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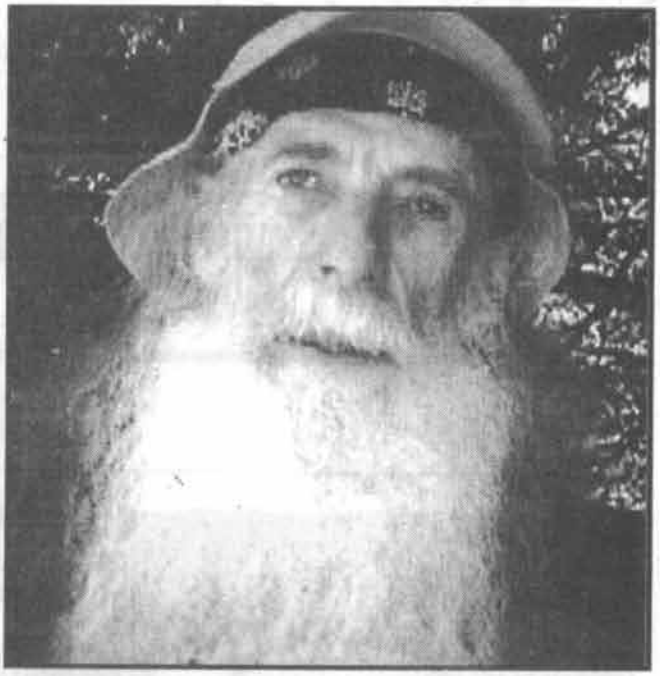
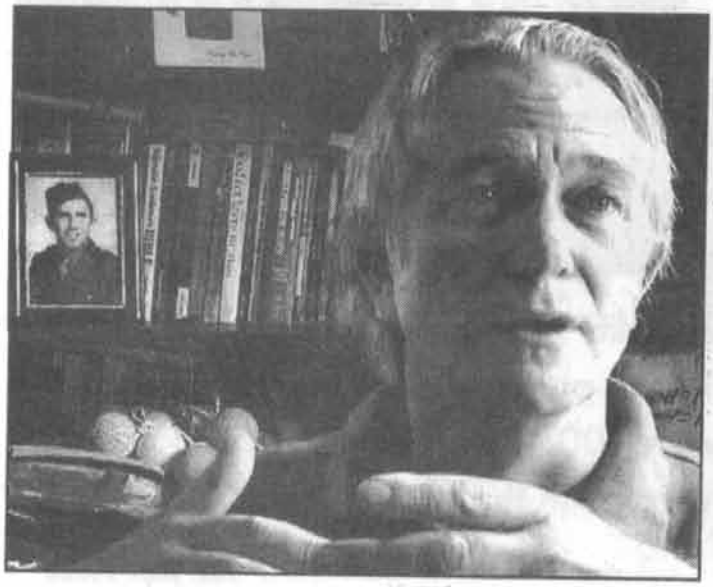
THE NEW SETTLER INTERVIEW

$2.50

issue 148 · 2010

medical marijuana sagas

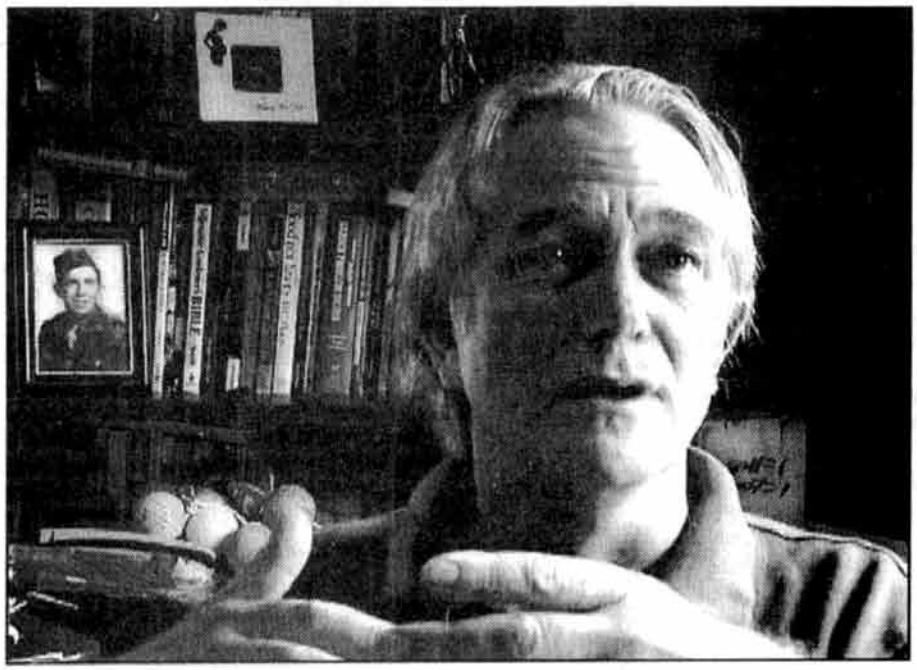




I feel like Marie Curie · **Kristen Peskuski** ·
Dr. William Courtney · cannabis physician's chronicle continues
Bob Wilson · Sweet Charity & Sugar-Red Leg · **Attorney**
E D Lerman · . . . drive them out or hide them in dark corners

The Courtney Chronicles continue . . .

Dr. William Courtney



There is a Hasidic premise engrained in the romantic lore I grew up with: that two souls matched in heaven need help to meet each other on earth. . . . What portion of your life were you passing through when you became acquainted with Kristen Peskuski? You fall in love with a woman with an endocannabinoid deficiency—how about that.

Dr. William Courtney: *[smiling] Yeah.*

And I am thinking of that first interview we did when I spoke of interstitial cystitis: Kristen had suffered with that for several years. Her bladder had failed for two and she had to self-catheterize for two years, and she comes out to Mendocino and suddenly reads *New Settler*, and here I am stating I have patients that have been helped with interstitial cystitis. Having already studied cannabinoids, she knew they were important, but it was unusual to find anyone in the medical community who was also interested in interstitial cystitis.

She was on the steering committee of MMMAB, and so we would run into each other in a number of places. Then, ICRS was coming up, and it seemed like she had the capacity to benefit from the symposia. She was interested in science, interested in research: was one of the few people who read widely in anything I had available. Because she was driven by her own severe physical condition, and her own intelligence to put the two of those together, I felt she could be of benefit to the whole community. She would apply her personal desire and capacities: whether she was doing statistical analysis, or designing research protocols, or doing clinical work: whatever it was, it would be very relevant.

So it started out with an interest—where we both were interested in the community through the advisory board, and were trying to improve understanding. That agenda was in place, and then her own personal agenda: the hope that somewhere she would find a place where she could apply her curiosity and intellectual strengths. Continue to open up the miracle of this plant.

Our first interview for New Settler: ***I remember while doing the interview, how full of primordial wisdom you were, and anchored in sorrow it seemed. Where were you in your life when the two of you became acquainted?***

Dr. Wm. Courtney: I had been living alone for a year, year and a half. . . . I have a child that just entered into college—we went to registration together. Every parent, when you have that first child go off to college, it's always wonderful to have time alone with them: all those memories, combine with promises of independence, and incredible challenges—and now, with the financial stuff: tuition has gone up 20%, teachers hours are being cut, subjects are being eliminated on the fly. She'd sign up for one class and they would decide to eliminate portions of the class because of the budget, and you have to find another class, because what was there last week is no longer.

This is a journey you make alone with your first child? The two of you together . . .

Dr. Courtney: Yes. We went up to Chico State. There was a whole day of parents doing this, kids doing that, crisscrossing: a first day enrollment. I managed to end up contracting a serious flu and she drove me home. So there was that reversal—probably the first time in my life. But it was wonderful that I could comfortably fall asleep in the back seat while she drove the four hours, and I'd wake up and crawl off to bed for awhile.

Before we went home, she drove me up to Redding, because I had an appearance in Court for a patient who had MS. . . .The bargains that people make in the political system are just so horrific. And yet, if all your money has been seized, and you can't defend yourself, and you're not in the position to hire the attorneys to mount a defense, you concede to things just because you can't afford to say that's wrong.

This was a patient of yours who was using medical marijuana . . .

Dr. Courtney: Yes. And pled guilty to some things because if what you have is $50,000, you're not going to be able to take it through the court system. So you plead to a 'Deferred Entry of Judgment', where you agree to a lesser charge; and after a year, the record is dropped. Technically, that makes you "Guilty": but it's either that or pay for trial. You pay one way or another.

This was a fellow who had tried Interferon, and had become suicidally depressed. Back when I was practicing regular medicine, I had patients who were going on Interferon, and they would have to be stabilized on an anti-depressant for *three* months before you would begin Interferon. Because of such a known and serious side effect, they wouldn't start you on Interferon until you had a stable blood level and had gone past the period it takes to get there. He was intolerant to the treatments for his condition.

Cannabis has been approved in Canada for MS and peripheral neuropathies, and there are late-stage clinical trials in England on cannabis and MS. There's a lot of science there.

But the District Attorney went: "Because you *pled* guilty and you're on Probation, you shouldn't have the right to use cannabis."

And you plead 'Guilty' because you can't afford to mount a $30,000 legal trial.

So that's why I was there. And fortunately, I was able to provide enough information to the judge that despite the District Attorney's displeasure, the judge said: "He's tried Western medicines; he's intolerant to them. This provides benefit, and he clearly has a very serious medical condition. Dr. Courtney says there are clinical trials on approved cannabis-based drugs that are used for this condition."

And so, he was given the right to use cannabis during his Probationary period.

I'm glad it was in the same neck of the woods, and sick as I was, I was able to help that person avoid personal disaster. It's horrifying that you have these people practicing law so unfamiliar with the new science. Haven't taken any courses. As I say this, I'm thinking

of this DA who afterwards was so irate this individual could continue to use this medicine. I met with another patient today: she was told by a scornful Mendocino County Sheriff's deputy: *"This isn't medicine."* To her, it was desperately needed.

The evidence is overwhelming, and it would be nice if people in positions of power and enforcement would familiarize themselves with the information. If you've read the ICRS manuals, you're familiar with the level of research that is coming on. See what they are doing down at Pacific Medical Center with aggressive breast cancer—if you have questions, ask those people about benefit, and they'll let you know where they are at with their certainty of benefit.

And if that's the case, and you have someone who has cancer and is wanting to use something the federal government has a patent that touts the anti-neoplastic activities . . .

Neoplastic?

Dr. Wm. Courtney: Neoplasia is cancer. Neoplasia is the growth, neoplastic is the process. In 2003, researchers from Bethesda listed neoplasia as a condition that CBD is beneficial for. There is a state law that says you can enjoy the benefits of this plant. My patient didn't do the basic research—she relied on the government scientists from Bethesda.

She may be violating royalty rights.
Maybe she should be paying the federal government a royalty fee for using *their* patented molecule in a plant she grows for herself. But that would be the most she would be guilty of.

Instead, law enforcement comes in. They take all your medicine. Your condition progresses; you have biological opportunities removed and are forced into surgery. And you can't afford to express your outrage. And that's what happened to my patient. If there is a philanthropist out there, that woman needs $55,000 to take this to trial. This is a woman who could possibly have avoided surgery; could possibly have kept a lot of her life together that is very dear to her.

A year later, just the thought of it brings her to tears.

This morning as she was recalling what happened, she was tearful at the damages she's gone through, based on actions of people who tell her: *"Cannabis is not a medicine. It's all a sham. Take your Vicodin."*

You are one of the doctors, practicing at the edge on an unsure shore. . . . I'm sure your older children have a sense of how quickly the pendulum may swing against you. When you depart on these rare drives with your daughter, what kind of conversations do you have about your medical practice?

Dr. Wm. Courtney: You know . . .*[sighs]* . . . whenever you are in the midst of a divorce, sometimes they are cooperative, and sometimes they are not; and mine was not one of the more cooperative ones. And so, my daughter struggles. . . . We were looking at a video of Gaza (the Israelis and Palestinians) and imagining what each of those families were hearing on both sides. Both are enraged, and the children get caught between parental issues and conflicts.

The older you are, the easier it is to make your own perspective, and despite one parent who you love dearly saying: *"This is a horrible situation; this is all wrong!"* my daughter also hears from friends she holds in high regard saying: *"Your father, I saw him and he provided me with new ways of using this plant and exciting research that I'd not heard before from other cannabis clinicians!"*

So she hears from her peers: she gets to weigh that feedback. People she knows, and who have her trust and respect telling her how much they appreciate the time and effort, and that they were able to accumulate the information and digest it . . .

There is an article in the *Smithsonian* about dream work—dream jobs.

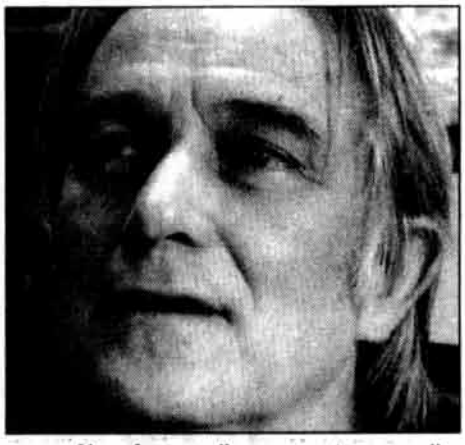
Being a cannabis physician in this county, there is nothing like it! You get to hear the hard battles of thousands of people, each one of them struggling to address their own issues, going to extreme lengths to find out how they can use this plant best to make themselves feel better.

They come into the office, and sit on the other side of my desk and they pour out their experiences: *"This strain, this amount; this topical, this edible. This is how I use the dry leaf."* The most important stuff I have learned has been from the street researchers in this county.

The high school kids, with their self-taught strategies engaged in hands-on horticultural discovery (whether it be for an indoor or solar grow); they should be in camo lab coats, not Detention . . .

When I was interviewing Kristen, and I asked her: How do you feel? Her voice went into a whisper and she said, "I feel like Marie Curie."

Dr. Wm. Courtney: Yes. Can you imagine going to the Mayo Clinic and being put on Methotrexate, a horribly toxic medicine. I fear —I hope that the course they gave her didn't produce any long term sequela.



Sequela?

Dr. Wm. Courtney: That's any morbid condition left as a result of a disease that can surface later. She went through what her family thought was the best of the best. I saw photos: she was just bloated from the steroids: the centripetal and the facial moon face.

Your face swells up, your torso swells up, and you are dilating your urethra, the poisons in your bladder. And then when that fails, they put you under general anesthesia and blow your bladder up four or five times its normal size to rip the nerves out to de-enervate it from the pain. And this idea of having your nerves ripped out of your bladder is a solution.

Yet, when Kristen talks about it, it is with total flat affect. . . .

Dr. Wm. Courtney: And she had her tonsils removed, and the subsequent sinus infections were so bad, she had multiple surgeries. They wanted to do another a few years ago—although they are supposed to go five years between, because pretty soon your nose falls apart and you can't do them anymore. They just wanted to go back-to-back surgeries.

Returning to the notion that you fall in love with a woman who is the embodiment of all the plant addresses: did that ever float into your mind?

Dr. Wm. Courtney: Not really. I fell in love with someone who is tenacious. I fell in love with someone who would grow cannabis in Chicago where they'll put you away for a long time. Who eventually gave into that pressure and journeyed to Mendocino, because she wanted more of it, needed more of it and really didn't want to go to jail—where she would have no access at all. She knew her family felt she wasn't going to be alive after the age of twenty-five.

At some point she stopped her guerrilla warfare in Illinois and came to Mendocino so that she could get as much medicine as she needed in an environment that she didn't have to fear. I've been to Chicago: I'm susceptible to anxiety, and if you are using medicine in Chicago, you're going to be anxious— *Is the car smoked up?* It's like a whole different country there.

In this state, you can grow cannabis, eat it, juice it and wear it. In her home state, this life-saving activity is a crime. It's mind-boggling that all the residents of Illinois are as much a victim as other citizens of the world. So I guess we could start cleaning up in our home. I have a friend in Michigan, a woman like Kristen, who had interstitial cystitis. Growing enough leaf is a big grow, because it takes either big plants or a lot of small plants: but whatever it is, you're committed to a serious bit of a garden. And if you've got kids and you're in a state where growing cannabis is bad parenting—people are terrified. Terrified by engaging in an activity they know is beneficial.

