

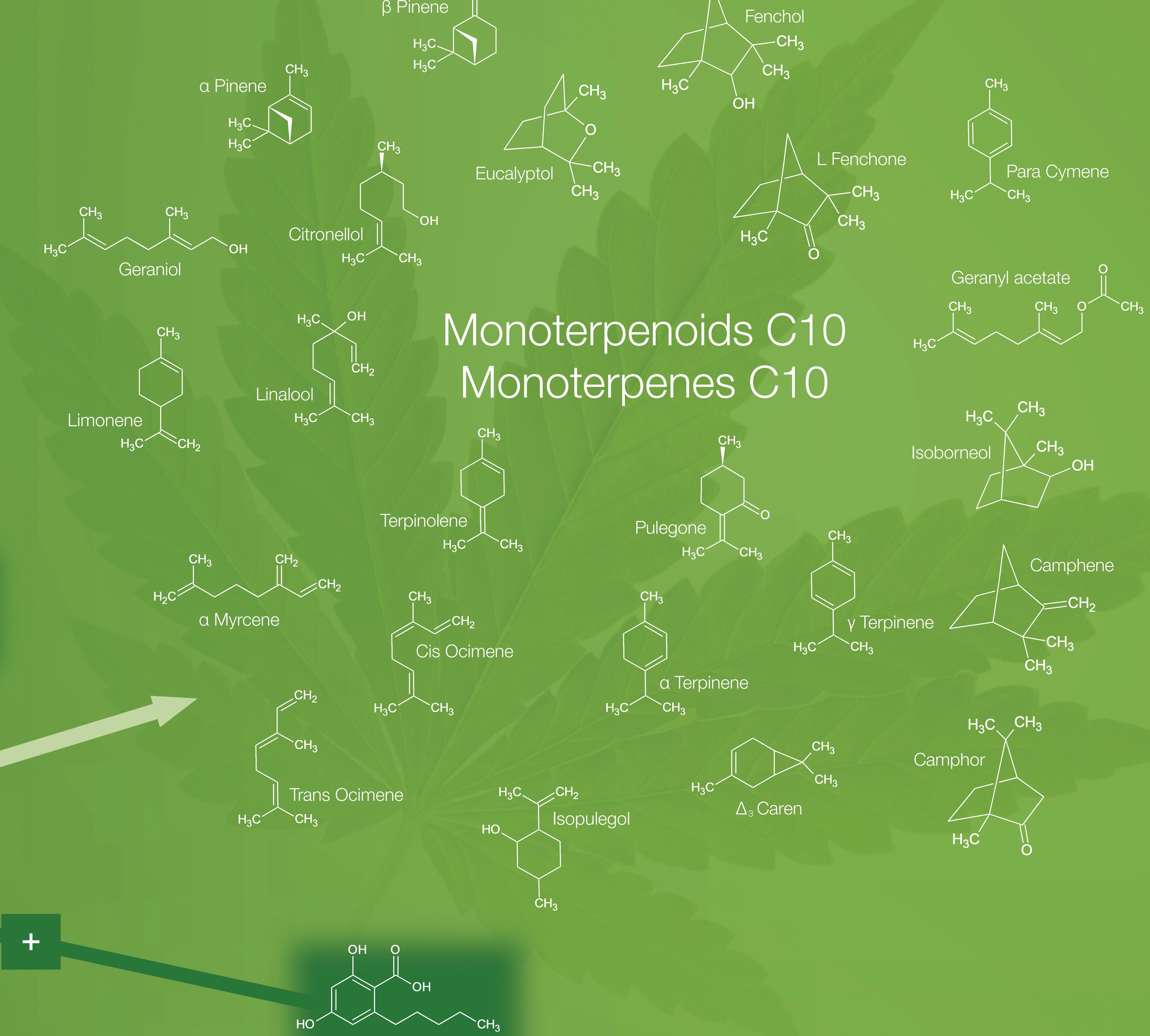
