TEEWINOT LIFE SCIENCES™

BIOSYNTHESIS OF CANNABINOIDS

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Executive Vice President
Chief Intellectual Property Counsel

Teewinot Life Sciences Corporation

- Innovative Biopharmaceutical Company
- Patent-Protected cGMP Biosynthetic Production of Cannabinoids, Cannabinoid Analogs and Cannabinoid Prodrugs
  - Reduced Cost of Production
  - Increased Purity
  - Improved Dosing
  - Environmentally Friendly
  - Clear Path to Regulatory Approval
- Innovative Cannabinoid Formulation Technology
- Cannabinoid-Based Therapeutics to Improve Patient Outcomes

Current Methods of Cannabinoid Production

- Current Cannabinoid Production Methods for Pharmaceuticals Relatively Expensive, Inefficient and Relatively Long Lead Times
  - Agriculture
    - Difficult QA/QC – FDA Issues
    - Genetic drift
    - Resource intensive with large carbon and water footprint
    - Purification of cannabinoids and proper dosing challenging
    - Low concentration in plant of some cannabinoids
    - Relatively expensive
    - Months
  - Chemical Synthesis
    - Relatively expensive
    - Large amounts of toxic waste produced
    - Weeks

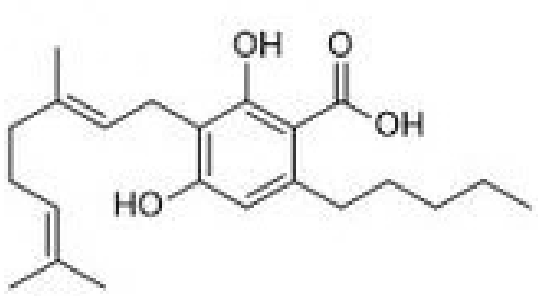
Teewinot's Proprietary Technology Platform for Biosynthesis of Cannabinoids

- Biocatalysis
- Synthetic Biology

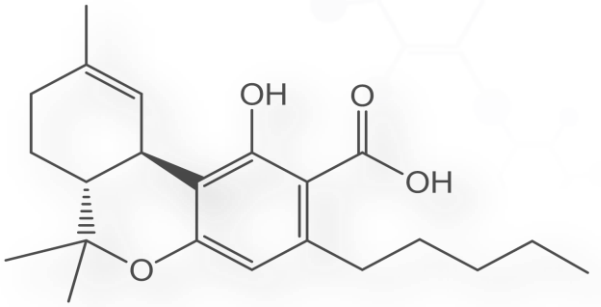
  - Relatively inexpensive
  - Kilogram quantities in days
  - cGMP compatible
  - Pharmaceutical formulations
  - FDA compliant
  - THCA, CBDA, CBCA, CBGA
  - Additional cannabinoids in development
  - Cannabinoid analogs and cannabinoid prodrugs

Teewinot's Proprietary Cannabinoid Biosynthesis Technologies

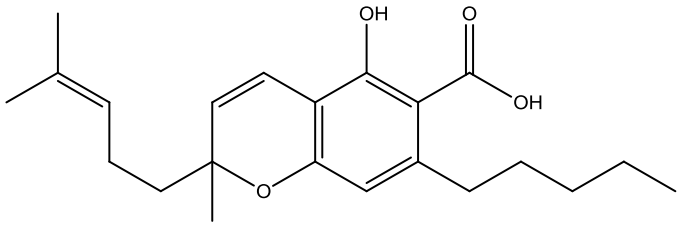
Biosynthesis of THCA and CBCA from CBGA



Cannabigerolic Acid (CBGA)



Tetrahydrocannabinolic Acid (THCA)



Cannabichromenic Acid (CBCA)