Mahmoud ElSohly is a research professor at the School of Pharmacy at the University of Mississippi. He presides over a farm that grows nearly a hundred varieties of cannabis plants. As director of the Marijuana Project, he oversees the only federally approved marijuana plantation in the country.

ElSohly published a new paper this year in which he stated there were another nine additional cannabinoids. (They were there last week, they were there last year, they were there ten thousands years ago: they're new to us, but that's all they are new to.) One of these cannabinoids has a very strong anti-leshmanial activity. Leshmania being an intracellular

parasite that lives inside of the white blood cells to protect it from our immune system; which makes it a particularly difficult organism to deal with, because as soon as the Polymorpho Nuclear Leukocyte ingests it, it's where it wants to be: inside this cell, hidden away from the rest of the immune system.

The political environment is still somewhat troubling in this state: a physician colleague of mine suffered an investigation, where it was found that she did not disclose adequately the risks of cannabis to her patients, and the Medical Board said: *"You need to also advise them of all the downsides of cannabis."*

Since I was quite involved in clinical cannabis consultation, I developed a three-page "Disclosure" that several thousand patients I've seen, have had to read through: it listed all the *purported* side-effects and risks. One of the risks has to do with cannabis being such a potent antioxidant.

—And it took me four or five years to be impressed with that effect. Even though researchers at Bethesda had developed a knowledge about its antioxidant abilities that led to the government's patent in 2003, which was a couple of years before I ever became involved in cannabis.

In other words, years before I was even interested, the government had already patented the anti-oxidant activity of cannabis.

But fearing the Medical Board reprisal of not warning patients, on that list I included the risk posed by cannabis *as* a potent antioxidant.

Because one problem with a very potent antioxidant is that the white blood cells actually produce a super-oxide to destroy tissue to get to intracellular parasites like TB, *Legionella*, and *Leshmania*.

And thus, in my paperwork, for years, I've had people read and sign that they understand that if you contract one of these three intracellular parasites, you want to be fairly aggressive about getting it diagnosed and treated traditionally; because what cannabis neutralizes is super-oxides produced by the immune system: and it hampers the immune systems ability to deal with these intracellular parasites.

Well, roll the clock forward four or five years, and suddenly—*Ah!* There are compounds in cannabis that are very potent anti-leshmanial compounds, offsetting the anti-oxidant strengths of the plant.

While, ElSohly's paper didn't speak to that, immediately; being a clinician, I brought home with me some of the basic science.

And to me, it's so interesting that in this plant, there is this self-correction: *Did the plant know this?*

—Not to anthropomorphosis ourselves right off the edge of the rational table . . . .

But! putting this brand new information into the web of a symbiotic relationship where we as hominids cultivated and help propagate this omni-healing species . . .

Dr. Wm. Courtney: And how is it that Cannabidiol (in particular) and THC, as well . . .

—Pardon me as I drift from subject to subject: but the new strains we have found out there in our own county that are much higher in CBD.

—And I just ran into one in the last two days in which the CBD *exceeds* the THC! Which is in addition to one grown by the farmer identified in *O'Shaughnessy's* where the THC and CBD were in a 50/50 balance, which is similar to Sativex.

But Sativex can have psychoactive affects; and if it is too psychoactive, you back off a couple of sprays, develop tolerance, and kind of edge it forward. It's interesting that this even newer strain with more CBD, seems less inclined to induce the psychoactivity, particularly in those that need such a product every two or three hours, all day long.

—And we can make another slight tangent, because eventually, this all ties together. The tangent being:

Since cannabinoids are cleared so quickly from the bloodstream, its best that they be taken in small amounts, often

Browsing is what the deer does: it has a couple of leaves at sunrise, a couple of leaves around mid-day, a couple of leaves in the evening, a couple of leaves before retiring.

And why? *Because it tastes so bad you can only eat a little bit?* or do deer understand on some level that it only takes a small amount to get the benefit, but that benefit doesn't last a long time.

Humans, with their busy schedules, figures: *How can I get all my crunches done early in the morning?* For a year, I would juice the leaf and vegetables, drink a glass of juice down and felt that was a reasonable approach to dosing. And I had many patients on a similar dosing schedule of ten leaves once a day, who were quite pleased with the benefits to their arthritis and inflammation and autoimmune disorders.

It wasn't until I looked at some of ElSohly's research on clearance, that it came to me that other animals *browse*.

People who have severe autoimmune disorders (Crohn's, brain tumors) they're using the plant five times a day.

I thought it was more along the lines of: *"If a little bit is good, more is better"—and I'm really serious about this!*

And I thought the regime was maybe excessive, and certainly not something that your average person would entertain because of the complexities in their lifestyle. Western medicine is all about the quest for single-day dosing. You can hardly get someone to take a pill once a day that lowers their blood pressure: they don't want to be reminded they have illness, they're afraid of side effects, they're on the go, they leave it at home. Whenever you get into divided dosing, compliance just falls off. If you have an antibiotic you have to take three times a day, the number of people who actually do it three times a day for ten days is minimal. The idea of dosing up to five times a day—nobody! has time; nobody's going to coordinate that, and schedule that . . .

So, browsing becomes a different lifestyle. And with leaf, how do you simplify it?

Dr. Wm. Courtney: Ideally, fresh cannabis leaf juice would be offered at coffee shops, on the menu of juice bars.

For me, cleaning the juicer only once a day is enough. So what I do as a trade-off, is make that same 10 leaf/10 carrot juice (modified with fruits for sweet, or other vegetables just to change the flavor over the year) once a day, then take a couple of ounces right away and store the rest; taking another couple of ounces with lunch; a couple of ounces at dinner, a couple of ounces in the evening; a little bit before going to bed.

I'm experimenting with storing the juice in small baby food jars: a two-ounce jar with a nice re-sealing lid. Completely fill the jar to the top, put a cap on it so there is no air in there. Divide into five little doses and put it in the refrigerator, and in two shots, you pretty much throw it back with a single gulp. I'm trying to figure out whether keeping the oxygen off of the juice for eight or ten hours helps stabilize it for palatability, if not for nutritional or medicinal benefits.

Browsing fresh would be ideal. But eating a leaf is difficult for some. Others enjoy it and go out there and munch all day long—and I find they are often munching the tender green leaf, which do have a little bit of psychoactivity, and if you munch enough of them. I have had people say they get fairly intoxicated if they are munching on the ones closest to the apical meristem. The large shade leaves, are pretty clearly the beneficial leaf . . .

Why are they clearly the beneficial leaf?

Dr. Wm. Courtney: There's an excellent study I picked up when I was doing a presentation in Austria on clinical cannabis in California. One of the researchers came up after the talk and gave me this wonderful paper where they had analyzed the chemo-type in the cannabis leaf over 120 days.

Included was a graph showing that the chemistry of the leaf reaches a peak between the 60th and the 80th day after sowing.

You plant the seed and the third month seems to be the one where the leaves are done structurally growing. There's a continuous improvement, but it peaks out in that third month.

The chart shows that at week two, there are two grams; at week four, six grams. By day eighty, there are 20 grams. There is a continuous increase in the amount of cannabinoids which are associated with some of the benefits of the plants in the leaf. And those amounts peak in that third month. Then begin to fall off as the leaf goes into senescence.

So the 3rd month, that's when the leaves are fully mature; they haven't become senescent, they're at their maximum health.

And that looks to be the place to focus it as a dietary supplement.

I'm missing something: why are you attaching the results to the shade leafs?

Dr. Wm. Courtney: Because you want the leaf *itself* to be in its third month, and the tiny little leafs will have been there for a week, or two or three. So they'll be in the early stage.

It seems like first there is a lot of structural growth; then once the leaf is at maximal size, it shifts over and begins to bring in the cannabinoids and their chemistry. I'll post it up on **leavesofgrass.info** because I find it an absolutely phenomenal paper in this area.

This fellow, ElSohly also found a couple of new compounds that have moderate activity against the methlycillin-resistant *Staphylococcus aureus*, that very vicious strain of staph out there. There are compounds in the plant that are maybe not as potent as other medicines, but are present. And the idea behind this plant seems to be small doses all day long—if you can do that comfortably.

Most folks in Mendocino County do something to take care of their health. People will try to eat less, to eat organic; they try to avoid toxic sprays; they drink water: they do a lot of things based on their best research and feedback. Here we try to take care of our own bodies as well as we do our cars.

And in the light of that, it's my best prediction that this plant will be at the top of the food pyramid in terms of importance—or at the bottom, in terms of supporting the whole structure (depending on which part of the metaphor you want to play with.) I consider it the single most important dietary element outside of water that humans should have on a daily basis, and on a frequent daily basis.

If everyone here knew that leaf as a vegetable was as important as water, and could figure out how to build it in comfortably without a lot of work, it would be a wonderful experiment for the rest of the world. And so we're working on some techniques where you plant just a few plants. If you're going to harvest the bud, you're harvesting every two weeks: which means that you are going to constantly be in the production phase when your plants go from veg to flower; and you're able to get the optimal from the leaf, then have the bud as well.

And the bud (with the new high CBD strains we are finding) becomes the source of a large amount of CBD. Which has been receiving an enormous amount of attention—O'Shaughnessy's and ICRS—for cancer regulation. In my mind, for further instigating curiosity of this plant. . . .

What do you mean, "instigating curiosity"?

Dr. Wm. Courtney: It is driving—or mandating—that we as a culture, if not a species, understand this plant and its relationship with animals that use this plant to maintain health. Such an enormous amount of research has already been done, and the one thing we have learned from this research is that there is so much to know, there is so much synergistic activity occurring. There is just so much more to learn about it. We need to really understand how this plant has evolved these capacities and has spent this enormous amount of energy to produce all of these various chemicals that are intimately involved in the health maintenance of members of a different kingdom.

—You've got the plant kingdom over here expending biochemical energy to produce all these chemicals, and an animal kingdom that allows those chemicals to bind and alter the structure of proteins in their membrane and improve functioning.

If we understood that we would no longer be struggling with questions such as: *Is biodiversity important?*

And, *Should we pull back a bit with some of our more destructive behaviors and learn a bit more before we eliminate huge chunks of a web that really is intimately related to ourselves as well as other animals and plants?*

The whole planet is *a* life-form in these different manifestations, and there is a relationship that we need to understand better because it would impel us to make better socially and environmentally correct decisions.

And maybe it is going to be more expensive, maybe it is going to cost a little more to keep our activities in check rather than the environment they occur in. But if we understand the intimate relatedness between ourselves, I think that would inspire us to take the time and effort to figure out how to do it better; preserve what is left and restore what we've destroyed already to this pretty amazing experiment. . . .

Life . . .

Dr. Wm. Courtney: Yes ,Life.. Keep it from altering even more drastically by our impact on the environment.

I'd like to segue into the promise of the incredibly gentle, non-toxic, no-adverse-affects therapy for breast cancer that could very well result from the work of Sean McAllister and Pierre Desprez (from the California Pacific Medical Center Research Institute) who have successfully tested the synergetic effects of specific dosage combinations of THC and CBD re. the inhibition of cancer cells.

Desprez entered the collaboration after a decade of studying metastasis, the process by which cancer cells escape from a primary tumor and seed secondary tumors at different sites in the body. He found that cells in aggressive tumors (unlike cells in tumors that remain localized) express large quantities of the gene called Id-1 . . . . Would you take it from there.

Dr. Wm. Courtney: So it goes back to that intimate connective-ness.

Here's a plant that produces a compound that the US Department of Health and Human Services has a patent on, that is able to alter the expression of Id-1 gene, which is this gene of fetal growth.

You take a single cell zygote, and nine months later you're going to have a fully functioning human with trillions of cells. The conversion of a single cell—to differentiate it into nervous tissue and bone and muscle and heart and brain and kidneys—for each of these cells to keep changing structure and function, and then not only to develop one of each, but then to create a whole organ: that whole embryonic is a crazy concept! It's an incredibly intense time. And, this Id-1 gene unleashes the genetic material that allows this to occur.

Then, before birth, that gene is shut down, and that explosive growth is dialed back in. And then, after the baby is born, they continue to put on lots of weight and continue to get bigger and bigger, but they've stopped creating new organs, they've stopped creating new tissue lines: a lot of the really unusual differentiation is done, and now it is just a matter of growing everything so you convert the infant to an adult.

With cancer, one of the things that happens is that gene (Id-1), which was shut down at birth, becomes reactivated, and it suddenly allows differentiation (which is a cell changing it's structure and function) **and also encourages explosive growth.**

And so, with the really aggressive cancers—the cancers that kill you within three or six or nine months; where they just grow so fast they suck up all of the food and energy, and grow so large they push on nerves and other organs and cause failure around the body—that gene is suddenly unleashed, and this cancer is growing at the rate of a fetus: very, very fast and furiously.

And along comes the United States government's Department of Health and Human Services' Cannabidiol, and it somehow down-regulates that Id-1 gene (and there is a Id-2, the next gene that kicks in to decrease the activity of the Id-1) which is that conversion from wild growth to "normal" growth.

Rarely does a molecule in a plant have access to up-regulating and down-regulating genetic expression of regulatory genes.

So this Id-1 gene regulates the conversion of a single cell to an organism. It's a huge orchestration: they've got all these different parts of the orchestra and it weaves them all together: you want the nerves to go from here to there; you want this bone to connect there: you've got this whole big construction going on, and this gene is involved in that.

And there is a molecule in this plant, cannabis, which somehow facilitates the timely expression of that, and the timely control of that . . .

When you add it externally . . .

Dr. Wm. Courtney:

When you add it externally.

When you eat *this* plant, and you get access to icosomine, this 20-carbon molecule.

The body has a whole series of endogenous cannabinoids, and the phytocannabinoids, these 20-carbon molecules act at the same receptors in the membrane that regulates cell function.

One of those cell functions is vigilance or programmed cell death—'apoptosis'.

Apoptosis is a term for when a nuclear membrane ruptures, and that cell dies. And that's how the cell often destroys pre-cancerous cells, or cells that have become more problematic and the body wants those cells to "explode" or blow-up: it destroys the nucleus and the cell dies and it stops that pre-cancerous line from developing.

In the research McAllister reported at ICRS, they were using a pure, synthetic form of CBD in combination with THC against glioblastoma multiforme, an aggressive form of brain cancer —in vitro.

This is still Petri dish research and one of the problems with cell lines is that when you passage them for years and treat them with semi-artificial high serums and all the things that you do in cultures, their genetic profiles can change so that they 're not the same as the original primary tumor

Nevertheless, they found that in two of three aggressive brain cancer cell lines that when they added CBD at a lower concentration than THC—what worked was about fourfold less CBD than THC—they saw a synergism in terms of its ability to induce cell death. And, they discovered a molecular mechanism that may explain why it is if you add THC and CBD together they might synergize.

There is a family of signaling proteins: mitogen-activated protein kinase, MAPK. These proteins control cell growth and survival, depending on how they function, they can either stimulate cell growth, or if you stimulate them for too long in cancer cells, you can cause the cells to undergo programmed cell death, which is a desirable property in a cancer drug.

McAllister and Deprez found that when you add either compound at lower concentrations alone you produce either no effect or marginal effects on certain MAPK. But when you combine them, you get a dramatic change that leads to increased cell death and reductions in proliferation. — that's Guzman's "entourage effect."

At present, they are working with mice with aggressive breast cancer. And just like the common human progression, the primary tumor in the breast metastasizes to the lung. They have found that if they treat the breast tumor with CBD, they get significantly less metastasis in the lung.

McAllister is hoping to get plant extracts from Arno Hazenkamp in the Netherlands to test different dosing schedules in human trials. In the breast cancer model, CBD appears to target two major pathways, resulting in modulation of MAPK and an increase in production of reactive oxygen species. Both changes lead to damaging effects in cancer cells. That's different though, than in the brain tumor model where the majority of the drug's effect is inducing cell death. With breast cancer it looks like there are two primary pathways.

