



Comments on Cannabis Policy

[Bud Hoekstra]

Joke time! The draft Cannabis Policy white paper exhorts, “The Cannabis Cultivator shall comply with all federal ... regulations.” Impossible.

First of all, before I address this statement in toto, I want to underscore my history: I have tried neither marijuana nor tobacco. Smoking is bad for the lungs.

HEMP: The 21 April 2017 SCIENCE (vol 356, issue 6335) page 232, reports that despite the diversity of the Cannabis genus, there is only one species – See “A New Neglected Crop” in April’s SCIENCE. C. sativa and C. indica are taxonomic myths.

MEDICAL MARIJUANA: Culbreth’s TEXTBOOK OF MATERIA MEDICA AND PHARMACOGNOSY defined medicine in the United States. It went through dozens of printing, and the textbook was used to train physicians for more than half a century. Attached to these comments are pages 163-167 of this med-school textbook, showing the long history of Cannabis as a medicinal drug. In 2015, Britain’s drug company G W Pharnaceuticals established Cannabis therapies.

RECREATIONAL POT: Use went underground with federal laws banning the psychoactive substance. There is evidence that R J Reynolds and Phillip Morris promoted harsh marijuana laws to protect their market shares. According to the venerable veterinary textbook POISONOUS PLANTS OF THE UNITED STATES AND CANADA, a classic since the 1960’s, marijuana shows little tendency toward addiction, and at the start of World War II, Uncle Sam was the leading Cannabis Cultivator, sowing millions of acres of bottomland in the Mississippi and Ohio river valleys with “hemp” seed, wildcrafting the plant to meet the naval needs for wartime hemp. Nylon, invented during WW II, displaced hemp from the marketplace. WW II shaped U.S. Cannabis policy. As Culbreth indicates, Cannabis was aphrodisiac, firing up the libido, inasmuch as tobacco lessened it, making soldiers alert for guard duty and keeping their minds off their girlfriends and sex. Tobacco became government issue for soldiers on the front in the form of rations, while Uncle Sam grew free, aerially sown marijuana in the Midwest.

SCHEDULE I DRUG: Federal statutes ordained that marijuana was addicting and psychcoactive, What became the signature drug of the Beatnik generation of the 1950’s was black-listed as a schedule I drug. Cannabis is a member of the Moraceae family of plants, better known as mulberries, and psychoactive substances are found throughout the family. For example, Peterson’s FIELD GUIDE TO THE EDIBLE PLANTS warns that unripe mulberry fruit is hallucinogenic. Mulberry jam can cause a false positive on urine samples for cannabis.

IMPACTS: A map of Mexico is likely to show the drug cartels’ turf-domms as it is the political lines of Mexican states. Outlawing marijuana boosted its market value, property seizures drove

growers onto public lands. Trail-runners reported being fired upon. I've been shot at three times within the County; Steve Wilensky reported that volunteers working on the Glencoe trail were fired upon. Illicit second-generation rodenticides are common on the sites of illicit grows – resulting in the deaths of endangered fishers, a member of the weasel family (according to CSERC) which had been collared and tracked. Half the inmates in federal prisons are there because of drug convictions, and we build prisons, not schools.

DRUG EDUCATION: As a graduate student in education, I was assigned to report on the status of drug education in one of my courses. I searched the literature in the field of education to find out what was being taught and how. Compiling the statistical data on the anti-drug programs, I found the programs neatly fell into three philosophical categories: idealism, realism, pragmatism. I also found myths, like the myth that smoking marijuana drives the user to seek greater “highs” and thereby users graduate to higher drugs like heroin and opiates. Tobacco was about 25 cents a pack at the time, and smoking was a rite of passage among males in our society. I was blasted for telling the truth – for example, I pointed out that 99% of heroin users started out with mother's milk, but the correlation doesn't implicate mother's milk. Tobacco and alcohol are addicting, and psychoactive – delirium tremens – and are not schedule I drugs – marijuana is less so but classified as a schedule I drug. Statistics have shown that one in nine, or was it one in six, Europeans used marijuana. Drugs are too controversial to teach in our schools, so – the other week I heard about a restaurant employee in Jackson who had pain and took ibuprofen – to speed its effects, she quadrupled the dose and wound up in the hospital because of the overdose. So much for effective drug education. Cannabis education doesn't exist, except for prohibitions that defeat the credibility of drug education.

