Focus on Cannabinoids

Chemical Analysis & Conversions

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CHEM 422 – Chemistry of Hemp & Cannabis
Department of Chemistry
Colorado State University
Fort Collins, CO USA
Spring 2022

Structures & Species

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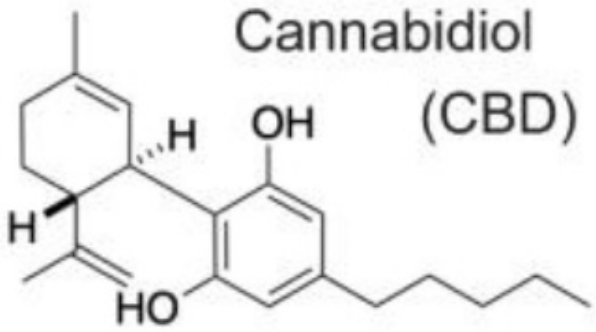
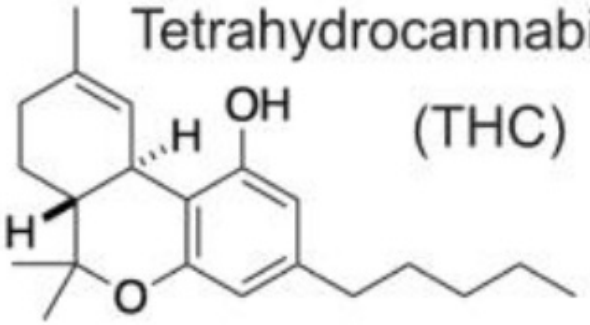
Fort Collins, CO

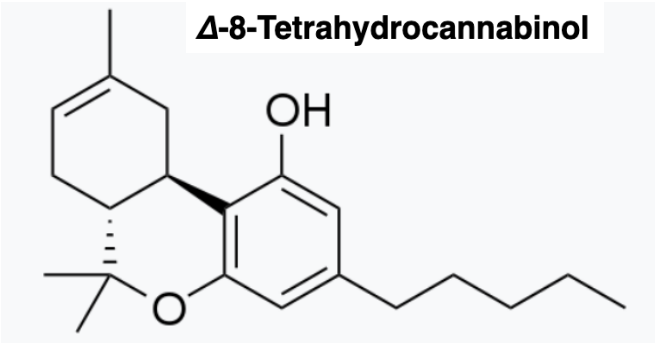
Cannabidiol (CBD)



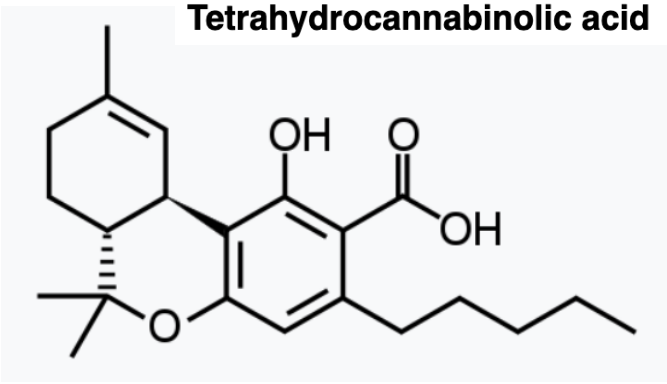
Tetrahydrocannabinol (THC)



