

Cannabis: An Encyclopedic Reference — Research Foundation Report

TL;DR

- Cannabis (*Cannabis sativa* L.) is best understood today as a single, highly variable species whose thousands of documented uses span medicine, food, fiber, construction, and advanced materials; the popular “50,000 uses” slogan is a memorable advocacy figure, not a literal verified count, and should be framed as folklore rather than fact.
- The science is strongest where it is best-studied: FDA-approved cannabinoid drugs (Epidiolex, Marinol, Cesamet), the endocannabinoid system, and the 2017 National Academies evidence review; industrial-hemp uses (hempcrete, textiles, nutrition, bioplastics) are real and well-documented, while several beloved historical claims (Ford’s “hemp car,” the Declaration on hemp paper) are myths or exaggerations.
- The legal landscape changed dramatically in 2025–2026: the U.S. closed the “hemp loophole” (total-THC standard, effective November 2026) and began rescheduling marijuana toward Schedule III, while Canada’s Cannabis Act framework remains a model for a regulated national market.

Key Findings

1. Botany & Taxonomy

Linnaeus named *Cannabis sativa* in 1753; Lamarck added *C. indica* (1785) and Janischewsky *C. ruderalis* (1924). Modern genomics increasingly supports a **monotypic genus** — a single species *C. sativa* L. with subspecies. A 2018 study in *Frontiers in Plant Science* (“Latitudinal Adaptation and Genetic Insights Into the Origins of *Cannabis sativa* L.”) recommended recognizing one species with three subspecies (*sativa*, *indica*, *ruderalis*). Watts et al. (2021) found “*sativa*”- and “*indica*”-labeled samples to be “genetically indistinct on a genome-wide scale,” concluding the vernacular labels poorly capture genomic/metabolomic variation. McPartland (2018, *Cannabis and Cannabinoid Research*) summarizes that vernacular “*Sativa*” is really *indica*, “*Indica*” is actually *afghanica*, and “*Ruderalis*” is usually *sativa* — all varieties of one species. The plant is normally **dioecious** (separate male and female plants), though

monoecious cultivars exist; medicinal/psychoactive resin concentrates in glandular **trichomes** on female flowers. Anatomy of interest for industrial use: the stalk's outer **bast** fiber and inner woody **hurd (shiv)**, the fan/sugar leaves, and the seeds (achenes).

Domestication: Ren et al. (2021, *Science Advances*, "Large-scale whole-genome resequencing unravels the domestication history of *Cannabis sativa*," DOI 10.1126/sciadv.abg2286; lead author Guangpeng Ren) analyzed 110 accessions and concluded cannabis was first domesticated in early Neolithic East Asia (ResearchGate) (~12,000 years ago), with hemp- and drug-type cultivars diverging by selective breeding ~4,000 years ago. (Phys.org) The ~12,000-year figure is debated; the leading peer-reviewed synthesis on center of origin is McPartland, Hegman & Long (2019, *Vegetation History and Archaeobotany*, DOI 10.1007/s00334-019-00731-8).

2. Phytochemistry

C. sativa produces more than 180 cannabinoids. Biosynthesis: a type III polyketide synthase (tetraketide synthase) with olivetolic acid cyclase produces olivetolic acid; an aromatic prenyltransferase combines this with geranyl pyrophosphate to make **cannabigerolic acid (CBGA)** — the central branch-point "mother" cannabinoid. Specific oxidocyclase synthases then convert CBGA into THCA, CBDA, and CBCA, which decarboxylate (with heat/time) into THC, CBD, and CBC (source: *Journal of Cannabis Research*, "The biosynthesis of the cannabinoids," 2021, PMC7962319). Propyl-chain analogs (THCV, CBDV, etc.) derive in parallel from divarinic acid. Terpenes (e.g., myrcene, limonene, pinene, linalool, caryophyllene) and flavonoids contribute aroma and possible synergy.