Much of this information is in a wonderful interview Fred Gardner did with Sean McAllister at his lab at the CPMC Research Institute in San Francisco. Fred asked Sean (given that his own clinical trials probably won't commence for another two years) if there were any consequences to folks in northern California just starting to experiment with our local high CBD strain.

McAllister responded that what he has seen in his experiments with mice is that there is definitely a specific dose-response occurring with CBD. If you're too low or too high you won't see any effect. You need to be within a specific therapeutic window. So that if the treatment is not formulated, and you don't really know what you are doing, you might not see any effect.

—Though titration (by puffing) for something like spasm, combined with the placebo effect might work. In that we now know, the placebo effect involves the endocannabinoid system.

What we always get back to, is that this plant facilitates the functioning of our immune system is my overarching belief. And that when it is supplied, it allows an innate ability. . . I've heard a million cells a day just begin to divide, and the body has to stop those divisions before they become cancer. Somehow the body has to say: *These two kidney cells just divided, but we don't need any more so we need to stop that growth, hedge it from getting out of control* And that's where I think this plant exercises its truest magic: supporting the immune system, preventing problems from occurring.

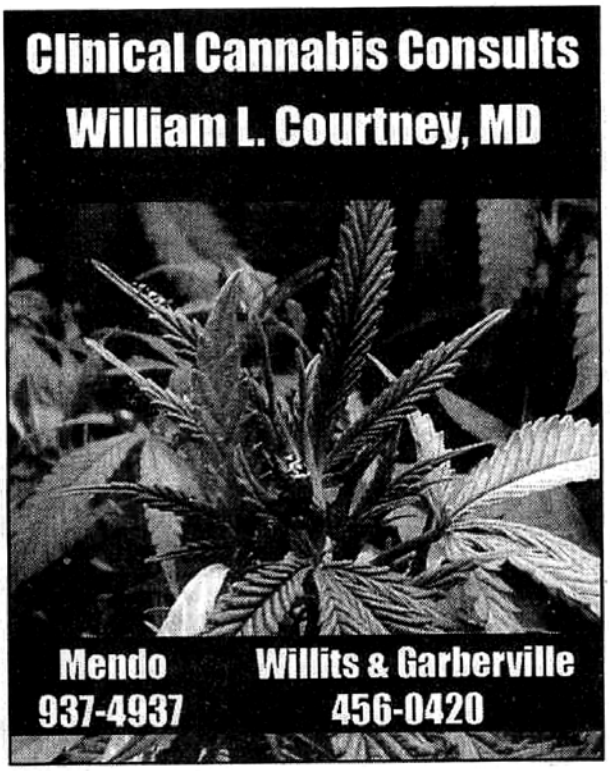
If you have not eaten cannabis for a long time, you are struggling alone. Your immune system is doing its best, but you've got 3000 chemicals in your diet and you've got a cancer of the pancreas or lung or breast or bone, or knee, or whatever, then all of a sudden you have this calamity, and need chemotherapy.

We're looking at how CBD can stop that aggressive growth. But it's my belief that if the CBD was there 5 years ago or twenty years ago —if it was part of your diet daily—there would be a lot less of those cancers that we then would have to struggle with in a life and death fashion.

So, what's nice about what Sean's lab is doing is foremost, 1) to ask the question; and 2) to report: *"We're getting quite a strong effect here. And nothing else seems to be acting in this area."*

And that is important because Cannabidiol is a Schedule 1 drug! Meaning, officially, it has no medical benefits. With heroin, you need a special license. I'm a physician, I can't order CBD, because *"There is no medical benefit."*

— Even though the federal government has a patent on the medical benefit. Even though we've got a lot of this anecdotal research coming up that says there are huge benefits, our federal government still is blocking access to something that is more like a vitamin.



In that US patent (which I encourage everyone to download and read) there is some heavy chemistry, but it also explains what an anti-oxidant is: it removes an electron from a super-oxide or hydroxyl; and it's those charged oxygen molecules that damage DNA and membranes.

And so, an anti-oxidant blocks these oxidative-associated diseases, and that federal patent that the Department of Health and Human Services has on CBD, identifies very diverse conditions. To quote: "CBD is useful for cataracts, neoplasia, cancers, strokes, Parkinson and Alzheimer's, heart disease, autoimmune disorders, inflammatory diseases: colitis and lupus and diabetes." The patent lists a very divergent range of conditions that benefit from antioxidants.

The patent compares CBD to Vitamin C, and concludes it is almost twice as potent an anti-oxidant as Vitamin C. CBD is more potent than Vitamin E. The only thing that comes close is BHT (Butylated hydroxytoluene) which is a preservative. And it is just mildly frightening that the federal government allows us to put toluene in our food but doesn't allow us access to . . .

Toluene is? . . .

Dr. Wm. Courtney: Toluene is used in jet fuel and embalming fluid, in plastic bags.—It's a modified toluene, but just having a toluene-modified chemical as a preservative in our food (BHT, BHA) while CBD is an anti-oxidant that is not toluene-based.

Despite what the government is telling doctors, you have pursued your own leg of research, part of which has been pursuit of a CBD-rich local strain.

Dr. Wm. Courtney: There is no better job in this County than being able to be in the middle of all these people's experiences. So many people have been drawn here by a sense of purpose, a pursuit of privacy and safety and tolerance.

And there are people out there in the mountains experimenting with this plant, crossing strains, saving strains, warehousing them. Trying to develop better ways of dealing with their pain, or their spouses pain, or their neighbor's affliction.

They have somebody in a wheelchair or somebody with rheumatoid arthritis. There are people out there who are doing the genetics, are doing the Luther Burbank thing. And this is one of those stories.

I'm always asking people if they have strains that they think are remarkable medicinally; and now especially, in that we have the capacity to do some analysis down at a new lab in the Bay Area that is testing for dispensaries—mostly for pathogenic mold contamination, but also for specific THC, CBD and CBN (Cannabinol) content.

So a patient brought me a bunch of strains and said: "These are from an old seed saver who lives behind me in the mountains."

I had said to him: "You run into lots of samples. We need to get a genetic analysis so we can finally have a strain for the person who knows CBD is beneficial for his ailment and goes to a dispensary and says: "I need a high CBD plant.""

Well the fellow who holds the genetics came through. My friend showed up and said, "Here are ten strains. There's not a lot of financial interest in these plants"—he was talking about the buds. They were kind of airy and not real dense; didn't have the weight; all these kind of issues.

"But," he continued: "this one in particular, it's really healthy. It has particular medical properties distinct from the other plant types this guy has." . . . And lo and behold that strain tested 50% CBD/50% THC.

When you come across a plant with a ration of 50% THC, 50%CBD, you have a plant with a ratio that can be remarkably useful. I think in more ways than we currently understand.

Up here, we've never seen CBD be in the 21%, 25-26% range—we've got THC in that range here. CBD seems to slow up around the 7.4s (I've not even heard of an 8.) But if we had 8% CBD and 8% THC, that's 16% cannabinoid content; that puts you up with the Kushes in THC. Sixteen percent is not 28, but 16% would be absolutely phenomenal, if the CBD allows the THC to also be medicinal. They competitively bind to the CB1 receptor, which is the psychoactive center.

It's known that a dose of THC is about 10 milligrams for most people, with tolerance maybe 20 milligrams. And maybe if you just smoke a lot all day long, maybe you can tolerate 30 milligrams—I doubt that. Generally 10 milligrams, you're intoxicated; 20 your stumbling and 30, you're laying down and are going to be recumbent for a period of time before you'll feel like getting up again.

Whereas, the doses for CBD that the Deptarment of Health and Human Services patent calls for are in the 1000 to 2000 milligrams. So the difference between 10 milligram THC (maximum for most) and 1000-2000milligram CBD dose is an area where you have a lot of these quite phenomenal benefits from CBD.

The samples, are they labeled with names?

Dr. Wm. Courtney: Yes, labeled. And I took them all down to Steep Hill Laboratory.

Did you get any history as to how they acquired their names?

Dr. Wm. Courtney: Very minimal history. My guess is that these are strains, may be from the 60s and 70s, that had been kept separate and bred back to themselves—kept distinct. A person who collects seeds and strains, they are a particular type of person: there is a real orderliness to it. I go back to Kinsey, who had a crazy collection of beetles and bugs.

—Or Darwin. There is a collector's mind, and out of there comes science. He knew there was something of value in his strains, but you just have to wait thirty years until government gets off the back of this plant enough so that a lab is willing to risk itself to do analysis.

And wow! Not only is there 5% weight CBD in this strain (weight of the resin compared to the vegetative structure of the bud); but there's 5% THC.

So you know you have a 10% plant that's in a balanced configuration. Which means you may be able to access all of those cannabinoids. THC and CBD will both be beneficial as opposed to one or another. You can suddenly multiply it.

GW Pharmaceuticals in Great Britain developed a high-CBD strain that it mixes with a high-THC strain to make Sativex, a plant extract formulated to spray under the tongue that has been approved in Canada to treat neuropathic pain. Patients with severe pain report significantly more relief from Sativex than from GW's high-THC extract.

CBD bolsters the pain-killing effects of THC, while moderating its psychoactivity. The feeling being because they in a sense compete for the same receptor site.

The strain saved by the old North Mendocino county grower has the same CBD-to-THC ratio as GW Pharmaceuticals' Sativex.

There's a caveat, of course: the variation from seed to seed of the same strain, the same plant can be an issue.

Because of variation from seed to seed: you can plant six seeds from the same plant, give them to six people with arthritis to grow out: one person could end up with one with 13% CBD and they are going to find an awful amount of relief; but someone may end up with one that has .8% and they are going to go: *"Nice THC in there, but it doesn't really deal with my chronic inflammatory issues."*

And that discrepancy corresponds to the widely divergent CBD in every seed off a single stalk on a single plant.

A clone, on the other hand, has a very consistent genetic presence. A clone is not going to have as strong of a taproot, I hear (you'll be able to tell by the leaf structure it is a clone), but it's genetics will be consistent with the plant from which it was taken. A plant tested out at 13% CBD: if you have a clone of that plant, you're going to have 13% CBD, as opposed to if you take seeds from that plant where that percentage, the same composition, is not guaranteed

Tell me about this new lab.

Dr. Wm. Courtney: Steep Hill Medical Collective. They had been working off-grid doing analysis for awhile, but then with the new fed-

eral government policy of allowing California to do what it is doing, and stop interfering, everyone's feeling a bit more emboldened.

—We were really hamstrung without analysis, and now that we have gas chromatographs-mass spectrometers and flame ionization detectors coming on line, we can begin to take peoples experience and do an analysis, so we can make statements like: *"This strain that you really like is high in cannabichromene."* Or, *"is high in THC-variant."*

Each of these cannabinoids really do have different effects—speed of onset, being one. So much is going on. Now we can take anecdotal reports such as: *"Of all the strains, this is the one I really like for my spasticity."* Now we can go through strains and look at not only the cannabinoids, but the terpenes. The terpenes are a hugely important class of molecules. And will probably become my focus for the next year.

Previously, terpenes were described as: "present to deter the deer from eating the plant." If you look at fairly sophisticated cannabis chemistry books, terpenes have been relegated to guesses. Like: *"Well we don't know what they are there for, but they taste bitte,r so maybe they are there to protect the plants from being eaten."*

That was science just a couple of years ago, that was cutting edge. And now we know that they are anti-neoplastic: they probably protect you from cancer; they're anti-fungal, they're anti-viral; they're anti-biotic; they're anti-inflammatory. There are at least ten different anti-inflammatory terpenes in cannabis.

We distinguish terpenes by way of our senses. Individual strains can have equal amounts of THC, but their scent be received so differently, and their taste; and those sensate differences reflect enormously different effects as reported anecdotally. The terpenes being the messengers of scent.

Dr. Wm. Courtney: The terpene profile—in general they are much smaller molecule. The mono-terpenes are a ten-carbon (they are the smallest of the terpenes.) The sesqueterpenes are a fifteen-carbon molecule. As the molecules get bigger, they're less able to be volatile at room temperature.

You don't smell cannabinoids when you smell cannabis because the molecules are too big to bust free and be in the air. The terpenes are small enough that at 70 degrees, at 50 and 60 degrees, they're busting free from the plant and volatizing . . .

Communicating to the animal kingdom . . . Informing discerning folks who are willing to listen through their senses—by smell, by taste—what they will be good for, ahead of time . . . The plants are talking to you.

Dr. Wm. Courtney: And they are affecting you. One of those fifteen-carbon terpenes binds at a secondary site—to the 2nd cannabinoid binder receptor (the CBD-2 receptor. One of the terpenes attaches to that protein, and changes the shape of the protein, which then alters how *strongly* that protein attaches to the cannabinoid. And so, the terpene is an allosteric modulator that alters the binding affinity for the cannabinoid such as CBD, or for one of the endogenous cannabinoids.

The human produces orthosteric molecules. Those bind at the primary site, and then this terpene comes in at a secondary site(or allosteric site) and changes how strongly that protein attaches to the primary activating molecule, leading to a longer duration of action.

How long your medicine endures?

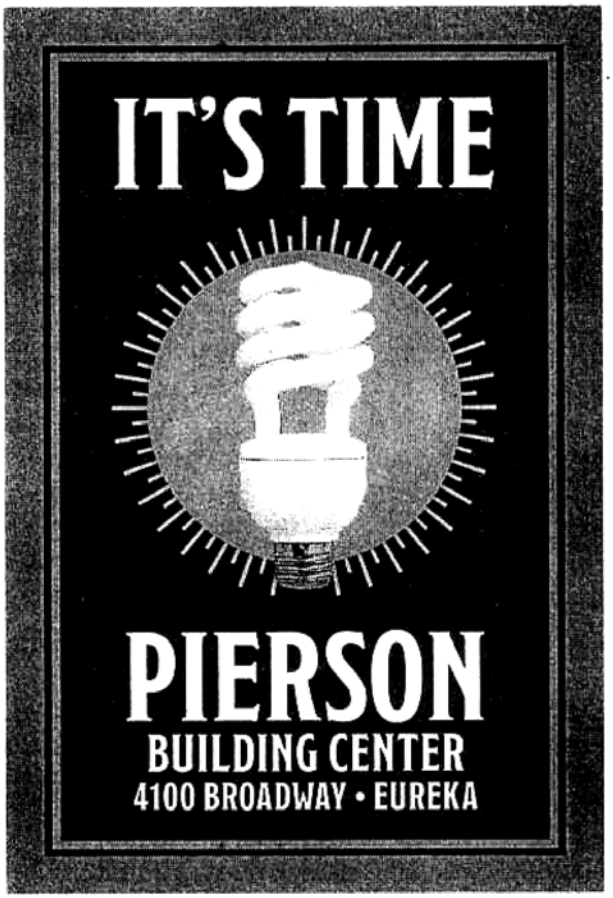
Dr. Wm. Courtney: Or how long the particular effect at the cellular level is. Without the terpenes, you got a one-minute signal of activation; with the terpene present, maybe you got a sixty minute signal. So it clamps on the molecule, holds on to it more tightly, and keeps that downstream signaling occurring which is causing the nucleus to rupture, killing the cell, causing the cell to divide . . . The downstream signaling from this cannabinoid system is dizzingly complex.

Does that mean if you remove some attributes of the cannabis plant in the lab and stick it in a pill or give it as a shot, you are not bringing the terpenes along? That if you get rid of the scent, get rid of the taste—if you so sanitize it for mainstream use—that really, you are interfering with the medicinal worth. Is that what is happening when you are pulling away from full plant medicine?

Dr. Courtney: Exactly. Western medicine is a kind of 'reductionism science'. Wants to reduce things to their smallest attribute, understand that attribute (and the other little attributes) and then say: *"Okay, there are multiple chemicals: but if you take it down to CBD, CBD is doing this ;if you take it down to THC—or Cannabichromene (CBC), Cannabigerol (CBG)—this does that, that does this".*

The atomistic approach produces an understanding that is very powerful and useful, but it falters with what they call 'dirty cannabinoids'.