Δ-8-Tetrahydrocannabinol



Tetrahydrocannabinolic acid



Metabolites of THC

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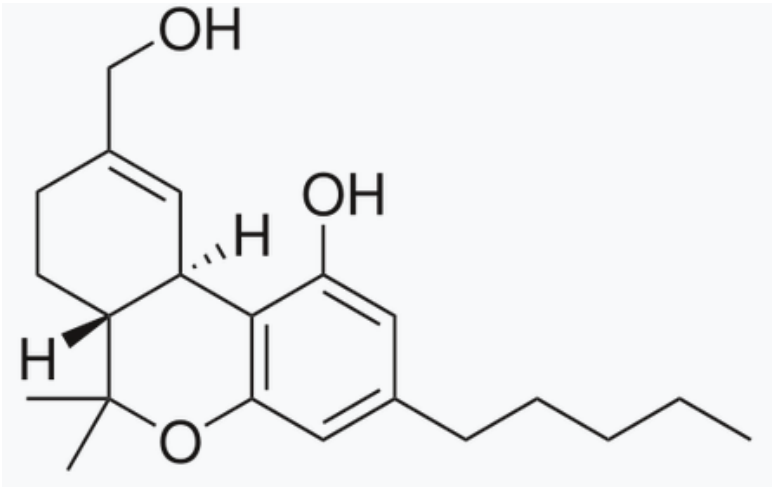
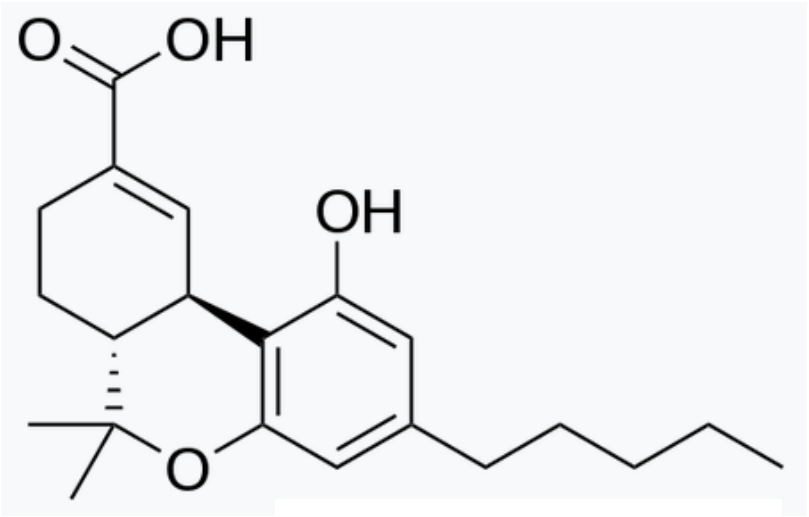


11-Hydroxy-THC

main primary metabolite of tetrahydrocannabinol

Has a comparable psychoactive effect to THC but with a faster onset of effect



11-Nor-9-carboxy-THC

main secondary metabolite of tetrahydrocannabinol

Endogenous Cannabinoids

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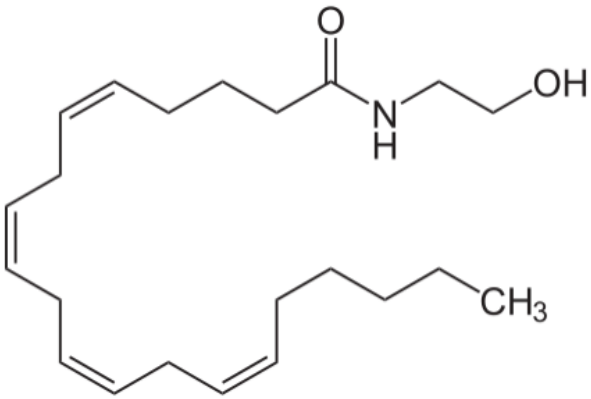
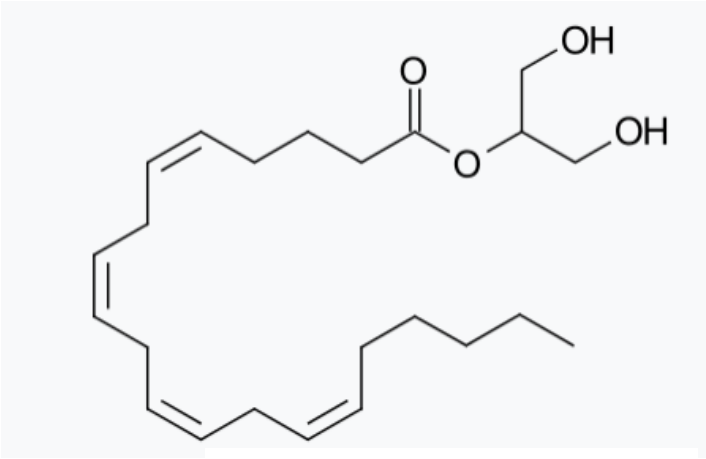


Anandamide

an endogenous agonist of the CB_1 receptor and the primary endogenous ligand for the CB_2 receptor



2-Arachidonoylglycerol

an endogenous agonist of the CB_1 receptor and the primary endogenous ligand for the CB_2 receptor