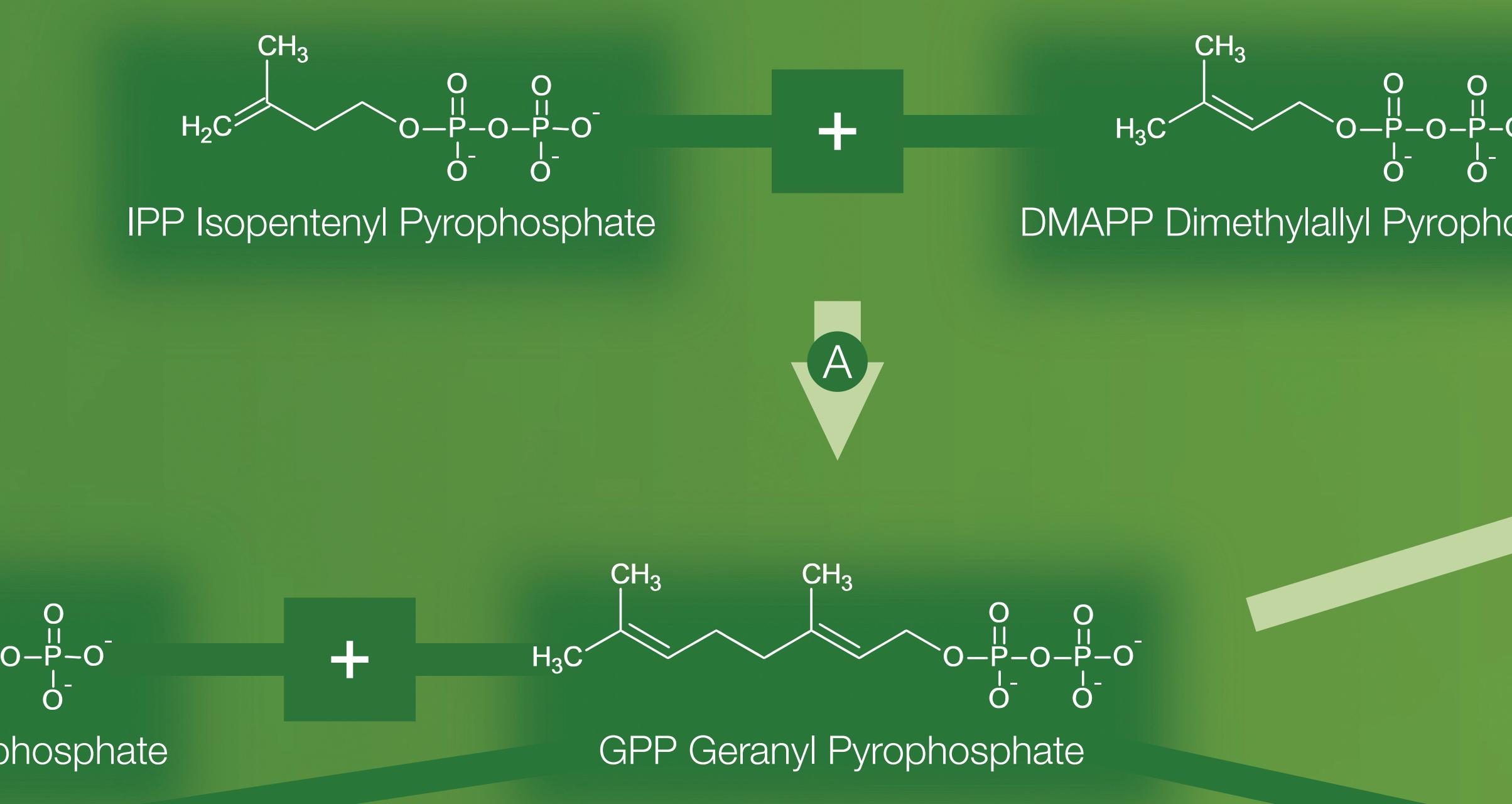
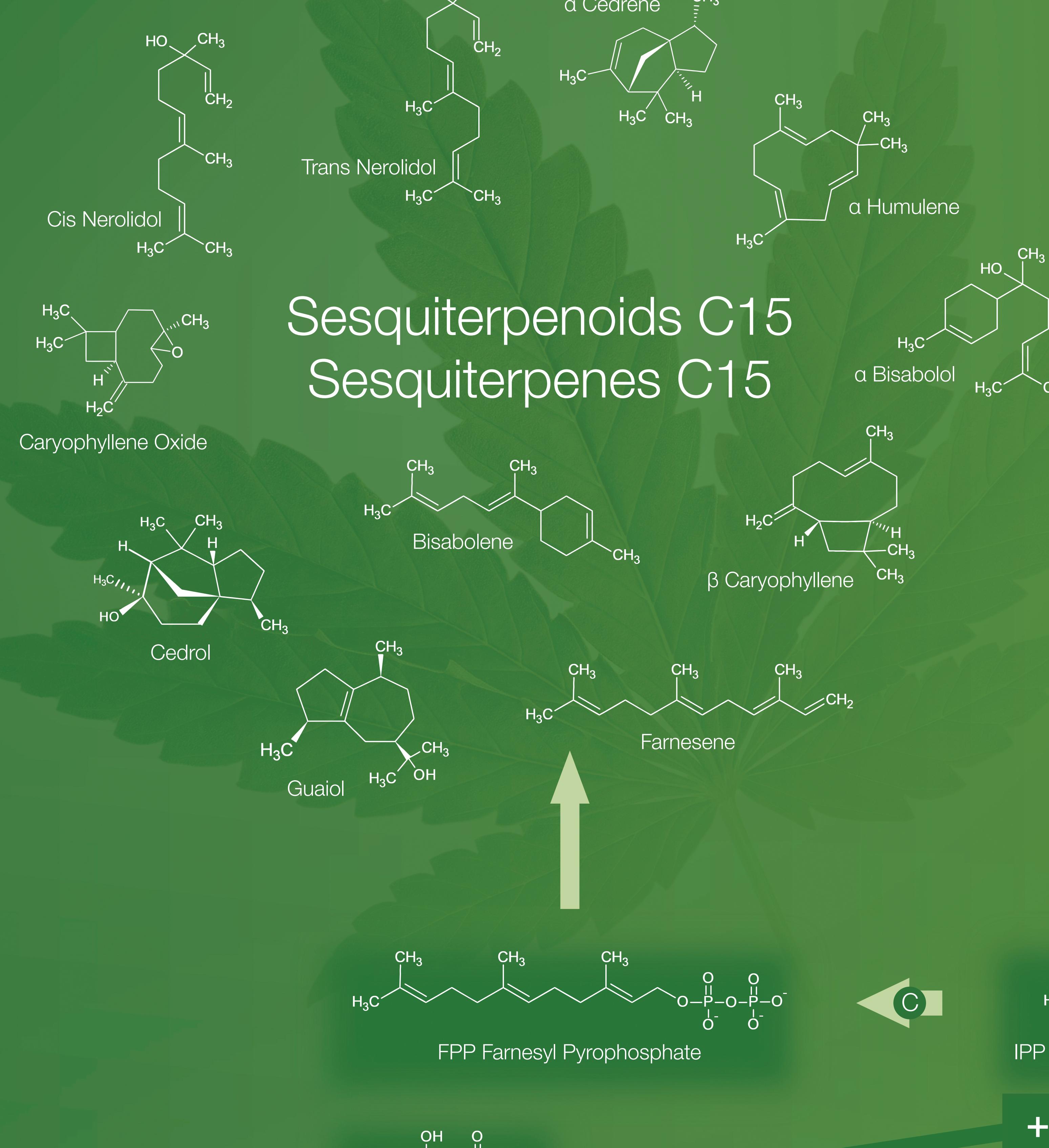
Biosynthetic Pathways of Cannabinoids