Cannabis is still against federal law, but the Cannabis Policy white paper wants “The Cannabis cultivator shall comply with all federal ... regulations.” If athletes jump up (and down) defying the law of gravity, well, why not include this defiance in the white paper.

CRIME: At \$2000/plant, the green gold engenders crime. People steal marijuana, because it's illegal and the theft may not be reported. To protect grow sites, cultivators don't use the USDA-NRCS BMP called “Access Control” (formerly Use Exclusion) but prefer guns, booby traps and weaponized guard dogs. How many pot-related murders in Calaveras County during the last two years? We don't know – the papers reported an incident where a man burnt to death in a trailer, possibly set by marijuana thieves. Controlled-substance rules and regulations have promoted crimes of two types: the victimization of growers, and the incidental victims when guard dogs escape or growers fire guns at runners on public trails. Taxpayers have been victimized by the exorbitant costs of border patrols for drug-runners, routine drug policing and cost of courts and prisons to house offenders of the marijuana laws. Calaveras County 9-1-1 is not likely to respond to a vicious dog complaint or a shooting, unless someone dies or is injured.

CALAVERAS COUNTY: The supervisors have waffled back and forth on their marijuana policies. The Butte Fire displaced refugees that didn't return and rebuild. The fallen market

prices in real estate triggered a land rush, Cannabis registration quadrupled land appraisals. A former county supervisor told neighbors at a neighborhood meeting that a new arrival had been stoned and his well pump sabotaged - A month later he saw the neighbor's helpers while he walked BLM land evaluating fire vulnerability – the same underdog neighbors had guns in their hands – Steve called them AK-47's. they patrolled BLM land near their private grow.

ENFORCEMENT: Neighbors complain of potential harm from the economic poisons (pesticides) that growers use – potentially contaminated wells, for example. Both state and local law enforcement shrugs, excusing their lack of enforcement activities because of staffing shortfalls. One illicit grow in Calaveras County involved human trafficking (in West Point) and the perpetrators plea-bargained and were let off on probation, so the rumor goes. There is a tendency by law enforcement to look the other way until the growers step too far out of line.

At the same time, compliance focuses on law-abiding growers – no threat from them.

CONTRADICTIONS: In Calaveras County, the General Plan dates back to 1995 and is still in effect after almost a quarter-century. My farm is adjacent to BLM's wildland, but it's zoned RR, Rural Residential. RR parcels are supposed to under 5 acres, our parcels are over 10; RR parcels are supposed to be suburban parcels, "ranchettes" of homes, ours is far from that. We have no visible neighbors. The upshot: we are mis-zoned RR. When the County upgraded its agricultural code, it changed the rules so that RR parcels had to have a dwelling on the property before the owner could farm it. One parcel we own and had been farming has no dwelling, and we were told we now farmed it illegally (though it had been legal before the upgrade) – and that the new General Plan would change our zone to Resource Production, RP, shortly and correct our mis-zoning. That was ten years ago! The Cannabis grow next to us is zoned RR, and the County registered the grow. Marijuana cultivation isn't farming, the agricultural commissioner has no voice in it. No pesticides are registered for the cannabis crop. The County's Planning Department registers cultivators to grow their non-farm crop.

To add to the ironies of this story – we can't sell farm goods until our zoning changes! – I filed for a waiver of WDRs from the Water Quality Control Board and I received an individual-farm conditional waiver long ago. Since our farm had once been a "doper community" that manufactured meth, the condition of the conditional waiver was that I test my nonpoint runoff from my fields for meth. This was silly. Meth is manufacture, not agriculture, and it's point-source pollution. The ILRP is for nonpoint pollution. The waiver required me to use BMPs to contain the wastes I generated from my operation – did I grow meth? The state had given me a waiver for meth in my operation. A couple of years later, the staff turn-over and a change of faces came to me, saying "this is wrong" and ordering me to rewrite my 100-page MRPP. I shake my head dejectedly at the dysfunctionality of government.