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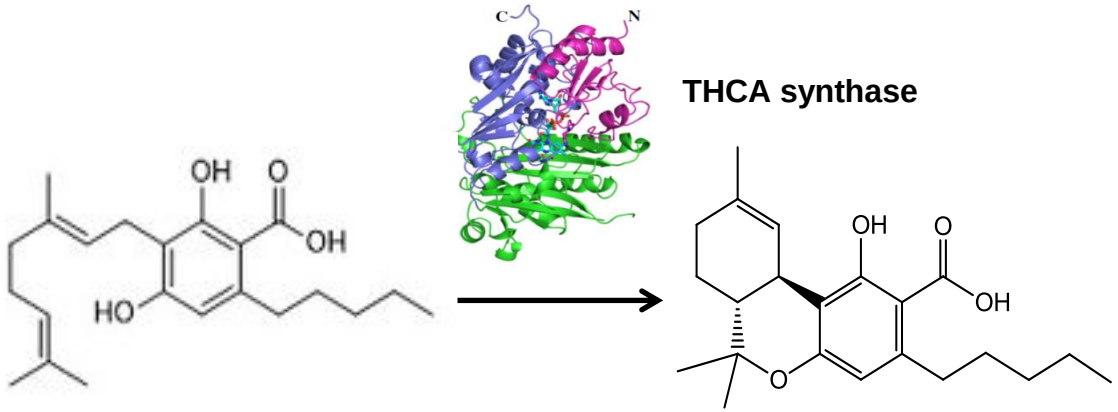
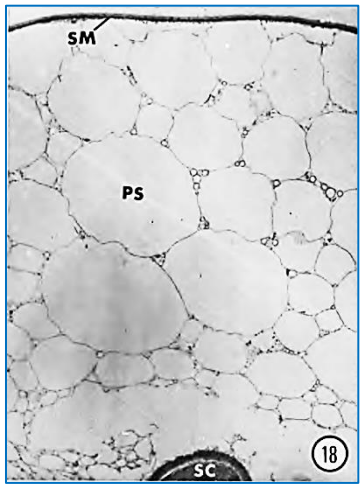
Teewinot's Proprietary Cannabinoid Biosynthesis Technology

Catalyzed by THCA synthase





- In *Cannabis* plant conversion takes place in a specialized cells associated with trichomes
- Unique environment

Hammond and Mahlberg (1978) *Amer J Bot*

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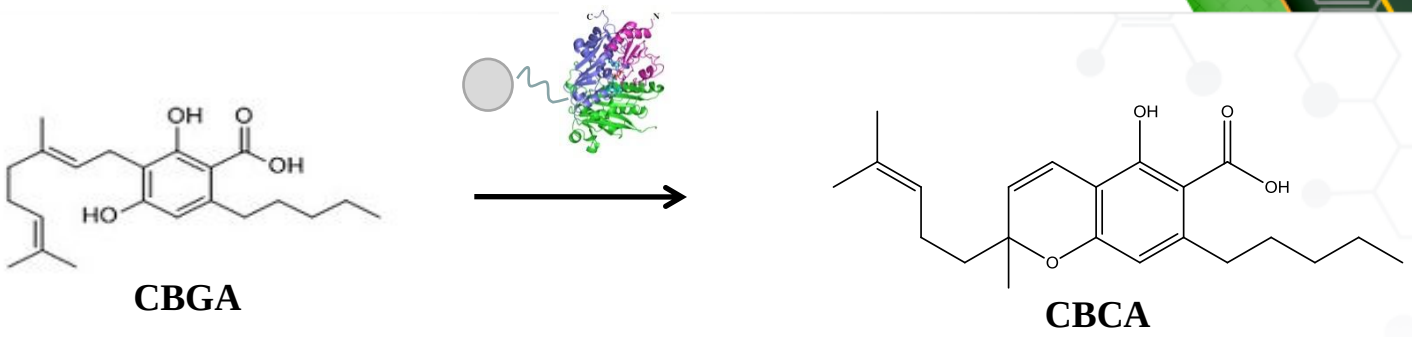
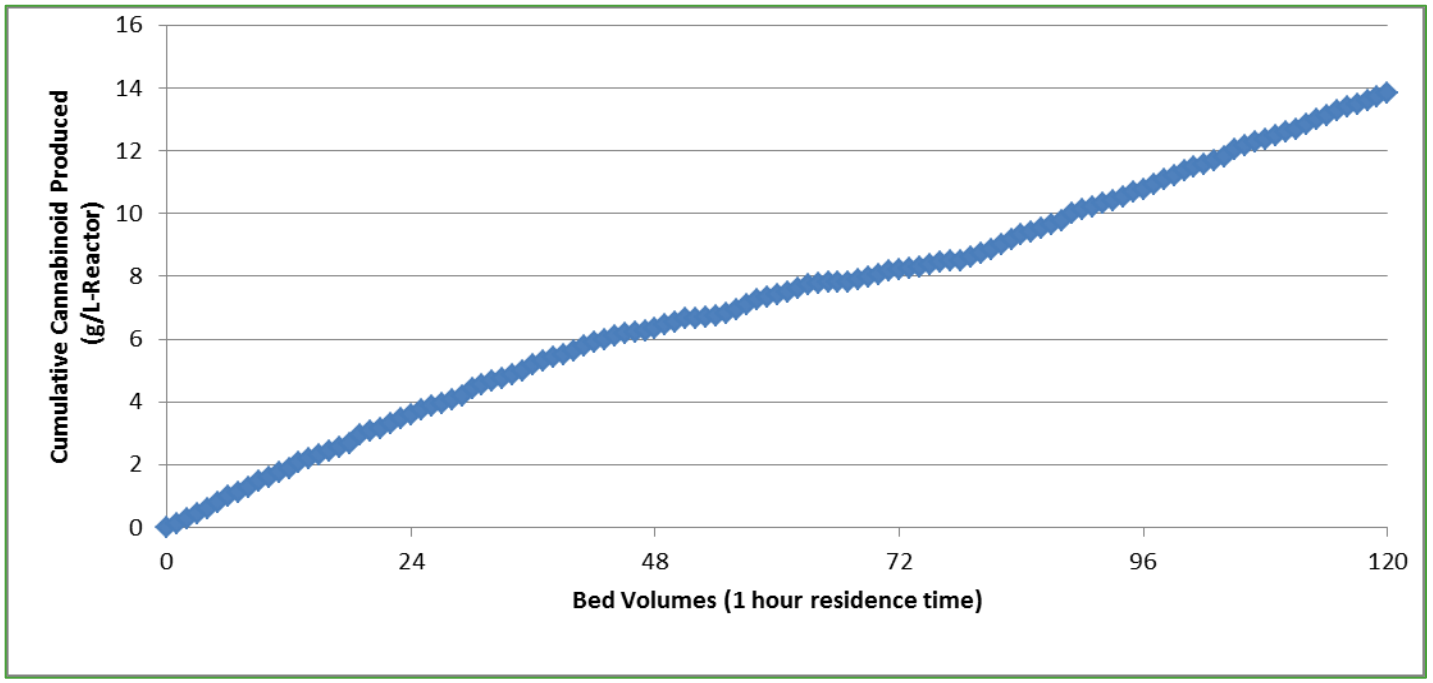
CBCA Biosynthesis



