

INSIDE THE DREAM GROWROOM

HIGH TIMES

FEB 4/21

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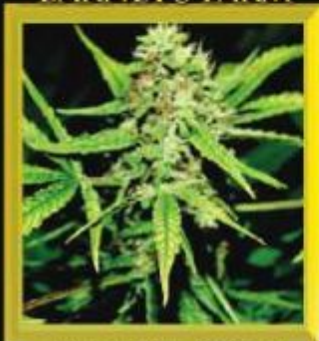
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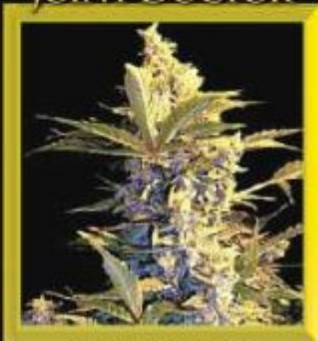
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BARNEY'S FARM



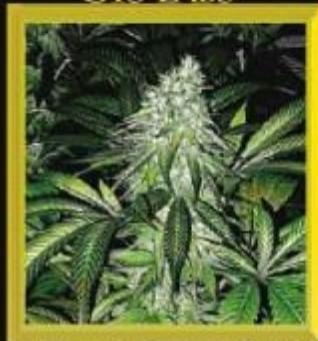
VANILLA KUSH

JOINT DOCTOR



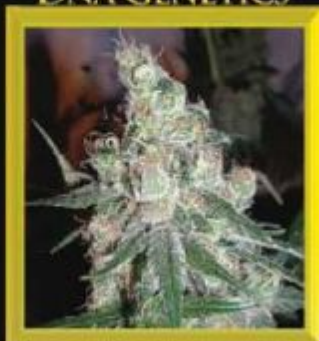
EASY RYDER

G13 LABS



PINEAPPLE EXPRESS

DNA GENETICS



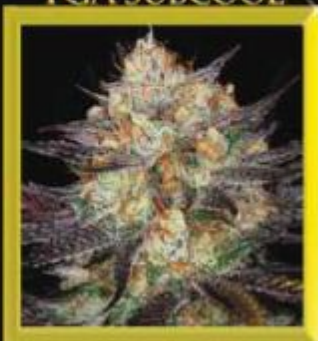
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GREENHOUSE



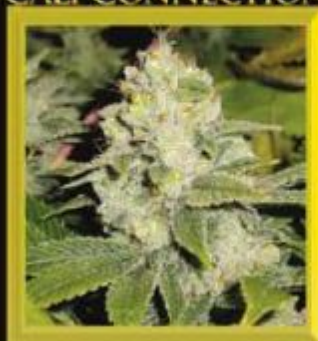
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TGA SUBCOOL



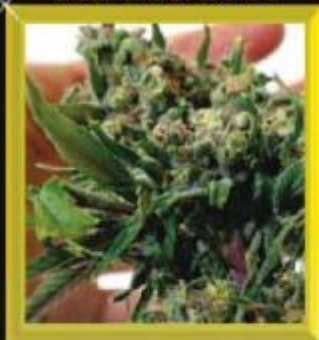
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CALI CONNECTION



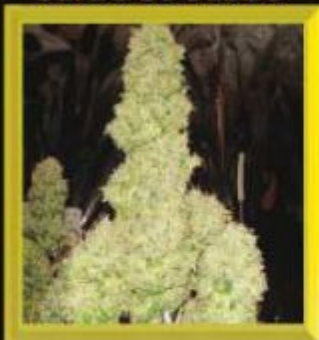
DEADHEAD OG

BIG BUDDHA



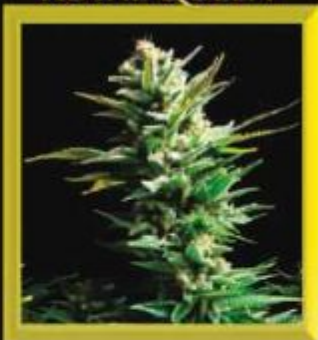
BLUE CHEESE

SERIOUS SEEDS



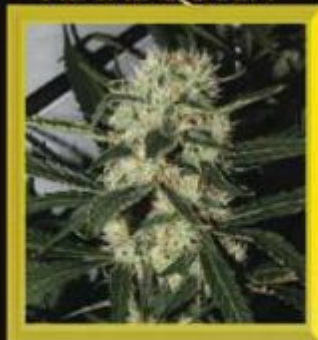
WHITE RUSSIAN

ROYAL QUEEN



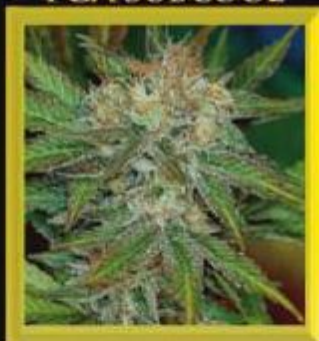
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ROYAL QUEEN



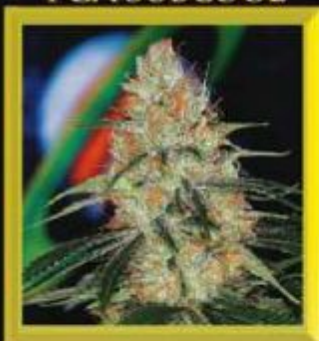
NORTHERN LIGHT

TGA SUBCOOL



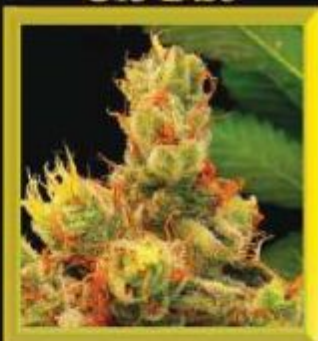
JILLYBEAN

TGA SUBCOOL



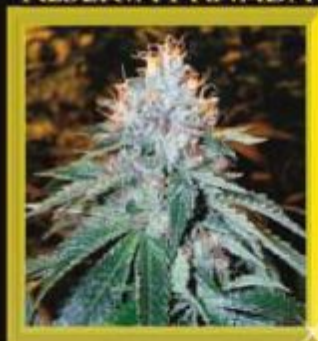
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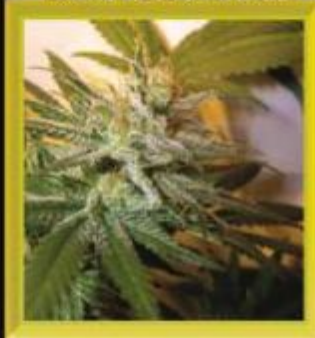
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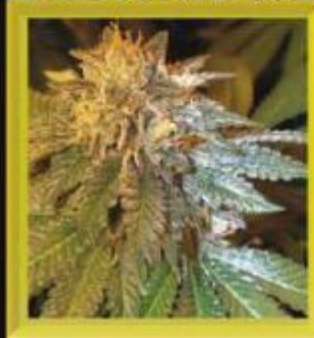


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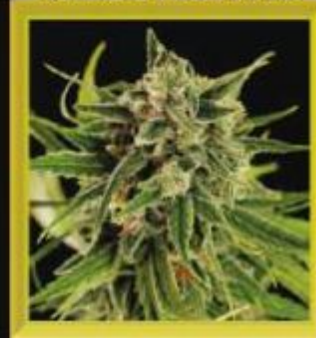
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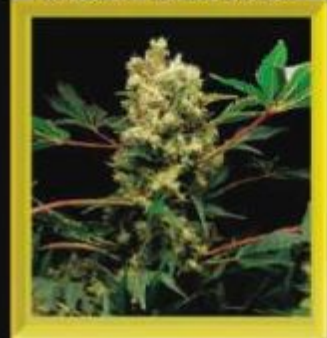
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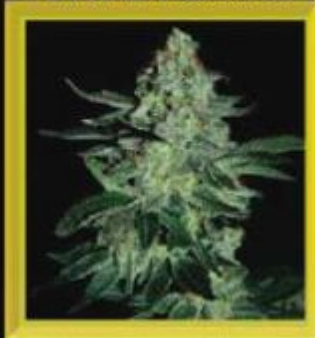
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DINAPEM SEEDS



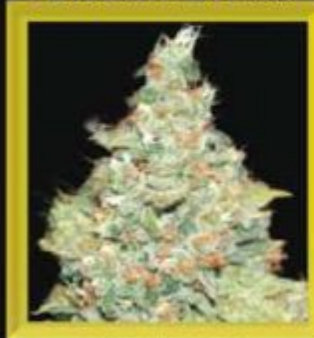
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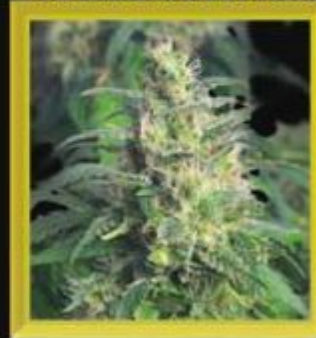
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PYRAMID SEEDS



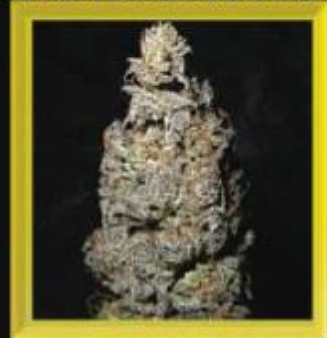
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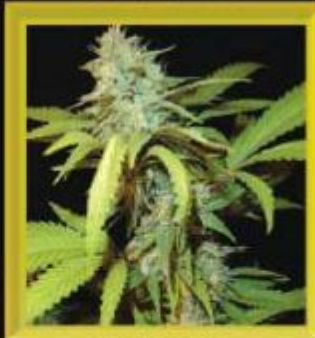
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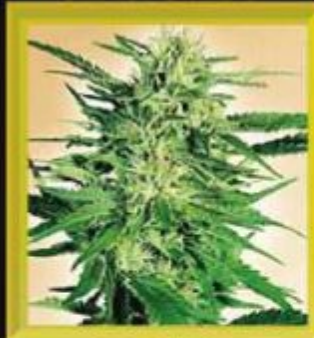
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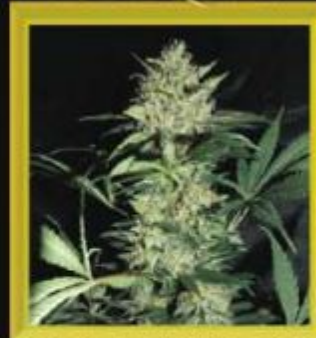
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BIG BUD

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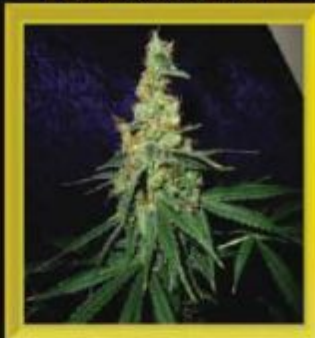
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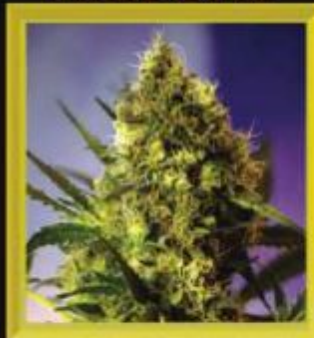
TWILIGHT

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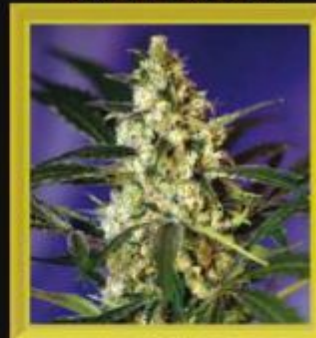
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SWEET SEEDS



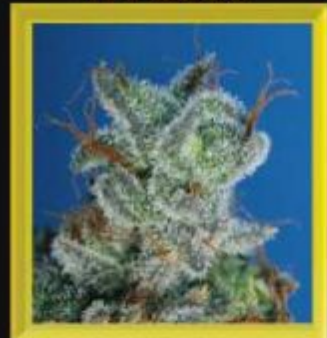
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NEW YORK, NY 10016 (212) 387-0500**

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KENT SEA

A WORLD OF WATER

This year, in keeping with tradition, we present our February issue featuring the 12th Annual Hydro Report. As many of you know, a significant portion of indoor marijuana produced within the borders of North America (in both the U.S. and Canada) is grown hydroponically. Hydroponics has rapidly evolved over the past two decades, though the technique itself, known as "water culture", was developed over a century ago and documented experiments date as far back as does civilized agriculture itself.

This Hydro issue, however, goes far beyond what we have done in the past in our annual Hydro Reports. This year's issue has been built for the geek-grower in all of us, diving deep into water in all possible aspects. Not only does the Hydro Report feature one of the best all-time hydroponic growrooms that this magazine has ever photographed (in fact, it made our cover), but there are excellent supporting articles, such as Hugh Jiëlder's piece on indoor water maximization, and our featurette entitled "pHiguring Out pH" by our resident PhD, Herb Spadowski. These stories are intended to help both beginner and advanced growers, but they are not only targeting those in the grow. It is our hope that all readers find something to take away from issues like this one, so that in the end we can all understand, demand and expect better-quality herb for medicinal and recreational purposes. Who knows, maybe it will even get people new to cultivation interested in starting up a garden of their own.

And the stories certainly don't stop there. Bobby Black visits Cannabis Therapeutics, Colorado's oldest medical dispensary. There he finds a full-service, all-encompassing facility that is a model of how medical marijuana is done right. On top of that, Lankford Jackson reports on "Fitness and Pot," and our annual STONY Awards coverage highlights the year's top stoner movies, actors and actresses. As always, there's plenty for everyone, so what are you waiting for? Enjoy.

Stay well amigos,

Nico Escondido

Nico Escondido
Cultivation Editor

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HIGH TIMES



FEATURES

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BY BOBBY BLACK

HT goes behind the scenes at the oldest and largest dispensary in Colorado, Cannabis Therapeutics, and talks with its owner, Michael Lee. We also pay a visit to Denver's latest medical-marijuana expo, the Rocky Mountain Cannabis Convention.

46 THE 10TH HIGH TIMES STONY AWARDS

The most lavish Stony Awards ceremony in HIGH TIMES history was recently held in Hollywood. Here's a smoke-filled behind-the-scenes look!

50 WATER WORKS

BY HUGH JIÉLDER

Maximize water usage for indoor grow ops. We tackle questions on water sources, filtration and hydro versus soil, and offer a detailed take on nutrient-solution temperature and alkalinity.

58 IN SEARCH OF LORD SHIVA

BY JOSH KRON

Journey to mystical India for a cannabis-laden tour of sacred cities, stoned saddhus, legal bhang shops and world-class, charas-grade hashish.

64 THE 2011 HYDRO REPORT

BY NICO ESCONDIDO

Our 12th Annual Hydro Report is one of our best ever! Covering everything from growroom specs to various hydroponic systems to details on EC and flushing in hydro setups, this article has something for every level of grower. If you're considering a garden of your own, this year's Hydro Report is a must-read!