Synthetic Cannabinoids

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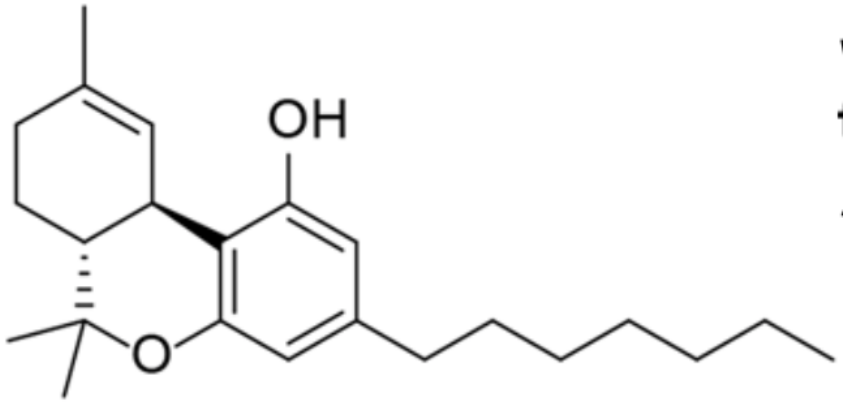
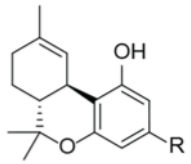


(-)-*trans*-Δ^9-THCP

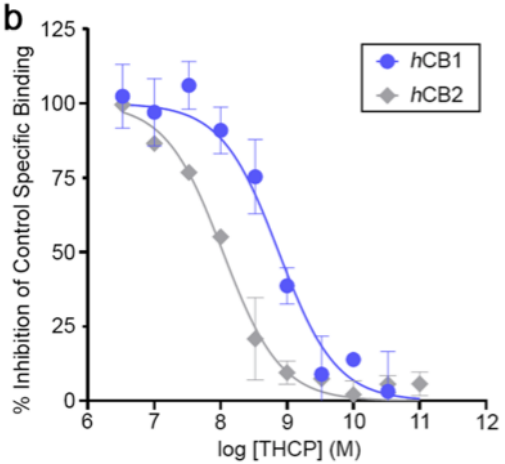
A novel phytocannabinoid isolated from *Cannabis sativa* L. with an *in vivo* cannabimimetic activity higher than Δ^9-tetrahydrocannabinol: Δ^9-Tetrahydrocannabiphorol

a



	R	*h*CB1 K_i (nM)	*h*CB2 K_i (nM)
(-)-*trans*-Δ^9-THCV	-propyl	75.4	62.8
(-)-*trans*-Δ^9-THCB	-butyl	15	51
(-)-*trans*-Δ^9-THC	-pentyl	40	36
(-)-*trans*-Δ^9-THCP	-heptyl	1.2	6.2

b



Decarboxylation

H. Perrotin-Brunel et al./Journal of Molecular Structure 987 (2011) 67–73

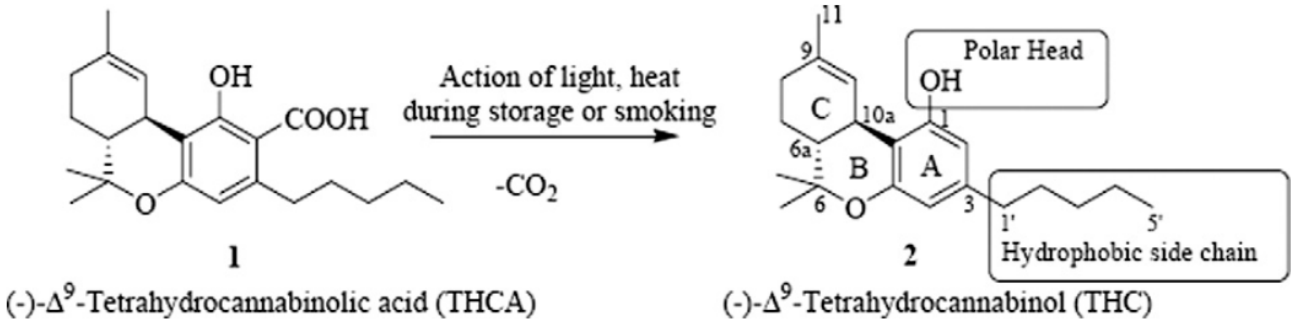


Fig. 1. Model of the decarboxylation reaction of Δ^9-THCA.