CBGA **CBCA**

- Continuous flow bioreactor THCA synthase
- Bioreactor generates more than 14 g CBCA per L of resin bed



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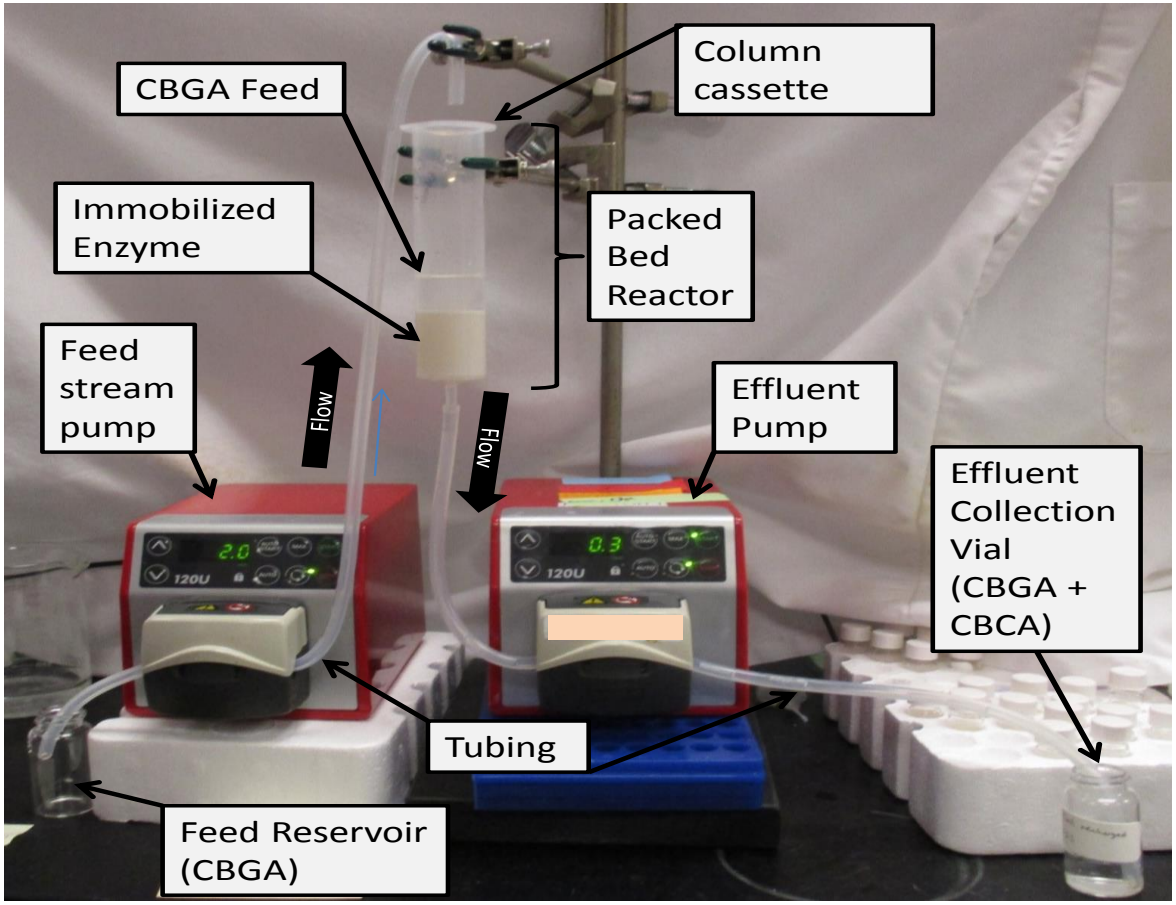
Continuous Flow Experimental System