The people at ICRS who are confounded by synergistic effects that they cannot nail down specifically, refer to the plant as 'dirty cannabinoids' because they can't tease out each unique specific activity; the whole thing is just this pile of confusion to them and they discount it.



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And they mask their inability to juggle synergistic effects with rationales: 'If you use plant vegetation instead of extracts, you are going to deal with issues such as aspergillum in the lung.' How do you address that argument?"

Dr. Wm. Courtney: That's where we draw the line. That's where we lay down in front of the bulldozers. I get really upset when I fear that they will attempt to block this plant with all the 'what ifs': *"What if this grower sprayed whatever on his plants?"* I really like the idea that there is testing of plant products before they are given to people who suffer immune-compromised situations. Steep Hill, for instance, is testing for aspergillum, for mold, and they are doing this not only for their dispensary, but for others.

In *O'Shaughnessy's* Summer issue, the partners running the Steep Hill lab speak to how if you get five or six people sitting around the living room trimming and there are dogs and cats and cat hair or birds and feathers: all that is getting stuck to the trichromes. That's a problem, and we can address that problem.

Trim in a clean room. wear gloves, wash your hands.
Treat your plants like medicine.
There are forces ready to elbow their way in and replace backwoods growers.

They are saying in effect: *"We will grow the plant because we are the only ones who can do it safely. We can create a test that is so rigorous no one else can cross the threshold. Therefore, we will become the sole purveyors.*

This is a plant that belongs in everyone's back yard. This is a plant everyone should have access to for fresh, raw leaf. My family used to do a lot of canning when I was a child, and you don't want botulism, you don't want certain bacteria. If you are going to can, you want to make sure you are killing the bacteria that could cause problems. If you have a peach tree, there are certain things you learn to do if you preserve the fruit. There is room for knowledge and reasonable use and handling and storage for every garden product. But the idea that we could lose the right to the whole plant, is so horrifying: I'm willing to draw the line there.

The strain you brought to the lab which checked out to have a high level of CBD, higher than anything you had come across previously in this region. Did that strain reach you with any particular recommendations re: ailments?

Dr. Wm. Courtney: These were medicinal strains, intentionally secured and kept separate and raised because they were believed by the farmer to be good. I haven't really talked with him, the strains were passed to me, so I don't know whether he felt one was really good for arthritis, another really good for G.I. upset, another good for migraines. I don't know how specific his knowledge.

But I know he felt there were individual properties that were unique. And it goes back to biodiversity: If we were to wipe out every strain of cannabis on Earth save one, that would be disastrous. This fellow appreciated that there were diverse characteristics and he had—I don't know how many strains—but he had a lot of seeds that he was keeping separate and I ended up with ten that he thought were medicinal and we were interested in looking to see if any of them were uniquely profiled.

What was the reaction at the lab you took the samples to?

Dr. Wm. Courtney: It was like Christmas: they were so excited to see what was in them. When you have people like myself who are very interested in trying to find high-CBD plants coming down from the hinterlands going: *"Here are these very rare plants that don't have a lot of commercial value, they're light and airy, but they could have very nice medicinal value . . ."* There was no time wasted: they immediately raced off and analyzed all ten of them. And, Wow! One of these was way more than they expected.

How do they figure out how much CBD is in a sample?

Dr. Wm. Courtney: You take a sample of the plant and you extract it: that means you pull out the different chemicals (there are 400 different chemicals but we're only interested in looking at two or three of them); you put them in solution. They have a gas chromatograph which separates the molecules, and then they connect it with a mass spectrometer which analyses the spectrum emitted from those molecules. You end up with an AGCMC profile, which is a graph of the molecules that are present in that sample. You could do an enormous amount of testing on the plant sample, or you could be looking to the three: they are currently testing THC, CBD and CBN (Cannabinol) content.

And CBN is of what value?

Dr. Wm. Courtney: More value than we suspect. Some people think it is a sign of an aging plant.

Steep Hill tests for CBN as an indices of the age of the bud, their concern being if it is a fresh as opposed to an older sample.

Steep Hill doesn't put the CBN content on the display card in the case—so they are not advertising it. But they are collecting it, and I believe they test for it to make decisions as to whether or not their dispensary will purchase that medicine based on how old it is.

CBN gives an indication of how long since harvest. If you tell them: *"Oh, it's a couple of months old,"* but it's really nine months old, they can counter with: *"We can tell by your CBN content it's not as fresh as we like."*

The longer it sits, the more CBN increases. They consider it a breakdown product. But the molecule has unique medical properties: it is the only known sedative molecule in the plant, a preferred molecule for people looking for something to aid them find sleep.

If the primary use is for sleep, a high CBN content would be ideal.

And reason to include CBN content on the card . . .

Dr. Wm. Courtney: Two additional CBN molecules were discovered by ElSohly and he listed their biological activity: in his paper the two Cannabinol derivatives 7 and 8; and molecule 7 were attributed with "moderate antibacterial activity against *Mycobacterium intracellularium.*"

Once again, it goes back to those warnings imposed on us by the Medical Board: I've told thousands of people that the side effect of cannabis is that it interferes with your ability to protect yourself against intracellular pathogens: TB, leishmania, Legionnaires. Then we find there are specifically potent anti-leishmania molecules, and here is a mycobacterium, then here is a tuberculosis, another intracellular organism—is even called *intracellularium.*

So, the plant includes compounds that offset the single side effect of a potent antioxidant which interferes with intracellular pathogens.

A plant that seems to ken its relationship with us so well, that it intrinsically self-corrects the harm it might cause?—Using "ken" because of the limitations of our language. But is that what you are indicating?

Dr. Wm. Courtney: We could probably use our language more accurately. In Western medicine, they'll say: *"This damages your kidneys, so we're going to increase water flow."* or, *"We want to give you Interferon for your MS or for your Hepatitis C, but it produces a lot of depression, so we're going to put you on an antidepressant first, because that will treat the side effect of the medicine we really want to give you."*

This plant, doing the same thing, goes another route. Antioxidants are *essential* for maintaining health. But, there are certain pathogens that have figured out how to avoid the immune system by moving inside the cell and living inside the cells; and you need super-oxides to destroy the infected tissue to get to the pathogens.

The plant produces additional medicines that offset the side effects of cannabis. Which is the potency of its antioxidant.

And CBN, which dispensaries consider a break-down product, is in effect good for you if you have TB, and also! if you cannot fall asleep at night . .

Dr. Wm. Courtney: According to ElSohly, in the paper he wrote two years ago, Cannabinol is a sedative: the only one listed of all the cannabinoids. It is also an antibiotic; also an anti-convulsive; also an anti-inflammatory. We now know it fights intracellular parasites. Nowhere does ElSohly list it as an indices of age by which dispensaries should exclude it as a product for patients that are suffering from these conditions.

This goes against the contemporary cannabis culture of indoor grows and urban dispensaries.

Dr. Wm. Courtney: Depending on your condition.

There are also strains that are higher in CBN, and if your issue is insomnia, if that is your primary struggle, you're going to want a high CBN strain

and you are going to want to let the flower probably get older, because that appears to shift the cannabis profile.

The analysis I would love to see is: young bud, middle bud, old bud left on the plant until it is very old and the hairs have gone brown. There is a lot of anecdotal evidence that that increases the CBD content—which is what we don't want, *unless!* you do want it!

There are some very simple questions that could be asked: if your issue is anxiety, you want CBD. If your issue is insomnia, you want CBN. And we're beginning to know which plants are higher in that, and which processes can increase that content. If you get a plant that high in CBN and you let it age, you're going to improve the sedative nature which is going to allow you to get to sleep and stay asleep, so that you're more rested the next day.

That's my scoop!

Dr. Wm. Courtney: It is. Because you've got people in the City not putting the information out. And the assumption is, all it is telling the dispensaries is what *not* to buy. But it's a very important piece of information and CBN content should be right up there with THC. Maybe people who are coming into the dispensary want a lot of THC for a particular reason. But there are more and more people who want CBD, and there will be more people who want CBN once they know that that is really what gives them most, the benefit they are looking for.

Our Community Colleges should be providing a course of study which prepares dispensary workers with this level of sophistication. Like recognition and respect for the career path.

Dr. Wm. Courtney: There are two things done at most scientific conferences: one is an oral presentation where you stand up and lecture and present information. It's unidirectional: one person gets up and talks and presents slides in a formal didactic.

And then there are the Poster Sessions, where you put up a poster (some of them are huge: eight feet by four foot) and you present a hypothesis and your research technique: your conclusions, your summary, your findings, and maybe future questions.

And people mill around.

The nice thing about a Poster Session is that you are face-to-face with individuals doing the research—could be a doctoral thesis or it's a full-time clinic research individual— and you can ask them questions: you can stop them to clarify a point. You can fast forward to: *Where do you think this is going? How do you think this interfaces with other efforts in this area?* It's like being able to visit with the persons who are trying to complete their PhDs in hundreds of labs around the world. It is really the *sine qua non* of exchange of information and growth of the larder.

Because when a person is talking in front of four or five hundred people, they take one or two questions at the end. But when you are at a Poster Session, all of your questions—and the researchers questions, and the researchers fantasies are out there.

The researcher is like: *"I needed to do this first to show that there was a relationship; I think we have conclusively shown it. The bigger question is: What is the relationship between the prostaglandins and leukotrienes and the endogenous cannabinoids? They're all formed from the same molecule they all regulate the immune system; but how do the three of these connect? — But before we can actually answer that question, I had to ask this little specific question, and that's what this paper is about. Really the importance is that that's the cornerstone to asking the next question."*

They put one hundred Poster Sessions up for two days, they put up another hundred for a couple of days, and then another hundred. And the worst part about giving a paper, is that you have to stand by yours and answer people's questions, as opposed to walking around and talking to the other 50, 60 people who you really want to go listen to.

So, it can be a one-on-one opportunity . . .

Dr. Wm. Courtney: Or a small group. You'll have a synthetic pharmaceutical organic chemist; and you'll have a microbiologist, and you might have a clinician if you get one of those California nuts in there who's actually doing field observations. *[smiles]* . . .

Going back to eating the raw green leaf with anti-*mycobacterium* antibiotics: If you can stop an infection before it's set up, that is medicine at its finest. And this plant is the embodiment of prophylactics and health maintenance. And so, you inhale some TB on a plane, or you are working out in a field and you run into someone else who is a carrier for TB and you get a little bit in you; if you can stop that organism before it forms a growth that you then have a hard time getting at. Prevention of that condition is so much better than waiting until is established, diagnosed, and you have to use very toxic medicines to treat it. . . . The more we learn about this plant, the more we see it is very well put together.

What did you deliver at ICRS this year?

Dr. Courtney:

A more suitable version of my original conclusion: that the Cannabinoids are fatty molecules that communicate harm between cells.

I was trying to come up with some terminology. As well as some evolutionary perspective.

From ICRS 2008 there was a study that showed the molecules (like CBD or THC) that attach to the cannabinoid receptor actually enters into the membrane, then move through the lipid layer. The active site (the orthosteric site to which the cannabinoid attaches to the protein that alters cell physiology) is within the fatty core of the membrane.

And that was a real shock to all of us. We assumed it was outside the cell, and it would attach outside; and that was a metaphor that pretty much everyone had held onto. But here all of a sudden, the molecule enters *into* the membrane, moves through that layer to attach. And the reason that was important to me—why I included it in my presentation—was that one of the real early organelles was its membrane.

Now they say the skin is the biggest organ in the body, one of the more complex. Well, the membrane that surrounds the cell, likewise is one of the earliest organelles, and without which, you don't have cellular life. So, in order for life to occur, you need to have a membrane-contained biochemistry-thing going on.

And it turns out that the structured membrane is consistent. It's been pretty much the exact same for billions of years. And it's got a polar outer layer, faces the water and the external environment. It's got all of these lipid molecules intertwined in the middle which is a fatty layer, then it's got a polar layer on the inside which faces the cytosol and another layer facing out of the cell into the aqueous environment.

So you have water—fat—water. And it turns out this fatty layer is like a conduit; and that probably molecules moved through that fatty layer as a way of communicating and regulating cell function.

Resource management is what a lot of early single cell-like life was about for billions of years. It was about getting in enough sugar, enough food; and moving out enough waste products. And the earliest communication molecules, these little fat messenger molecules, quite likely moved through the membrane as a structure to facilitate their movement. Because if you look at *Archaea,* which is one of these very primitive organisms, there is no nucleus; there is no organelle, no mitochondria, no golgia apparatus; no interplasma reticulum.

It is a bag of life.

And it's an incredibly simple organism. And getting a message across that would be very difficult, like plowing through thick mud, as opposed to being able to move through that lipid.

So it actually is like a tubule, through which messenger molecules could migrate and communicate this autocrine regulation. (An 'autocrine' is where a cell communicates with itself, often times externally.) So, it emits a molecule; it goes outside the cell; reattaches to the cell and so it is kind of regulating cell function externally.

'Pericrine' is where one cell adjacent to another cell emits a molecule that goes across and attaches to the adjacent cell and regulates local tissue function. 'Endocrine' is where an organ produces a hormone, an endocrine gland or messenger molecule that circulates through the blood system and affects the whole body.

So you've got autocrine, which is the self-regulated cell; pericrine, which is two cells adjacent; and then endocrine, which is the huge system. Well these whole autocrine and pericrine functions are really, in my mind, part of the early evolution of multi-cellular lifeforms.

What happened in this primitive single cell organism allowed a cross talk to occur. And so suddenly you had Cell A sending out a message that Cell B intercepted. And Cell B was saying: '*Wow! Cell A's got extra sugar, or it's got extra magnesium or nitrogen.*'

That information allowed symbiosis to occur, because suddenly there was a communication of resource management and an exchange that led to collective growth.

I think in the past I've talked about *Mixotrixa paradoxa,* which is a strange organism that lives in the intestine of the Australian termite. And there is this protozoan, this large organism, to which are attached five different spirochetes, which are little organisms that have these tails. Those spirochetes *push* this bulk around through the intestine. Inside there are bacteria that break down cellulose and have the chemical ability to convert cellulose back into carbon to recycle the carbon.

And so here is this organism that's a compilation of all of these different organisms that are individually distinct organisms, but they all work collectively to convert cellulose into carbon so that new plants can use that carbon dioxide. It is one of those very bizarre organisms that is in a kind of mobile symbiotic relationship, where you've got these various creatures coming together.

Well, in order for them to do that, they have to communicate: it goes back to these cannabinoids—or these fat molecules—that allow resource management to be exchanged, and then cooperative structures to develop. From that it evolved into symbiotic relationships, and from that into multi-cellular life-forms.

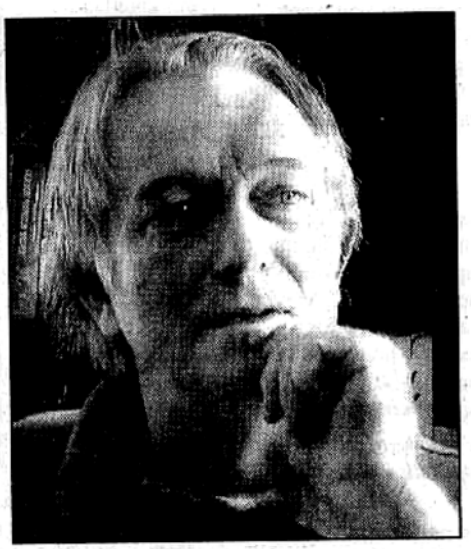
All of this stuff sprang from these early fat molecules that eventually were consolidated into cannabis.

Billions of years after they were around, this plant took upon itself the task of gathering them all together and producing them in quantities sufficient so that other organisms could ingest and acquire the benefits.

And then some two million years ago, humans come along, or anthropomorphic-type creatures, and they have their own 21-carbon molecules.

But they're all just a continuation of this early lipid messenger molecules that were essentially formed from the very first membranes and then led to symbiotic and then multi-cellular life-forms—which would be required before the plant could come along and have the structure and ability to consolidate these cannabinoids and provide them for other organisms on the planet who could use them to modulate and maintain their health.

Do you set this in some kind of Creationist understanding of life? Your narrative has a sensibility beyond the sanitized or secular story of Evolution. It feels like Purpose incased in a mythology spoken in the science of these times— your story of Existence, of Being. How do you see it?