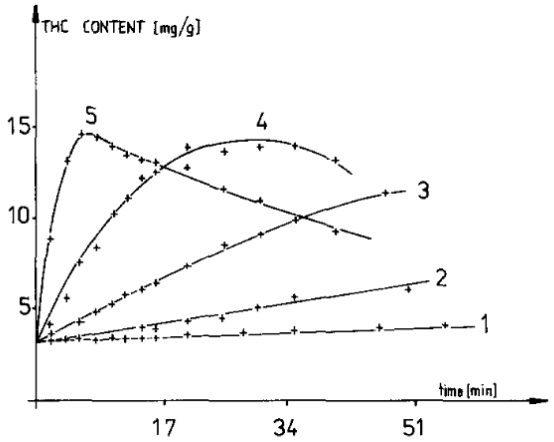


Fig. 3. Effect of heating time and temperature on the THC content of an *n*-hexane marihuana extract after heating on the glass surface in an open reactor. Curves: 1 = 80°C; 2 = 94°C; 3 = 106°C; 4 = 122°C; 5 = 145°C.

Derivitization

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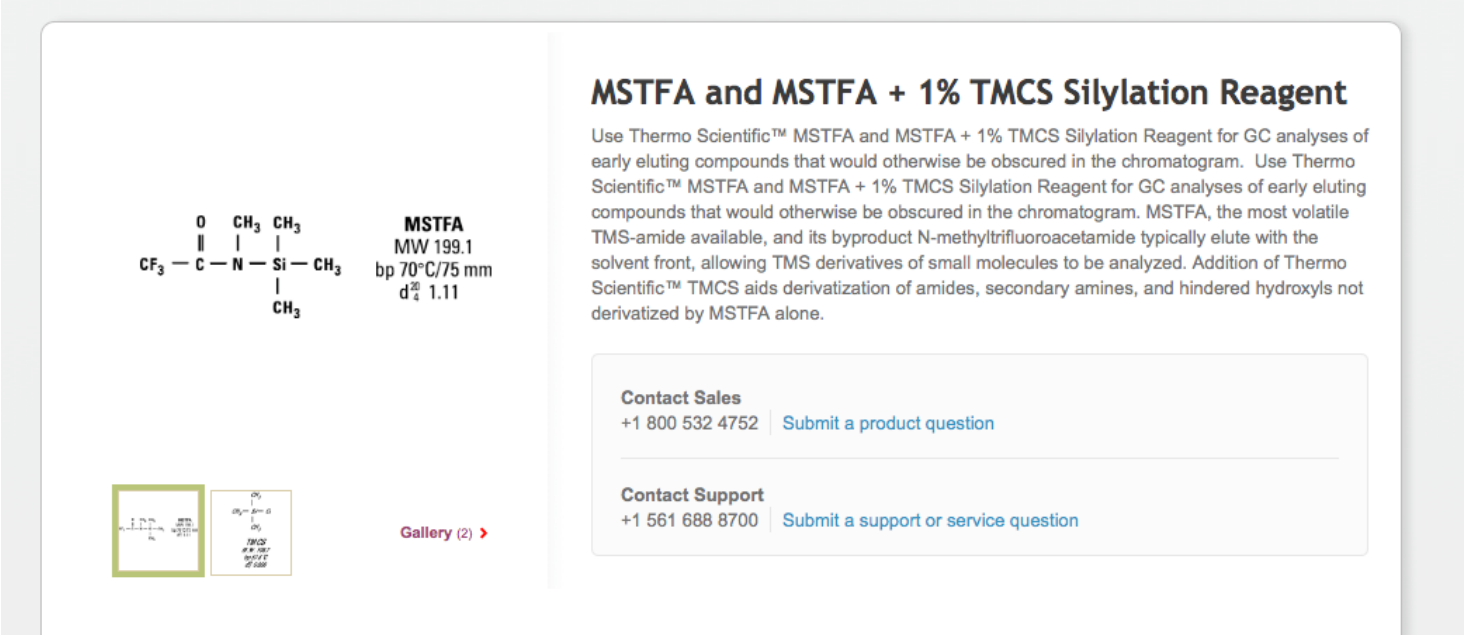