What I'd like is sane regulation that makes life better for all Californians and doesn't rob taxpayer pockets with nonsense regulation. Here's what I think the Cannabis Policy paper should cover thoroughly:

1. Cannabis is a crop, if it's grown in the ground. Containerized, it's nursery stock.
2. "Crop size limits" like "6 plants" inadvertently control market forces and promote the use of chemicals, some of which, online reports state, are illicit chemicals coming from Mexico.
3. Organic standards should be developed; Cannabis pesticides need to be registered. Agricultural commissioners need to be involved in the control of chemicals used to grow marijuana.
4. The State needs a clearinghouse where potential water-quality issues associated with registered and illicit grows are reported and recorded, and probably an enforcement mechanism to discern illicit pesticide use to protect the water & soil resources.
5. Fly-by-night growers buy land under fake names, grow for a season and abandon the grow site, which is confiscated and resold for back taxes. Often the cleanup is incomplete, falling years later into the hands of the County which can't cope with the left-over clean-up from an illicit, unregistered operation.
6. Neither staff, nor law officers, nor cultivators understand environmental regulations. A good source of information is the EPA's textbook NATIONAL MANAGEMENT MEASURES FOR THE CONTROL OF NONPOINT POLLUTION FROM AGRICULTURE. The Water Board has taken the position that it can't order BMPs, but it does anyway, because no one knows what a BMP is. CDFA has ordered nutrient management – specifically nitrogen-budgeting, effected through the coalition groups which promote the use of PAM, a soil & water contaminant as a BMP. The Cannabis General Order prescribes BMPs, but the staff which wrote the General Order, didn't recognize the BMPs. My County's Code requires agriculture to use UCANR BMPs and USDA-NRCS BMPs (best management practices or conservation practice standards). The Planning and Building Departments of my County use CalTrans and EPA stormwater BMPs in lieu of UC Extension and NRCS BMPs. Even though my neighbor farms marijuana and I farm berries, I use UCANR, NRCS & Coalition BMPs, whereas the abutting cultivator uses CalTrans BMPs on his land as ordered by the Building & Planning Departments. The Cannabis General Order will set up more conflicts.
7. The Water Board needs to define BMPs, elaborate on suites of BMPs, and discuss the science of BMPs – and train its staff to comprehend what a BMP is. Example: a point-source BMP is recrystallization of sugar from the wastes (outfall) of a sugar beet factory. Example, a nonpoint source BMP is contour-plowing that impedes the flow of runoff from a field and the consequent erosive forces at work in the runoff. The BAERcat treatments catalog is another source of BMPs to be used on land ravaged by wildfires. "Scarification" is a BAERcat BMP. The Water Board, vain as it is, wants to sell water quality to growers without selling the BMPs that bring water quality about.

Compliance is a suite of BMPs. Surface water can be monitored for quality, but in regard to groundwater, basically groundwater BMPs must be monitored, both point-source like aprons sealing the well bore, or nonpoint source like an AHF, Agrichemical Handling Facility for a farm.

To market water quality to the state's population, the Water Board has to market BMPs. Colleges need to teach the science of BMPs. Regulators need to know BMPs. Cultivators need to know BMPs, how they work, what they do, which ones are most effective. The Cannabis Policy omits this area of water-quality education. The Water Board staffs chemical engineers, not BMP experts.

Marijuana policy is in its infancy, and market prices will fluctuate greatly in the years ahead. The policy must do two things absolutely: reduce crime and make compliance safe for the environment. To do this, I underscore the role of BMPs. Regulators and cultivators alike must learn the systematic use of BMPs to protect the environment. I'm not saying the policy should prescribe BMPs. The best course of action is to urge colleges and universities to offer a generalized course on adaptive management, management measures (environmental goals is another term) and BMPs, exploring the full range of BMPs. Also, free, or cheap workshops offered in each county exploring the range of BMPs is a good idea.

I am proposing know-how and savvy: what's the difference between a water bar and a rolling dip. Do you divert toward a drainage or away from it? What are surface-spreading BMPs? Is a culvert & ditch a channelization BMP? What is a sediment trap, a water harvest catchment, a infiltration zone? Fence is a NRCS BMP, how is it used? Cover crop and perennial cover are BMPs from the NRCS, and are they cost-effective? CalTrans uses silt screens, wattles and hydro-seeding – what are the comparable BMPs on a farm?