Compilation by Tanja Reither, Institut für Hanfanalytik

CBDV	Cannabidivarin
CBDVA	Cannabidivarinic Acid
CBGV	Cannabigerovarin
CBGVA	Cannabigerovaric Acid
THCV	Tetrahydrocannabivarin
THCVA	Tetrahydrocannabivaric Acid
CBCV	Cannabichromarin
CBCVA	Cannabichromaric Acid
CBNV	Cannabivarin
CBNA	Cannabivarinic Acid
CBLV	Cannabicyclovarin
CBLVA	Cannabicyclovarinic Acid

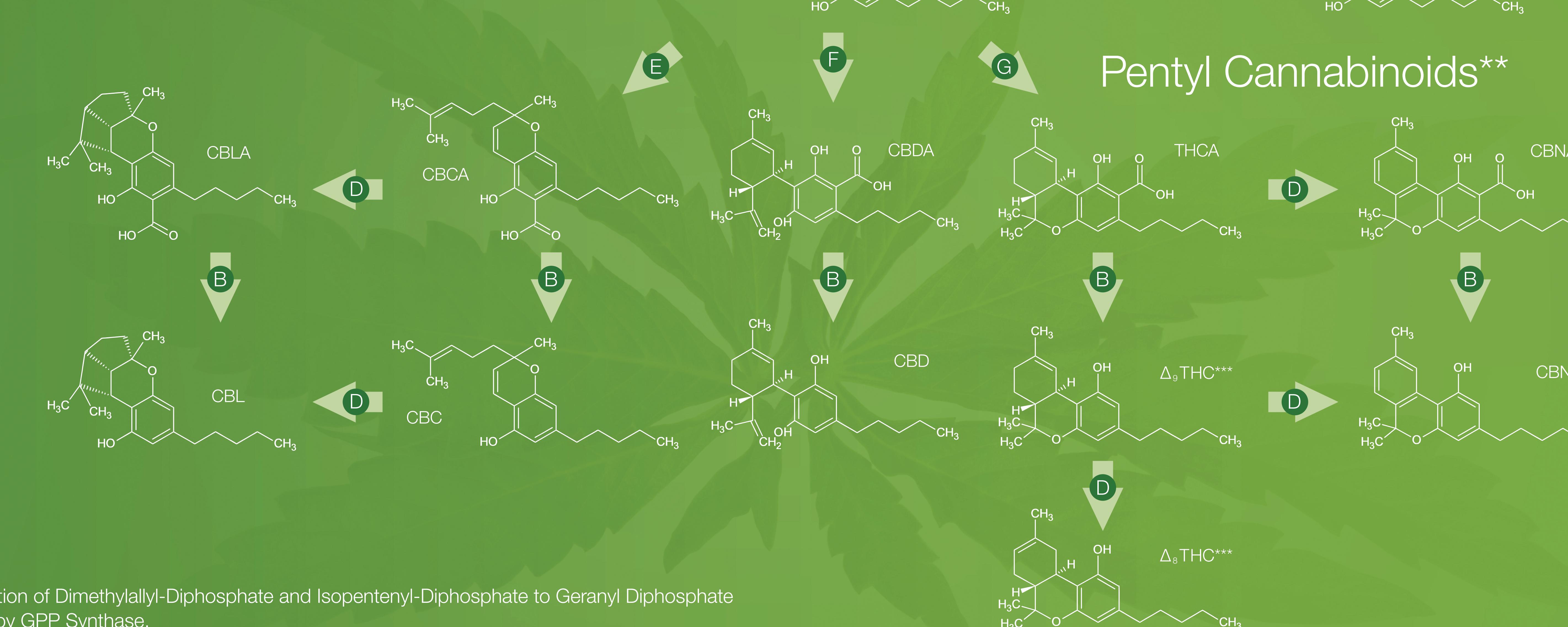
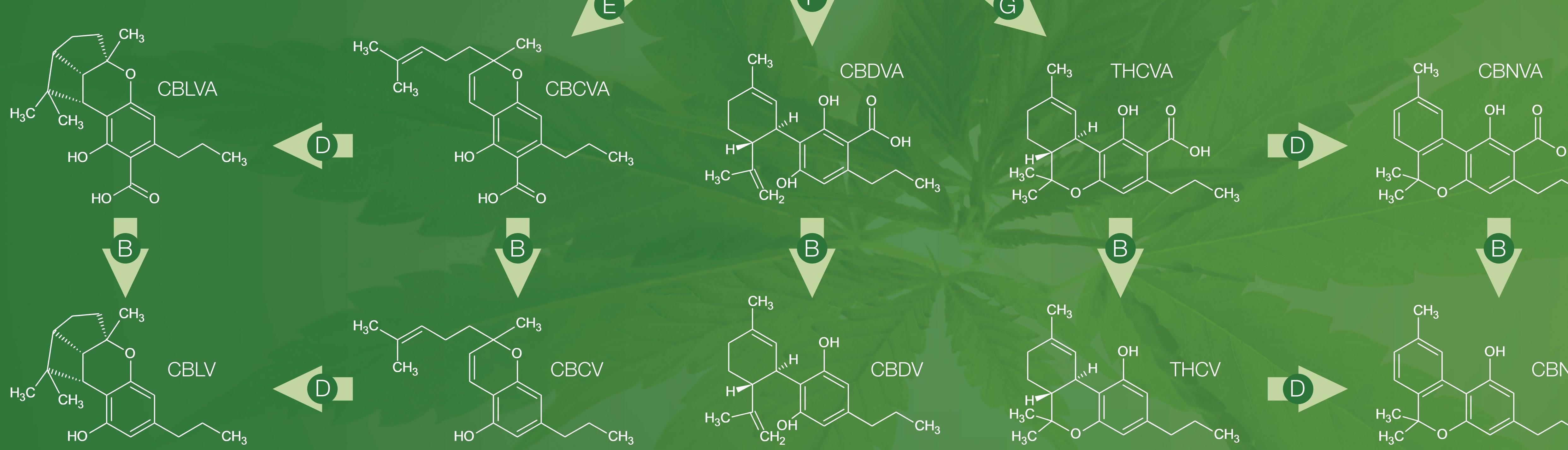
CBD	Cannabidiol
CBDA	Cannabidiolic Acid
CBG	Cannabigerol
CBGA	Cannabigerolic Acid
D9-THC	delta 9 Tetrahydrocannabinol
D8-THC	delta 8 Tetrahydrocannabinol
THCA	Tetrahydrocannabinolic Acid
CBC	Cannabichromene
CBCA	Cannabichromenic Acid
CBN	Cannabinol
CBNA	Cannabinolic Acid
CBL	Cannabicyclol
CBLA	Cannabicyclolic Acid