MSTFA
MW 199.1
bp 70°C/75 mm
d_4^{25} 1.11

Gallery (2) ›

MSTFA and MSTFA + 1% TMCS Silylation Reagent

Use Thermo Scientific™ MSTFA and MSTFA + 1% TMCS Silylation Reagent for GC analyses of early eluting compounds that would otherwise be obscured in the chromatogram. Use Thermo Scientific™ MSTFA and MSTFA + 1% TMCS Silylation Reagent for GC analyses of early eluting compounds that would otherwise be obscured in the chromatogram. MSTFA, the most volatile TMS-amide available, and its byproduct N-methyltrifluoroacetamide typically elute with the solvent front, allowing TMS derivatives of small molecules to be analyzed. Addition of Thermo Scientific™ TMCS aids derivatization of amides, secondary amines, and hindered hydroxyls not derivatized by MSTFA alone.

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Silylation

If THCA has to be analysed separately, i.e. without decarboxylation, 1.5 ml aliquots of the above (non-thermally decarboxylated) extract has to be derivatized before GC analysis. Derivatizing agents frequently used are:

MSTFA:	N-methyl-N-trimethylsilyltrifluoroacetamide
BSTFA/TMCS:	N,O-bis(trimethylsilyl)trifluoroacetamide/Trimethylchlorosilane (1 per cent)

Silylizable solvents such as ethanol have to be removed, usually by a gentle stream of nitrogen. The residue is taken up in 1.5 ml chloroform. 100 µl MSTFA are added and heated for 30 min at 70°C. The resulting solution can be analysed directly.

Derivitization

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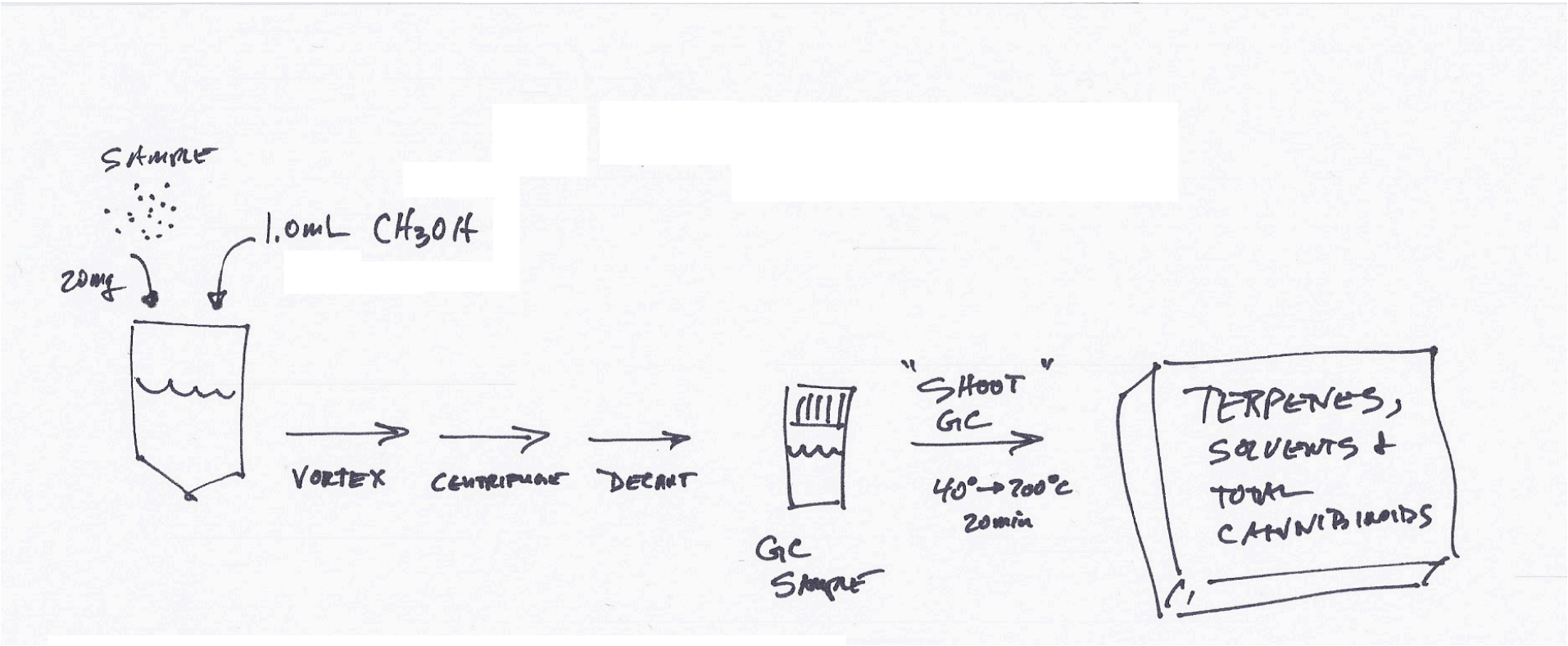