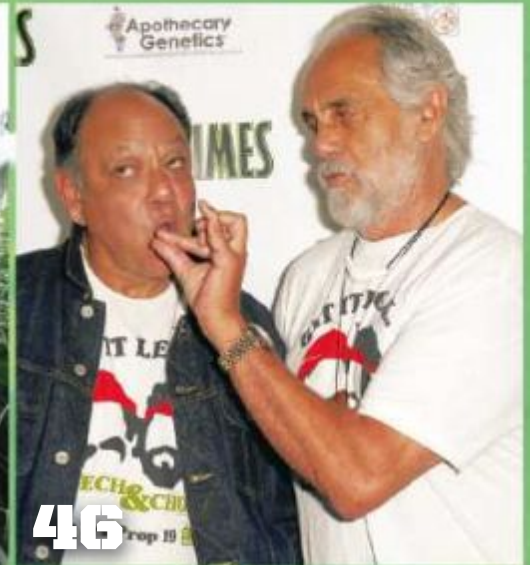
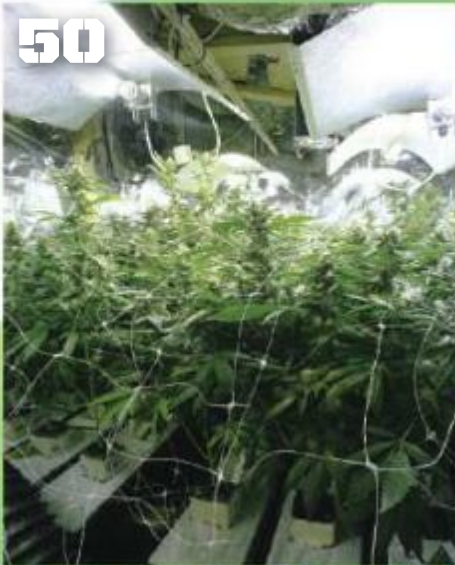
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ALLEN ST. PIERRE

BY RICHARD CUSICK

The national director of NORML sits down for an in-depth, one-on-one conversation about life as a marijuana activist. Allen St. Pierre also discusses what we can expect in the coming year: There's reason for hope, but still plenty of work to do.

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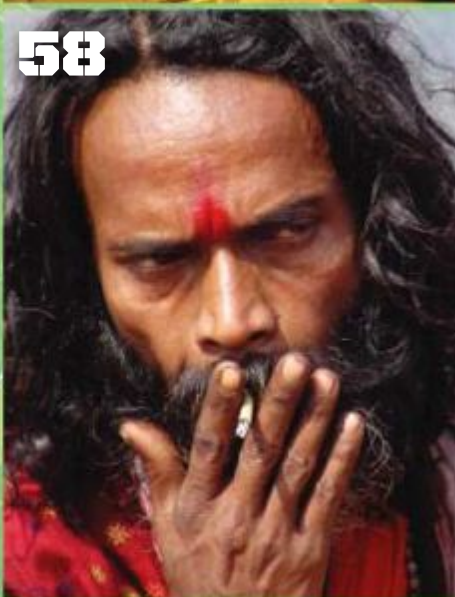


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EDITED BY DAN SKYE

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EDITED BY DANNY DANKO & NICO ESCONDIDO
Pix of the Crop; Cannabis Clinic; Munchies; NORMLizer; Freedom Fighter; Dr. Mitch; SSDP Report; pHguring Out pH, Dear Danko.

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COVER: NICO ESCONDIDO STRAIN: ASSORTED
CENTERFOLD: FREEBIE STRAIN: DEEP CHUNK

HIGH TIMES FEBRUARY 2011 Issue #421 (ISSN#0362-630X), published monthly by Trans-High Corporation, 419 Park Avenue South, 16th floor, New York, NY 10016. Periodical postage paid at New York, NY, and at additional mailing offices. POSTMASTER: Please send address changes to HIGH TIMES, PO Box 422560 Palm Coast, FL 32142-2560

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feedback

NOBODY BEATS THE WIZ

Wiz Khalifa made a mixtape called *Kush and Orange Juice* that I find a very nice plate to play. I would love to read an interview about him and/or his mixtape ... if you need to, Wikipedia him!

Christopher

How's it going? I'm Jeff—I live in the US, and I was just looking through all the issues I have of the mag and noticed that you guys usually do a lot of musicians who smoke. So then I realized: Why not get Wiz Khalifa in one of the magazines? He's an amazing artist and he smokes a lot.

Jeff

You're in luck—check out the Wiz Khalifa article starting on page 24 this month.

BRAIN DAMAGED

I saw your recent article on legalization in California—good point about amnesty. However, the piece confused Proposition 19 with the legalization bill introduced by Tom Ammiano in the California Assembly. Ammiano's bill was originally called AB 390; as of today, he's reintroduced it as ABX6 9 (http://info.sen.ca.gov/pub/09-10/bill/asm/ab_0001-0050/abx6_9_bill_20100921_introduced.html).

It's Ammiano's bill (under all of its various numbers) that proposes a \$50 tax, though the new version adds "until a different fee is determined." And it's Prop. 19 that actually ups the penalty for furnishing pot to minors from age 18 to 20. (They say it will then match the penalty for providing alcohol to that same age group.)

Keep up the good words!

Ellen Komp, CA NORML

HT ROCKS!

Hey, **HIGH TIMES**—longtime reader, first-time writer-inner. I love your magazine! Your support of the marijuana counterculture is very important to many people throughout the world who read your magazine for news and how-tos on marijuana and hemp. I just wanted to write in and let you know that you guys are doing an amazing job. Keep up the good work!

Ryan T

Oakville, Ontario, Canada

Well, well, well—look who's still around!!! I used to buy this rag every month back in the '70s and '80s. I thought you guys were gone. I'm glad to be back in the bosom of the best rag ever published to amuse and educate everyone on the ins and outs of Mary Jane, whether for medicinal or casual use. I wish I could have gotten some medicinal jane for my wife while she/we battled ovarian cancer for almost eight years.

Mike S., New York

I just wanted to let y'all know for prob'ly the gazillionth time that y'all do a wondrous job. I'm a havta-keep-hidden toker—amazes me with my



personality that the ones I wanna keep it hidden from still honestly think I've long ago given up the green. For me, it helps with seizures, so I'm awful grateful for the many articles written informatively and concisely. Bein' kinda closed off from the world at large and constricted in various ways as I am, sometimes y'all are the way in which I first discover new things or ideas or info.

I was turned on to the life of livin' green long ago—and, funnily enough, in the house in which I am now master—by a large family of Georgia plumbers. First time I ever went accessory shoppin', I got the li'l freebies you generally get from those types of stores ... and one of those gifts was a **HIGH TIMES** mag. I'm unable to work or drive, and I'm a single momthang with a teen and a mini-me twerpling girly, so, budgetwise, I long ago had to make a choice on what I could afford (or not). I had no idea until 'bout two years ago that y'all were online ... BLEW MY MIND.

Thanks so much for the work y'all do. Every single one of you is a light in the dark world that surrounds us all—you are amusing, and you teach so many things. Now that I'm back, my fave thing so far is the Almost Infamous dude, Bobby Black. Keep up the highest form of flaming work that y'all have thus far represented. Peace, love, happy stuff at alla y'all, and behave 'round cops and cameras.

Lisa

DECEMBER DROOL

Great issue—I was slobbering when I got to the 10 strains! Peace.

Mikey Neides

REVIEW OF REVIEWS

Thanks for the review of *Baked* by Mark Haskell Smith in the latest issue. It's not often that I see book reviews in your magazine, and this one was very well written. However, I do question why you took the time to review *Baked*, a lowbrow pot thriller that will soon be forgotten, but have neglected to review T.A. Sedlak's *Anarcho Grow*, a literary pot book that one of your former editors referred to as "the best marijuana novel since T.C. Boyle's *Budding Prospects*"? Nonetheless, thanks for including book reviews in your magazine.

Gary Storck, President of Wisconsin NORML

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Mark

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Caption tk goes right here and looks like this.

WAZZ

WORLD SERIES HITS

San Francisco proved once again why it's our national stoner capital. During the first two games of this year's World Series between the hometown Giants and the Texas Rangers, fans cheered their team on by lighting up liberally throughout the games. Texas outfielder Josh Hamilton was blown away by the sweet smells wafting out of the stands. "I could smell weed in the outfield," he said. "It was crazy!"

BLAZE ON WITH AVON!

The Avon Lady rang your doorbell when you were little and tried to sell your mom cosmetics. In fact, the commercial catchphrase "Avon Calling" is a part of Americana. For over 70 years, Avon has flourished. It's a Fortune 500 company, represented on the stock exchange.

We'll buy shares in Avon any time, especially if their latest catalog of products is an indication of the company's new direction. Avon's muffin trays, pancake dispensers, utensil sets, and tea infusers are all featured in the "Wake 'n Bake" section of the catalog.

Next time we hear "Avon calling," we're answering!



NO STONER LEFT BEHIND

In this new era of medical-marijuana dispensaries and even possible widespread legalization, let us never forget the Americans still being arrested and incarcerated for marijuana cultivation, intent to distribute, and even mere possession for personal use.

According to US Department of Justice statistics, 51.6 percent of all arrests for "drug abuse violations" (possession, sale or manufacturing) in 2009 were for marijuana. Considering that it's the most popular illicit drug by far—the US government recently estimated that over 15 million Americans use marijuana on a monthly basis—the actual figure could be much higher. The raw numbers reveal that there were over 1.6 million arrests for *all* drugs in 2009, with half that number—over 800,000—busted for marijuana. (Which, by the way, is more than *twice* the number of pot arrests that were being made back in the early '90s.) By comparison, lethal heroin and cocaine combined accounted for only 17 percent of possession busts in 2009.

Breaking down those numbers still further, 45.6 percent of all pot busts nationwide were for possession, and 6 percent were for sales/manufacturing. When the arrest stats are broken down by region, the lowest percentage for both cultivation and possession busts occurred in the more sparsely populated and/or more marijuana-tolerant western states such as California, Washington and Oregon. Arrests for all pot violations were highest in the more entrenched, conservative Midwest. The East Coast had the second-highest number of pot busts, while the South placed third.

A disturbing trend finds that the vast majority of arrests for marijuana and other illegal drugs continue to be at the user level: Only 18 percent of all drug arrests in '09 were for sale/manufacturing charges—putting the lie once again to the notion that the War on Drugs is producing any kind of actual success. When over 80 percent of all drug busts—more than four out of every five—are for low-level possession or personal use, it's a clear indictment of misguided law-enforcement priorities.

Frustratingly, the Department of Justice has released no nationwide drug-incarceration stats since 2004. Due to unspecified DOJ priorities, updated drug-prisoner data won't be available until 2012.—Mark Miller



Michelle Rainey

MICHELLE RAINY PASSES AWAY

In late October, Canadian marijuana activist Michelle Rainey passed away after battling melanoma and lymphatic cancer. She battled Crohn's disease most of her life.

In 1998, Rainey met Marc Emery, the publisher of Cannabis Culture and the president of Marc Emery Seeds, which sold millions of pot seeds across North America. Rainey became his "right-hand woman" as well as an outspoken, inspirational activist who campaigned across Canada for patients' access to cannabis and appeared in hundreds of video segments as an advocate.

Emery's empire came crashing down when the DEA targeted the company. Both Emery and Rainey, along with one other defendant, were convicted of conspiracy to distribute. Rainey received two years' probation; Emery is currently serving five years.

In a statement from prison, Emery said: "Michelle needs to be recognized as one of the greatest activists this movement has ever had. Michelle may have literally given her life to the movement, and when people think about what they can do for freedom in their lifetime, Michelle's life is a shining example of how much is possible, even under great duress." 🌿



10 TRIMMERS TO AVOID

At harvest time, growers need top trimmers to manicure buds into marketable merchandise. But growers often refrain from hiring specific members of the workforce.

TRIMMER TYPE	IDENTIFYING TRAIT	RESULT OF HIRING
THE BLABBER	An endless, moronic stream of consciousness.	Other trimmers threaten mutiny unless they shut up.
THE EATER	Arrives for work with a bag of groceries.	Your buds are now coated with Cheetos dust.
THE MANGLER	Possesses manual dexterity of a bus driver.	You're now selling shake instead of buds.
THE TURTLE	Trims one bud per hour—if you're lucky.	At \$20/hour, your profit margin has vanished.
THE SOPHISTICATED HIPPIE	Won't work with buds unless they're organically grown.	Other trimmers attack after a smug lecture on enlightened trimming.
THE SUPERSTAR	Always in demand with a full schedule. Demands top dollar.	Buds look great! But when you have to raise prices, who can afford it?
THE THIEF	Pockets your buds—and anything else worth stealing.	A police report is out of the question. You're pissed, but that's it.
THE TREE-HUGGER	Like the Sierra Club, leaves trees intact—with lumber.	Pot smokers hate lumber and—as you discover—growers who sell it.
THE TV ADDICT	Won't work without <i>The Price is Right</i> or <i>Family Feud</i> blaring.	Pot smoking no longer eases your stress. Try the suicide hotline.
THE UNWASHED	Your pot wilts when they enter the room.	Your buds are now funky—not skunky.



You can help stop the Mexican Drug War!

BUY AMERICAN NOW!

The Mexican military is claiming a major victory in Mexico's drug war with the seizure of about 10,000 packages of pot concealed in cargo containers. The bust occurred in Tijuana, which is just across the border from San Diego, and officials say that the haul, worth \$340 million, was headed to the US.

It's doubtful that this one bust will make any significant dent in the production of illegal drugs in Mexico or the horrific violence that Mexicans have witnessed. But as contributor Malcolm Beith wrote in "Madness in Mexico" (Dec. '10 HT), American marijuana consumers can play a significant role in ending the Drug War south of the border by buying American-made cannabis products only.

BURN BUDS, NOT BOOKS

No publication in America relies more heavily on our nation's First Amendment guarantees of free speech than HIGH TIMES. So it

should be duly noted at the outset that the US Constitution clearly protects David Grisham's right to burn any book he pleases. In September, Grisham, who heads the fundamentalist Christian group Repent Amarillo, announced his intention to torch the holy book of the world's billion Muslims, even after the US Secretary of Defense argued that such public displays pose a danger to American soldiers overseas. (Of course, had the government intervened directly, it would have been a clear act of censorship that would ultimately make us all a little less free.)

Enter Jacob Isom. The 23-year-old Amarillo resident and pizza chef heard about the scheduled Qur'an burning from friends about an hour before it took place, so he arrived at the counterprotest a bit late.

"Turns out it was just a little stoner moment, I guess," Isom told HIGH TIMES. "They had already stopped him and gotten his lighter, but I didn't know So I was just like, 'Qur'an—snatch!'"

Isom waited until Grisham turned his back, then plucked the Qur'an from the barbecue grill and skateboarded away.

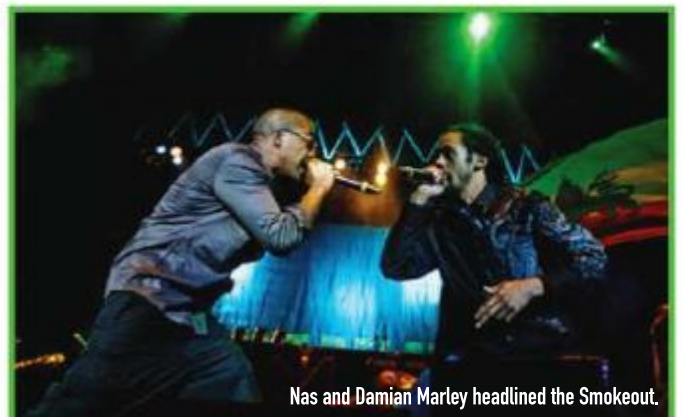
"I snuck up behind him and took his Qur'an," Isom famously told KFDD-TV. "He said something about burning the Qur'an. I said, 'Dude, you have no Qur'an!'"

That local news clip quickly went viral, and when Gawker.com finally tracked Isom down for his reaction to all the hoopla, he admitted to harboring one remaining ambition: "I want to be in HIGH TIMES," the Hero of Amarillo said.

Mission accomplished!



Jacob Isom and his HIGH TIMES bounty.



Nas and Damian Marley headlined the Smokeout.