I will even go as far as to say that the Water Board needs to film a farm make-over, not unlike the House Hunters programs on TV, to illustrate what can be done with BMPs.

Here's the extent to which the Water Board does its job:

Management Measures: The Water Board sets basin standards.

BMPs: The Water Board requires BMPs like nitrogen-budgeting [Nutrient Management] and sediment & erosion control plans.

Monitoring: The Water Board requires a dozen or so chemicals to be monitored for water quality in water polluted by 80,000 or a 100,000 trace chemicals. No bulk or cocktail monitoring is done to assess complex mixtures of pollutants.

Enforcement: The Water Board staff tried to cite me for compliance – I used the authentic NRCS BMP, Code 500, "Obstruction Removal," multiple times on my farm.

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The draft Cannabis Policy white paper doesn't seem to direct things toward improvement, and that's a deficit in the Water Board's overall performance and thinking. The problems in the ILRP are found in the Cannabis Cultivation policy white paper all over again.

Cannabis is irrigation-intensive, and it should be a part of the ILRP.

Sincerely, **Bud Hoekstra**

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attachment

fruit, official 1820-
ee, 4.5-7.5 M. (15-
ling branches; bark



minate flower; c, pistillate

3-5-palmately bluntly
dioecious, borne on the
which becomes the fruit.
pale yellow, frequently
scaly orifice, base with



ceptacle; b, ripened fruit; c,
r.

many small brownish-
yellow; taste sweet, pleasant;
(2-3') long. They occur
in Smyrna (Turkey.

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Elemi), the smaller and less pulpy—the Greek; contain grape-sugar 62 p. c., gum, fat, phosphates, chlorides, achenes and cellular tissue 15 p. c., water 16 p. c. Nutritive, demulcent, dietetic; habitual constipation—fresh juice, indigestible skin and seeds causing intestinal irritation, the latter acting mechanically; roasted and split open as a poultice. Dose, *ad libitum*.

2. *Morus rubra*, Red Mulberry.—N. America. Fruit in dense spikes with coalesced perianths, 2.5 Cm. (1') long, dark purple, fleshy; contains sugar 10 p. c., pectin, citrates, malates; refrigerant, flavoring.

3. *Dorstenia Contrayerva*, *Contrayerva*.—The root, official 1820-1860; W. Indies, C. and S. America. Acaulescent perennial; leaves lobed, radical, 10 Cm. (4') long; flowers staminate and pistillate, fruit capsule, disperses seeds by hygroscopism; root (rhizome) fusiform, 1-2-headed, 5-7.5 Cm. (2-3') long, 12 Mm. (½') thick, reddish; taste acrid, bitter; contains volatile oil, resin, bitter principle, starch. Used as stimulant, tonic, diaphoretic, for low fevers, typhoid, diarrhœa, dysentery, serpent bites; in decoction, tincture. Dose, gr. 30 (2 Gm.).

4. *Urtica dioica*, Nettle (*Stinging Nettle*), Urticaceæ.—N. America, Europe. Plant .6-1 M. (2-3°) high, very bristly, stinging, leaves ovate, heart-shaped, pointed, serrate, downy beneath, upper stem downy, spike much branched. Tonic, astringent, uterine hemorrhage. Dose, gr. 15-30 (1-2 Gm.).

CANNABIS. CANNABIS.

Cannabis { *sativa*, Linné,
or var.
indica, Lamarck. } The dried pistillate flowering tops, freed from thicker stems and large foliage leaves, with not more than 10 p. c. of fruits, foreign matter.

Habitat. Asia, Persia, hills of N. India; cultivated in India, Europe, C. and S. Russia, Brazil, W. and S. United States.

Syn. Cannab., Cannabis Indica, U. S. P. 1900, Guaza, Ganjah, Indian Hemp, Black Indian Hemp, Tristram's Knot, Bangué, Hashish, Halish, Gallow Grass Hemp, Neck or Nick Weed, St. Andrew's-lace, Welsh Parsley, Bang, Bhang, Gunjah Churrus, Charas, Ganja (dried flowers); Fr. Chanvre (Indien); Ger. Hanf, Indischer Hanf.