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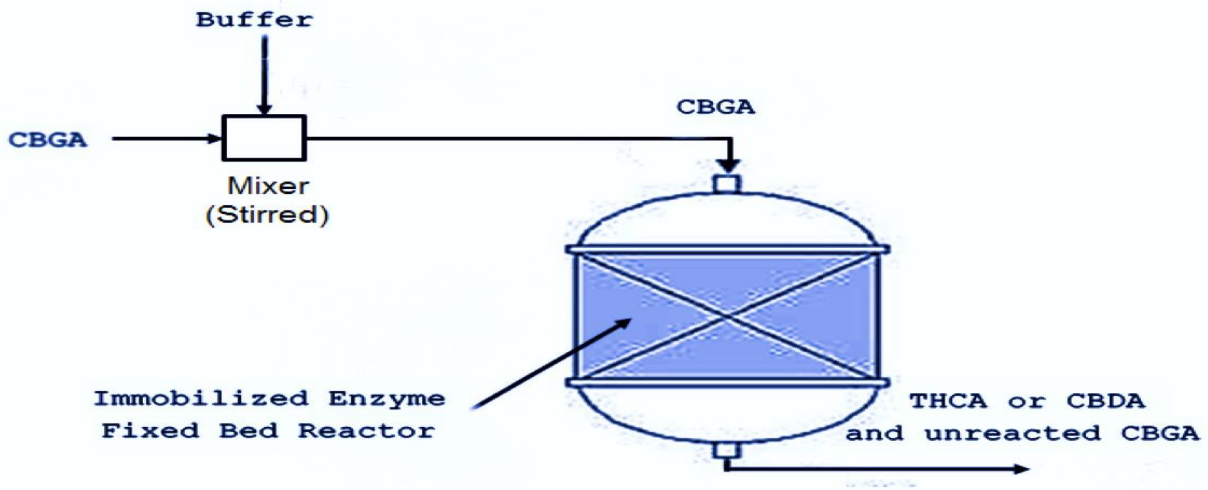
Teewinot's Proprietary Cannsynthesis™ Technology