SUPER SMOKEOUT

In October, the Cypress Hill Smokeout lit up the West Coast once again, hosting 40,000 fans of music and marijuana. This marked the 13th year of the Smokeout and this year's event had a heightened sense of urgency because of the vote on historic Prop 19. There was no shortage of legalization speeches and—obviously—the crowd was extra-enthusiastic about the possibilities of seeing legal, adult use in their lifetime. Cypress, plus Incubus, Slightly Stoopid, Nas and Damian Marley, MGMT, Manu Chao, DeadMau5, Erykah Badu and many more herb-friendly acts—plus all-star panels on all aspects of cannabis, from cultivation to activism—powered the high-octane pot celebration.

HEAVY HITTER

This past harvest season, **HIGH TIMES** cultivation editor Nico Escondido was on the road filming his upcoming DVD, *How To Grow Like A Pro* (scheduled for release in February). The DVD will be an eye-popping tour

of the best gardens of the West featuring the latest, smartest cultivation know-how.

On his journey, Nico took time out to sample some of Colorado's best buds. Like the true marijuana superstar he is, Nico had no problem burning this bud down to ashes in just one hit!



Michael Stetler of Marisol Therapeutics in Pueblo lights Nico up.

Ralphie gets grounded.



MAY FLIES

In October, drug-sniffing dogs at the airport in Guam nailed comedian Ralphie May. May had less than an ounce of pot in his possession,

but he still had to go to court and pay a nominal fine. Custom agents said that more than an ounce would have earned him stiffer penalties. A spokesperson said May was sorry and wanted to return to Guam with his family. He also said, "He will not be doing that again."

Um, we doubt that. May asked us recently when he was going to be named **HIGH TIMES** Stoner of the Year.

STAR WOES

Carrie Fisher, who played Princess Leia in the Star Wars movie saga, told the world that she was snorting cocaine back in 1980 while filming *The Empire Strikes Back*. In fact, Fisher says her coke use occurred specifically on the set of the frozen ice planet. (Drug use is always better in a thematically correct environment.) Currently touring her one-woman standup comedy show, *Wishful Drinking*, Fisher told the Australian press that she "didn't even like coke that much, it was just a case of getting on whatever train I needed to take to get high."

She also said her coke habit was bad enough that even the late John Belushi, who died of a speedball (cocaine/heroin) overdose, told her to slow down.



Carrie shares memories.

little shop of hookahs

We dare not tell you the location of the Little Shop of Hookahs where this eerie occurrence took place. (All we can say is that it's next to a Starbucks—like everything else in life.) Little Shop of Hookahs recently sold this piece, fashioned after the man-eating plant known as Audrey from *Little Shop of Horrors*, complete with glistening teeth. Unfortunately, the purchaser seems to have vanished. Investigators found Audrey alone in his apartment. The only trace of the purchaser that could be found was his lighter, which looked as if it had been chewed on, digested, and regurgitated.

Maybe the Feds are right. Maybe pipes and bongos really are dangerous paraphernalia. The diabolical glass artist Steve Hamm is responsible for the mayhem.



Jars Of Distinction

We're way past the age of plastic sandwich bags. In 2011, the way to store your stash is in jars. And there are no better jars on the market than CannaFresh. Available in a variety of sizes from 4 ounces up to 2.5 gallons, CannaFresh jars are the ideal way to keep your buds sparkling, fresh and flavorful. CannaFresh jars are also available in collector's editions featuring Cheech & Chong. Plus, dispensary owners and other industries can request custom logos for advertising and promotions. Visit cannafresh.com.



IN YOUR FACE!

In our December issue, we blasted Facebook for its crackdown on ads featuring pot leaves that promoted California's Proposition 19. However, Dustin Moskowitz, one of Facebook's founders, who now runs Asana, had no problem donating \$70,000 to the Yes on 19 campaign group. So which social network are you using?



Ex-Facebook mogul Moskowitz backs buds.



Howard's op popped.

RADIO HEADS

Howard Arenstein is radio bureau manager for CBS News, Washington and a two-time Edward R. Murrow Award winner. His wife is Orly Katz, a correspondent for *Yediot Ahranot*, a major daily newspaper in Israel. However, in early October, they were the ones making the news. DC cops obtained a search warrant and busted them for eight-foot plants growing in their backyard and packaged pot inside their home. Apparently, a neighbor/snitch reported them. The couple was charged with possession with intent to distribute.



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OREGON TRAILS

NORML holds its annual conference in Portland.

In September, at NORML's national conference in Portland, OR, advisory board member and PBS travel host Rick Steves made all of the usual political arguments for the full legalization of marijuana. But Steves went one step further.

"High is a place that I sometimes want to go," Steves explained.

Steves has crisscrossed the globe many times, but the cannabis experience remains a compelling enough destination to put his reputation and livelihood on the line in order to tell a simple truth to power: There's nothing wrong with responsible adults choosing to smoke pot.

The weekend's other keynote speaker, two-term New Mexico Governor Gary Johnson, continued to hint at a 2012 run for



NORML keynote speaker Rick Steves.

president with marijuana legalization as a central plank in his platform. Johnson started openly supporting legalization while still in the governor's mansion, and he's never looked back.

In addition to the keynotes, NORML assembled panels featuring the nation's premier cannabis-law reformers and activists, who looked at a range of topics including the War on Marijuana's detrimental effects on women and minorities, the push for full legalization in California and Prop. 19's potential effects in other states, the parallels between the end of alcohol prohibition and the modern effort to re-legalize cannabis, the role that social networking can play in advancing this cause, and a full day devoted to the latest research and issues for medical-marijuana patients, physicians and providers.

The conference overlapped with Hempstalk, a two-day celebration of all things cannabis, held annually in Portland's Kelley Point Park. After days of attending to the serious business of changing the world for the better, NORML conference attendees found Hempstalk the perfect place to roll one up and unwind! ✨

DAN SKYE, DANNY DANKO



Plants await inspection in a Northern California drying room.

MARIJUANA & THE MILITARY

Uncle Sam doesn't smile kindly on tokers in uniform.

Article 112a of the Uniform Code of Military Justice, or UCMJ—the foundation of US military law—states that illicit drug possession, use, and manufacturing by any military personnel (or civilian subject to the UCMJ) is punishable by court-martial. Besides pot, this includes opium, heroin, cocaine, speed, LSD, and every other outlawed narcotic. Those accused of drug crimes will stand trial, and if found guilty of violating Article 112a, are given a dishonorable discharge. A dishonorable discharge results in losing all veterans' benefits (including disability), as well as a lifetime ban on personal firearm ownership.

The proliferation of medical marijuana use in the last two decades has resulted in conflicts between a patient's right to self-medicate (especially if they reside in a state where medical pot is legal) and the military's zero tolerance pot policy. As reported in *The Oregonian*, Spc. Richelle Golden, 39, of the Oregon Army National Guard, suffers from rheumatoid arthritis and Sjogren's syndrome (an autoimmune disease destroying glands that produce tears and saliva). Wheelchair-bound, Golden got a medicinal marijuana recommendation in Oregon last January, not expecting to receive active-duty orders just one month later. She reported to an Army medical center in Washington State in February, still in a wheelchair and declaring she was a medical marijuana patient, expecting to be retired from military service. Instead, she was given an "Article 15", which is non-judicial punishment by the military—no court-martial necessary. Not surprisingly, Golden failed an urinalysis test for pot and was soon busted down to the rank of private, put on probation, and restricted to barracks. She wants an open court-martial in order to have a chance to win her case and regain her freedom.

Golden's predicament is especially curious given that the policy of the Oregon Guard since 2007 requires soldiers to declare medical marijuana use and

appear before a medical board. The soldier is offered treatment options other than pot, but must quit pot or the Guard. Apparently, Golden wasn't offered these options, but was instead locked down for "wrongful marijuana use," officially flagged as a "drug addict". In May 2010, US Senator Ron Wyden (D-OR) and Rep. Kurt Schrader (D-OR) called for an investigation into possible Army discrimination against National Guard soldiers in response to the Golden case, a potentially encouraging outcome to an otherwise unjust story.

In the summer of 2009, an even more bizarre case involving marijuana and the military transpired. During "Operation Endless Summer," San

Diego's District Attorney filed drug charges against 33 individuals, ostensibly to "protect military housing" in the city, which has a high-profile US Navy presence. However, 14 of those arrested were actually medical pot patients, who were initially targeted as part of police entrapment tactics focused on San Diego dispensaries. Furthermore, a number of those charged in "Endless Summer" had no military connections. Fortunately, two of the 14 patients who have gone to trial have been acquitted by jury.

In 2004, a Bay Area rapper/soldier named Singe was snapped with an Iraqi pot plant growing wild. That shot landed on the cover of *Grow America* (a HIGH TIMES spin-off), and eventually resulted in a confrontation with his commanding officer. Singe admitted to posing in uniform with the plant, but he wasn't discharged; he was told he was too good a soldier.

Before Singe served a second tour of duty in Iraq in 2008, HIGH TIMES conducted a follow-up interview with him. He stated that he had been told that President George W. Bush had been briefed and was actually shown the cover photo. Singe also disclosed that on the front lines, commanding officers "look the other way" when it comes to pot or hash use. ✨

A dishonorable discharge results in losing all veterans' benefits.

Give a man a bud, he smokes for a day. Teach a man to grow, he smokes for life...

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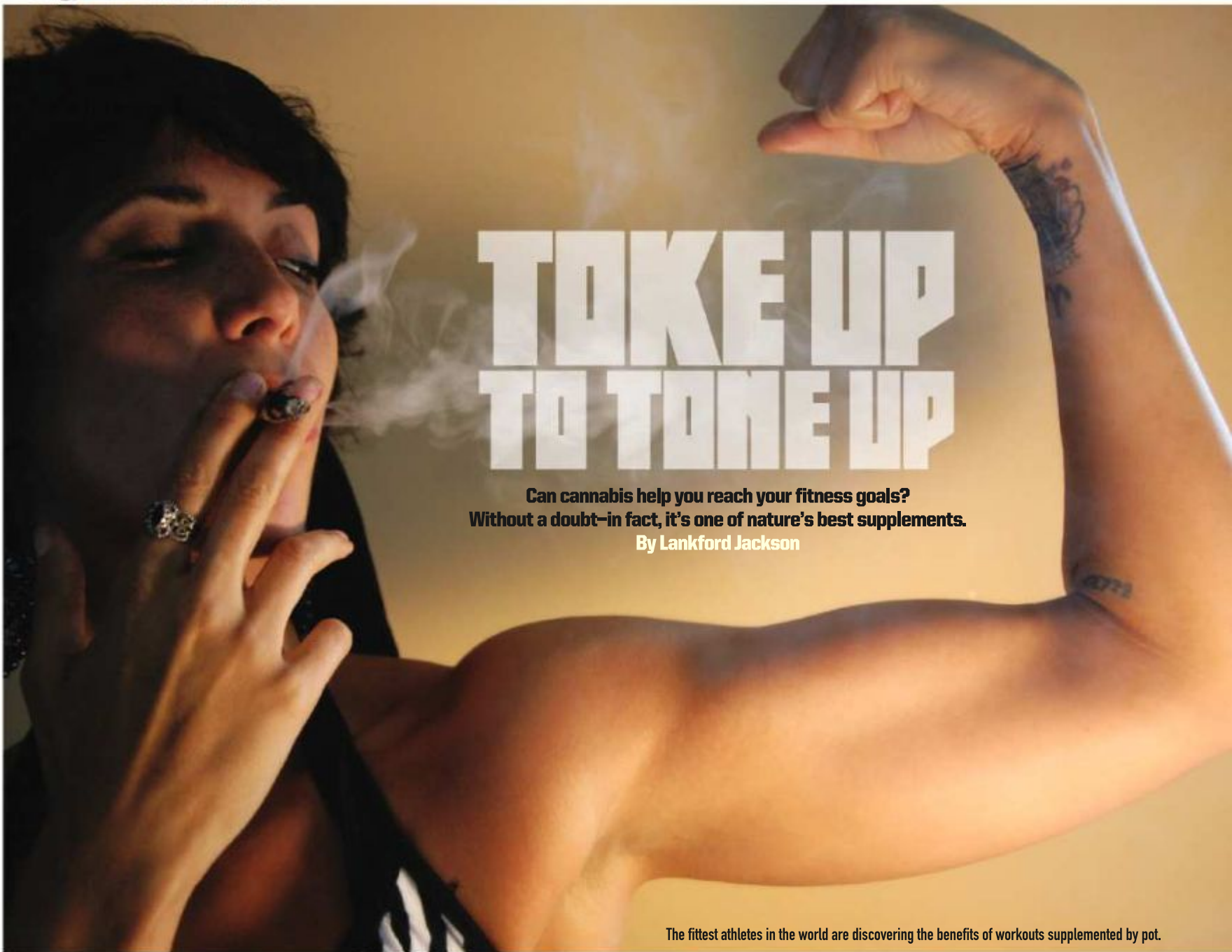
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TOKE UP TO TONE UP

Can cannabis help you reach your fitness goals?
Without a doubt—in fact, it's one of nature's best supplements.

By Lankford Jackson

The fittest athletes in the world are discovering the benefits of workouts supplemented by pot.

Growing up in California in the 1980s, we were active. Video games had yet to complete their assault on kids' recreation time. Our games comprised any sport that was in season—or you could simply ride your bike all day long. The sport stars and action-movie heroes we idolized all shared intense training rituals: Whether it was Arnold or Bruce Lee or Sylvester Stallone as Rocky, we dreamed of transforming our bodies and achieving some type of epic victory. And when we discovered weed, those dreams didn't diminish.

Eventually, however, a full-time job, eating out, drinking and a decreased activity level took their toll. For me, my wake-up call came 16 years ago, when I decided to overhaul my life. Now, as a fitness professional, I've discovered that cannabis use is not just conducive to exercise—it's an outstanding "supplement" for adding lean body mass, as well as an excellent means of aiding the body's overall recovery from a workout. In fact, it's the best supplement out there!

During my transition, I had the good fortune to pick up a bodybuilding book by Mike Mentzer. His

logical approach to training allowed me to gain 40 pounds of muscle in my first year and took my strength to levels that I believe should have taken at least a decade to reach. In fact, with a half-hour of work once or twice a week, you should be able to see great results as well!

To start, let's take a look at the laws of hypertrophy (muscle gain), since it's a logical transition from there to all forms of exercise. Hypertrophy can be broken down into three basic laws, which are common to every single exercise endeavor:

1) You must impose a significant enough stress to cause micro-damage (soreness) and nervous-system response in the targeted muscle or muscle group.

2) You must allow the targeted muscle to recover through rest and nutrition.

3) You must allow the muscle to *overcompensate* and add extra lean tissue.

You must also allow the nervous system to recover so that the same workload is easier the next time around. For example, after a workout, your muscles may have recovered their original strength in four days, but it may take another three to six

days to allow the body to add extra lean tissue.

This last law is often neglected, usually due to ignorance (or by not following the second law). But neglecting this last law will have you spinning your wheels and cause you to stall at a particular plateau quickly. If you follow these rules, however, you'll soon realize that the last two address recovery, which encompasses 50 percent of your workout results. (The other 50 percent is the workout itself.) But recovery doesn't get the attention it deserves.

When muscles grow, it's the result of recovering from damage—and damaging muscles requires intensity. But the intensity of your next workout, and its effectiveness, are both determined by how well you recovered from your previous workout. For example, if you go running on sore legs, your time will very likely be slower. If you try to bench-press while your arms and chest remain sore from your previous workout, expect to have trouble lifting the same amount of weight. Intensity is proportional to recovery: If you only recover to the point where you can complete your last workload, your recovery period has been in-

What other supplement will enable you to eat every three hours, plus help you sleep well and relieve life's stresses?