Entourage effect: coined/popularized by Ethan Russo (2011, "Taming THC: potential cannabis synergy and phytocannabinoid-terpenoid entourage effects," *British Journal of Pharmacology* 163:1344–1364), building on Mechoulam & Ben-Shabat. The idea — that terpenes and minor cannabinoids modulate THC/CBD effects — is widely embraced but scientifically contested. A 2020 *Frontiers in Pharmacology* study (Santiago et al., "Terpenoids From Cannabis Do Not Mediate an Entourage Effect by Acting at Cannabinoid Receptors") found cannabis terpenoids do not act at CB1/CB2 receptors; critics (e.g., Cogan in *Expert Review of Clinical Pharmacology*) argue it is presented as established clinical fact when it remains a hypothesis. The book should present it as plausible but unproven.

3. Pharmacology & Medicine

Endocannabinoid system (ECS): cannabinoid receptors CB1 (mainly CNS — hippocampus, amygdala, cortex) and CB2 (mainly immune cells); endogenous ligands **anandamide (AEA)**, isolated in 1992 from brain tissue by Devane, Mechoulam and colleagues (named for the Sanskrit *ānanda*, "bliss"), and **2-arachidonoylglycerol (2-**

AG). 2-AG is a full agonist present at roughly three orders of magnitude higher brain concentrations; AEA is a partial agonist that also binds TRPV1. [nih](#) Degrading enzymes: FAAH (AEA) and MAGL (2-AG). Additional targets include GPR55 and TRPV channels. (Sources: *Review of the Endocannabinoid System*, PMC7855189; *Endocannabinoid System: Chemical Characteristics and Biological Activity*, PMC9966761.)

FDA-approved drugs:

- **Epidiolex** (purified plant-derived CBD oral solution; GW Pharmaceuticals/Jazz): FDA-approved June 25, 2018 — the first cannabis-derived drug in the U.S. — for Lennox-Gastaut syndrome (LGS) and Dravet syndrome, [Epilepsy Foundation](#) later tuberous sclerosis complex, now ages 1+. [Epidiolex](#) In the pivotal LGS trial, the **median reduction in drop-seizure frequency was 41.9% on 20 mg/kg/day CBD versus 17.2% on placebo, with a $\geq 50\%$ responder rate of 40% on high-dose CBD versus 15% on placebo** (Devinsky et al., *New England Journal of Medicine*, 2018, “Effect of Cannabidiol on Drop Seizures in the Lennox–Gastaut Syndrome”). [New England Journal of Medicine](#) The label carries hepatocellular-injury (transaminase elevation) warnings, heightened with concomitant valproate. [FDA](#)
- **Marinol (dronabinol)** and **Cesamet (nabilone)**: synthetic THC and a THC analog, approved for chemotherapy-induced nausea/vomiting and AIDS-related anorexia.
- **Sativex/nabiximols**: oromucosal THC:CBD spray approved in many countries (UK, Canada, others) for MS spasticity; not FDA-approved in the U.S. (in clinical trials).

2017 National Academies report (*The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research*, National Academies Press, DOI 10.17226/24625; ~100 conclusions across 11 prioritized endpoints):

[Vermont Legislature](#) **conclusive or substantial evidence** that cannabis/cannabinoids are effective for chronic pain in adults, chemotherapy-induced nausea and vomiting, and multiple-sclerosis spasticity. [ScienceDirect](#) It also found substantial evidence linking cannabis use with increased risk of developing schizophrenia/psychoses, especially among the most frequent users.

