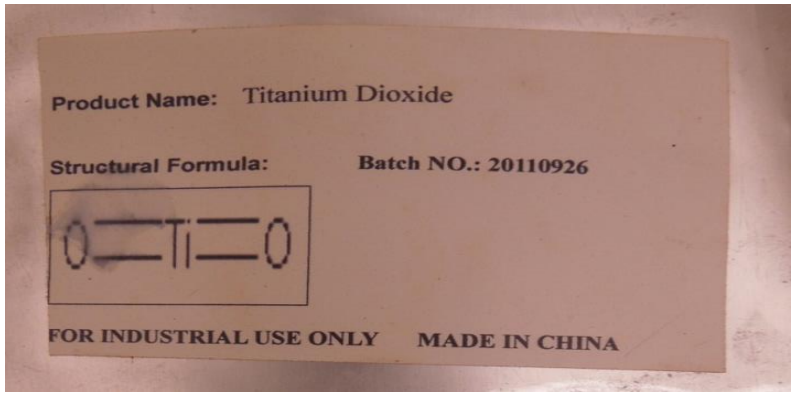


Synthetic Cannabinoid Synthesis

Synthesis of the drugs is conducted in a laboratory setting. This is required due to the complexity of synthesis.

Bulk Packaging





Plant Material

There are three main plant materials used as a base: Damiana Leaf, Mullien Leaf, and Marshmallow Leaf. The final product may have flowers or coloring added.

Damiana Leaf

Tunera diffusa

Illegal in the state of Louisiana due to it’s use in synthetic cannabinoid products

Purported to have aphrodisiac effects

Processing

Cannabinoid is dissolved in solvent and added to the plant material

Processing - Drying

Bay News 9

Packaging

ABC Action News

Bay News 9

Packaging can be done by hand or using automated tools. Commercial packages are typically 1g, 3g, 5g, and 10g sizes.

Tampa Bay Times

chron.com

chron.com

brevardtimes.com

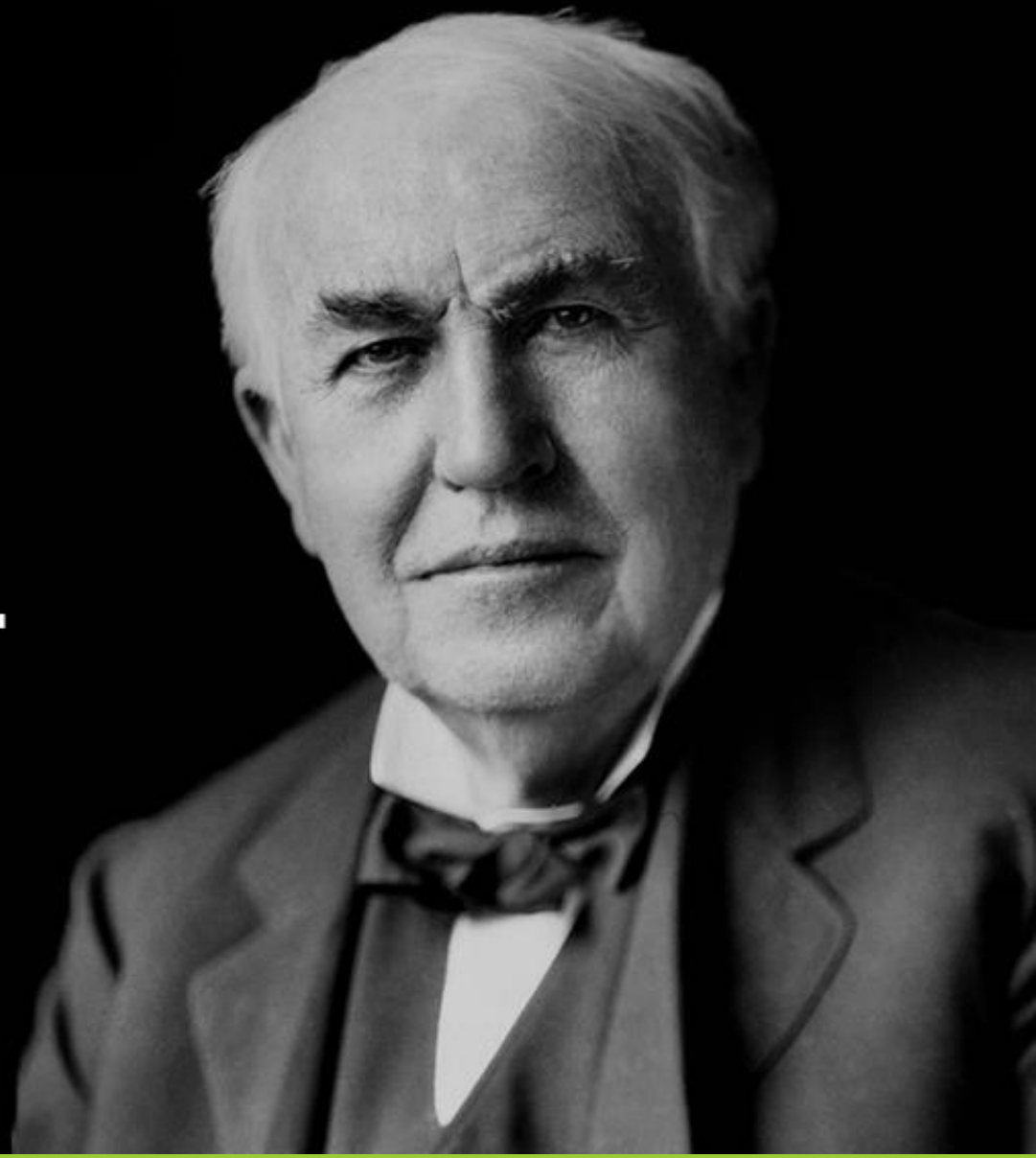
Processing

Bay News 9

Joshua C. Yohannan
Allegheny County Office of the Medical Examiner
July 2019

When you have exhausted **all** possibilities, remember this: **you haven't.**

- Thomas Edison



Goalcast