Whatever your goals, fitness experts advise eating every three hours, with a complete protein source in each of these meals. Cannabis will definitely help with the eating. It's not easy to eat six times a day, but a little toko will increase your appetite (and make that chicken and brown rice taste a helluva a lot better).

There are many supplements that provide an energy source for your training, while amino acids and creatine are ingested post-workout. But for recovery, you have limited choices. Then again, what other supplement will enable you to eat every three hours, plus help you sleep well and relieve life's stresses—and all without causing negative physiological effects like booze does?

You guessed it: good ol' *Cannabis sativa*! I'd even go so far as to say that you're foolish *not* to incorporate it into your recovery program.

Rest isn't only a matter of getting a full night's sleep and avoiding over-training; the *absence* of stress is essential. A body under stress cannot be in an anabolic state (the process that promotes the building up of organs and tissue). All stress must be minimized to achieve optimal results. The perfect supplement to achieve this is cannabis: It not only allows deeper and longer sleep, but it reduces stress levels without all the negative side effects of prescription drugs or alcohol.

Athletes, coaches and managers need to realize that the traditional practice of partying and getting drunk after games is horribly counterproductive to recovery. Unless these athletes run afoul of the law, their post-game behavior is rarely questioned. Yet those who go home to smoke a bowl, relax, rest and recover are quick to be stigmatized as problem players.

Logic, anyone? 🌿

Lankford Jackson (NASM CPT, PES) is a fitness professional with ICSP Fitness in San Diego. His upcoming book, *Lanksystem*, will focus on functional bodybuilding, which relies on brief and infrequent workouts.

WORKING OUT ON WEED

Let's be honest, cannabis may inhibit performance prior to exercise. A strong *indica* may impact the intensity of a workout, and smoke probably isn't the ideal substance to inhale prior to aerobic activities like running or biking, because of its effect on optimum functioning of the lungs.

But stoners of the fitness community aren't convinced. First off, these considerations are easily counteracted. Caffeine can be ingested to offset drowsiness—or, try a *sativa*. And vaporizers or edibles will negate the effect smoking may have on aerobic exercise. Significantly, millions of fitness enthusiasts prefer to get high before working out because pot allows them to focus more deeply on targeted muscle groups. Those who have experienced the tedium of moving down a line of weightlifting machines in the gym know that a few tokes help to release the rigors of linear thought. Long-distance runners say it helps them stay in the rhythmic, steady "zone" required to maintain a competitive pace.

There are three components of fitness: stretching, strengthening, and building stamina. However, stretching is generally neglected. Why? Because we're all too busy, even though stretching is essential to pre- and post-workouts.

But many modern athletes swear by the benefits that pot has on stretching. The initial discomfort or stiffness commonly associated with stretching lessens under the influence of cannabis, they say. Instead, they "embrace the pain."

Certainly, the use of cannabis is woven throughout yoga history and many yoga-philes wouldn't dream of performing an asana otherwise. Pot may, in fact, be the perfect kinesthetic key to integrating body, mind, and spirit.

sufficient—you need to recover to the point where you can *exceed* your previous workload. In short, you need to get stronger. And to do this, you must pay strict attention to nutrition and supplementation daily, and allow enough days between workouts for your body to adapt and overcompensate for the workload.

If you want to reduce fat, you need to eat a little less. But if you want to gain muscle, you need to eat a little more.

STONER SPORTS HEROES

The list of superstar athletes who have toked up is highly impressive—smashing the myth that marijuana detracts from peak performance.



USAIN BOLT

The Olympic gold medalist once told reporters, "When you're a child in Jamaica, you learn how to roll a joint." Later, Bolt's handlers released a statement: "Although admitting to trying marijuana as a child, he has never used it as a competitor." Then Bolt himself added, "Nobody in my family or those close to me smoke, and I don't hang out with people who smoke."



MICHAEL PHELPS

After winning eight gold medals at the 2008 Summer Olympics, Phelps was snapped expertly handling a bong. The photo ran internationally, and Phelps subsequently went on an apology tour, saturating the media with *mea culpas* for his stupidity.



MARK STEPNOSKI

The former Dallas Cowboy offensive lineman won two Super Bowls and was a five-time Pro Bowler. Unlike Bolt and Phelps, however, Stepnoski has been outspoken in his support for cannabis issues: He was the subject of a HIGH TIMES Interview, and he's also a member of NORML.



RICKY WILLIAMS

One of the premier running backs in the NFL, Williams has been suspended multiple times for pot use. Williams now gets drug-tested regularly, but he's said publicly that once his career ends, his smoking will resume.



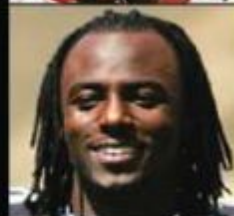
ROSS REBAGLIATI

In 1998, Rebagliati made Olympic history by being the first athlete to win a gold medal for snowboarding. Not so fast—after being drug-tested, he was stripped of his medal when pot was found in his system. Then he got it back again because pot wasn't on the official list of banned substances at the time.



LANCE MACKEY

He's won the grueling Iditarod dog race four times, and Mackey admits that he toked up throughout three of those races. But this year, Iditarod began testing the mushers, so Mackey went without—and won anyway. He's quick to credit the dogs, though, since they're the ones racing, not him.



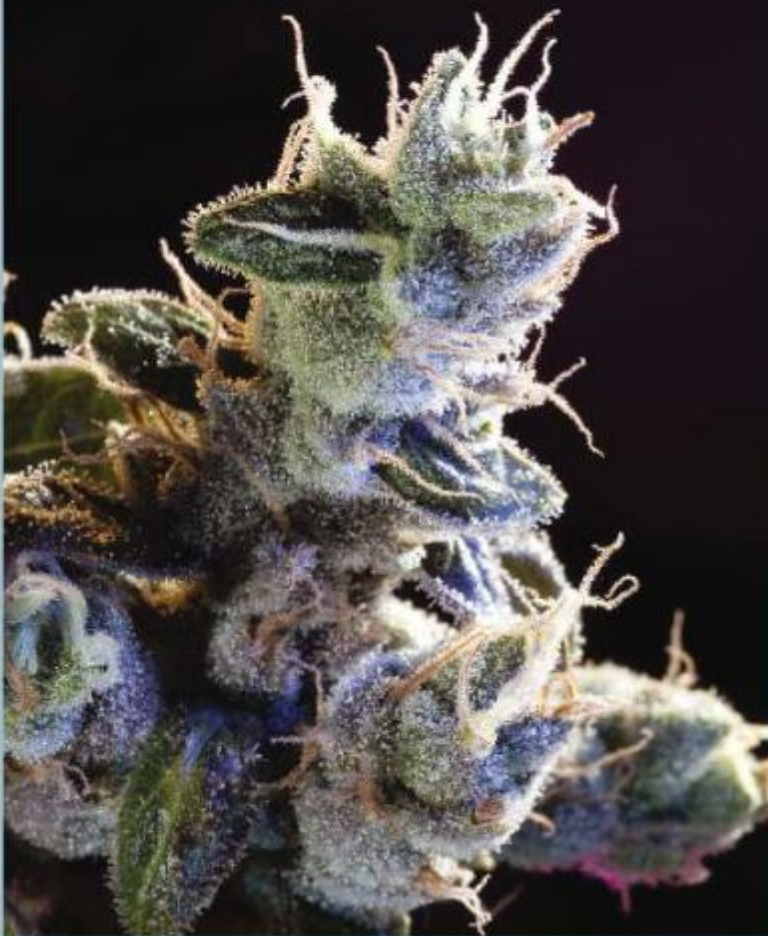
SANTONIO HOLMES

After making one of the greatest catches in Super Bowl history, the game's MVP had to sit out the first four games of the 2010 season. NFL justice moves slowly: Holmes's pot-possession rap occurred in the fall of 2008.



TIM LINCECUM

He's been the Cy Young Award winner the past two years and led the National League in strikeouts this year. But Tim's a toker, make no mistake. He was cited for puffing behind the wheel in 2009. He paid his fine, but gave no indication that his pot use was over—just that he'd try "not to let it happen again."



MARKET ANALYSIS

Diesel's mini-run as the most submitted strain ended this month with Kush reclaiming the top pot spot by a wide margin. Additionally, Diesel's average price dropped \$94 from January, while Cheese made its first appearance in the top five. The top five submitted strains (with average price) were Kush (\$400), Purps (\$349), Diesel (\$339), Haze (\$415) and Cheese (\$375).

Index Watch: The lack of schwag submissions in January helped raise the US Price Index to \$377. However, in February, the Schwag was back and the US Price consequently dropped \$42 from its previous month's average. While the US Price finished a bit low, the Kind Index essentially held steady and the Mids Index was down only slightly.

HIGH TIMES wants to know what you're smoking. Submit your strain information, including location and price by the ounce, to thmq@hightimes.com.

Trans-High Market Quotations (THMQ) reports pot prices by the ounce, strain and location. To submit prices, go to the THMQ link at hightimes.com.

CURRENT US PRICE INDEX: **\$335** (last month: \$377; YTD: \$356)

CURRENT KIND INDEX (\$350+ PER OZ): **\$426** (\$423, \$425)

CURRENT MIDS INDEX (\$150-\$349 PER OZ): **\$268** (\$283, \$276)

CURRENT SCHWAG INDEX (\$1-\$149 PER OZ): **\$109** (N/A, \$109)

OG Kush x Granddaddy Purps - \$400
Tiverton, RHODE ISLAND

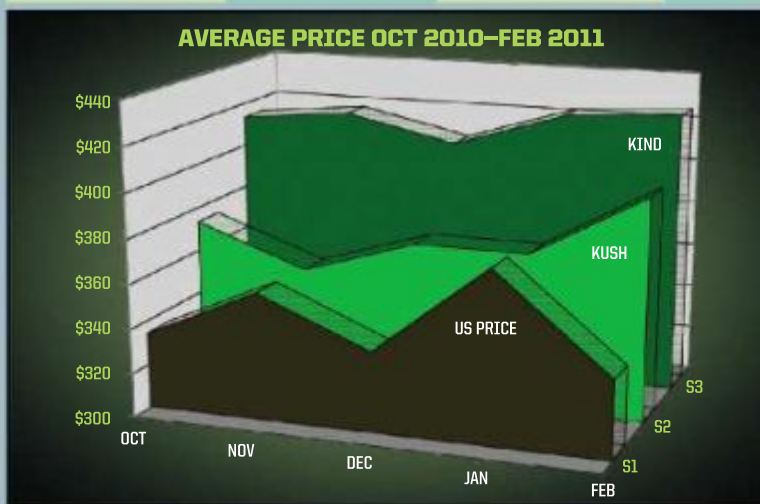
"Solid, dark green nuggets with shades of purple throughout the buds and a hashy Granddaddy odor, so powerful that an open jar will stink out a room. Taste is phenomenal to the very last hit. Very clean, long-lasting, medicated feeling."

Outdoor - \$350
Rockingham County, VIRGINIA
"Dank bud has been rare as of late."

There's been an abundance of outdoor trees, though, but the quality is lacking."

Mango - \$275
Loxahatchee, FLORIDA
"This Mango has beautiful buds with high resin production and leaves behind a hazy smell in the air after it's smoked. A heavy stone that will have you eating and then falling asleep."

STATE	CITY	STRAIN	PRICE
ARIZONA	Phoenix	Blue Cheese	\$500
ARKANSAS	Paron	Raspberry Cough	\$280
CALIFORNIA	Sacramento	Grape Ape Sour Diesel AK-47	\$275 \$275 \$310
	San Diego	Skywalker Purple Bubba Kush	\$385 \$350
COLORADO	Craig	White Widow	\$345
CONNECTICUT	Windsor Locks	Strawberry Diesel	\$350
FLORIDA	Loxahatchee	Mango	\$275
	Melbourne	Purple Kush AK-47	\$375 \$400
HAWAII	Maui	G-13	\$300
		Super Lemon Haze	\$590
		Nebula AK-47	\$300 \$250
ILLINOIS	Chicago	Chocolope Mids	\$420 \$240
	Joliet	Headband Purple Mr. Nice	\$375 \$375
LOUISIANA	Baton Rouge	Cheese	\$350
		Pineapple Express	\$400
MICHIGAN	Garden City	AK-48 Strawberry Cough	\$350 \$350
MONTANA	Helena	Agent Jack Blue Dream	\$250 \$250
	Missoula Polson	Lavender White Widow	\$250 \$280
		NEW YORK	Niagara Falls
New York	Kush		\$400
	White Shark		\$280
	The Church Sour Kush		\$260 \$320
PENNSYLVANIA	Bethlehem	White Rhino Super Silver Haze	\$500 \$500
	Pittsburgh	Apollo Blue Haze	\$375 \$350
RHODE ISLAND	Tiverton	OG Kush x G-daddy Purps	\$400
TENNESSEE	Memphis	Purple Kush	\$475
TEXAS	Fort Worth	Lemon Skunk Warlock	\$450 \$500
	La Marque	Afghan Kush	\$525
VIRGINIA	Rockingham County	Outdoor	\$350
WASHINGTON	Wenatchee	Trainwreck	\$290
INTERNATIONAL (prices in Canadian dollars or British pounds)			
CANADA	Ottawa	Mazar	C\$180
ENGLAND	London	Strawberry Diesel	£250



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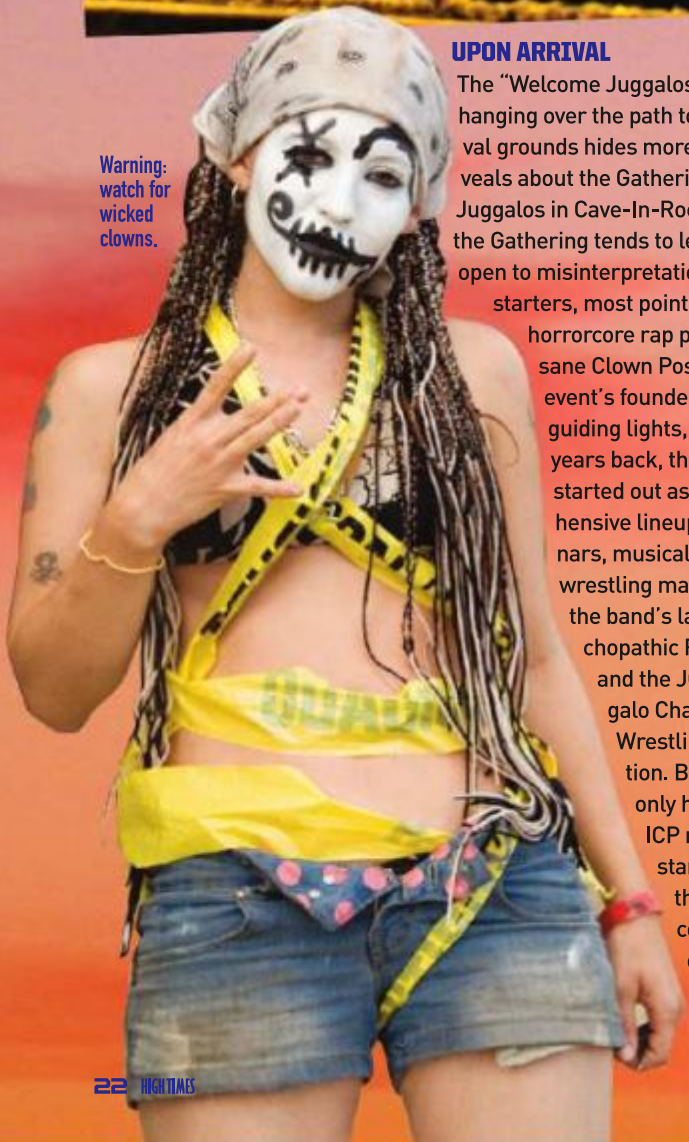
Night of the Living Juggalos



Come mid-August, hardcore followers of the horrorcore rap-rock outfit Insane Clown Posse are either making their way to the annual Gathering of the Juggalos or wishing they were. In this environment, people come to see performances by established and underground hip-hop artists, heckle stand-up comics, yell at professional wrestlers, or otherwise do as they please in one of the most defiantly autonomous spaces on Earth. Here we offer up some glimpses from the event.