Sesquiterpenoids C15 Sesquiterpenes C15



Monoterpenoids C10 Monoterpenes C10

Propyl Cannabinoids*



References

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(A) Condensation of Dimethylallyl-Diphosphate and Isopentenyl-Diphosphate to Geranyl Diphosphate catalyzed by GPP Synthase.

(B) Decarboxylation, a chemical reaction that removes a carboxyl group (R-COOH) group and releases a CO₂ molecule with the addition of energy (heat, light, etc.).

(C) Reaction between Geranylpyrophosphate and Isopentenyl Pyrophosphate, catalyzed by FDP Synthase to Farnesyl : Pyrophosphate.

(D) Oxidative degradation by heat, light, acidic environment, etc.

(E) Cyclic oxidation catalyzed by CBCA Synthase

(F) Stereoselective oxidative cyclization of the monoterpene moiety in CBGA/CBGVA by CBDA Synthase

(G) Oxidative cyclization of the monoterpene moiety of CBGA/CBGVA by THCA Synthase

(H) Reaction between GPP and either Olivetolic Acid (C5) or Divarinolic Acid (C3) catalyzed by Geranylpyrophosphate : Olivetolate Geranyltransferase

*Cannabinoids with Propyl (C3) - side chain

**Cannabinoids with Pentylic (C5) - side chain

***Delta # refers to the double bond position

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