Risks/harms:

- **Psychosis**: Di Forti et al. (2019, *Lancet Psychiatry*, EU-GEI multicentre case-control study, DOI 10.1016/S2215-0366(19)30048-3): daily cannabis use carried an adjusted odds ratio of **3.2 (95% CI 2.2–4.1)** for psychotic disorder versus never-users, rising to **4.8 (95% CI 2.5–6.3)** for daily use of high-potency (>10% THC) cannabis. Population-attributable fractions reached **30.3% in London and 50.3% in Amsterdam.** [nih](#)

- **Cannabinoid Hyperemesis Syndrome (CHS):** cyclic nausea/vomiting with compulsive hot bathing in chronic users, resolving on cessation (Sorensen et al. 2017, *Journal of Medical Toxicology*, PMC5330965 — diagnostic features include regular use 100%, cyclic vomiting 100%, hot-bathing relief 92.3%; [PubMed Central](#) first described by Allen et al. 2004, *Gut* 53:1566–1570).
- **Cannabis Use Disorder (CUD):** about 9% of people who use marijuana develop an addiction, nearly doubling to 17% when use begins in the teen years, with NIDA estimating roughly 30% of users have some form of cannabis use disorder (National Institute on Drug Abuse, nida.nih.gov); Connor et al. (2021, *Nature Reviews Disease Primers*) report ~10% of users worldwide, rising to 30–40% among daily users; [PubMed Central](#) the CDC cites ~3 in 10 users. Adolescent initiation is the strongest predictor. [NIDA](#)

4. History

Archaeology: the oldest direct evidence of cannabis *smoking* is from the Jirzankal Cemetery in the Pamir Mountains (~500 BCE) — Ren et al. 2019, *Science Advances*, DOI 10.1126/sciadv.aaw1391 — where **cannabinol (CBN) residue in ten wooden braziers** indicated the burning of unusually high-THC plants in mortuary ritual [Science News](#) (no pipes were found). The 2,700-year-old Yanghai Tombs shaman's grave (Turpan, Xinjiang) yielded **~789 g of well-preserved psychoactive cannabis** confirmed by phytochemical and genetic analysis (Russo et al. 2008, *Journal of Experimental Botany* 59:4171–4182, DOI 10.1093/jxb/ern260 — “the oldest documentation of cannabis as a pharmacologically active agent”; [Semantic Scholar](#) note Russo's GW Pharmaceuticals affiliation). Hemp fiber/cordage use in China dates to the Neolithic (Clarke & Merlin, *Cannabis: Evolution and Ethnobotany*, University of California Press, 2013).

Age of sail: hemp was indispensable for cordage and canvas; the 1942 USDA film notes a 44-gun frigate like USS *Constitution* (“Old Ironsides”) took over 60 tons of hemp for rigging, including a 25-inch-circumference anchor cable, [Globalhemp](#) and that the word “canvas” derives from cannabis. [Westword](#) Hemp was grown by founding-era Americans including **George Washington** (verified via Mount Vernon). **Myths to debunk:** the official Declaration of Independence was written on **parchment** (animal skin), not hemp (per the Library of Congress, cited by Monticello); [Westword](#) the Betsy Ross hemp-flag and “Lincoln's hemp lamp oil” claims are unverified folklore.

20th-century prohibition: the **Marihuana Tax Act of 1937** (Pub. L. 75–238; drafted by Federal Bureau of Narcotics commissioner Harry Anslinger) effectively criminalized cannabis amid racialized “Reefer Madness” propaganda amplified by the Hearst press; [EarthMed](#) the American Medical Association initially opposed it, and cannabis was dropped from the U.S. Pharmacopeia in 1942. [Scientific American](#) The Act was struck

down in *Leary v. United States* (1969) on Fifth Amendment grounds and replaced by the **Controlled Substances Act of 1970**, which placed marijuana in **Schedule I** ("high potential for abuse, no accepted medical use"). [Wikipedia](#) The "**Hemp for Victory**" USDA film (1942) briefly reversed course, urging farmers to grow hemp for WWII cordage after Japanese conquest cut off Manila hemp and Indian jute; [Westword](#) ~36,000 acres of seed hemp were planted in 1942 [Druglibrary](#) (rediscovered by activist Jack Herer in 1989; held by the National Archives/Internet Archive).