By Justin Hampton. Photos by Fawn Economou-Schuessler

Warning: watch for wicked clowns.



UPON ARRIVAL

The "Welcome Juggalos" sign hanging over the path to the festival grounds hides more than it reveals about the Gathering of the Juggalos in Cave-In-Rock, IL. But the Gathering tends to leave a lot open to misinterpretation. For starters, most point to Detroit horrorcore rap pioneers Insane Clown Posse as the event's founders and guiding lights, since, 10 years back, the Gathering started out as a comprehensive lineup of seminars, musical acts and wrestling matches from the band's label, Psychopathic Records, and the JCW (Juggalo Championship Wrestling) Federation. But this is only half-true. ICP may have started it, but they don't control it. No one does—and, hopefully, no

one ever will.

Once I reach the carny booths and game stands, it all hits me at once. Face paint. Teen Jugalettes walking around in "Twiztid" jerseys declaring "RED-POP!" on the back. Faygo bottles crunched up beneath our feet. Someone beckons us with a megaphone. "Um, excuse me," he asks, "but does this megaphone make my balls look fat?" I look down: His nutsack is tied up with a leather strap and hanging out of his pants. Insecurity strikes again. I tell him he has nothing to worry about. Up next is the Drug Bridge. I pass the gantlet of high merchants selling it all: 'shrooms, LSD, Ritalin, rolls, plus practically every variant of marijuana currently cultivated around the country. And what you've heard is true: There are no cops here—we don't need them if we have our own

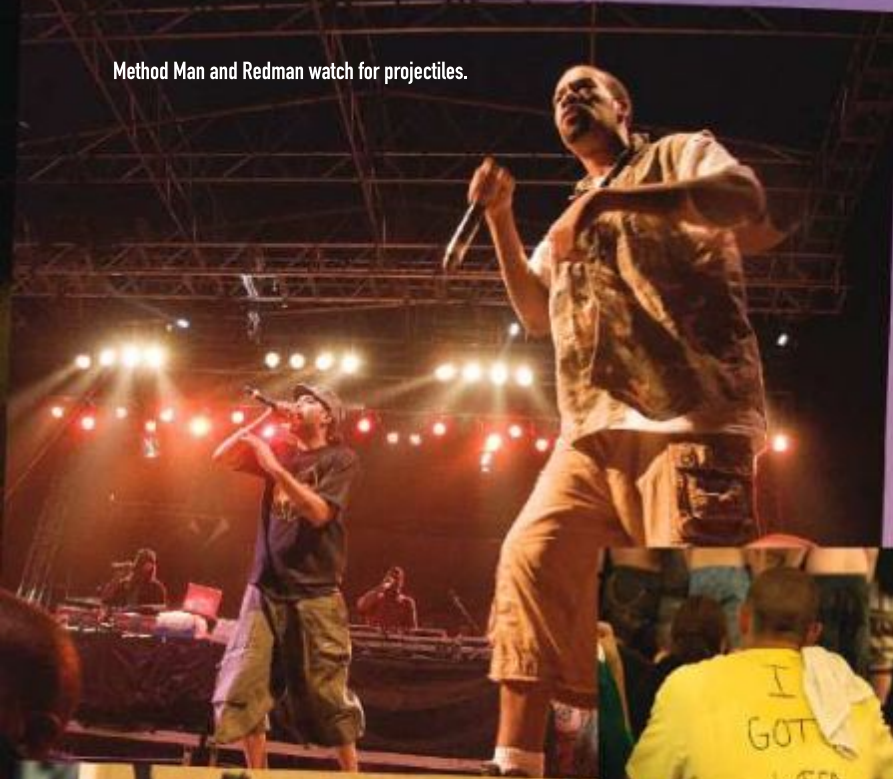


Fun for the whole family.

security. Everyone follows Juggalo law, which states that all drugs, for the next four days, are legal. And they're cheap as hell to boot, thanks to the miracle of the free market.

At the main stage, fireworks are going off, with some being launched straight into Naughty By Nature's "O.P.P." Other projectiles occasionally hurtle toward the stage, adding a note of excitement to what would otherwise be a rote performance by an aging b-boy crew. The treatment they receive is playful and not overly hostile—but if they're gonna play here, they have to play with fire. That's the rule.

Method Man and Redman watch for projectiles.



Not a bad deal.



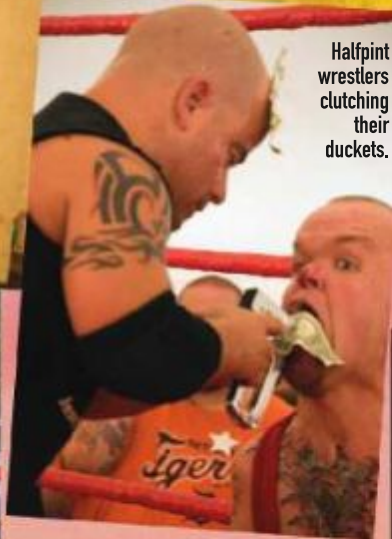
Who needs Off?



Juggalo depictions of the "bang! pow! boom!" explosion.



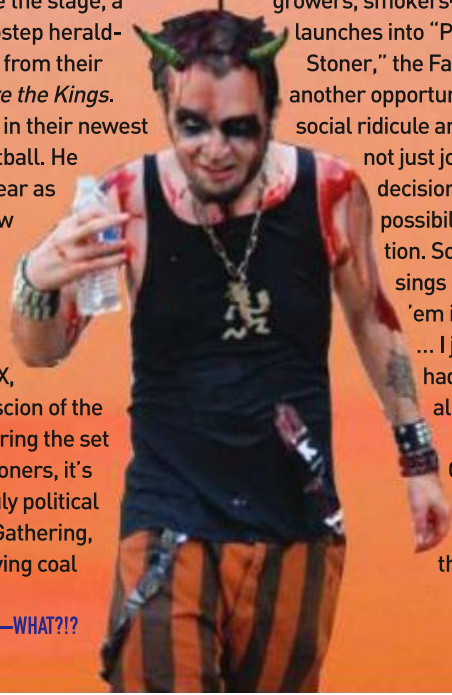
Halfpint wrestlers clutching their duckets.



A MOMENTARY UPRISING

On Friday, stoner rap/rockers and longtime Gathering faves the Kottonmouth Kings take the stage, a huge blast of dubstep heralding the title track from their new LP, *Long Live the Kings*. They're breaking in their newest member, the Dirtball. He performed last year as a solo act, but now he's being bumped up a notch, and it's exciting to see.

When Daddy X, the surfer-punk scion of the group, pauses during the set to speak to the stoners, it's one of the few truly political moments of the Gathering, as if he were rallying coal



miners to trash the company store. "We are *this close* to legalizing marijuana! Do you want to see this happen in your lifetimes?" he asks, fully anticipating the "Whoop whoop!" he'll get in return. Dispensary owners, growers, smokers—as the band launches into "Proud to Be a Stoner," the Family is granted another opportunity to dismiss social ridicule and celebrate not just joy in their life decisions, but also the possibility of vindication. So everyone sings along: "Smoke 'em if you got 'em" ... I just *knew* we had the right idea all along.

After the Gathering, Violent J acknowledges that this au-

tonomous zone is still temporary. He suspects the Juggalos recognize this as well. "I think that's why they get so high, you know what I'm saying?" he chuckles. "I think that's why there is a Drug Bridge—because everybody's taking advantage of the fact that, for this weekend, we get to live in total freedom here."

THE MIRROR CRACK'D

The Gathering made national headlines for its treatment of MySpace celebrity-turned-recording-artist Tila Tequila. Booked as part of an all-female lineup entitled "Juggalette's Revenge," Violent J took her on since he figured anyone singing a song called "I Fucked the DJ" would appeal to Juggalos. Instead, she was pelted with water bottles, garbage, Maglites and finally a rock that split her cheek open. The following took place immediately after she was yanked offstage by security, who accompanied her on-stage and ran interference throughout her performance.

The audience quickly encircles Tila Tequila's car from all over. About three or four people have created a buffer around it to keep anyone from breaking the windows or otherwise mangling it. I'm looking into the office trailer, because that's where some of her security is now, visible through the windows. Someone else tells me that Tila has locked herself in a port-o-potty. This makes cruel sense to me; a person can have a million friends on MySpace, but it takes a tabloid moment like this to prove that in one's hour of real need, none of them really exist.

There's a lovely blonde next to me, with doe eyes and hair in braids. She tells me her name is Taylor. "This always seems to happen to her," she says aloud.

"What do you mean?"

"I knew her in high school. She always used to get beat up."

Some pop psychology thrusts itself through my mouth: "Well, it sounds like she's still perpetuating her own misery."

"That doesn't mean people are justified in playing into it, though."

"Abuse is a hard cycle to break."

About 20 minutes pass before Tila is finally swept into her automobile and cruises down the hill. By now, the crowd has thinned out. Li'l Kim, who was supposed to have played after her, has cancelled for some reason. The stage smells like a landfill.

The next day, people

are still reacting. Particularly concerned are the Juggalos who specifically avoided Tila's set and never thought it would get this bad. One of them approaches me afterward and requests that I remind people of this. I deeply respect this stance, but I sense there's more to it.

Weeks later, I'm combing through ICP's back catalog, and I come across the track "Hall of Mirrors." In it, the mirrors confront the dying soul with the darkest side of itself and its consequences for others: "You're the beast you never knew / This reflects the things you do." And I look at Tila's bruised face on TMZ and think: Those bruises were always there. The Dark Carnival, this limbo state of existence conceived by ICP and made real by the Juggalos, only exposed them to the world. The truth may be ugly, but it's still the truth.

COMMUNION

Tonight's the night: Insane Clown Posse will hit the stage. The vibe is gleeful and electric with anticipation. The backstage is in lockdown mode for this period of time. Someone asks me for my VIP badge, but he ain't gettin' it.

By the time the Ringmaster brings ICP out, the bottles of Faygo are positioned in massive drums on-stage, along with a huge firehose that sprays it into the crowd. A Juggalo monsoon of soda overtakes the center field, while along the periphery, the calmer Juggalos are awash with a deep inner peace, brought about by songs depicting graphic death and murder. To understand this is to understand the Family.

"Most of the people who consider themselves Juggalo family are here because they lost their own, be it to drama, drugs, death or whatever," a Juggalette named Samantha Eagen explains to me after the Gathering. "So relating through this music comes easy. We know what it's like to feel this way—but instead of acting out, the majority of us can sing about it. Just to get it off our chest, like writing a letter you don't send."

My plane is waiting for me in Chicago, six hours away. As I make my way through the parking lot, the ICP anthem "Fuck the World" follows me. The Juggalos are entitled to sing it. Anyone can, as long as they have the courage and imagination to create their own. ✨

For more:



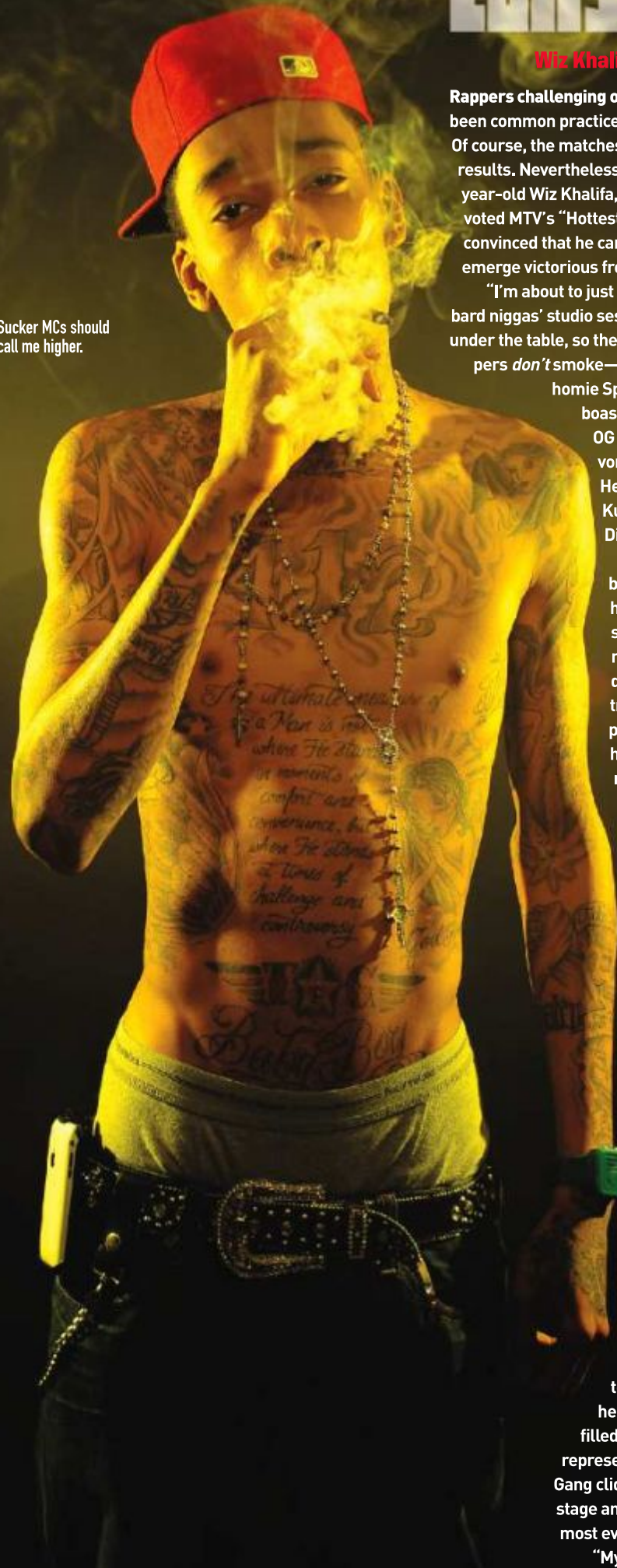
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This is an excerpt from the upcoming travel fantasy Heaven in the Disaster Area. Follow the work in progress at scribd.com/jhampton_2.

CONSTANT ELEVATION

Wiz Khalifa challenges all the other MCs to a smokeout. By Tru.

Sucker MCs should call me higher.



Rappers challenging other MCs to do battle has been common practice since hip-hop's inception. Of course, the matches have all had their varied results. Nevertheless, Pittsburgh, PA's 22-year-old Wiz Khalifa, a rising star who was voted MTV's "Hottest Breakthrough MC," is convinced that he can go blow for blow and emerge victorious from this latest gantlet.

"I'm about to just get a camera and bombard niggas' studio sessions and smoke them under the table, so they can see how much rappers *don't* smoke—and how much me and my homie Spliff *do* smoke," Wiz

boasts, adding that although OG Kush is his all-time favorite, he highly favors Headband (a cross of OG Kush, Master Kush and Sour Diesel) at the moment.

In bygone days, a number of rap artists connected heavily with the weed-smoking community, and many of those artists still do. However, Wiz—an extremely fan-friendly rapper—has positioned himself as hip-hop's new marijuana spokesman. On his mixtape skits, he's even incorporated "Mr. EZ Wider," who serves not only as a smooth and mysterious presence, but as a clear indication of Wiz's rolling preferences since giving up blunts over a year and a half ago.