Can'na-bis. L. Gr. *κάνναβις*, hemp, fr. *ganeh*, its Arabic name. Celtic *can*, reed + *ab*, small—*i. e.*, its slender stems.

Sa-ti'va. L. *sativus*, that which is sown or planted—*i. e.*, in the gardens and fields for use.

In'di-ca. L. *Indicus*. Gr. *Ἰνδικός*, pertaining to India—*i. e.*, its habitat.

PLANTS.—Annual herbs; stems 1-3 M. (3-10°) high, angular, tomentose; leaves palmate-compound; leaflets 5-7 linear-lanceolate, serrate; flowers dioecious, yellow spikes. FLOWERING TOPS, greenish-brown, compressed, agglutinated fragments 5 Cm. (2') long, consisting of short stems, bracts, and pistillate flowers, sometimes fruits; stems of varying length, 3 Mm. (⅛') thick, cylindrical, longitudinally furrowed strigose-pubescent; leaves digitately compound; leaflets linear-lanceolate, sessile, serrate; bracts ovate, pubescent, each enclosing 1-2 pistillate flowers or fruits; calyx dark green, pubescent, folded around

ovary or fruit; styles 2, filiform, pubescent; ovule 1; fruit greenish-brown, ellipsoidal, 3.5 Mm. ($\frac{1}{4}$) long, wrinkled, slightly reticulate; odor agreeably aromatic; taste characteristic. POWDER, dark green, effervescing with dilute hydrochloric acid; microscopically—many sharp-pointed fragments of non-glandular hairs, bracts, leaves with laticiferous vessels, rosette aggregates of calcium oxalate, and calcium carbonate; glandular hairs 2 kinds; oil globules, aleurone grains (crystals, globoids); alcoholic solution bright green; alcoholic extractive 8 p. c. Should not be kept longer than 1 year, when it usually is only one-fourth as strong as the fresh, and in 2 years it practically is inert. *Solvent*: alcohol. Dose, gr. 1-5 (.06-3 Gm.).

Commercial.—Plant was known to the Romans, but not to the Egyptians, and has been cultivated universally many centuries for fibre,



FIG. 93.—*Cannabis sativa*.

seed, and medicine—that for the latter at present being grown mostly in the two districts, Bogra and Rajshahi, north of Calcutta, in rows, the richest in resin at 1,800-2,400 M. (6,000-8,000°) elevation. When mature (indicated by brown color and falling of leaves) the flowering branches are cut off, cured by wilting, pressing, rolling, and shaking out of leaves and fruits (if any of the latter have developed), and as such is recognized natively by the Hindustani names, *ganja*, *gunjah*; the rolling and treading are preformed by human feet, an art demanding training, the object being possibly to work resinous matter from stems into inflorescence tips. There are two kinds: 1, *Round ganja*, requiring 4 days for kneading each branch into a cylindrical or terete mass; 2, *Flat ganja*, requiring 2 days for working into a flat form; the Bengal (Calcutta) *ganja* (best) is brownish or dusty, the Bombay bright green. Variability in the drug may be due to the presence of staminate flowers, leaves, fruits, cold weather, inopportune collecting (not later than 4 days after maturing), intentional removal of resin, excessive age (losing most of its properties within a year). Great care is taken to prevent the flowering tops becoming fertilized by suppressing the male plants, as a single one is claimed to spoil an entire field; however, when for fibre or seeds both male and female plants are cultivated together. Our plant, often called *Cannabis americana*, having escaped from native country, may possess slight variations owing to colder climate, but under proper cultivation and care may be as active as the India product, in spite of which it is regarded generally as being about one-fourth weaker.

CONSTITUENTS.—Cannabinol, Cannabin 15-20 p. c., choline (bilineurine—trimethylamine), volatile oil (chiefly sesquiterpene—cannabene), $C_{10}H_{16}$, .3 p. c., bitter principle, paraffin, $C_{25}H_{50}$, chlorophyll, gum, sugar, potassium nitrate, ash 15 p. c.