Dr. Wm. Courtney: Rather than the 'Survival of the Fittest' as a test against which designs are tested and succeed and replace, and the project evolves in that direction: in addition to some of those classical principles, this brings to fore an inter-relatedness and "group growth" phenomena which would rely upon all the different life-forms on the planet.

You've got the bacteria, and bacteria are capable of very rapidly doing multiple, multiple generations: they can move genetics at a phenomenal rate, because they reproduce and reproduce and reproduce; and each time, they get a new generation that can test out biochemical theories. So the bacteria are a very strong component of life.

You've got plants, which can capture sunlight, create compounds. And if this one plant is an indicator of all these other plants out there, they have special abilities to convert electromagnetic radiation into biological molecules that are essential for animals to do their contribution. And so, the interwoven aspect of life is really as broad and sharp focused by focusing on this plant:

This plant is a fruiting body of mycelium that go back billions of years. When these membrane messengers first occurred, which allowed complex lifeforms to evolve, some of which could capture sunlight and move towards the plant kingdom; some of which could not capture sunlight and more or less have to depend upon the plants to survive. There is an inter-relatedness that seems to encourage an understanding of that connectivity, so we don't inadvertently destroy a four billion year old experiment that we have the capacity to inadvertently mess up.

What does this have to do with H1N1? NAFTA flu, I call it. This course of swine flu smacked back at us from Mexico, where campesinos were forced to accept the Industrial pig farming rural communities in the United States would no longer tolerate. The odors that make everyone sick. Contaminated ground water. The congestion which incubated another planetary round of swine flu.

Dr. Wm. Courtney: Swine flu was known as Spanish flu in 1918; it killed 20 million people. They do come around and around and there are some people who have some resistance based on a previous exposure.

Every time a virus goes around the Earth, the parts of the flu virus (I think it is an eight part system) just reorganize, and every year it's a whole different configuration. So it's a very rapidly evolving aspect of life.

What *is* a virus? It's always been an essential element in my cosmology, because the broad host virus is the extra-corporal shuttle of genetic information between the bacteria, which can test and prove and multiply. We use bacteria to produce hormones and drugs: they are phenomenal biochemical machines.

The virus can tap into the bacteria. It can tap into the plant with its connection with electromagnetic radiation and energy sources for the production of complex carbon molecules. And it can connect to the animal, who depends upon the plant and the bacteria for its ability to be alive. It's just this shuttle of genetic information of the highest order. Most essential molecules mounted on this plasma can be shared between all of these different kingdoms on this earth.

Has there been any investigation of the abilities of the cannabis plant to help the body deal with the current swine flu pandemic.

Dr. Wm. Courtney: It's my belief that there are terpenes and other elements in the plant that are anti-viral. Part of what swine flu does is compromise a person's health, which can result in secondary bacterial infections, which are more difficult to support and lead to higher fevers, and probably people end up dieing of the secondary bacterial infection after having the viral pneumonia or flu in the first place. There are definitely many antibiotic elements in the raw plant. CBD-Acid for one.

Now, you hear the word 'acid' and you think caustic and strong, dangerous and hard. If you take CO2 and you attach it to a carbon chain, it produces a carboxyl acid. So there is free hydrogen molecule, which is what the definition of an 'acid' is: it can release a hydrogen, which is a positive, an H+ molecule.

But the carboxyl group (the carbonic acid that is attached) is very delicate and breaks off easily. So you take CBD-acid (which is an antibiotic). You heat it, dry it, age it, that carboxyl group breaks off, and CBD is no longer antibiotic. That's one thing it is not. But CBD-acid is! The pharmaceutical companies are trying to figure out: *How do we capitalize on this? How do we patent this? How do we put this in pill form? What's our shelf life? How do we take something that is a fresh, delicate vegetable, and put it in a bottle to sell for $5000, and promise it will last for five years?*

It's befuddling to them.

Do you see cannabis as playing any special medicinal role as swine flu in a virulent formrolls across this continent?

Dr. Wm. Courtney: My Western mind says you want an anti-viral and how much is there? And you want it to be effective. If this plant would be recognized as the single most important dietary element, and it was accorded that kind of respect. If it was in every bag of salad and in every grade school food line. If everyone was fully saturated with these anti-viral elements, I think it could be very beneficial.

So we could be doing our own experiment here in Mendocino/Humboldt counties.

Dr. Wm. Courtney: I've been working with a woman up in Humboldt who wants to put in a 10,000 square foot greenhouse with the goal of producing enough leaf so that all of her patients could come in, get a glass of cannabis juice on a daily basis made from fresh leaf. And, as a nutritionist, is trying to separate out people with different conditions, looking at people with rheumatoid arthritis and people who are Post Traumatic. Kristen is going to be setting up some experimental designs based on significance: How many people do we need in each group to be able to say *"This many people suggests that there is a significance at a certain level of probability."*

This woman is very excited about supplying raw green leaf, and providing juicers to her patients, through her collective; providing juice to those who can't do it; keeping it fresh, and making a commitment to bestowing an awful lot of people with medicine that we can begin to follow. —As well as ask: *Are there strain-specific benefits? With one of these high-CBD bud strains, is the leaf going to be different?*

It looks like the leaf is fairly constant, at this point: Across strains, the leaf doesn't have the dramatic variations of the bud. But we'll know that better once we're able to analyze it, and once we have more high CBD strains: To see if the leaf is a constant and independent of the chemistry of the trichromes.

Are terpenes as present in the leaf as in the bud? Can you distinguish strains, for instance, by smelling a leaf?

Dr. Wm. Courtney: It's stronger in the bud. There are people who can smell differences in leaf and those smells would be terpenes. I don't have that answer at this juncture, but the next time we meet I'll be much more knowledgeable about their presence, their amounts, their effects.

I hold out a lot of hope that even if they are what would be considered sub-clinical doses, the fact that you've got ten or fifteen different terpenes and you've got other anti-viral, anti-neoplastics (again, a neoplasm being an abnormal new growth of tissue; a tumor) and anti-bacterial actions—if you have a whole bunch of small actions, you very well will accomplish the things that Western medicine can only expect from a huge pharmaceutical dose.

So, I'm hoping that in the synergistic effects of smaller amounts there is an outcome that surprises those who think you need 120 milligrams before you're going to have an effective dose. I believe that if you have a couple of milligrams of a lot of things, that those combined actions will be even more beneficial . . . in part why you don't have side effects, is because you don't have the overwhelming single concentrations that overwhelm the kidneys ability to manage adrenal exhaustion. So we are not going to be damaging our organs. With any luck, science will give us an understanding as to why synergistic effects will be the way of medicine in the future.

The Mendocino County grower who bred Sugar-Red Leg and the Charities told me that after grazing his cannabis leaves for three months he was astounded. He's lived with HIV for two decades that he knows of. He's come closely to death. And right now he is really spry. Lean, not languishing. Trim, not wasting away. What is in that extra acid that is bringing him back to such health?

Dr. Wm. Courtney: I like the fact that CBD-A is delicate, is an antibiotic, and once heated decarboxylates and no longer is. A lot of what we have done in the past 30 years is decarboxylate THC. And when you take the acid off THC it becomes psychoactive. All of our maneuvers have been to decarboxylate THC-acid and liberate THC. As a result, we've developed techniques and plants that are high in the precursors, and methods of drying and heating that result in high THC. Plus there are other breakdown products that are also quite psychoactive: other derivatives that through heat manipulation can increase the psychoactivity.

You like the delicate—why?

Dr. Wm. Courtney: It is a respect for the effort that has gone into the development of this plant. In my mind, it drives home the whole raw food benefit and Movement. What if heat does this much damage to broccoli, to carrots, to corn?

—Culture is the application of heat to food.

—Barbeque the meat; cook it, boil it, steam it; make it palatable. What if everything else is damaged by heat, the first tool of culture. That has to be a wake-up

The liberation of THC has benefits. But to me, the delicateness of a fragile THC-acid is an underdog thing. I've always had a bit of an interest in everyone making their way to the top of the pile, those struggling with being in a down position . . .

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It's a plant that Agribusiness can't convert into a capsule. This plant has evolved to be used fresh.

There's no way the pharmaceutical companies are going to be able to get all of the benefits out of that plant without having the plant. The plant is really best.

What does the A do? The acid attached by a hyphen.

Dr. Wm. Courtney: So why is CBD-A an antibiotic and CBD not? That gets into the intricacies of structural analysis. Marinol, for instance, is two stereo isomers of THC. When they synthesize THC to make Marinol, there is a right handed molecule and a left handed molecule.

It's like with your two hand: you have the same number of fingers and a thumb, but they are not identical. The direction in which your fingers and thumb are attached to your hands makes it such that they are not the same thing. Accordingly, by the way you attach the atoms, you create a structure that is unique. These are stereo isomers: this is a left-handed molecule, this is a right-handed molecule; even though they have 21-carbons, 36-hydrogens, 2-nitrogens, and an oxygen: they have the same number of elements but they are different.

In THC, one of these is biologically active, the other can't attach to the receptor and is not. So the receptor site at which molecules act are very specific. Even though they are exactly the same, they have identical molecular weight and constituents, one of them by spinning *this* way is the only way the receptor can be activated.

So, when a portion of human culture claims: *If we make synthetic THC, we don't need the plant anymore; the plant can remain totally illegal,"* they are wrong.

But, that's where this mindset was at: *THC is the active ingredient. We'll make synthetic THC. We'll make the whole plant illegal and kill two birds with one stone. You say you want the benefits of cannabis: take Marinol. All the rest of you folks growing it are felons and we're going to put you in jail. . . .*

And when you heat off the acid, the A, what have you done that is ruinous?

Dr.Wm. Courtney: It's not necessarily ruinous. It's modifying. Or evolving. Some products will break down into CBN. CBN has different attributes than the precursor molecules. CBD-A is an antibiotic, in part because of the acid. Remove the acid, it no longer can interfere in a bacteria's growth. CBD will not inhibit the growth of a bacteria, but CBD-acid will. I like CBD as an example because it does differentiate. Cannabigerol-acid is an antibiotic; but so is CBG, so it isn't lost by the removal of the acid in that case.

—Until recently, people were not looking at the 21-carbon acid molecules. .If you look at any science four or five years ago, THC-A was a storage molecule. It was how you stored THC until the magic of that medicine was released by heat. THC-A had no benefit.

Cannabichromene is an antibiotic without the acid present. The subtleties of this plant are baffling and keeps unfolding. Long before we'll understand everything that is going on, the plant was beneficial. This plant was beneficial to the rest of the world when that was what they used for their medicine. We came to them and said: *That plant is a crime and we're not going to support your hospitals and schools if you grow that plant. You make that a crime and we'll give you money.* We criminalized! antibiotics and anti-inflammatories and anti-leishmanias.

The Leishmania factor is amazing: here is the life cycle of this parasite protozoan: a sand flea is absorbed by the polymorphonuclear leukocytes where it multiplies; then it is absorbed by the macrophage, and when the fly sucks up the macrophage, we infect the fly. The fly gets infected from us and we get infected from the fly. Leishmania currently infects 12 million people in 88 countries—Old World, New World, Bering Straights. It was named after a Scottish pathologist.

What I'm saying is that there is a molecule in this plant that could be effective to 12 million people worldwide, but because that plant is a "criminal", we've taken that away from them.

How much damage have we done through the progression of this condition, that in the past would have been held in check in these cultures that relied on the cannabis plant as a medicine? — mixed it with milk, put it in salads, developed various delivery systems. Whatever happened in 1927 with Harry Anslinger, the rest of the world suffers the slings and arrows of his rabid ignorance.

[reaching for a folder] This case of psoriatic arthritis is as horrible a condition I have ever seen. Her fingers are terribly swollen up, her knuckles were dissolved: it was like you had taken the bones out. We were trying to deal with the swelling and inflammation—it was a symptomatic control; it was way too late to prevent the bone destruction that had already occurred.

This was a patient coming in for relief, and obviously, it would be very difficult for her to grow a lot of cannabis. She was just beginning to consider different ways of looking at it—topical keif, looking at using green leaf to decrease the inflammation and swelling on a preventative basis. There is a lot of bone remodeling research going on: theoretically, parts that were injured but not destroyed could possibly be rebuilt. And I had to make that case in court. This woman was actually taken to court!

We talked about bone remodeling in our last interview. Since then, a new study claims cannabis diminishes bone in young people though it increases it in older people. Do you want to discuss that..

Dr. Wm. Courtney: I would like to see the research. I'm skeptical of the problems with youth. Lot's of times, if it is an animal study, they'll use HU2-10, which is thousands of times more potent than THC, amplifying the effect; then saying there are problems. I have a hard time believing that if the individual was using the raw green leaf there would be a downside, given the nature of the process that led to that plant, the benefits. I'm just skeptical of what the specifics are and eager to look at them. At this point, my suspicion is that synthetic cannabinoids were used to enhance an effect, and that is not really the way the plant was evolved to be used.

Would you explain Simpson oil. In this transitional period of what's legal, what's not forever changing; where newer discoveries have to be home-brewed, one of the legends on UTube has it that Simpson oil if not carefully prepare, can be explosive.

Dr. Wm. Courtney: It is alcohol that is being boiled off, so the vapor could be explosive. But it is not butane or naphtha, or more explosive fumes. It is a possibility that alcohol could be a "processing" rather than a "manufacture", a very fine point which an attorney needs to address. The nice thing is that alcohol absorbs and dissolves the trichromes in the cannabinoids very quickly, which allows a very thorough extraction, more thorough than tumbling or screening or other keifing. So if it is legal and reasonably safe (and those are all questions that need to be addressed) it produces an interesting product: one that has a very high concentration of the cannabinoids, so it has the benefits of the bud itself.

The one downside is that it is a heated product, and it is becoming increasingly clear that when you heat it you effectively decarboxilate all of the acid compounds and those are significantly medicinal.

Claims for the Simpson oil have included cancer cures.

Dr. Wm. Courtney: In Canada, people who have had significant diagnoses that have led Western medicine to say: *"There's not much more we can do for you,"* have turned to Simpson oil, and supposedly have been having some survival links that are unexpected by Western medicine. I have not personally reviewed that research, but it seems like a hypothesis worth developing by doing more controlled trials.

Mico Wagner, in Luxembourg, has been using a high-CBD plant to make the oil. His trichromes have a higher proportion of CBD than the plants that are native to North America. He's using those plants to extract just the cannabinoids to make a high CBD oil, relatively speaking. He's also making a higher CBD/THC tea.

The point is: these new high-CBD strains have started appearing. There is a fellow now in San Diego: he feels he has a 10% CBD plant, which would be fairly remarkable. The G5 strain of GW Pharmaceuticals is 7.4% CBD, which I thought was at some maximum concentration. But if this 10% plant actually materializes and is available, that would put us up to 40 grams of CBD per pound of cannabis: compared to the Northern Lights grown here, which is about 4 grams. A factor of 10 in terms of increased concentration. That would be a very nice thing for many folks.

What do you think the relationship may be between a daily diet of leaf and Alzheimer's?

Dr. Wm. Courtney: In 2003, our federal government using tax dollars up in Bethesda, Maryland did research that led to the patenting of CBD. The abstract is a 150-word condensation of a 20 page document. It highlights the most salient features of that patent. They named Alzheimer's as being a condition that benefits from this molecule, because of its "chimeric" structure.

Chimera is a composite structure: it's part fat molecule, which allows it to cross the membranes and get into the brain; it's got two hydroxyls. When you put a second hydroxyl on, you make the molecule a bit more soluble.

You end up with this molecule that is soluble enough to be in the bloodstream, but fatty enough to cross membranes.

And that is walking a fine line: antioxidants that are very potent chemically, when measured electromagnetically.

But there is a difference between brute strength as an antioxidant, and physiologic acceptability.

Because if you have a whole bunch of antioxidant in your bloodstream, that's one thing. But if it doesn't cross the blood/brain barrier, it's not going to help your Parkinson's, your Alzheimer's, your stroke, your re-profusion injuries. And this molecule crosses cell membranes.