"I got a really sick bong that I enjoy, too," he adds.

Neither his deal with Warner Bros. Records nor his 2006 debut, *Show and Prove*, managed to propel Wiz to the forefront of the rap scene. However, after departing from the label in 2009 and releasing the album *Deal or No Deal*, Wiz saw his career begin to catapult. Nationwide, he's now selling out arenas filled with fans who vigorously represent his flourishing Taylor Gang clique, throwing joints onstage and handing him weed at almost every show.

"My shows are a great repre-

sentation for the hip-hop community," he says. "When the marijuana community comes out, there's rarely any problems. But a lot of people don't know that if you let everyone smoke, everything will be cool." He attributes a huge portion of his current rampant success—including his recent signing with Atlantic via Rostrum Records—to his incessant utilization of social-media platforms like Twitter and YouTube. Early in 2010, he released his hit mixtape, *Kush and Orange Juice*—a title that soared within hours to the number one trending global topic on Twitter, as well as number one on Google's "hot search" trends.

Wiz's easygoing personality and strong affinity for high-end fashion, champagne, women and airplanes (to say nothing of elevated states in general) are abundant in his music. Whether he's sampling rock, classic soul, pop or electronic music, or holding his own alongside heavyweight talents like Rick Ross and Curren\$, Wiz is a risk taker who's never content with anything less than dancing to the beat of his own drum. Even as a child, he felt the subconscious desire to be different. "I used to tuck my pants in my socks. My dad told me I used to do that out of nowhere," Khalifa laughs. "Just the fact that I would run around blurting shit out, singing songs and making loud noises, having to be heard, made me different. I'm not the average individual who someone's going to run into."

In his poverty-stricken industrial hometown, which Wiz has dubbed "Pistolvania"—and where, as a teen, he partook in the low-grade weed that locals call "50"—opportunities for advancement are rare. There, the people's faith in these hard economic times resides primarily in the city's professional sports teams. But for a multitude of Pittsburghers, Wiz symbolizes a new breed of hope. To his great surprise, when the Make-A-Wish Foundation agreed to grant a local cancer patient a wish, the young recipient asked to meet Wiz.

"I was like, 'Damn, a kid that's going through what he's going through wants to meet *me*?' he says. "It's nothing I seek commendation for, but I went to his house and kicked it with him. He raps and got a chance to spit for me. And I don't know if he wants it to be out there, but there was some smoking going on around there. I don't know where that shit was coming from, but it didn't stop. It was *real* smoky!"

Despite his success, Wiz still enjoys living in Pittsburgh with his mom, whom he's been smoking with since he was 16. He admits that she was reluctant to smoke with him until he turned 18, but eventually she caved. "She started seeing the big bags of weed that I had, so she was like, 'Yeah, you might as well break bread,'" he laughs.

In all seriousness, though, it's safe to assume that Wiz's torch will be burning brightly for some time to come. ✨

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Cas is cuckoo for cannabis.



spot on the TV show *America's Got Talent*, where he successfully finished in second place. But that sort of fame wasn't all it was cracked up to be: Haley explains to HIGH TIMES, "It was a big business—their whole thing is that they sign you into these record deals once you're in the top 20 and it's their option, you have no option." Putting it candidly, the Paris, Texas native exclaims, "I didn't want to

'To me marijuana is a perspective enhancement. Like if I'm being an asshole or feeling anxious, I smoke, and I see that, rather than being caught up in it.'

make no TV-show album... that stuff is cheesy! I've always liked to be more of a homegrown artist than to do anything like that."

And although he was able to struggle out of contract after binding contract to finally release his first album, a self-titled trip that finished at number eight on the 2008 Billboard Reggae Chart, Haley still hadn't found his groove. "The *Cas Haley* album was real and everything, but it was basically a collection of 'best ofs' from the last 10 years; it wasn't who I was at the time I was recording it."

Connection is Haley's first album on the legendary Easy Star Records, and to Haley, it's his true debut. With

his gentle, catchy guitar-strumming matched to his charismatic voice and songwriting, the artist's comfort in his new Easy Star home lends his music a star-shine that just can't be bought.

Where did the self-assurance stem from for Haley to be able to walk away from big money contracts and strike out on his own? His weed-loving parents, of course. "They were hippies, man. They smoked pot my whole life. The big thing that I credit to them is my ability to be secure without security, like entirely. That's the biggest thing that's kept me committed to music and art. There's no security in art, and then when you put financial security in art it's the minute it gets washed up."

Haley's music certainly emits the stoner's chill vibe, and Haley admits he can often be found with vaporizer in hand, but pot's not essential to his music-making. "I don't have to be high to be creative. To me marijuana is a perspective enhancement. Like if I'm being an asshole or feeling anxious, I smoke, and I see that, rather than being caught up in it." Which was a big help while fielding six to eight calls a day from TV-show bigwigs. Haley laughs, "That's why the shit should be legal!"

Connection is truly an album of enhanced perspectives all around. From touchingly autobiographical lyrics to his one gorgeous cover, Alicia Key's "No One," the album is as likeable and down-to-earth as Haley himself. ✨

CANNABIS CONNECTION

Cas Haley's mix of reggae, ganja and soul. By Mary Ought Six

The instant I hit play on Cas Haley's recently released album, *Connection*, a natural sort of reggae two-step starts my feet moving around the house in a happy bop that is bound to

become contagious as Haley's easy, poppy, wonderfully listenable sound continues to gain fame.

Haley's climb up the music world's ladder began with a 2007

DOMI ALONE

Legendary street artist P.H.A.S.E. 2 was asked to pick an artist to travel to Amsterdam to paint stage backdrops for the 23rd Cannabis Cup; he selected Dome. As told to Steven Hager

I grew up in East New York and Brooklyn. In 1977, we had a family gathering up in the Bronx. My cousin Freddy wrote "MEAN." Freddy was a local guy from East Harlem, not the "MEAN" everybody knows today. We went to the hallway to look at trains, 'cause the 4 train was running outside. Freddy said, "Oh, Yosemite Sam!" I was like, "Where, where?" And when the doors closed, I saw Yosemite Sam. That's when my head turned. It went beyond anything I could even think about. That's when I got the bug.

Then I started what you call "benching." I started watching trains. I looked at trains for many, many years. My first time going to a yard was 1985. I brought maybe 10 cans, [to make] a red outline with a yellow fill-in with green



and beige. The color combination was based off a piece I saw in the Graffiti Hall of Fame, by a writer named SEM. In 1985, the trains were just full of throw-ups. I noticed there was a void of whole cars. We did a whole car in about three hours. We were moving quick 'cause we were nervous so we wanted to get it done fast. I was like, "This is what I want to do." I waited at East Tremont afterwards. I didn't even go to bed. You should never go to sleep. You just stay up and wait for your train, otherwise you're never going to catch it with windows.

If you're writing today and you're on top of your game, you may not realize it, but there's something you're doing that was influenced by P.H.A.S.E. 2. What he did for this culture is incredible. He developed the technical wild style.

My brother used to sell weed. I had tried it once and I was just giggling or whatever. My brother had so much of it, I remember putting it in the rice. I don't remember if I got stoned, but it tasted good with the rice. He was the first one who turned me onto it. At that time, everyone was talking about Acapulco Gold. Smoking some weed, that was something that put me in a zone, in a great place, so I could develop a different style. It really helped motivate me to do something different. If you ask me, listening to some music and smoking some weed helped my imagination expand and be open to something else. ✨

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Indoor Blooming: 8-9 weeks.
Outdoor Harvest: End of September, Beginning of October.
3s. 19,50€ / 5s. 32,50€ / 10s. 65€

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AMERICAN WASTE

Cheetah Chrome:
A Dead Boy's Tale From the Front Lines of Punk Rock
 Cheetah Chrome
 (Voyageur Press)
 ★ ★ ★ ★ ★

American Hardcore
 Steven Blush
 (Feral House)
 ★ ★ ★ ★ ★
 America has not been kind to the founding fathers of punk rock. They are rock'n'roll's dumpster babies. In nearly all the other genres that were spawned in the USA during the 20th century—jazz, country, rock, funk, pop, rap, etc.—we heaped money and praise on the progenitors during their lifetimes. In this respect, I equate those original punks with



Cheetah backstage at CBGBs.

the old Delta bluesmen who planted the seed that spawned numerous genres, but who died penniless and too young. Forty-two years after Iggy told us he wanted to be our dog and 30 years after Keith Morris gave voice to the suffering of a man with the world up

his ass, the stories of the originals are being told—far too late, but better than never. Among the books out there, *Cheetah Chrome: A Dead Boy's Tale From the Front Lines of Punk Rock* and *American Hardcore* are two of the best.

Having always loved the Dead Boys, I caught Cheetah solo one night at the Continental Divide, and it was like an audition for an obituary. So imagine my happy surprise to find that he's managed to duck the reaper all these years and crank out this engrossing, sensitive memoir of the few highs and many lows of a life lived punk. A flame-haired Irish tot born in the Cleveland housing projects, Cheetah devotes the first third of his autobiography to his *Angela's Ashes*-like youth. Seduced by rock'n'roll, booze and drugs at a young age, he finally assembles the Dead Boys with singer Stiv Bators, just in time to ride the short-lived crest of the late-'70s CBGB scene. There was a moment

where the Dead Boys could have gone "new wave" in the hopes of becoming The Knack, but Cheetah refused. He details his subsequent fall with a bone-crushing honesty.

The hardcore punk movement of the early '80s has to its credit more suicides, overdoses and drug addicts than any other genre of American music—and yes, that includes rap. Unlike the late '70s, where it seemed for a brief moment that punk might break out into the mainstream, hardcore punk bands never entertained the idea of commercial success. What you wound up with was a scene of zealots who did what they did for little more than beer money and bragging rights. The first edition of *American Hardcore* came out back in 2001, but has been expanded and re-released. Fast, aggressive, vehemently antisocial—to this day, '80s hardcore is ignored by the mainstream press, so this book is essential. —Chris Simunek

The Orb featuring David Gilmour

Metallic Spheres
 (Columbia)
 ★ ★ ★ ★ ★

In recent Pink Floyd history, the band reunited in 2005 for a charity performance, then lost Syd Barrett and Rick Wright, while Roger Waters launched massive tours doing old Floyd albums. Waters was willing to reunite Floyd in 2006 for a full-scale tour (before Wright's death), but guitarist David Gilmour declined in favor of a low-key career, reversing their roles when "Pink Gilmour" toured the world in the '80s and '90s sans the spiteful Waters.

Gilmour's latest aural adventure finds him teaming with innovative UK house/ambient two-some The Orb, comprised of (founding member) Alex Paterson and Thomas Fehlmann. It seems fitting these three musicians collaborated, as The Orb's multimedia live shows have been compared to Floyd's onstage excesses.

There are only two tracks—or "sides"—on *Metallic Spheres*, "Metallic Side" and "Sphere Side." Both open murky before recognizing Gilmour's tasteful licks, and The Orb utilize percussive elements never previously heard on a Gilmour project for a unique juxtaposition. The only knock on this stellar album is the (thankfully brief) vocalizing.

Often The Orb emerges victorious in this 'duel' over Gilmour's electric and lap-steel guitar work, but Dave always manages to battle back and reassert his classic sound. At the 15-minute mark of "Metallic Side," there is an acoustic interlude that will please *Ummagumma*-era Floydians; then things get *really* lysergic from there. Credit Gilmour for not repeating himself and contributing to new music, a lesson Waters would do well to learn. —Mark Miller



Peter Stampfel

Dook of the Beatniks
 (Piety Street Files & Archaic Media)
 ★ ★ ★ ★ ★

The Holy Modal Rounders co-founder, former Fug, Bottle-caps captain and the father of psychedelic folk has delivered a 21st century masterpiece and my favorite album of 2010. Produced by Mark Bingham, it was mostly recorded in New Orleans, a town known for unorthodox originality. Stampfel wails on his white fiddle and sings with more unabashed joy than most young 'uns have ever experienced.

Originals like "Oomalooma Messy Dessy," "Black Leather Swamp Nazi," and "New Adam In The Garden" take the listener to Planet Peter, where imagination runs so rampant, it's as if his tunes are missives from the dream-state. While one can discern traditional country, folk, Celtic, Mexican, children's music, doo wop, and unclassifiable Stampfelia, this is a *rawk 'n' roll* record, something I found out when my twentysomething hipster neighbors complained that I was playing my music too loud. "Jesus," the kid with the goatee and leather wristband whined, "why are you blastin' Dead Kennedys at three o'clock in the morning?" I proudly informed him that the squawker is no punk, but a 71-year old folk singer.

HIGH TIMES readers will particularly dig the faux-Injun "Pass That Peace Pipe," originally a hit for Gene Kelly and Fred Astaire in 1947, but easily made for appropriation by millennial generation vipers. An iconoclast for five decades, Stampfel brags in the title song that "I fought the '50s/And I won!" Thank the universe for small favors. —Michael Simmons



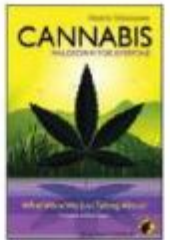
Cannabis: Philosophy for Everyone—What Were We Just Talking About?

Edited by Dale Jacquette
 (Wiley-Blackwell)
 ★ ★ ★ ★ ★

Cannabis: Philosophy for Everyone—What Were We Just Talking About? provides a refreshing collection of essays—from both sides of the fence—on the many philosophical facets of pot ingestion. Harvard scholar Dr. Lester Grinspoon points out in the opening essay, "All through the seemingly endless heated discourse on cannabis in this country... little has been said or written about its many uses. The overwhelming preponderance of funding, research, writing, political activity, and legislation has been centered on the question of its harmfulness."

Through an arrangement of great minds plucked from fields ranging from philosophy to pharmacology, *Cannabis* manages to step outside the boxes of traditional marijuana debates to include subjects like imagination enhancement, the hindrance and/or expansion of creativity, and trying to define the marijuana experience.

All contributed angles considered, this focused yet free-flowing stream of analysis is the type of roundtable that can get under your skin—just as philosophical inquiry should. HIGH TIMES associate publisher Rick Cusick writes in the foreword: "While I personally believe that legalizing cannabis would encourage a more civilized society, I also recognize that reasonable people can disagree. That's why this book is so timely and important. There are overblown claims on both sides of the equation and we need to have the more disciplined discourse that philosophy provides." —Mary Ought Six



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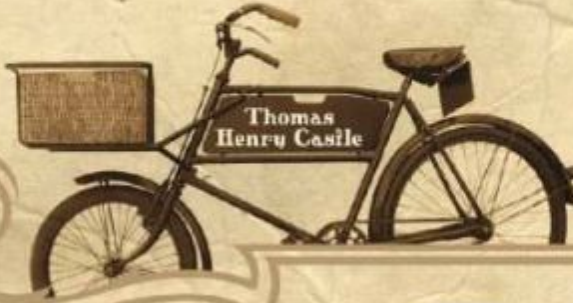
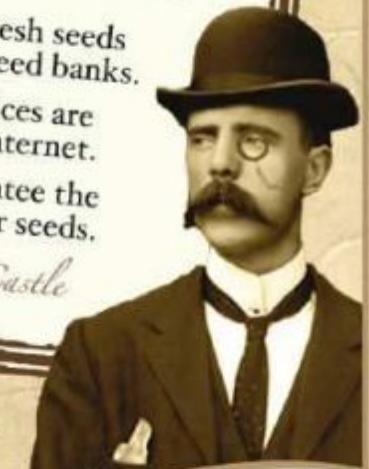
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IMAGINING JOHN LENNON HAD LIVED

We wanted more of Lennon's wit and insight, as much as his music. By Paul Krassner

Celebrating what would have been John Lennon's 70th birthday, here's one little memory of him, a moment that I treasure, excerpted from my autobiography, *Confessions of a Raving, Unconfined Nut: Misadventures in the Counterculture*:

Yoko Ono and John Lennon spent a weekend at my house in Watsonville. They loved being so close to the ocean. In the afternoon I asked them to smoke their cigarettes outside, but in the evening we smoked a combination of marijuana and opium, sitting on pillows in front of the fireplace, sipping tea and munching cookies.