5. Industrial Hemp Uses (core encyclopedic material)

- **Textiles & fiber:** rope, cordage, canvas, sailcloth, twine, parachute webbing (WWII), and clothing; processed by **retting** (microbial loosening) and **decortication** (mechanical separation of bast fiber from the woody hurd).
- **Paper:** historical hemp papers and modern specialty/archival papers.
- **Construction — hempcrete:** a biocomposite of hemp shiv (hurd) plus a lime-based binder (hydrated lime with hydraulic or pozzolanic additives); lightweight (~8× lighter than concrete), non-load-bearing, with excellent thermal performance (thermal conductivity ~0.06–0.11 W/mK), breathable, and naturally mold-, pest-, and fire-resistant. It can be **carbon-negative** through biogenic carbon storage in the hemp plus carbonation of the lime binder (Arehart, Nelson & Srubar, 2021, "On the theoretical carbon storage and carbon sequestration potential of hempcrete," *Journal of Cleaner Production*). Related products: hemp insulation batts (e.g., HempWool), hemp fiberboard, and "hemp wood."
- **Bioplastics & composites:** hemp-fiber-reinforced plastics and automotive interior panels. The **Ford "hemp car"** claim is a **myth**: Ford's 1941 prototype was the "Soybean Car," a tubular-steel frame with 14 phenolic-plastic panels; per The Henry Ford museum, "no record of the formula exists," and builder Lowell Overly described the material as "soybean fiber in a phenolic resin with formaldehyde used in the impregnation." [Mac's Motor City Garage](#) Period sources suggest hemp was at most a minor cellulose filler.
- **Food & nutrition: whole hemp seeds are roughly 20–25% protein, with dehulled "hemp hearts" reaching ~31.6%** (whole-seed protein "can vary between 20 and 25% depending on variety and environmental factors"; [Wikipedia](#) dominated by edestin and 2S albumin — *Molecules*, 2022, PMC9369619). Hemp seed oil is ~75–80% polyunsaturated with an omega-6:omega-3 ratio of roughly 3:1, plus the rarer gamma-linolenic acid (GLA) and stearidonic acid (SDA) (Callaway, 2004, *Euphytica*). Products: hemp hearts, hemp oil, hemp protein powder, and hemp milk.

- **Body care/cosmetics:** hemp seed oil in soaps, lotions, balms, and skincare (vitamin E/tocopherols, GLA).
- **Fuel/energy:** biodiesel from seed oil and biomass/ethanol potential (largely developmental, not commercially dominant).
- **Agriculture/environment: phytoremediation** (heavy-metal uptake), rapid carbon capture, weed-suppressing rotation crop, animal bedding, and mulch. **Industrial hemp absorbs between 8 and 15 tonnes of CO₂ per hectare of cultivation, compared with 2 to 6 tonnes per hectare per year typically captured by forests** (Darshil Shah, Cambridge University Centre for Natural Material Innovation, *Dezeen*, 30 June 2021). [Dezeen](#)

6. Cultivation & Agronomy

Hemp grown for **fiber** is sown densely (close rows) to force tall, slender, lightly branched stalks; **grain/seed** crops use different spacing; **cannabinoid (CBD)** crops resemble drug cannabis (well-spaced, feminized plants). Drug cannabis is frequently grown indoors under controlled photoperiods to maximize flower and resin. Hemp prefers rich, well-drained loam ("soil that will grow good corn will usually grow hemp," per the 1942 USDA film) [Druglibrary](#) and forms a dense, weed-suppressing canopy. The legal distinction between fiber/grain crops and cannabinoid crops is increasingly central to regulators in both the U.S. and Canada.