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Bioreactor

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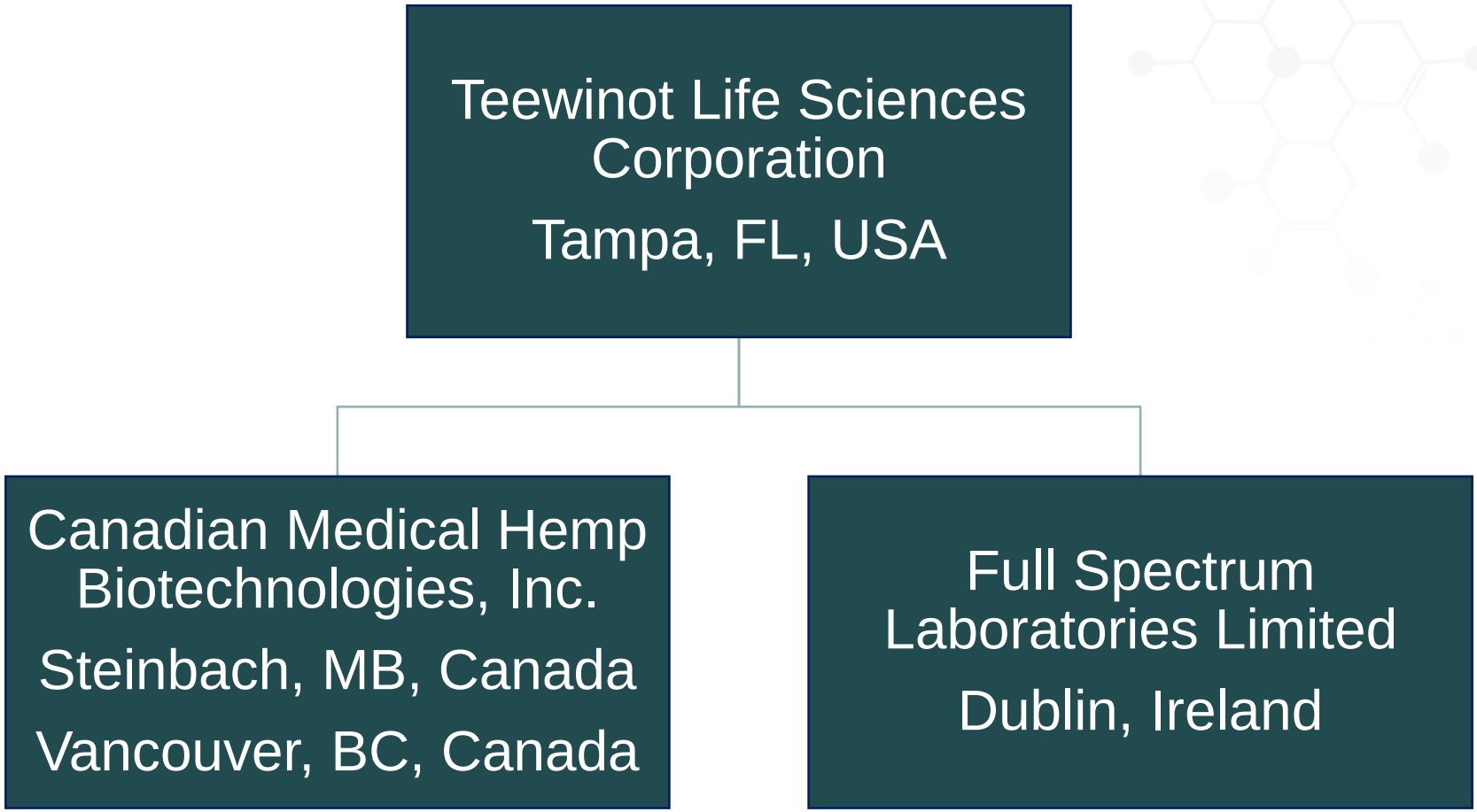
Teewinot Life Sciences Corporation

- Cannabinoid-Based Biopharmaceutical Company
  - Authentic Cannabinoids (Chemical Structure Identical to Natural Phytocannabinoids)
  - Cannabinoid Prodrugs
  - Cannabinoid Analogs
  - Cannabinoid Formulations
  - Cannabinoid-Based Therapeutics
- Teewinot Does Not Grow *Cannabis* Plants
- Teewinot Produces Cannabinoids By Means Of:
  - Synthetic Biology
  - Biocatalysis
  - Chemical Synthesis

Teewinot's Powerful Proprietary Technology Platform

- Synthetic Biology
- Biocatalysis
- Chemical Synthesis
- Bioinformatics and Metabolomics
- Cannabinoid Formulations
- Patient Care

Corporate Structure



Significant Achievements

- Biosynthetic Production of THCA, CBCA and CBDA
  - Inexpensive Method of Making Pure Authentic Cannabinoids
  - Green Technology
- CBGA
- First Granted Patents for Biosynthetic Production of Cannabinoids
  - U.S. Patent No. 9,394,510 (Peet et al.)
  - U.S. Patent No. 9,359,625 (Winnicki and Donsky)
- Patent Applications with Claims to Novel Cannabinoid Analogs and Prodrugs
- Granted Cannabinoid Formulation Patents
- Worldwide Patent Portfolio
- Licensed Albany Molecular Research Inc. to Produce First Commercial CBCA Analytical Standard
- Signed LOI to License Biosynthetic Processes to Nemus Biosciences, Inc. to Produce Nemus' Proprietary Cannabinoid Prodrugs
- Bioinformatics Analysis of *Cannabis* Genome
- Metabolomics Research

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