Oxidation occurs at the mitochondria within the cell, so oxidative damage is going to be spinning around the mitochondria, where oxidation occurs. You are picking up those destructive free radicals as they spin off of this process . . .

—I mean, oxidation is controlled burn: you eat carbon and you burn carbon, and you release C02, which is a single-carbon molecule.

(You take a sugar that is a glucose; has six carbons. You exhale C02, which is a single carbon; and in the mitochondria, you chop off a carbon and release energy. That energy is captured by the adenozine triphosphates and diphosphates, and the body stores up that energy in a chemical bond which is released when you chop off and release the C02 molecule.)

So *oxidation* is the controlled burning of sugars and starches and proteins, releasing chemical energy that life runs on. But as that very force goes on, sparks fly off of it: those sparks are these reactive oxygen species that need to be neutralized. CBD, because it is a fat molecule can get through the membrane and be present, and absorb those free electrons and stop the damage that occurs from the burning of food that provides the energy of life.

Recent indication that cannabis can prevent or reverse brain damage following stroke . . .

Dr. Wm. Courtney: The majority of the federal patent I've been referring to focuses on brain trauma, brain surgery and pathological states like a hemographic stroke, where you blow out a vessel, or an embolic stroke, where plaque breaks off from your neck, goes up and clogs an artery; you stop blood flow to a part of the brain and without the oxygen, that part of the brain dies. So whether it is surgical trauma, a blunt head injury, a ruptured blood vessel that no longer brings oxygen to that area, or an occluded vessel that no longer brings oxygen—all of these result in oxidative damage. . . What is really strange is that once blood supply or profusion is restored, there is a re-profusion injury, what's called RI.

I'm not clear: how does cannabis aid in reversing damage of a stroke?

Dr. Wm. Courtney: I'm not as familiar with the reversing, but the prevention. You want to have CBD present before an event occurs. So if you are eating leaf regularly, and if your CBD content is ready—think of it like Vitamin C: it's just an anti-oxidant that absorbs an electron to prevent damage from being done. If you have a lot of anti-oxidant on board, you limit the extent of the re-profusion injury, and you mitigate the damage of the initial stroke itself, as well as the secondary re-profusion.

So! You want to have it present in advance, rather than waiting until after the stroke is finished. Because after the stroke is done, the tissue is dead: you're not going to resuscitate those dead cells. . . . You may be able to bring in collateral circulation and start communication flowing around the dead area.

Were you describing the same avenue as consuming a half aspirin a day?

Dr. Wm. Courtney: The 81 mg. baby aspirin is accountable for fully 1/3rd of the gastrointestinal bleed fatalities. Three or four years ago I started studying the non-steroidal anti-inflammatories of which aspirin, ibuprofen, naproxen are the broad classes: they block the enzyme that makes the mucus; the mucus washes off; you begin an erosive gastritis. By Day 3, 90% of people have capillary hemorrhages.

Capillaries are the smallest little vessels through which single blood cells can pass at which gas exchange occurs. (The red blood cells brings in oxygen, lets go of the oxygen at the capillary; the cells pick up the oxygen, get rid of the C02; the C02 is absorbed and removed from the tissue.) So the gas exchange at the cellular level occurs at the level of the capillary, which is the smallest vessel. And those are what are rupturing—but they are rupturing all over the place as you wipe out that mucus lining and erode into the lining of the stomach.

Insignificant in terms of symptoms or survival, but as early as day 14, you can erode deep enough to hit an artery. And you'll digest into that arterial wall. And have one of those squirting bleeds (like you see on TV if you watch those channels.) Every time the blood pumps, it squirts into the stomach and you fill the stomach with blood. That's called a GI bleed. And there is research that has been suppressed by large financial political concerns, liability exposures—all the things that go into covering up and eliminating the passage of knowledge that can be life-saving.

The baby aspirin accounts for 1/3rd of those fatalities. And that 1/3rd is three or four percent of twenty million. The numbers run one-to-six hundred thousand have serious bleeds.

Is raw green leaf juice accomplishing the same benefit with regard to heart attacks and stroke for which baby aspirin is touted?

Dr. Wm. Courtney: Baby aspirin places an acetyl group on the platelet preventing it from forming blood clots. So what you are doing is you're decreasing the clotting. It takes about ten days to replace the platelets (they last about ten days and then new ones are formed); so when you acetylate, and more or less destroy the platelet, they want you to stop aspirin a couple of weeks before you go into surgery so that your platelets (which allow you to clot blood) restore themselves in your bloodstream.

I don't have this on the tip of my tongue, but I have a recollection that there is some acetylation as a result of eating cannabis. That it also is beneficial to control an over-active coagulation system, which when that trips off, is what produces the blood clot that causes the stroke or the heart disease.

If you approach it from that angle, the clotting cascade is another miracle of the human body, of living bodies: you've got this fluid coursing through these vessels; if you've got a cut and you've got this bleed, you've got to stop that bleed or you're going to die. So there is a huge, very powerful process that kicks in to staunch the loss of blood by forming a clot and plugging that hole. It has to be dramatically fast. If you sit there and pump out a pint or quart of blood, pretty soon you're going to get faint and fall down and the tiger is going to come eat you.

But the problem with any system that is so powerful and so quick, is that it can become activated when it shouldn't be, and you can form clots where they shouldn't form because you misinterpret a roughened surface in the lining, the intima of the vessel; you confuse that with a torn vessel (if it is a torn vessel, you want to clot it off; if it is a damaged vessel you don't want to clot it off, because it could be going to your heart or brain.)

As Americans have a lot of athrosclerosis, they have a lot of these roughened surfaces, and the body is confused: does that mean that you've been stabbed by a knife and you're looking actually at the edge of a vessel that is torn? Or is that vessel just tearing apart and the system goes off, and then all of sudden you have a clot, and your heart no longer gets oxygen, and then it dies and you have a heart attack or a stroke.

So, the regulation of the coagulation system: I'm fascinated at how that would interface with the cannabinoid system, which appears to be the modulation element of physiology of the body. If it is too active, it will kill you; if it is under-active, it will kill you. You've got to keep this system poised delicately.

Do you think cannabis addresses the rough surface?

Dr. Wm. Courtney: It would address the rough surface, and I hope it would be involved in the formation of plaque intima (irregular surfaces), and I hope it would be involved in fine-tuning the regulation of the coagulation system so that it knows when to blitz and block

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So *oxidation* is the controlled burning of sugars and starches and proteins, releasing chemical energy that life runs on. But as that very force goes on, sparks fly off of it: those sparks are these reactive oxygen species that need to be neutralized. CBD, because it is a fat molecule can get through the membrane and be present, and absorb those free electrons and stop the damage that occurs from the burning of food that provides the energy of life.

Recent indication that cannabis can prevent or reverse brain damage following stroke . . .

Dr. Wm. Courtney: The majority of the federal patent I've been referring to focuses on brain trauma, brain surgery and pathological states like a hemographic stroke, where you blow out a vessel, or an embolic stroke, where plaque breaks off from your neck, goes up and clogs an artery; you stop blood flow to a part of the brain and without the oxygen, that part of the brain dies. So whether it is surgical trauma, a blunt head injury, a ruptured blood vessel that no longer brings oxygen to that area, or an occluded vessel that no longer brings oxygen—all of these result in oxidative damage. . . What is really strange is that once blood supply or profusion is restored, there is a re-profusion injury, what's called RI.

I'm not clear: how does cannabis aid in reversing damage of a stroke?

Dr. Wm. Courtney: I'm not as familiar with the reversing, but the prevention. You want to have CBD present before an event occurs. So if you are eating leaf regularly, and if your CBD content is ready—think of it like Vitamin C: it's just an anti-oxidant that absorbs an electron to prevent damage from being done. If you have a lot of anti-oxidant on board, you limit the extent of the re-profusion injury, and you mitigate the damage of the initial stroke itself, as well as the secondary re-profusion.

So! You want to have it present in advance, rather than waiting until after the stroke is finished. Because after the stroke is done, the tissue is dead: you're not going to resuscitate those dead cells. . . . You may be able to bring in collateral circulation and start communication flowing around the dead area.

Were you describing the same avenue as consuming a half aspirin a day?

Dr. Wm. Courtney: The 81 mg. baby aspirin is accountable for fully 1/3rd of the gastrointestinal bleed fatalities. Three or four years ago I started studying the non-steroidal anti-inflammatories of which aspirin, ibuprofen, naproxen are the broad classes: they block the enzyme that makes the mucus; the mucus washes off; you begin an erosive gastritis. By Day 3, 90% of people have capillary hemorrhages.

Capillaries are the smallest little vessels through which single blood cells can pass at which gas exchange occurs. (The red blood cells brings in oxygen, lets go of the oxygen at the capillary; the cells pick up the oxygen, get rid of the C02; the C02 is absorbed and removed from the tissue.) So the gas exchange at the cellular level occurs at the level of the capillary, which is the smallest vessel. And those are what are rupturing—but they are rupturing all over the place as you wipe out that mucus lining and erode into the lining of the stomach.

Insignificant in terms of symptoms or survival, but as early as day 14, you can erode deep enough to hit an artery. And you'll digest into that arterial wall. And have one of those squirting bleeds (like you see on TV if you watch those channels.) Every time the blood pumps, it squirts into the stomach and you fill the stomach with blood. That's called a GI bleed. And there is research that has been suppressed by large financial political concerns, liability exposures—all the things that go into covering up and eliminating the passage of knowledge that can be life-saving.

The baby aspirin accounts for 1/3rd of those fatalities. And that 1/3rd is three or four percent of twenty million. The numbers run one-to-six hundred thousand have serious bleeds.

Is raw green leaf juice accomplishing the same benefit with regard to heart attacks and stroke for which baby aspirin is touted?

Dr. Wm. Courtney: Baby aspirin places an acetyl group on the platelet preventing it from forming blood clots. So what you are doing is you're decreasing the clotting. It takes about ten days to replace the platelets (they last about ten days and then new ones are formed); so when you acetylate, and more or less destroy the platelet, they want you to stop aspirin a couple of weeks before you go into surgery so that your platelets (which allow you to clot blood) restore themselves in your bloodstream.

I don't have this on the tip of my tongue, but I have a recollection that there is some acetylation as a result of eating cannabis. That it also is beneficial to control an over-active coagulation system, which when that trips off, is what produces the blood clot that causes the stroke or the heart disease.

If you approach it from that angle, the clotting cascade is another miracle of the human body, of living bodies: you've got this fluid coursing through these vessels; if you've got a cut and you've got this bleed, you've got to stop that bleed or you're going to die. So there is a huge, very powerful process that kicks in to staunch the loss of blood by forming a clot and plugging that hole. It has to be dramatically fast. If you sit there and pump out a pint or quart of blood, pretty soon you're going to get faint and fall down and the tiger is going to come eat you.

But the problem with any system that is so powerful and so quick, is that it can become activated when it shouldn't be, and you can form clots where they shouldn't form because you misinterpret a roughened surface in the lining, the intima of the vessel; you confuse that with a torn vessel (if it is a torn vessel, you want to clot it off; if it is a damaged vessel you don't want to clot it off, because it could be going to your heart or brain.)

As Americans have a lot of athrosclerosis, they have a lot of these roughened surfaces, and the body is confused: does that mean that you've been stabbed by a knife and you're looking actually at the edge of a vessel that is torn? Or is that vessel just tearing apart and the system goes off, and then all of sudden you have a clot, and your heart no longer gets oxygen, and then it dies and you have a heart attack or a stroke.

So, the regulation of the coagulation system: I'm fascinated at how that would interface with the cannabinoid system, which appears to be the modulation element of physiology of the body. If it is too active, it will kill you; if it is under-active, it will kill you. You've got to keep this system poised delicately.

Do you think cannabis addresses the rough surface?

Dr. Wm. Courtney: It would address the rough surface, and I hope it would be involved in the formation of plaque intima (irregular surfaces), and I hope it would be involved in fine-tuning the regulation of the coagulation system so that it knows when to blitz and block

effect. It's like: we're not going to take four years to get anywhere; we're going to be there now, because we're entangled.

And 'entangled' is what we are with this plant.

How did we get to 'spooky effect'?

Dr. Wm. Courtney: So Einstein rejected his own conclusions of the 'spooky effect', where if you take a beam of light and split it and send it in opposite directions; when you alter beam A, it simultaneously alters beam B, whether it is six feet apart, sixty feet apart, six million miles, six light years: these two beams are entangled. And this entanglement is one that occurs between two things that allow actions to occur irrespective of time and distance—a phrase that I can't even imagine to understand. But it is huge. And people are trying to develop communication systems that rely on this.

The concept of 'spooky' is the term that Einstein used because it was unsettling that this was a possibility. That science predicted it would happen: he couldn't accept it.

We are entangled with this plant: and it is spooky. It is also wonderful.

You practice medicine with the mind of a researcher, which is perhaps not rare amongst cannabis consultants, but certainly rare in the practice of the family physician.

Dr. Wm. Courtney: The drug rep comes into the doctor and says: "You need Prozac; it increases serotonin levels and it's better than the placebo—maybe 5% better."

— In order for it to be given status as a drug, it's supposed to be at least as effective, if not a bit more effective than a placebo.

And so, I'd like to talk about the term 'Placebo' and alternate terms for the body's ability to heal itself and be involved intentionally.

That mind/body interface, to me, is also a lot of what this is about. If you are feeling dis-ease, and you want to pull yourself back from the edge, the body's intent is pretty remarkable in its ability to impact outcome and it mobilizes resources, and the mind, through it's intent can optimize physiological function.

Placebo is a poor term,
because it has such a pejorative connotation
—*It's a sugar pill*— It's like you
***fool* yourself into getting better.**

No, you *intended* yourself to get better. You're drawing upon the highest aspects of humanity when you galvanize all of your resources to heal yourself. It shouldn't be a negative concept.

Of course, because of my recent indulgence in cannabinoids,

I believe that the cannabinoid system is part of the interface between the mind and the body, and is the avenue by which the mind with intent, improves its ability to help itself.

And part of that is by saying in effect: *Wow! this is beginning to cause problems.*

In a double blind study the person who is supplying the medicine doesn't know, the person receiving doesn't know, and there are two groups: one group is going to be getting the new medicine, the other group is getting a "placebo". But the real medicine might cause kidney failure in 3% of people. Some people could have psychotic reactions; some people could become depressive, some people might develop diarrhea, and they have to warn you of all the possible side effects.

So, if you are the subject who is in pain and suffering, and this clinician says: *"You may be getting the sugar pill or you may be getting something that can cause a lot of harm, theoretically can kill you, and certainly can cause illness. . ."* But the person wants to get better so much, they are willing to risk harm and injury to get over their condition.

And then, 50% of the people on the placebo get *better!*—without the side effects. Although, lots of times, they'll develop side effects, too. Just because they have been told about them.

The important thing is: here's the improvement curve with Placebo, and here's the improvement curve with an anti-depressant, and they touch points, and there is a little bit of difference. But over-all you might benefit some five or six pereent more than the 50% you get from Placebo. And that's all.

We need a tourniquet here. Because placebos cause a misdirection of resources in terms of the intent to heal, the intent to get better, and the mobility to mobilize this huge immune system to kind of visualizing the cancer and the body fighting the cancer and succeeding: There's so many things the mind can do when it interfaces with the immune system.

When you are sitting in your offices as a practitioner, absorbing information from your patients as a researcher—almost in the same way an anthropologist would take account—what's going on? How different are you from the MD sitting there listening, totally focused on the interface between patient and the strategies of Western medicine?