7. Law & Policy (current as of June 2026 — verify at proof stage)

United States:

- **2018 Farm Bill** (Agriculture Improvement Act, P.L. 115-334) defined **hemp** as cannabis with $\leq 0.3\%$ **delta-9 THC** (dry weight) [Reason Magazine](#) and removed it from the CSA, [Congress.gov](#) legalizing it as an agricultural commodity under USDA oversight (7 CFR Part 990). This inadvertently created the "hemp loophole" enabling intoxicating delta-8/delta-10/THCA products; courts (4th, 8th, 10th Circuits, 2025) largely upheld their technical legality, [NatLawReview](#) and the market grew to a reported ~\$28 billion.
- **November 12, 2025:** President Trump signed H.R. 5371 (Continuing Appropriations and Extensions Act, 2026; P.L. 119-37); **Section 781** redefines hemp by **total THC** (including THCA and isomers), [FHC](#) caps finished consumer products at **0.4 mg total THC per container**, [NBC Right Now](#) and excludes synthetically produced cannabinoids. Effective **November 12, 2026**, the change is widely expected to ban most intoxicating hemp products and may sweep in some full-spectrum CBD; FDA must publish clarifying cannabinoid lists within 90 days (Congress.gov CRS)

IN12620; Akerman, Buchanan Ingersoll & Rooney analyses).

- **Marijuana rescheduling:** Following a 2023 HHS finding of accepted medical use and a May 21, 2024 DOJ/DEA proposed rule to move marijuana to Schedule III, hearings stalled into 2025. On **December 18, 2025**, President Trump issued Executive Order 14370 directing expedited rescheduling. In **April 2026**, the Acting Attorney General immediately placed **FDA-approved and state-licensed medical marijuana products in Schedule III**, withdrew the prior (2024) hearing, and set a new expedited hearing for **June 29, 2026**, to consider broader rescheduling. Recreational/adult-use marijuana remains Schedule I pending that outcome (DOJ/DEA; Federal Register 2026-08178; Gibson Dunn, ArentFox Schiff analyses). A Schedule III move would, among other effects, relieve state-legal operators of IRC §280E tax burdens but would not by itself legalize the adult-use market.
- FDA maintains that CBD cannot currently be lawfully added to foods or dietary supplements absent a new regulatory pathway.

Canada (relevant for the Moncton, NB author): The **Cannabis Act** (S.C. 2018, c. 16) came into force **October 17, 2018**, legalizing and regulating recreational cannabis nationally; edibles, extracts, and topicals followed [Canada.ca](https://www.canada.ca) **October 17, 2019**. The **Industrial Hemp Regulations** (SOR/2018-145) define industrial hemp as a cannabis plant (or part) with $\leq 0.3\%$ THC (w/w) in the flowering heads and leaves, accounting for THCA-to-THC conversion potential; licensing is handled by Health Canada via the Cannabis Tracking and Licensing System (CTLS), with a non-binding 60-business-day service standard. Approved cultivars are listed by the Government of Canada; growers may also need CFIA/Canadian Seed Growers' Association recognition.

International: On **December 2, 2020**, the UN Commission on Narcotic Drugs voted **27–25 with 1 abstention** to remove cannabis and cannabis resin from **Schedule IV** of the 1961 Single Convention (following a WHO Expert Committee on Drug Dependence recommendation), implicitly recognizing medical value while keeping cannabis in Schedule I (UNODC press statement, 3 Dec 2020). Other WHO recommendations (e.g., on extracts/tinctures, dronabinol) were rejected. Notable national policies: **Uruguay** (first country to legalize, 2013), the **Netherlands** (long-standing tolerance/“coffeeshop” model), **Canada** (2018), and **Germany** (legalized adult recreational use in 2024).

8. Economics & Markets

(All figures are market-research projections; cite firm, base year, and forecast year, and treat as estimates.) Grand View Research estimated the global **legal cannabis market** at **USD 69.78 billion in 2024**, projected to reach **USD 216.76 billion by 2033 (CAGR 13.49% from 2025 to 2033)**, with North America holding 71.69% revenue share in

2024 [Grand View Research](#) (a separate, narrower GVR “legal marijuana” report gives materially different numbers — note the methodological divergence). GVR estimated the global **industrial hemp market** at USD 7.5 billion in 2025, projected to USD 27.7 billion by 2033 (CAGR 17.9%); [Grand View Research](#) Fortune Business Insights gave a higher USD 11.42 billion 2025 base [Fortune Business Insights](#) — flag the inter-firm discrepancy. The U.S. **hemp-derived cannabinoid** market was valued by **Whitney Economics** (2023 *U.S. National Cannabinoid Report*, chief economist Beau Whitney) at over **USD 28 billion supporting ~328,000 jobs and \$13 billion in wages** [Whitney Economics](#) (a 2026 Whitney revision raised the market estimate to ~\$47–64 billion) — figures now threatened by Section 781.