We discussed the Charles Manson case. Lennon was bemused by the way Manson had associated himself with Beatles music. "Look," he said, "would you kindly inform him that it was Paul McCartney who wrote 'Helter Skelter,'" not me."

Lennon was absentmindedly holding on to the joint. I asked him, "Do the British use that expression, 'to bogart a joint,' or is that only an American term—you know, derived from the image of a cigarette dangling from Humphrey Bogart's lip?"

"In England, if you remind somebody else to pass a joint, you lose your own turn."

Bruce Fessier, entertainment correspondent for the *Desert Sun* ("Serving the Coachella Valley Since 1927"), posed a question about Lennon to a group of more-or-less well-known local folks. Here are two of those mini-interviews:

Suzanne Somers—Actress and health activist Suzanne Somers understands what it's like to publicly open up the doors after growing up in a dysfunctional family. She wrote her memoir, *Keeping Secrets*, after finding herself 'not so self assured.'

Q. Would the world have been different if Lennon had survived?

A. John battled low self-esteem as a result of the abandonment and was a drug addict. Makes sense. Drugs take away the pain. They also can put you into an altered state where some people are able to tap into a part of their brain so stunning that artistic expression oozes out.



John Lennon was disarmingly normal.

'In England, if you remind somebody else to pass a joint, you lose your own turn.'

Clarity of his demons in the form of song and lyrics would have and could have changed the world. We'll never know. Like his mother, he wasn't able to live long enough to get hit by the light of wisdom and insight. What we got from John Lennon was a man in progress who was still punching his way out of a bag.

I think if he could have lived long enough to have come to and allowed himself to feel his pain without being in an altered state, the resultant insight could have made him one of our greatest teachers. I would have liked to have heard the song he might have written from clarity about forgiveness and understanding and compassion.

Paul Krassner—Satirist and political activist Paul Krassner has fond memories of sharing

a joint with Lennon in the 1970s. "On a personal level," Krassner said, "his influence on me was simply enjoying his company as an individual rather than as an icon, with his irreverence, honesty, vulnerability and generosity. When I was publishing *The Realist*, and the printer wanted \$5,000 cash in advance for a particularly controversial issue, Lennon provided it."

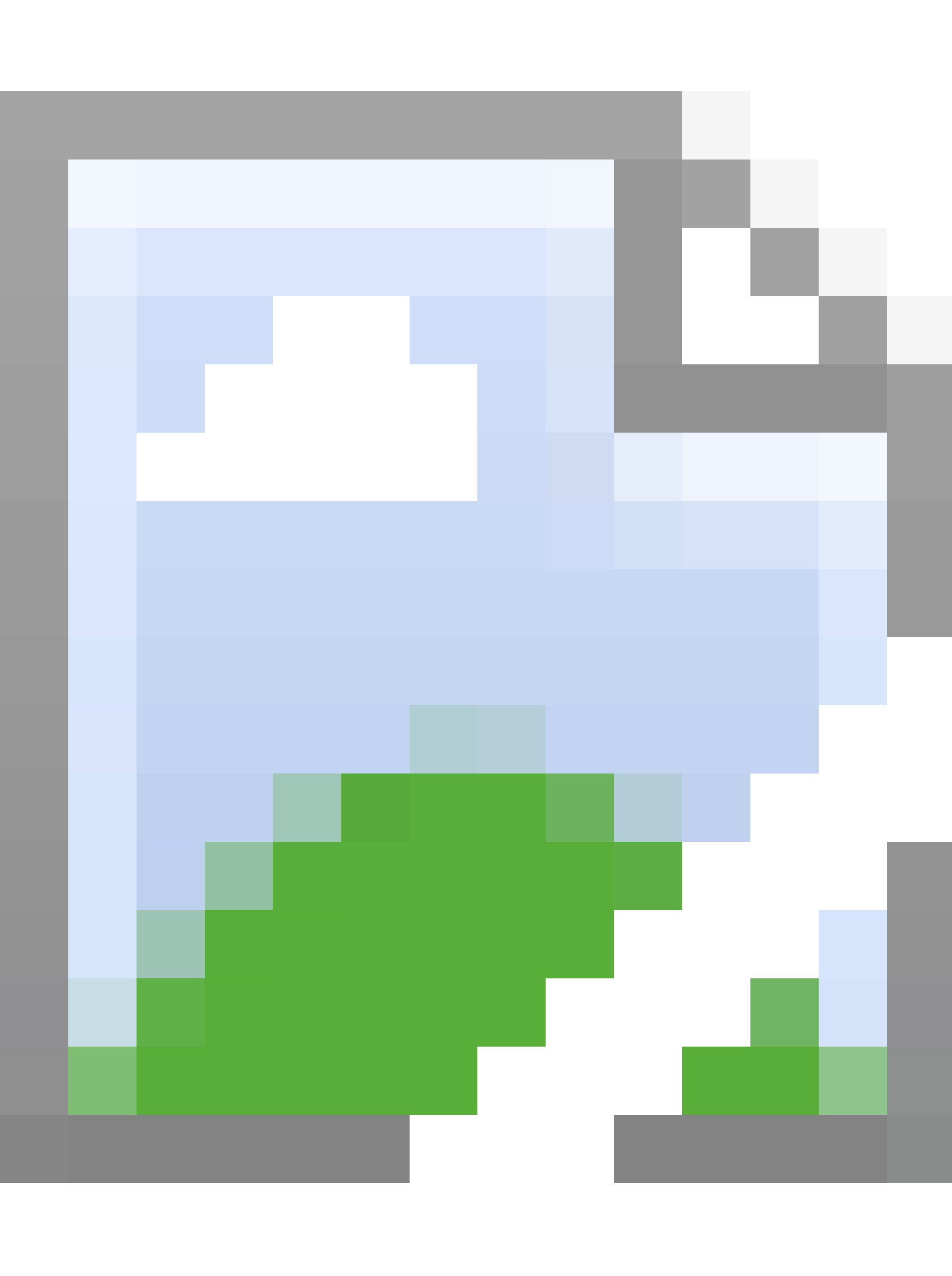
Q. Would the world have been different if Lennon had survived?

A. Sure, there would've been more songs and books to entertain and inspire, more wit and empathy to appreciate, more stories and insights to share, more social and political activism to lead.

Q. What do you think his stance would have been on medical marijuana and other drugs, such as LSD?

A. There's not the slightest doubt that he would have supported the medical marijuana movement as well as the right to smoke pot on a recreational basis, and to harness LSD as a vehicle for enhancing his music and his soul-searching alike. ✨

An expanded edition of *Confessions of a Raving, Unconfined Nut* is now available, as a physical book and as an e-book on Amazon's Kindle and Barnes & Noble's Nook. "For short stories, it's *Nookie*," Krassner says. To see his reading at the Winnipeg Comedy Festival, visit paulkrassner.com.





HIGH TIMES UNSIGNED BAND OF THE MONTH THE CLICK CLACK BOOM

The Click Clack Boom is a gang of Appalachian outcasts, foaming at the mouth, from the middle-of-nowhere, Pennsylvania. In 2008 the band staggered out of the woods with their instruments in hand and hopped in a van, and they have been on the road ever since.

Their sound has been described as eclectic and timeless, drawing comparisons to the Talking Heads, the Foo Fighters, the Smashing Pumpkins, the Beach Boys, and Wilco. If surf rock had been born in the '90s, it would sound something like The Click Clack Boom.

To see them perform is like watching an animal in the wild – exciting, unpredictable, and completely natural. It's impossible not to get caught up in the exhilaration of the music and the energy of the crowd when The CCB take the stage.

A DIY group in the truest sense, The CCB write, record, produce, and perform, but they also route and book tours, print T-shirts, and execute photo shoots, music videos, and marketing campaigns.

The CCB can't stay still for long and are always ready for the next city, state, and gig. They count on their tireless dedication, catchy songs, and unbridled artistic spirit to go farther than the road can take them.

For more on the CCB, including tour dates and audio samples, check out hightimes.com/theclick-clackboom.

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BY BOBBY BLACK

SMOKING WITH THE STARS

heads I know, I've pretty much worshipped Cheech and Chong since I was old enough to cough. From *Up in Smoke* to *Nice Dreams*, they set the standard for stoner comedy that Hollywood is still trying to live up to today. So



Interviewing Cheech & Chong on the green carpet.

naturally, for an aspiring celeb stoner like myself, getting my photo taken with reefer royalty like them was pretty high on my bucket list.

Now, I'd met and gotten high with Tommy Chong on many occasions over the years: at the Marijuanalogues in NYC, at the 20th Cannabis Cup in Amsterdam ... I even got to interview him on the green carpet at the 2007 Stony Awards in Hollywood. But Cheech? I'd never had the pleasure of meeting him, let alone blazing with him. So when I learned that the Stonys would be returning to Hollywood this past September, and that they would be hosting it, I immediately volunteered to go. But with the job of green carpet host already filled by fellow editor Natasha Lewin, I had to find some other way to ensure I'd have the opportunity to fulfill my pipe dream. Luckily, I managed to score myself the job of celebrity handler.

We couldn't have asked for a better venue than The Music Box. Located smack dab on Hollywood Boulevard's Walk of Fame, it's the epitome of rock n' roll elegance. The first celeb to arrive was Craig Robinson (*Hot Tub Time Machine*, *The Office*) and members of his band The Nasty Delicious. I showed them down to their dressing room, got them water, then brought them upstairs to the roof deck and got them high. Then, just around ... let's say 4:20 ... they arrived: the dynamic duo of dank, Cheech and Chong—along with Tommy's lovely wife Shelby and son Paris.

"Hello, welcome ... its an honor to have you all here," I gushed. "I'm Bobby Black from HIGH TIMES, and if there's anything you need, anything I can do for you, just let me know and I'll take care of it."

I showed them to a comfy VIP booth, got them some drinks and let our producer and stage manager know they'd arrived. But before I could even think of asking them for a photo, I was needed elsewhere. First, I had to head out on a food run. Next, I worked with the club staff to get our banners hung above the entranceway. Then, I headed outside to get the green carpet backdrop set up. Fortunately, I finished just in time—the MySpace Comedy video crew had just showed up. As they and Natasha began their interviews and more celebrities began to make the scene, I headed back in. Cheech and Chong were already onstage, so I headed upstairs for another

moke. There, I jumped into Miss HT 2010 Brittany and Miss HT 2007 Sarah, who were dutifully fulfilling their obligations as our smokesmodels. After our session, I led them back out to the green carpet for our

minutes and 20 seconds of fame. Then something happened that was totally unexpected: perhaps in need of a smoke, Natasha turned to me and asked:

"Hey... do you want to take over?"

"Are you sure?" I asked in disbelief.

"Yes I'm sure. Here," she said handing me back the mic, "it's all yours."

No sooner than she'd walked away, the kings of cannabis comedy themselves stepped onto the carpet. Now, I not only got to have a picture taken with them—I had the entire pot-parazzi photo corps snapping away at us.

"What do you think about what's going on here in California with Prop 19?" I asked.

"I think it'll pass," Cheech replied, "and soon after every other state will follow. It'll be legal for any purpose within three years. That's my prediction. It's going to spread faster than casinos and Starbucks."

I went on to interview a number of other celebrities, including Robinson and Doug Benson. When the Tinseltown tide had finally subsided, I packed up the backdrop and went back inside. As the Nasty Delicious wound down their cover of Rick James' "Mary Jane," I went in search of my permanent plus one Vegas Price. Lo and behold, I found her sitting on a step backstage sharing a bowl with none other than Mr. Marin himself. As our smoke session—and the event—drew to a close, we walked Cheech outside, where Tommy and their limo awaited, thanked them and bid them goodnight.

With my dream of chillin' with Cheech fulfilled and my work as celebrity handler done for the night, I headed up to the roof for the after-party, where I proceeded to get baked beyond belief. Not quite as baked as MySpace correspondent Ben Gleib, however, who apparently got a bit too "immersed in the story" and ended up face-down on the carpet. Oh well ... I guess that's what happens when you send a MySpace reporter to do a HIGH TIMES reporter's job. ✨

To see more

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For more Stonys coverage turn to pg. 46. Check out Bobby's Stony Awards photo gallery at hightimes.com/bobbyblack.

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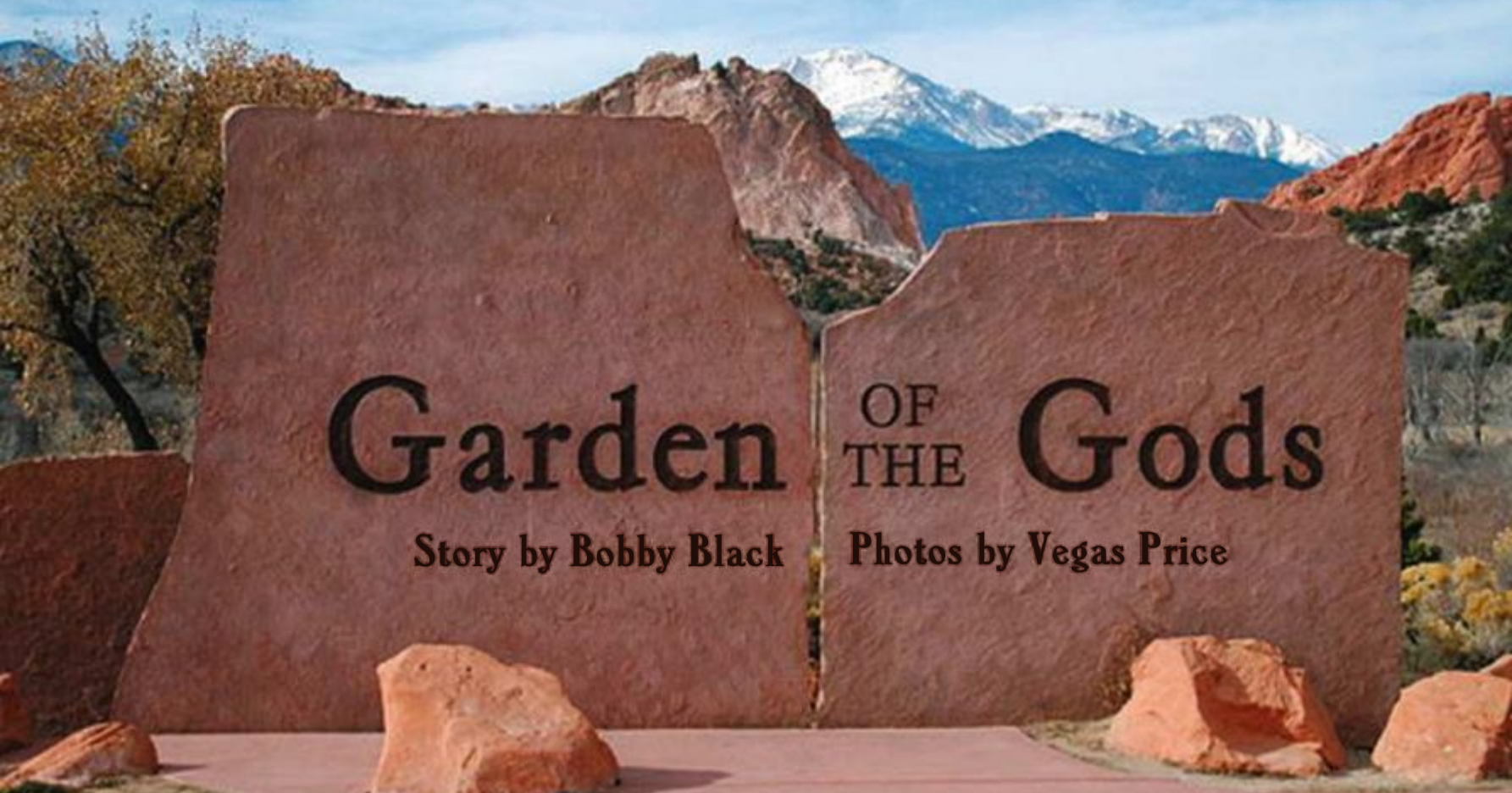
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Basking in the evening shadow of mighty Pikes Peak just an hour or so south of Denver lies the conservative town of Colorado Springs—home to the US Olympic Committee, NORAD, Garden of The Gods National Park, and the oldest and largest medical marijuana dispensary in Colorado—Cannabis Therapeutics.