Dr. Wm. Courtney: With the Western medical paradigm, it all comes downhill. If you've been in medical school for a few years, it's the drug rep person: *"Here's a new calcium blocker; here's a new beta blocker."*

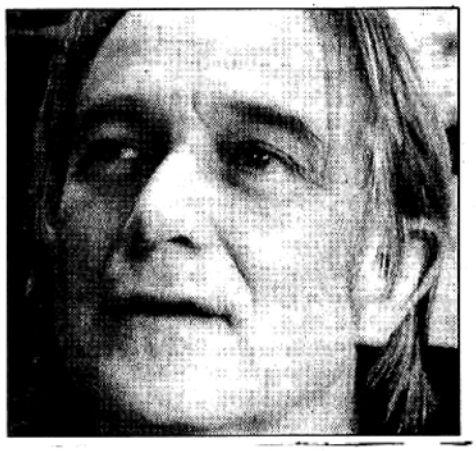
And when the patient comes to you, and they have migraines, the doc pulls out some capsules and says: *"Well, we've got Maxalt, we've got Demotrex; but now we've got this new thing: 5% of people do develop gastric ulcers, but this is really helpful. There are some side effects, but in general this is what we're recommending."*

The patient comes to the doctor, the doctor has special knowledge, and he says: "Here are the risks associated with the medicine."

Whereas, with cannabis, in my practice, much of the information flows uphill. It's the patient who comes to me saying: "This really helps with my migraines, " or "I eat leaf capsules."

And at first, it was like: *Oh my god, I'm dealing with people eating leaf!* This is a far out cry from the medicine I trained in.

—And by the way, I have people who are using green leaf as a poultice on the knee. I've had five people say: "My knee swells up and it's painful, and I grind up some leaf and Saran-wrap it on my knee, put on an ACE bandage and the next morning the swelling is gone and it feels better."



So, now when someone comes to me and they've got problems with their knees, I tell them: "Well, five people have said they've tried a topical application and felt relief. I don't have any double blind studies to support this—all I have is four or five people who have said it is a benefit to them . . ."

Old wives tale medicine . . .

Dr. Wm. Courtney: Exactly. It's kind of a frightening model. But there's Koch's Postulate: If your knee has been swollen and hurting for five or ten years, you try this and the swelling goes down and it feels better; and you do that for a week or two, and then you stop; and a couple of weeks later the pain comes back and you try the leaf again and it reduces the swelling and then you stop after a week and the pain comes back: there is an association.

We don't understand it, and it's certainly not "clean medicine"—this is medicine at its dirtiest: Grind up the leaf and slap it on your knees. It makes me feel silly to say it. But if that is all that you need . . . at least try it.

And there are so many plants out there that we need to be more curious about. The Tulsi have a holy basil. It's one of the plants that they worship in India, a sweet basil. I'm excited about the range of other botanical medicinal plants used by these cultures that are more naturally-oriented in their medicines. If this plant has taught me anything, it's a lot of reverence for the whole plant, the raw plant; and keeping one's ears open to people's experience with it, and be willing to entertain it.

This is not sterile science.
This is real-world poultices.

And I'm as guilty as the next. I'm all excited about CBD. But, I also know that terpenes extend the duration of action of the signal, and that the other cannabinoids are important. And that CBD as a moniker is just a bellwether of a whole bunch of stuff that is going on under that rubric.

Jeffrey King, a physician, wrote an essay for O'Shaughnessy's addressing why the lexicon of words and phrases representing cannabis matter: Here he quotes Dr. William Woodward, testifying before the US Congress at hearings for the 1937 Marihuana Tax Act.

"There is nothing in the medicinal use of Cannabis that has any relation to cannabis addiction. I use the word 'cannabis' in preference to the word 'marihuana', because cannabis is the correct term for describing the plant and its products. The term 'marihuana' is a

mongrel word that has crept into this country over the Mexican border and has no general meaning, except as it relates of cannabis preparations for smoking. It is not recognized in medicine. . . .The American Medical Association knows of no evidence that marijuana is a dangerous drug." ***He warned the prohibition they were considering*** **"loses sight of the fact that future investigation may show that there are substantial medical uses for Cannabis."** ***King commented: "Substituting the term 'marijuana' was such a successful ploy that many of the Congressmen voting for prohibition clearly did not understand what it was they were making illegal." Quoting from the too brief debate: "Mr. Speaker, what is this bill about?" To which Speaker Sam Rayburn of Texas replied: "I don't know. It has something to do with a thing called 'marihuana'. I think it's a narcotic of some kind." So King researched other ways of speaking about cannabis. Sanskrit and Hindi terms, "a richness of names that reflects the central role that it played in India's medicine and culture." Technical terms for different forms of the plant—bhang for mature leaves, charas for cannabis resin; ganja for unfertilized female flowers. Ethan Russo had cataloged Hindi terms that express behavior: ' the light-hearted, causer of reeling gait;'*** *capala,* ***a word that at the same time means 'agile', 'capricious', 'mischievous', 'scatter-brained'. But most of the terms pay tribute to the medical, psychic and spiritual benefits of cannabis:*** *Sarvarogahni,* ***'which cures all diseases';*** *kalagni,* ***'helps to overcome death,*** *bhangini* ***'breaks three kinds of misery,*** *matkunarie* ***'an enemy of bugs. My favorites:*** *manonman* ***'accomplishes the objects of the mind;'*** *dnayana vardhani:* ***'knowledge promoter', and*** *pasupasavinaini:* ***which translate into 'liberates creatures from earthly bonds.'—I'm paraphrasing and reading from*** 'Messin' With the Kid: Why Names Matter' by Jeffrey King, MD, O'Shughnessy's, Summer 2009.

Dr. Wm. Courtney: That was a part of what my paper was about: to come up with a language. that would allow everyone to talk about the plant. —And to consider the plant in its leafy, green vegetable essence: it's part of the environment; it should be part of the diet.

Removing it from terms that were created to degrade its use is part of the task.

It's a huge crime to push the Treaty One agenda on the rest of the world. Here, in the United States there are other options and you've got a lot of food, and so you have help from other sources of nutrition. But in so many of the other 104 countries that were, I'm sure, coerced into signing onto this anti-cannabis edict with threats of withdrawal of financial aid, food is scarce, pharmaceuticals unaffordable. And so you have countries suddenly giving up this plant so that they can get financial benefits, some of which probably never make it to those who need it.

But the trade-offs are made, and these other countries are the ones that are deprived of a plant that for 1000 years was grown in the backyard, including in the back yards of the founding fathers of this country: you have a patch back there and you use it for cramps and headaches. The rest of the world really needs this plant, desperately; and we have this strong obligation to undo the damage that we continue to force other countries. . . . A wonderful new name would be a banner by which we could approach this Treaty One.

In California, where prohibition is no longer total, the term "medicine" is often used; while the various strains that growers have introduced retain their sassy names—indicating the science is being done by an outlawed culture which has taken on the responsibility — and wears it like a mantel in names like Train Wreck, Afghani Fullmelt, Humboldt Purp.

Dr. Wm. Courtney: Cannabis is a term that is neutral enough for me, and how medicine referred to it for hundreds of years before. When the word 'marihuana' came along, doctors weren't clear about what it meant. The Political Action Committees were trying to prohibit 'marihuana' and the docs went: *"Marihuana? Doesn't have anything to do with us."* Big Cotton, Big Wood Pulp, the synthetic fiber industry didn't want Medicine involved in the debate, and so they called it something else, and left Medicine out of the circle as they were deciding to prevent this plant from interfering with the cotton industry, or the wood pulp industry, or the synthetic fiber industry. Three or four Political Action Committees decided that this plant was unnecessarily competitive. The PACs intentionally *excluded* Medicine from expressing their opinion. The docs come in on the very last day, and the decision is all made. And the rhetoric had flown, and chaos and 'Reefer Madness' was raging. —It wasn't 'Cannabis Madness.' And now, here we have the ink dried on the Treaty.

If people need another reason to be active, it is in reversing Treaty One, immediately. Stop that legislation that prevents this plant from being used by billions of people in the world, for whom that is really their own source of analgesia and anti-inflammatory, anti-neoplastic, antifungal, anti-bacterial, anti-malarial, anti-anxiolitic and anti-psychotics.

Give them back what is theirs and never ours to take from them. Because it is horrifying what we have done, and continue to do every day. The fact that this treaty is still around is a testimony to our indifference and messed-up sense of priorities. To reverse this wrong would speak legions about our willingness to admit we made a major mistake and inflicted pain and suffering on the whole world. Really, it's time we own up to that responsibility and stop it.

I'm ready to embark on a global effort.

I think some of the small Third World Countries are in a position to make a motion to amend the Convention One Treaty, which is the source of cannabis being withheld from so many people in the world, denying them something they can actually raise themselves for the cost of a couple of seeds. I need to learn a lot about the whole process of what is involved in modifying or amending a Convention: what the procedural issues are, as well as beginning to understand the politics of who can actually ask for that.

What is it you want to accomplish?

Dr. Courtney: I want to remove cannabis from the list of drugs that are associated with drugs that have no current known medical benefits—heroin, PCB; remove it from that class so that it will no longer be illegal around the world for individuals who want to use it as a medicine, grow their own medicine.

The plan is to first learn about the UN, learn about the work in seeking to modify a Convention. And then trying to gather the support from the more supportive countries, initially. I need to learn the politics of how you approach the main players. And it seems a pivotal piece is that US patent which has clearly identified the far-reaching medical benefits of cannabis. Using that as the reason to having it removed from that convention.

The scientific papers are just overwhelming; the evidence is very clear. At this point, the US Data Quality Act, which says you should rely upon science in making decisions: that, plus the federal government's own research and conclusions, and patent issuance all work in our favor. This is overwhelmingly a beneficial medicine. People in the US, you can go to the pharmacy, you can take prescription medications—antibiotics and anti-fungals; pain killers and steroids and anti-inflammatories—but so many of the members of that Convention, they can't afford to go to the pharmacy and spend three or four hundred dollars a month for anti-inflammatories, some of which have pretty serious side effects, in the first place, but if they wanted to, they are unavailable.

I will need the support of people in this county. Help with doing the particulars of meeting with the various delegates to the UN; presenting what my understanding is of the science behind this plant and why it is beneficial. One of my first stops is Jamaica where the long-term studies have been done. Anyone reading this interview that has contacts, connections, knowledge, diplomatic experience, knows anything about what the process is, who the players are, how the UN is best approached to achieve a rapid outcome, I invite you to contact me. The initial treaty was issued in 1961, and then it was modified and I know it has been worked on in the ensuing almost fifty years. And so that is encouraging—though in general, they just keep adding drugs, placing more in the banned category. I don't know if there is any history of them actually removing drugs from the treaty.

Whenever I distribute New Settlers in the towns along highways 1 and 101, I'm stopped by folks wanting to let me know how grateful they are for the Dr. Courtney interviews, Bill; the extent to which they have been informed and their own best guesses acknowledged. How important it is to them to have access to both your physician's vocabulary and stream of consciousness delivery, stepping them through the new research with which they can both better discuss their own lives with others and fine-tune their use of cannabis. Embedded in the acclaim is the natural inclination of human beings to be curious about their celebrities. I find there is

enormous curiosity about you, about you as —well—a celebrity.

Dr. WILLIAM COURTNEY: It would be hard to talk about my life without mentioning the birth of Zahiya. She was born on December 12th 2008 and is now going on eight months. Curious about everything. Every morning we go out on a walk and we touch grasses and leaves and trees and bark. You learn a lot from some one so totally open to everything; it can't help but refocus your own curiosity. She doesn't have assumptions. Doesn't cloud her mind with what she knows. She's just curious, curious, curious and that's a wonderful way to begin your day. When she wakes up and she opens her eyes, she doesn't really know: *Is this a dream or is this reality?* It always takes a few seconds to decide if she is dreaming, or if this is wakefulness.

How do you determine that?

Dr. Wm. Courtney: Her eyes kind of dilate and contract. It almost looks like she is in a reverie state; but suddenly there's more external input, and you see her struggling to decide. It occurs in a matter of ten or fifteen seconds, and then she is in the familiar world.

Zahiya's birth became very relevent in the context of your career as a cannabis clinician and researcher, and now, also to the international community of cannabis scientists..

Dr. Courtney: Probably Kristen has flushed out the details. We used raw green leaf as a dietary supplement throughout the pregnancy.

And what did you attribute to the leaf?

Dr. Wm. Courtney: Kristen's antinuclear antibody was at 30 at one point early on, and dropped to eight; so there was continuing resolution of some of her autoimmune aspects. The rheumatologist at UCSF response was: *"We don't know what this is. But don't stop what you're doing. Don't stop."* Because if we had, she would have had to become involved with the use of steroids and fairly toxic medicines to both Kristen and the fetus, and we didn't want to have to resort to those.

What did those numbers mean?

Dr. Wm. Courtney: There's an antibody in immune system disorders which is actually attacking the membrane that surrounds the nucleus inside the cell. So, as that count drops, there's indication that the process is less active, is calming down or going quiescent. It meant that she continued to improve her health during the pregnancy. Earlier, we were considering that we were going to have to live in San Francisco for a month for a Caesarian delivery. And things just kept getting better and better. Finally, they told us: "It looks like you can have your child in Fort Bragg." Obviously, it was much nicer to be close to home, and not waiting, away from your town and friends for a month awaiting a University hospital birth.

Cannabis leaf as a medicine is a discovery you make as a medical doctor, stepping forth in the first decade of a new millennium to plant your spear, and declare: "The leaf of this plant is medicine."...

Dr. Wm. Courtney: . . .Of the highest order.

Your reputation—indeed your license— on the line.

Dr. Wm. Courtney: One thing I have been graced with is the honor to be able to spend my day, every hour many days, talking to people who have such a wide range of experience with cannabis. People who have been through Western medicine for ten, fifteen, twenty-five years; have been through surgeries, medications and side effects upon side effects. Wanting to feel better and the best they were offered was: *"Try Vioxx.Try Celebrex* (for arthritis pain). *Try anti-inflammatories. Try aspirin."*

And when you are hurting and the metaphor of the culture you are in says the medical doctors and pharmaceutical manufacturers are the witch doctors, the holders of special knowledge; you struggle for a long time. And when these people found there were plants that they could grow in their back yard that could give them relief without a lot of side effects, they'd bring those experiences. They'd come in and set that in front of me.

Then the next person sets another story, and all day long I'd gather an enormous number of stories from people with autoimmune deficiencies, inflammatory conditions, seizure disorders, mood disorders. And they were tested and tried experiences—sometimes for decades.

Obviously, this included many people using THC preparations. But there were people who had been using green leaf capsules for Lupus (one from Texas for eleven years), people who were using green leaf capsules for migraine and depression. From them I got the strength to turn to the next person and say: "You've got the plant. You're composting ten, twenty pounds of leaf off of the plants you're growing; people are getting a lot of benefit from their leaf, so let's try it."

Pretty soon, new people would be coming in because their friends were using leaf. Now, two years out, people are coming back with their responses and for some, green leaf is all they are doing; they are growing plants just to use it as a dietary supplement.

Tell me about the research with terpenes you have in mind in the coming year?

Dr. Wm. Courtney: The discovery of that terpene that changed the binding affinity of the receptor for the cannabinoid: that was a couple of years ago. Before that, the terpenes were just a bitter that protected the plant from being eaten. Now, suddenly, it is *critical* to a more efficient function of the cannabinoids.

It probably will be a handout at the office over the next year, listing these terpene essential oils and boiling point properties. For instance: Caryophyllene, is anti-inflammatory, cyto-protective, anti-malarial. Limonene is a possible cannabinoid agonist, an immune potentiator, anti-depressant, anti-mutagenic. Linalool a sedative, antidepressant, anxiolitic, immune potentiator . . .

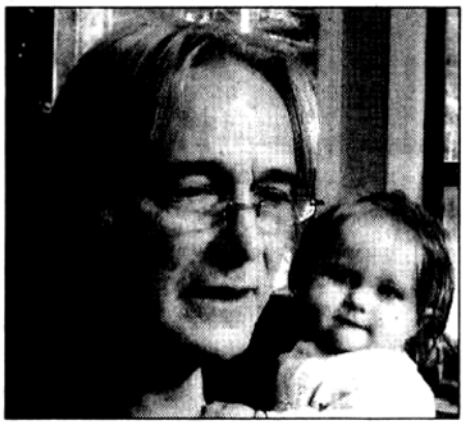
These are all terpenes . . . .

Dr. Wm. Courtney: Terpenes and their properties: antibiotic, anti-canadidiasis, ACE-inhibitor; antibiotic, sedative, antioxidants, anti-malarial, bronchial dilators, anti-inflammatories, anti-neoplastics.