9. Materials-Science Frontier: “Hempoxies v.56”

Hempoxies v.56 is included as ONE speculative, forward-looking entry — a **pre-experimental research hypothesis at Technology Readiness Level 1–2, NOT a validated or commercialized product**. The concept proposes a bio-based **covalent adaptable network (CAN) vitrimer composite** built from epoxidized hemp seed oil, furfuryl glycidyl ether, citric acid (bio-crosslinker), and zinc acetate (transesterification catalyst), reinforced with hemp fiber. **Every performance specification must be presented as a projected/target value pending experimental validation**. It should appear only in the advanced-materials/speculative section with an explicit disclaimer.

The real, citable science that legitimately surrounds the concept:

- **Vitrimerers / covalent adaptable networks:** introduced by Ludwik Leibler and co-workers in 2011 (Montarnal, Capelot, Tournilhac & Leibler, *Science* 2011) — epoxy/acid networks in which **zinc-acetate-catalyzed transesterification** lets the material flow like glass above a topology-freezing transition temperature (T_v) while remaining permanently crosslinked. Leibler’s original system reacted DGEBA with fatty di-/tricarboxylic acids using $Zn(OAc)_2$ (5–20 mol%) (reviews: *Polymers* 2020, 12(8):1660; PMC5508697; PMC12511975).
- **Epoxidized vegetable oils (EVOs):** epoxidized soybean oil (ESO, ~4 epoxides/molecule) and epoxidized linseed oil (ELO, ~6) are established bio-based epoxy precursors, cured with bio-acids such as itaconic, tannic, or citric acid to yield thermosets (Di Mauro et al. 2022, *Applied Catalysis*; Reinhardt et al. 2022, *Macromolecular Materials and Engineering*, DOI 10.1002/mame.202200455). Epoxidized hemp seed oil is a plausible analog within this class.
- **Hemp-fiber biocomposites** are a documented natural-fiber reinforcement class.
- **Citric acid** is a recognized bio-based polyfunctional crosslinker, and **zinc acetate** is the canonical transesterification catalyst from Leibler’s foundational work — making

the proposed Hempoxies chemistry internally consistent with the literature even though the specific formulation is untested.

10. Safety, Consumer-Product Regulation & Public Health

Product safety requires testing for **heavy metals** (hemp is a phytoremediator and can accumulate cadmium, lead, etc.), **pesticides**, **residual solvents**, and microbial contaminants. The **delta-8 / synthetic and "hemp-derived" cannabinoid loophole** — now being closed federally by Section 781 — raised public-health concerns about unregulated, intoxicating, lab-converted products sold in gas stations, smoke shops, and online without age limits or standardized testing; a bipartisan coalition of 39 state and territory attorneys general urged Congress to act in October 2025. Reason Magazine

Impaired driving and **youth prevention** remain priorities, and adolescent initiation is the strongest predictor of cannabis use disorder.

Details

This report synthesizes authoritative primary sources — peer-reviewed journals (*Science Advances*, *Journal of Experimental Botany*, *Lancet Psychiatry*, *NEJM*, *Journal of Medical Toxicology*, *Nature Reviews Disease Primers*, *British Journal of Pharmacology*, *Journal of Cleaner Production*), government and intergovernmental bodies (USDA, FDA, DEA/DOJ, Health Canada, UNODC/CND, WHO, NIDA, CDC), the National Academies, statutes and the Federal Register, and high-quality journalism and legal analysis — and is suitable for dense inline citation and a verified bibliography. Each numbered domain maps to a planned encyclopedic chapter.