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Cannabinol, $C_{21}H_{42}$ due, may be obtained reclaiming latter, evaporated under pressure to fractionate when the distillate condensed removed with alcohol liquid, darkening on cooling consequently must be kept in containers.

Cannabin. — Resin is attributed all of the effects to its contained cannabinol with water and a solution of lime, precipitating the resin to filtrate, filtering, it is a brown, amorphous solid, ether, from the former.

PREPARATIONS. — 1. *Extrait de Chanvre* (Indien): Ge.

Manufacture: Macerated exhausted, reclaim alcohol frequently stirring, to add enough glucose for gr. $\frac{1}{2}$ -1 (.01-.06 Gm.).

2. *Fluidextractum Cannabis* (Indien): Ge.

Manufacture: Similistruum: alcohol; after adjusting finished volume incoördination in a dose (Kg.) of body weight.

3. *Tinctura Cannabis Indica* (Indisch) Hanftinktur.

Manufacture: 10 p. c. menstruum: alcohol. Dose.

These preparations generally be recognized by the color of water; if olive-green, thus, whatever there is in principle.

PROPERTIES.—Anodyne increases appetite. It is a condition, and relation to others have delightful in

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ovule 1; fruit greenish-
led, slightly reticulate;

POWDER, dark green,
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lled *Cannabis americana*,
possess slight variations
cultivation and care may
e of which it is regarded

15–20 p. c., choline (bili-
efly sesquiterpene—cane-
raffin, $C_{29}H_{60}$, chlorophyll,

Cannabinol, $C_{21}H_{26}O_2$.—This, to which the activity of the drug is due, may be obtained by exhausting cannabis with petroleum benzin, reclaiming latter, evaporating residue to dryness, and subjecting it, under pressure to fractional distillation at 210–240° C. (410–464° F.), when the distillate contains cannabinol and paraffin, the latter being removed with alcohol. It is a poisonous, yellow or brownish syrupy liquid, darkening on exposure to air into inert, brittle, pitchy mass, consequently must be kept, as well as preparations of the drug, in sealed containers.

Cannabin. — Resin constituent (resinoid), to which formerly was attributed all of the drug's activity, that now known to be due solely to its contained cannabinol; it may be obtained by treating cannabis with water and a solution of sodium carbonate, washing residue with water, drying, exhausting with alcohol, treating tincture with milk of lime, precipitating lime with sulphuric acid, adding animal charcoal to filtrate, filtering, concentrating, and precipitating with water; it is a brown, amorphous resin, burning without ash, soluble in alcohol, ether, from the former being precipitated white by water.

PREPARATIONS. — 1. *Extractum Cannabis*. Extract of Cannabis. (Syn., Ext. Cannab., Extract of (Indian) Cannabis (Hemp); Fr. Extrait de Chanvre (Indien); Ger. (Indisch) Henfextrakt.)

Manufacture: Macerate, percolate 100 Gm. with alcohol until exhausted, reclaim alcohol, evaporate residue at 70° C. (158° F.), frequently stirring, to pilular consistence, mix thoroughly; after assay add enough glucose for biological standard; yield 12–14 p. c. Dose, gr. $\frac{1}{8}$ –1 (.01–.06 Gm.).

2. *Fluidextractum Cannabis*. Fluidextract of Cannabis. (Syn., Fldext. Cannab., Fluid Extract of Cannabis; Fr. Extrait fluide de Chanvre (Indien); Ger. (Indisch) Hanfffluidextrakt.)

Manufacture: Similar to Fluidextractum Sabal, page 95; menstruum: alcohol; after dissolving soft extract in the reserve, assay and adjust finished volume to its biological standard—amount producing incoördination in a dog; gr. $\frac{1}{2}$ (.03 ML. (Cc.)) for every 2 pounds (1 Kg.) of body weight. Dose, $\mathfrak{m}ij$ –5 (.13–.3 ML. (Cc.)).

3. *Tinctura Cannabis*. Tincture of Cannabis. (Syn., Tr. Cannab., Tinctura Cannabis Indica; Fr. Teinture de Chanvre Indien; Ger. (Indisch) Hanftinktur.)