Medicine likes an antibiotic which blocks a single step in cell wall growth, so that if a bacteria can't form a cell wall, it can't divide and you stop that bacteria. So, the best that can be said of Western medicine is: if you get a very specific chemical that has a known effect — until the resistance develops—it's a very silver bullet in the sense that this particular bacteria can no longer grow (it stops its growth) and therefore you survive its infections.

But that dominates to the point that there is no other thinking, and anything that varies from that model is just cast aside as so much snake oil. It's "dirty science" they say: *"There are so many factors going on, we can't understand them; so we need to get back to a lower level so we can discern the actions, and then we'll eventually add them all together and at some point, we'll have an understanding".*

And I believe, that probably in 100 years, we'll have a good handle on the various elements and their contributions, and their synergistic activities. But, in the meantime, we've got this plant that represents thirty-four million years of trial and error research, and has an incredible safety side effect profile and an incredible efficacy. And has actions that we do not understand yet. Every year we go to ICRS, we're finding out new things about it. They were there last year. We just didn't understand them. And there will be stuff that we're going to understand next year we don't understand now, but they are still effective today.



Returning from the European Conference—late October

Dr. William Courtney: It turns out, one of the really big things at the 'Cannabis As Medicine Conference in Germany' was, that as Kristen was talking about the benefits she got from raw green leaf with her various immune and inflammatory conditions, someone in the audience became very excited. This person, it turns out, was growing a lot of the cannabis for Amsterdam; had a very large manufacturing facility, and had the money to do some original research.

And so he ordered an analysis on the raw plant, the whole plant—the types of analysis you do if you are looking for botanical medicinals: Like if you are down in South America, you mix a sample of a vegetation up in a solution; you inject that into 40 little cylinders,

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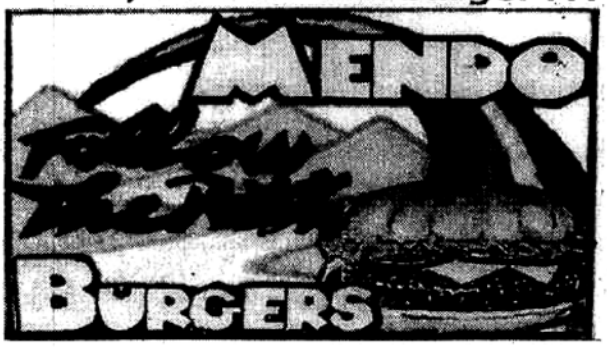

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each of which tells you of a particular characteristic: *Is it an anti-oxidant? Is it an antibiotic? Is it this, is it that?* They did a gas chromatograph, a complete, total profile, and it turned out, that THCA was massively in predominance in the raw plant. He took the THCA, analyzed it, and found out that it has many anti-inflammatory and immune modulator capabilities.

That basic research eventually evolved into a patent on the cannabinoid acids, and he's worked on a raw plant aerosolized system that essentially gives you a shot at those raw acid molecules; THCA being the big one. because there is a lot of that there in the plant.

This basic research was done in 2006 and reported in the *International Journal of Immunopharmacology.* I'll read from my copy of the paper: "Unheated Cannabis: Sativa Extracts and its major compound, THC-acid have potential immune modulating properties not mediated by CB1, CB2 receptor-coupled pathways. . ."

What does that mean?

Dr. Wm. Courtney: That means that the raw green leaf that people have been telling me has been of a lot of benefit, THCA is one of the major compounds present in the leaf—as well as (probably) in the bud and the trichromes. And when you heat THC-acid, you almost completely take the acid off, and this goes from a 21-carbon THC-acid molecule to THC, which is the psychoactive molecule.

So THCA is not psychoactive.

In the unheated plant there are 14,500 units of THCA compared to 90 units of free THC. This is a dramatic ration of THCA to THC: 14,500 to 90. Upon heating, you completely convert—that is you remove the carboxyl acid group, ie. you decarboxylate THCA into THC. Suddenly, you have over 10,000 units of THC.

That is: heating increases the THC content from 90 to 10,000. Heating is an effective and complete process, converting the non-psychoactive THC-acid into the psychoactive THC. This is the chemistry behind the differences between the raw plant versus the heated plant.

For the longest time, the psychoactive effect was tantamount to the *quality* of the medicine; if it was not very psychoactive, it was not so good medicine, and many people correlate the medical efficacy with the THC content.

And so: if you sauté it, if you bake it; if you simmer it, if you steep it, if you smoke it, you're going to effectuate and increase—a much dramatic increase— in the TCH concentration, and therefore, the ability to bind the CB1 receptor and produce the psychoactive effect.

And, for the federal government, THC is the only active ingredient. That is where it has been for so long.

Do you have guesses as to the medical benefit of the raw mature bud?

Dr. Wm. Courtney: It would be a higher concentration of THC-acid. In the bud, with its trichromes; and with trichromes being filled, you're going to have a lot of THC-acids. But also, of Cannabichromene-acids, Cannabidiol-acids, Cannabigerol-acid. THC was the focus of his paper, though he mentions and refers to all of the acid molecules.

I first talk about this when I came back from ICRS 2008: that was when I switched from dry capsules to fresh leaf, because of these delicate acid molecules. They break down just with age. If you take leaf and you store it, the third or fourth month it becomes psychoactive. You heat it for ten minutes, it becomes psycho active. Just with aging, it decarboxylates. THC-acid is converted into THC, and you now have a psychoactive product. So at that point, I switched from dry leaf to fresh leaf, because of the concentrations of these THC-acid. There was interest in the molecules, and it looked like it had properties.

—I was unaware of how extensive the research was on the 21-carbon molecules.

Most members in the community think that THC-acid is just a storage molecule —that it's like starch until you turn it into sugar— its just where you hold something; it has to be activated with heat to release the THC, is kind of the vision that most folks have. But in fact the THC-acid is shown to affect the Tumor Necrosis Factor

and there are various indices of its involvement in modulating the immune system, and acting as an anti-inflammatory.

Because the trichromes contain the volatile oils, do you suspect, then, that raw bud contains an even larger dose of the THCA that lead to those benefits?

Dr. Wm. Courtney: It could be a very rich source. But there is a question: You have 14,500 units of THCA compared to 90 units of THC in the unheated plant. Obviously a huge difference between THC-acid versus THC.

One question is: are the 90 units of THC sufficient to endow psychoactivity to the point that it would interfere with the naïve user's activities of daily living: driving, functioning, teaching school; whatever they are doing?

And that's a pretty simple test (it's in the process of being organized) to see if the young flower, the medium-age flower, the mature flower, or if the very old flower decarboxylates on the plant to the point that it creates the 10 mg dose of the THC needed for psycho activity. To see if there is a shift in the concentrations of THC, and if it is palatable. And, if it is mixed with the leaf and other vegetables, is it then something that would be useful as part of the raw plant use?

To date, short-term use of the raw flower even the fully mature flower is not psychoactive. The second question is, over time will the user saturate to the point that the free THC gradually becomes psychoactive?

I use raw leaves from our Stevia plant to sweeten our beverages. —I just read that Stevia plants have insect-repelling tendencies; that their sweetness may be a natural defense mechanism against aphids and other bugs that find it not to their taste. Crop-devouring grasshoppers bypass Stevia fields under cultivation. We grow ours in a pot . . . I'm wondering how it would do in a cannabis juice short on fruit that needs sweetening to be palatable but you don't want to ruin it with processed sugar.

Dr. Wm. Courtney: The cannabis plant can't but make you eager to know more about plants. So many medicinal compounds have come from plants over time. I never looked at that as intensely as I am now. The fact that there are herbs that can be involved in heart rate, heart function; stuff that is involved in stimulating the opiate receptor.

And I'm curious as to why each plant has maybe a slightly different focus.

With the cannabis plant, we are up to 75 of these 20, 21-carbon molecules called Cannabinoids that are really not found anywhere else. Why does one plant focus so intently on a system, and another one has opioids that bind to various receptors and block pain? There are herbs that bind with the benzodiazephine centers, and ones that effect the contractility of the heart. I don't think I'm going to live long enough to look into all the amazing interactions between the plant world and the animal world and how one branch can take photons and take carbon dioxide from the air, string those together an make a carbon chain that becomes a sugar (or a starch) that then animals convert *back* into CO2 through oxidation.

Lewis Thomas (another physician) his book, *The Lives of A Cell* moved me tremendously when it came out in the mid-1970s. His challenge to understand the relationship between the bacteria that live inside the intestine of a termite, and the ability of that organism to break down cellulose and release the carbon so that the carbon cycle could be restored—as opposed to wood lying fallow for long periods of time. His hope was that if we could understand the interrelatedness of these various organisms, that we would step away from nuclear proliferation, this annihilation thing that we were hell-bent on at that time.

My favorite imagery from** The Lives of A Cell **was the slime mold's response to the depletion of a shared habit and impending starvation. The hormone, alarme manifests in the human body when we are starving. For the slime mold, alarme is the hormonal signal it begins transmitting when the forest floor is running out of food. The signal sets other slime mold to convening, in closer and closer concentric waves. Enough of the slime mold pile on top of each other to form a stalk that stiffens as they suffocate, so that the live slime mold at the top, waiting like mushroom spores, can be swept out of the disaster area and carried to another feeding ground on a gust of wind.

Dr. Wm. Courtney: That's a nice metaphor for an organism on a micro-scale, that probably has a very neutral carbon footprint. But when I was a younger person, the thought was: *Okay, we'll get into a spaceship.* Like how some folks say: *"We'll log earth first, and then we'll go log the rest of the Universe."* Like, this one has run out of resources: We need to find water or moisture; drift off to somewhere else. . . .

I'm so old school! I saw it as a lesson in altruism. It seemed so touching that as part of the biology of this tiny species, individuals stack up specifically to build a stalk so that others could survive. That this collaborative sacrifice was a part of the lives of an organism we repugnantly named —'slime mold'. It never occurred to me it had to do with planetary travel or screwing up this place and going on to do the same to another. Some times cleaning up is good for a spot, and that's what slime mold do: they clean the forest floor.

Dr. Wm. Courtney: I love the lichen metaphor every time I get to this area of contemplation: one plant that can fix sunlight and the other that can re-scavenge minerals and water; and the two of them coming together, creating a symbiotic relationship that looks like a "plant", but it's just a relationship between two single-cell organisms.

I really believe these little fat molecules have been at the heart of evolution: first the evolution of single cell life. I mentioned before these cannabinoids circulate through the lipid part of the membrane, before they enter into the protein to alter the functioning inside the cell. We just discovered that a year ago. Every book out there today that you will see, will show THC, and CBD, and then the body's cannabinoids, attaching to the protein outside the cell at the "lock-and-key" kind of site. Well, it turns out that it enters into the membrane and travels through the membrane, and enters the protein within the membrane.

And to me that is significant because it shows that probably one of the very first organelles in the cell was the membrane through which these structural fat molecules convert into the message molecules, and then traveled around the cell through this contained environment to manage resources.

Most of life is a quest: *Is there enough sugar? Is there enough water? There is a deficiency state, and how do we make sure that life will go on?* These molecules release that "hurting" message about the environment, which allows that information to be available to another cell. The first time one cell is struggling with: *I'm short on water and I'm desiccating,* and there is another organism that is more hydroscopic and able to suck water up—*Okay, I can capture sunlight and if you can capture water, we can relate in that symbiotic way.*

I love that part of the progression of Life. And that leads to the web, with this interwoven nature—entangled.

It's pretty much a stretch of the term, but what else is the plant doing with these seventy-seven 20, 21-carbon molecules that modulate the functioning of the immune system, the endocrine system? In a very selfish perspective: Why would one spend the energy to do that? Why would one spend one's life building molecules for the other half of the creatures (which is

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the animal kingdom) that so needs them?

Is it because the plant needs those creatures to carry the seeds around? Is it the bird that picks up the seed and distributes it, supporting the plant kingdom because of its mobility? We immerse ourselves in that interrelatedness, and in particular, this plant that is so healthful for our own health maintenance and restoration.

Which leads me to talk about some of the projects I am now embarking on. One of the big projects is CANNABIS INTERNATIONAL, either as a foundation or just as an organization.

The first focus of Cannabis International Foundation is to allow the one-to-two billion people on this planet that are trying to survive on a dollar or two, to have this medicine back.

This medicine comes from billions of years of research. It's been used for millions and millions of years by organisms (and humans for a couple of million). And now, to grow it or use it or pass it to others, is the death penalty in certain countries. And it is a ten years mandatory prison sentence, with zero tolerance in so many countries.

And there are so many patents by so many people. If you look at any one of these patents: if you go to the Patent Trademark Office, it will give you a list of links, and you click on one and it will take you to another patent. There is a web of intellectual property of people trying to purchase, control, dominate, manipulate—personally profit. Corporate profit.

But outside of the problems with patenting a plant so essential, it documents the validity of this plant, and that it does not belong with crack cocaine and heroin, substances that cause lots of harm. Yet, we have removed it from billions of people, where this is the only medicine they will ever have. We have taken it away.

And your intent . . .

Dr. Wm. Courtney: The intent is to bring together as many countries as we can to put together to back an Amendment to the Convention One Treaty. They occasionally have these amendments that add more drugs to this Convention One Treaty, which is the basis by which other countries then ostracize that drug's use. We want an amendment that would, instead, remove this plant, based on intellectual property of individuals who identify, unequivocally, the medicinal value in an incredibly wide range of conditions.

Just based on the pure science and intellectual property, to offer an Amendment to the Convention One Treaty, to have cannabis removed as a harmful substance, so that individuals the world over can grow a plant or two in their backyard.

If you're living on a dollar a day, you're not going to buy Ibuprofen; you're not going to buy aspirin—or antibiotics, or antivirals, antibacterials, let alone anti-neoplastics and compounds that are anti-inflammatory.

These people have a very mechanical lifestyle: they are struggling with raising food. Arthritis, inflammations, the over-use, that's the story of their life

And here's a plant that is *phenomenal!* No side effects, 34 million years of gradual evolution to facilitate the relief of this pain and suffering. It's the only medicine they will ever have. And as a country, the US has taken this from the rest of the world.

Political Action Committees wield their force, and were able to push the Convention One Treaty through; now government looks back *blindly* on decisions made in the 1920s, and still declares:

"It's determined that marijuana has no medical value."

It's so untrue. There are all kinds of untruths. But this one had major ramifications on billions of people. And we want to amend it, remove cannabis from that treaty . . .

—And then, we would also like to do some strain development: we would like to have an organization that looks at hardy strains, that have a good balanced profile of cannabinoids. Because apparently, they all have wonderful properties.

And then, to provide a seed bank for these other countries, where we can give any one who was a gardener a package of seeds so that they can grow their own plants for their use. It would be nice if this organization could also facilitate analysis, so that people around the world could provide feedback as to what plants they have and what the properties are.

We just want to decriminalize it internationally. It really is a dietary supplement. It's way beyond medicine. It is a dietary essential. It may not have that classification yet in this country, but it clearly is.

So this Cannabis International Foundation is to make it available, to develop strains, to assess the quality of those strains and to provide seeds to these billions of people who we know this is the only medicine they will ever have. There is so much you can do for people, but this is a very simple, wonderful thing.

And as a country, it's incumbent upon us to say: "We misunderstood this plant and we allowed Political Action Committees to blackball it. But it is obviously not a horrible thing and it is time that this country spearheaded a coalition to decriminalize cannabis at the international level."

—Which is why the foundation will be called CANNABIS INTERNATIONAL. In this country we've done some experimenting; we've rediscovered things that people have known; and now for those countries where it is a criminal offense, we'll provide support and understanding, and obviously, come in and talk with governments and provide education, and copies of intellectual property: copies of the patents and the clear science that is in place so that they can come to this decision (in the most grievous instances) that they can stop killing the members of their society because they are wanting to use cannabis to relieve their inflammation and pain. •

UN Convention One Treaty of 1961 Barnstorm

To provide an Amendment to reverse inclusion of cannabis in that collection of compounds that include heroin, cocaine and PCB.

To help organize that effort email Dr.Courtney@mcn.org