Suggested appendices:

- **Glossary:** cannabinoid, terpene, flavonoid, trichome, chemotype, dioecy/monoecy, bast, hurd/shiv, retting, decortication, hempcrete, vitrimer, covalent adaptable network, transesterification, entourage effect, decarboxylation, phytoremediation.
- **Historical timeline:** Neolithic East Asian domestication (~12,000 BP, contested) → Yanghai shaman's cannabis (~2,700 BP) → Jirzankal smoking braziers (~500 BCE) → age of sail → 1937 Marihuana Tax Act → 1942 "Hemp for Victory" → 1970 Controlled Substances Act → 1992 anandamide discovered → 2017 National Academies report → 2018 U.S. Farm Bill / Canada Cannabis Act → 2018 Epidiolex approval → 2020 UN Schedule IV removal → 2025 Section 781 / 2026 marijuana rescheduling.
- **Comparison tables:** hemp vs. cotton (water/pesticide use, fiber yield); hempcrete vs. concrete (weight, thermal conductivity, carbon balance); hemp seed nutritional profile vs. flax/chia; major cannabinoids (THC, CBD, CBG, CBN, CBC, THCV, acidic forms) and major terpenes with reported properties.

- **Key organizations/agencies:** USDA AMS, FDA, DEA/DOJ, NIDA, CDC, Health Canada, CFIA, UNODC/CND, WHO ECDD, National Academies.

Recommendations

1. **Frame the “50,000 uses” claim explicitly as folklore/advocacy rhetoric** in the front matter, and organize chapters by verified use-category rather than attempting literal enumeration.
2. **Triage every notable claim into “verified,” “contested,” or “myth” callout boxes** — e.g., verified (Washington grew hemp; hempcrete carbon storage; Epidiolex efficacy), contested (entourage effect; 12,000-year domestication date), myth (Ford hemp car; Declaration on hemp paper; Betsy Ross hemp flag; “Lincoln’s hemp lamp oil”).
3. **Keep the law-and-policy chapter modular and time-stamped** (“current as of [date]”), given rapid 2025–2026 change. Revisit at proof stage; the key benchmarks that would change the text are (a) any final DEA rule rescheduling all marijuana to Schedule III after the June 29, 2026 hearing, and (b) the November 12, 2026 effective date and enforcement posture of Section 781’s total-THC hemp definition.
4. **Present Hempoxies v.56 only in the advanced-materials/speculative section**, with a prominent TRL 1–2 disclaimer and every performance number labeled “projected/target — pending experimental validation,” surrounded by the genuine vitrimer/EVO literature above.
5. **For all market figures, cite firm + base year + forecast year and label as projections**; explicitly note inter-firm discrepancies (e.g., GVR vs. Fortune Business Insights for hemp; GVR’s two cannabis report lines).
6. **Commission primary citations for any claim flagged as thinly sourced** — notably the Yangshao pottery cord-impression claim — before asserting it as fact.

Caveats

- Market-size figures are proprietary projections that vary widely by firm and report scope; treat as estimates, not established facts.
- Cannabis taxonomy remains genuinely unsettled; present the emerging monotypic consensus while acknowledging the polytypic debate.
- The entourage effect and the ~12,000-year single-origin domestication date are scientifically contested.

- U.S. cannabis law was changing month-to-month in 2025–2026; the final form and enforcement of both marijuana rescheduling and the Section 781 hemp redefinition were unresolved at the time of writing.
- The Yangshao pottery cord-impression claim lacks a clean primary citation; rely on Clarke & Merlin (2013) rather than asserting a specific archaeology paper.
- Note source affiliations for transparency where relevant (e.g., Ethan Russo’s GW Pharmaceuticals ties in the 2008 Yanghai study; some consumer/industry sources on hemp benefits are promotional and should be corroborated against peer-reviewed or government data).