Manufacture: 10 p. c. Similar to Tinctura Veratri Viridis, page 101; menstruum: alcohol. Dose, $\mathfrak{m}v$ –30 (.3–2 ML. (Cc.)).

These preparations give varying results, but usually their value can be recognized by the color of the precipitate formed when added to water; if olive-green, it is active; if yellowish-brown, it is inert; thus, whatever there is that destroys chlorophyll injures the active principle.

PROPERTIES.—Anodyne, nervine, sudorific, narcotic, aphrodisiac, increases appetite. It excels even belladonna in perverting perception, condition, and relation of objects; some subjects become pugnacious, others have delightful intoxicating dreams, in which time, distance, and

sound are magnified—a few minutes' dream extends over weeks, near objects as in infinite space, whispering as cannonading. Large habitual doses bloat the face, inject eyes, make limbs tremulous, weak, mind imbecilic, death by marasmus.

USES.—Neuralgia, distressing cough, gout, delirium tremens, tetanus convulsions, chorea, hysteria, mental depression, epilepsy, morphine and chloral habits, softening of the brain, nervous vomiting.

Poisoning: Have pleasurable intoxication, double consciousness followed by drowsiness, unconsciousness, collapse, insensibility, dilated pupils, rapid pulse, slow respiration, debility, pale, clammy, insensitive skin, catalepsy, excited passion; effects usually last 24 hours, and closely resemble those of opium, differing, however, in not constipating and in not lessening secretions; increases appetite. Give emetics, lemon juice to neutralize its effects, tannin, coffee, ammonia, strychnine, atropine, electricity, spirit of nitrous ether, artificial respiration; similar to hydrated chloral and opium.

Incompatibles: Strychnine, caustic alkalies, acids.

Synergists: Alcohol, ether, bromides, cocaine, narcotics.

Allied Native Products:

These are mostly used for smoking, beverages, or electuaries, etc.

1. *Bhang* (*Sidhee, Subjee, Siddhi*).—Consists of the dried coarsely broken leaves and fruit (dark green), resembles *ganja* in odor and taste; used by natives in their sweet-meat (*majoon*), also smoked with or without tobacco; its cold infusion (tea) as an intoxicant.

2. *Churrus, Churras, Charas*.—This is the resin (practically the active constituent) which exudes spontaneously from the entire plant in minute drops. It is collected in several different ways: 1. By men, wearing leather suits, brushing forcibly against growing plants, whereby resin adheres and afterward is scraped off. 2. By rubbing green portions between the hands and then scraping off adhering resin. 3. By frequent stirring around that put away in barns to cure, thus causing the resin to rise in the form of dust, and to deposit upon the roof and sides of the building, from which it can afterward be collected. Owing to this being more or less impure it is not used in medicine, but solely smoked in pipes; contains usually cannabinol 33 p. c.

3. *Hashish* (*Hasish, Haschisch, Hasash, Hasheesh—Majoon*).—The Arabic name for hemp, signifying "green intoxicating liquor" fr. Heb. *shesh*, to be joyous. This may consist of the dried tops collected before seeds ripen, thereby resembling *ganja, gunjah*, but usually is more complex, being prepared by heating tender leaves and tops 4 parts, butter 3, water 4, until latter is dissipated, straining, washing twice the greenish extract with water, adding this to syrup (sugar 16, water 32, little milk, boil), heating, mystifying by incorporating stramonium or nuxvomica; in Bengal a small amount of rose oil, musk, cardamom seed, cantharides, or opium (to which mostly is due the deliriums, manias, dreams, sensualism), boiling half an hour, allowing to solidify, cutting into cakes; the Russians prefer it formed into cakes with the resinous extract.

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4. *Hemp* S. long, roundish chiefly, but, demulcent a p. c., suitable

5. *Hemp* C. sure; odor h extracted for seeds possess

6. *Hemp* F. The colder cl is most med hemp fibre, India is infer

San-ta-la's or fr. *L. santal chand*, shine shines. Herb late; calyx 3- flowers perfect pended; fruit astringent, se

Genus: 1.

SA

Oleum Santal

Santalum all *Linné.*

Habitat. S. cultivated.

Syn. White Sandal (old wood) Ligni Santali, O Santali æthereum holzöl.