j_chromat_b_2011_v879_p3059.pdf

5 μl of THCA solution (100 μg/mL in methanol) were evaporated and derivatized by silylation with 25 μl MSTFA and 25 μl ethyl acetate for 45 min at 90 °C. 1 μl was finally injected into the GC–MS system.

Derivitization

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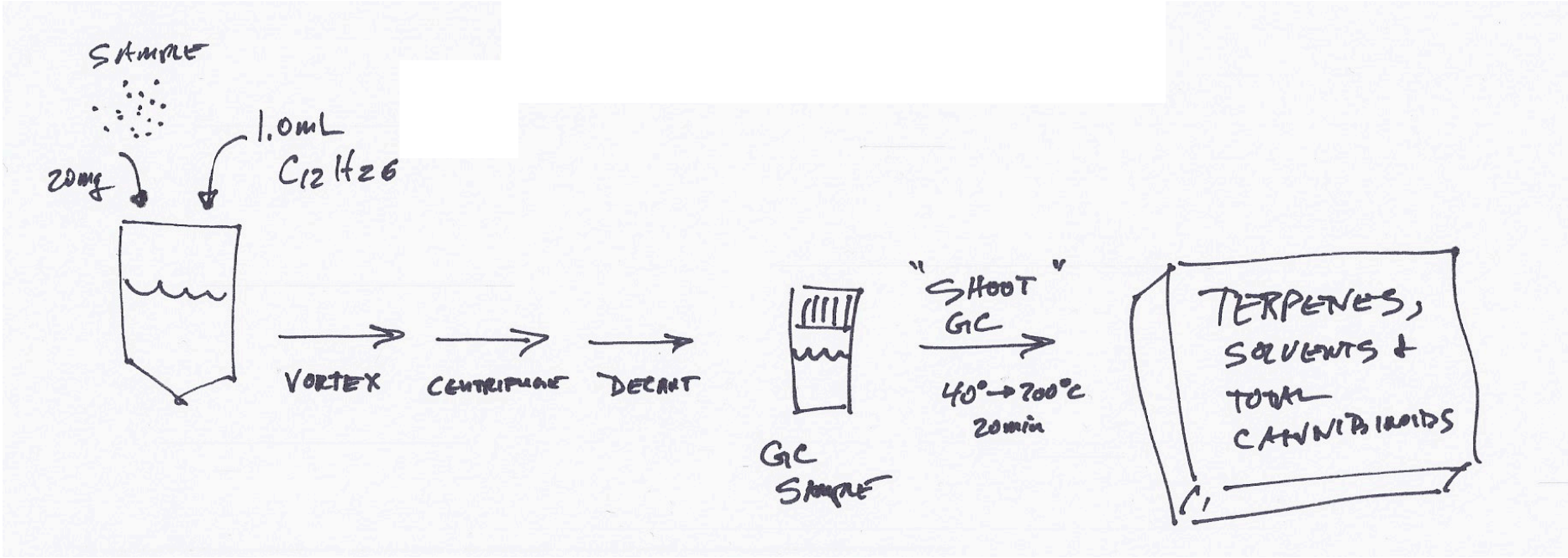

j_chromat_b_2011_v879_p3059.pdf

5 μl of THCA solution (100 μg/mL in methanol) were evaporated and derivatized by silylation with 25 μl MSTFA and 25 μl ethyl acetate for 45 min at 90 °C. 1 μl was finally injected into the GC–MS system.