San'ta-lum. Al'bum. L.

PLANT.—S. leaves oval, smooth, odorless, color (heartwood), be used, which eter, hacking ground until s

tends over weeks, near
ading. Large habitual
remulous, weak, mind

irium tremens, tetanus
on, epilepsy, morphine
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acids.

e, narcotics.

ges, or electuaries, etc.
s of the dried coarsely
ganja in odor and taste;
), also smoked with or
ntoxicant.

resin (practically the
y from the entire plant
erent ways: 1. By men,
growing plants, whereby
By rubbing green por-
adhering resin. 3. By
ns to cure, thus causing
posit upon the roof and
ard be collected. Owing
l in medicine, but solely
33 p. c.

Asheesh—Majoon.—The
xicating liquor" fr. Heb.
ried tops collected before
but usually is more com-
nd tops 4 parts, butter 3,
shing twice the greenish
agar 16, water 32, little
ting stramonium or nux
, musk, cardamom seed,
e the deliriums, manias,
wing to solidify, cutting
cakes with the resinous

SANTALACEÆ

4. *Hemp Seed (Cannabis Semen).*—These are achenes 3 Mm. ($\frac{1}{8}$) long, roundish, smooth, greenish, taste sweet, oily. Used for birds chiefly, but, owing to the fixed oil, an emulsion becomes a valuable demulcent and anodyne; contain proteid 22–24 p. c., fixed oil 28–36 p. c., suitable for painting, varnishing, etc.

5. *Hemp Oil.*—A greenish fixed oil, lighter and brownish on exposure; odor hemp-like, taste mild. Demulcent, protective; chiefly extracted for its possible use in the domestic arts; neither this nor seeds possess narcotic properties.

6. *Hemp Fibre.*—Used for cordage, sacking, sail cloths, clothing, etc. The colder climates produce the best fibres, and the tropics that which is most medicinal and intoxicating. Russia produces most of the hemp fibre, but Italy the best; that grown in the United States and India is inferior to that of the other two countries.

19. SANTALACEÆ. Sandalwood Family.

San-ta-la'se-e. L. *Santal-um* + aceæ. Pers. name *sandul*, useful, or fr. L. *sandal*, Gr. *σανταλον*, the classic name for Skt. *chandana*—*chand*, shine; L. *candere*, to shine—*i. e.*, polished woody surface shines. Herbs, shrubs, trees. Distinguished by leaves entire, exstipulate; calyx 3–6-lobed, coherent with 1-celled ovary, superior, valvate; flowers perfect, greenish, petals none, stamens 3–9, ovules 1–4, suspended; fruit 1-seeded, drupe or nut; temperate climates, tropics; astringent, seed oily, fruit edible.

Genus: 1. *Santalum*.

SANTALUM ALBUM. WHITE SANDAL.

Oleum Santali. Oil of Santal, *official*.

Santalum album, { A volatile oil distilled from the wood, containing
Linné. { 90 p. c. of alcohols, calculated as santalol.

Habitat. S. India, E. Indian Islands, Malabar, Macassar (mountains); cultivated.

Syn. White Sandal Wood (young wood), White Saunders, Saunders, Yellow Sandal (old wood), Almug; Ol. Santal., Santalwood Oil, Oil of Sandalwood, Oleum Ligni Santali, Oleum Santali Flavi; Fr. Santal Citrin; Essence de Santal, Oleum Santali æthereum; Ger. Gelber Sandel; Sandelöl, Santelöl, Ostendisches Sandelholzöl.

San'ta-lum. L. see etymology, above, of Santalaceæ.

Al'bum. L. *albus*, white or light—*i. e.*, the color of the sapwood.

PLANT.—Small tree 6–9 M. (20–30°) high, bark grayish-brown; leaves oval, smooth, glaucous beneath; flowers small, numerous cymes; odorless, color variable, violet-pink, red, yellow. Wood, yellow inside (heartwood), white outside (sapwood). The heartwood only should be used, which natively is obtained by felling trees of .3 M. (12') diameter, hacking off sapwood, or allowing these trunks to remain on the ground until sapwood is eaten away by ants, thereby becoming 10–20