Combination Derivatization & Analysis

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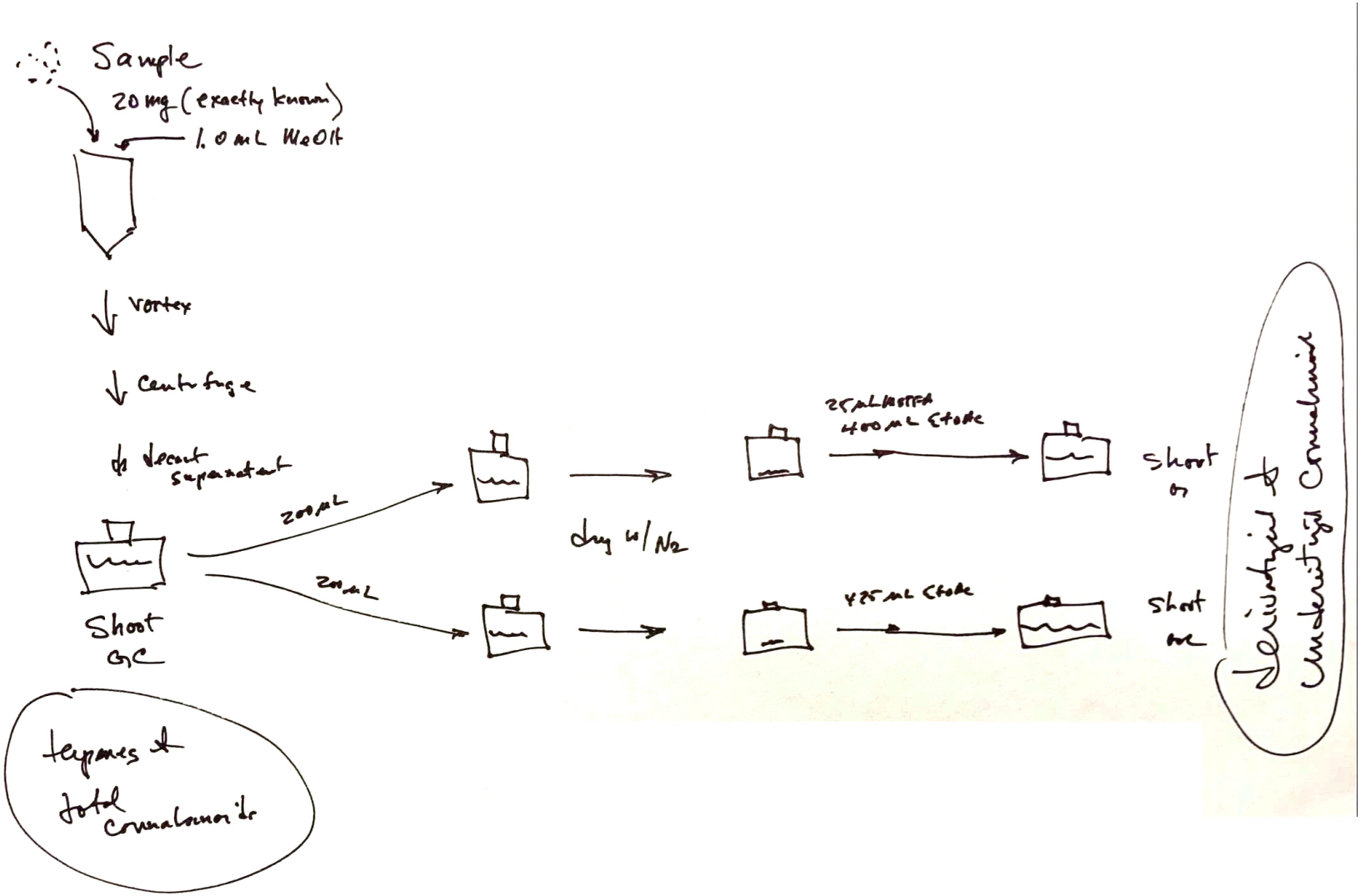

Then There's …

Cannabis and Cannabinoid Research
Volume 4, Number 3, 2019
Mary Ann Liebert, Inc.
DOI: 10.1089/can.2019.0016

ORIGINAL RESEARCH

Absence of Entourage: Terpenoids Commonly Found in *Cannabis sativa* Do Not Modulate the Functional Activity of Δ^9-THC at Human CB_1 and CB_2 Receptors

Marina Santiago,[1,*] Shivani Sachdev,[1] Jonathon C. Arnold,[2,3] Iain S. McGregor,[2,4] and Mark Connor[1]