Entrance to Garden of the Gods National Park.

I first heard about Cannabis Therapeutics—and its passionate proprietor Michael Lee—from my friend Jen Steele, who raved about their free, Saturday morning breakfast grow classes. Last summer, I traveled there to see this mountainside marijuana mecca for myself.

The store is usually closed on Sunday, but Lee and his staff graciously came in and opened up their doors for me. It doesn't take long for me to realize that CT is more than just a mere dispensary: it's a full-service clinical complex taking up nearly an entire office park. Lee—a patient himself who moved to Colorado in 1997—began using marijuana medicinally almost two decades ago to treat his chronic pain and spasms.

"I was in a car accident where I clinically died for 41 minutes," Lee recalls somberly. "Fractured skull, ruptured spleen, my right ear was ripped off, five fractures in my back ... I deal with continuous muscle spasms everyday. It's like a cattle prod all the time."

After his accident, Lee was prescribed a plethora of pills but knew right away they weren't for him. Instead, he turned to cannabis for relief, and when Amendment 20 passed in 2000 he was among the first to be approved for a license.

"I was patient number seven in Colorado," he says, "but nobody would sell me weed. They thought I looked like a cop. So on my doctor's recommendation, I started growing weed." By 2002, Lee had become the caregiver for six patients—delivering them medicine for just \$90 an ounce. When he took on a seventh patient, however, his attorney advised him to open a store. So in 2005, he opened CT—the state's first official dispensary.

"When we first started, we would wait a week to see one patient, sitting and looking out the window. We had no paint on the walls for the first year and a half because my wife (who is technically the owner of the shop) thought they'd come and raid us," he quips. Unfortunately, she was right—they were raided, first by the EPA (for allegedly dumping chemicals, a charge of which they were cleared) then by the DEA.

"I had nine DEA agents here for six hours. They took everything that had THC in it—including a 30-pound box of leafage from the lab, and a plant that we used to teach people how to grow." But eventually as word got out, the patients began to flood in.

"They came from all over," says Lee. "We had people that would drive six or eight hours, come in, stay at a hotel overnight, and then come back in the morning. This was because according to state law you could only buy two ounces a day. We were making about \$180,000 a month—four or five times more than we are now."



A jar of meds with one of the shop's signature glass pieces.



The Cannabis Therapeutics store features a fridge full of edibles, a lending library and live demo plants.



Owner Michael Lee admires his Black Domina bush.



Medicated soap.



The staff: budtenders Julie and Michael, grower Shawn and lab tech Matthew.



Medicated body wash.



The PARC lounge.



Medibles.

At first glance, the dispensary itself is not unlike many others I've seen. Naturally, it has a large selection of "raw product" (as Lee calls it) for sale—up to 70 different strains, all labeled in red and blue (red for *indica* and blue for *sativa*) and all with full chemical breakdowns listed on the jar. They also sell seeds, clones, and a full assortment of drinks, edibles, oils and tinctures. But unlike most shops, CT also offers a huge variety of bath and body products, such as THC throat sprays and roll-on sticks, lotions and deep rubs, goat's milk and honey soap, medicated shower gel and bubble bath. In addition, they have their own headshop—offering an assortment of papers, wraps, jars, bubble bags, top-end vaporizers and quality glassware (all made by their own resident glass blower DBK) at highly discounted prices. Customers can also borrow books and DVDs from their lending library and enjoy free popcorn while they browse.

After I peruse the store, Lee takes me outside and across the lot to the "PARC" (Patients Activities Research Center), a rec room where verified patients can bring their own bud and medicate in a safe, chill environment. Here they have free information, exercise equipment, TV and magazines; also on offer are meditation, yoga, massage

therapy, chiropractic care, meals, and of course, those free grow classes on Saturdays.

"We have game nights, barbecues with growers and patients, live bands ... you name it, we have it. I'm having more interaction, more breaking bread, with these patients than most do with their own family."

On the wall hangs a chart (created by Dr. Lester Grinspoon) mapping the molecular breakdown of cannabis and what illnesses each cannabinoid is best suited to treat. Just behind the lounge is the PARC kitchen, where they whip up medicated meals for their patients and produce all of the shop's edibles, using only 100 percent organic product.

"When we bake, we use raw oil so we know what the dosage is, down to every milliliter. In its raw form, all of that THCA has titrated, making it ten times more potent than normal THC—pure medicine. Without the oils, you're not making good product. We use 16.5 pounds of weed to make our Rick Simpson oil, using 86 percent chloroform extraction. Some of the things we make we only let terminal patients have, because they are so strong. It helps our MS and cancer patients, but we can't give it to the general public."

THE ROCKY MOUNTAIN CANNABIS CONVENTION



The Genovations lab.

All of their extracts and edibles are carefully created and tested for composition and purity by their own Genovations Lab, located just a few doors down. The lab is filled with lots of beakers and test tubes, and expensive-sounding machines like a refractometer, an electronic brix meter, and a high-performance liquid chromatograph.

"This is our HPLC," explains Matthew, the facility's manager. "This instrument is used to identify and quantify the different cannabinoids in the sample."

How exactly does this complex contraption work? Matthew attempts to break it down:

"First, we weigh out our raw, dried bud samples. We mix the raw plant material in a tube with the solvent. After it's in solution, we load a sample into the HPLC. The needle comes out to pick up the vial, injects it in the tubes where it then flows through these tubes and into this silica meshwork column, which separates and sorts the cannabinoids. The ones with less attraction are washed out of the column sooner." A forced ventilation chamber keeps the samples at a constant temperature while the machine sends light through the solvent. A detector then shows the particular wavelength of UV light—220 or 240 nanometers, for example—that each cannabinoid absorbs. "It'll show a little peek relating to each cannabinoid in there," Matthew says, "that's how we're able to quantify the samples."

"We have a 99.998 percent accuracy rate," brags Lee. "Just as good as a crime lab—actually, better." He believes that if you're going to call a product medicine, testing should be mandatory.

"The crazy thing is that once you start testing products, you see how many people are selling stuff that's not even medicated," he claims. "Seventy percent of all baked goods that we're testing have zero THC, THCA, CBD, and CBN. They're using cold water extraction hash, which is just THC acid but no THC. It's not heated to the right temperature to convert it."

One thing the folks at Genovations are not interested in, however, is mapping the genomes of strains. "We don't do that because I guarantee that we won't do it," Lee insists. "If you map the DNA of the plant and the original grower didn't map it, then you copyright it. Whoever maps the strain, patents it. It's stealing somebody else's strain, their hard work—I don't agree with it."

Speaking of genetics, it was about time for me to check out their cultivation setup. Lee brings me to the other side of the complex to a series of rooms where the breeding and processing take place. First stop: their mother room, which houses their entire genetic stock—a total of 70 plants spread out in ten gallon buckets of soil. Here, I'm introduced to Shawn—CT's head gardener.



High-performance liquid chromatograph.

Last July, HIGH TIMES was invited to attend the first-ever Rocky Mountain Cannabis Convention and Wellness Expo in Denver. This two-day event at the Denver Convention Center was designed to provide opportunities for networking and education for both the medical marijuana community and the general public. The expo was sponsored by local activist groups like SAFER, Mile High NORML, and John Doe Radio, and featured lectures by specialists from all over the country, such as endocannabinoid expert Dr. Bob Melamede, organizer of Colorado's Amendment 20 Warren Edson, SAFER's Mason Tvert, and civil rights attorney Robert Corry.

There were hundreds of vendors, showcasing anything and everything cannabis related. Edibles were a heavily represented group, although because of the convention center's policy, all of the samples distributed at the expo were non-medicated. There were ice creams from Mangia Ganja and Hemp I Scream, whose products are made with dairy-free hemp milk. There were flavored sodas by Keef Cola and Nancy B's Edible Medicine, who also cater to the extreme vegan crowd with products like wheat-free and low-glycemic carrot cake.

Over at the HIGH TIMES booth, we promoted Cannex, our iPhone dispensary app, and our new sister magazine, Medical Marijuana News and Reviews. Just across the way from us was Boldt Bags, the longest-standing bubble bag manufacturer in America and third-place winners for Best Product at the HIGH TIMES Medical Cannabis Cup last June. And around the corner from us was Dank Decals, who create custom logo designs for dispensaries, strain shirts and a line of snowboards. At the Silver Surfer vaporizer booth, I ran into Neverxhale—the metal sculptor I featured in my June 2010 column, who is now working with them as a glass-blower. To my surprise, he'd brought me a little thank-you gift: a custom black vape he'd etched with my favorite comic character, Ghost Rider.

The real fun, however, came at the end of the expo; Friday's finale was a fashion show organized by Stiletto Hippie, and my fiancée Vegas and I were invited to participate. Vegas and I were the last to hit the runway—she in her tan ladies' hoodie and me in my orange flannel—to a hearty ovation. Then on Saturday night, there was a killer VIP after-party at Quixote's, featuring iconic MC KRS-One, which we arrived at via stretch limo, courtesy of Adam Dunn from T.H.Seeds.

All in all, the RMCC proved to be an inviting and informative event. Hopefully, our upcoming HIGH TIMES Medical Cannabis Cup in Denver this April will be even more educational and exciting.



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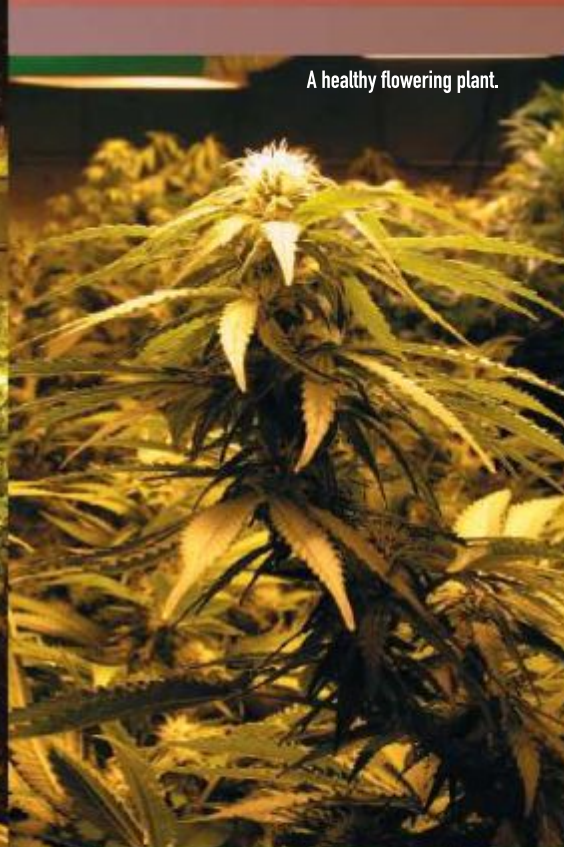
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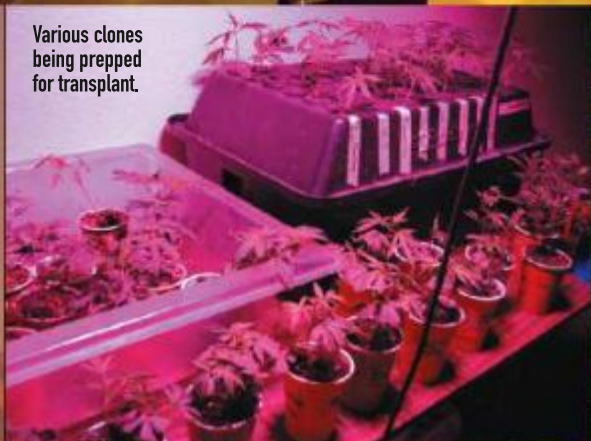


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Various clones being prepped for transplant.



Mother room overhead.



Diesel, Brain Freeze, Big Kahuna, Blueberry and other mother plants.

“There are so many crosses in here, I don’t even know what to tell you,” he says. “We have everything from Strawberry Kush to Grape Fruit to OG. We got rid of many of our old strains because everybody else had the same thing and we wanted new flavors.”

Next, they lead me to the red-lit cloning and drying room, containing several empty, tiered mesh racks hanging from the ceiling and a couple dozen sproutlings in plastic cups.

“These are the upcoming crops that Sean is working on,” Lee says. “There are 46 different strains. Everything you see is from seed.” Lee prefers Dutch seeds to Canadian ones, which he claims are weak and often don’t crack. “These are about a month and a half along. The top ones are recently rooted and the bottom ones are further along ... probably closer to two months. They’re about ready to go into flowering. Soon we’ll get these all into 10-gallon pots and ready to go.”

From there we make our way down the hall to the flowering room, filled from wall to wall with eight large trays of Dyna-Rok II, holding around eight bushy plants per tray.

“The person who taught me this tray method was from California,” he continues. “What you’re looking at now are plants about two and a half weeks in [to flowering]. In here we’ve got Pineapple Express, OTB, Sweet Tooth, White Widow, NYC Diesel, Sour D, Recon. You can see there are already colas forming. If it’s grown properly, it should produce four to six pounds per tray.”

After exploring the entire CT complex, we hop in Lee’s SUV and take a short drive to another of their growrooms, in the basement of a house in an outlying residential neighborhood.

“By September, this room will literally be filled with plants six feet tall; and fully lit. We’ll have 200-amp service into two units, so 400 amps. We have an electrician designing all of this.”

According to Shawn, the high altitude here creates longer grow cycles—extra weeks to finish flowering—something that many growers don’t take into account. “Everything that we look at from everybody else is premature. If they’d take a little more time and be less concerned with a calendar finish date than the needs of the specific strain, they’d have better products,” Sean comments. “We need to get growers growing to strains.”

As far as nutrients go, Sean prefers to make his own as much as possible.

“I think everybody has raped this [nutrient] industry. Distributors are selling you 90 percent water. We use Advanced Nutrients Connoisseur line and Cutting Edge. We only did one cycle on that. We always test two products at a time—room by room, so we can see the results side by side, and we always use some different technique every time we grow.”

After touring the entire complex, Lee says he has a surprise for me and takes me for a long drive out to the country. Along the way, we get to talking politics—particularly, the new regulations going into



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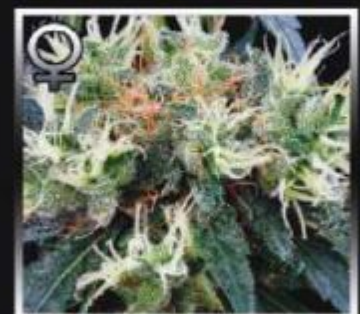
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The greenhouse.

effect due to HB 1284, the controversial 77-page bill that the state legislature passed.

According to the new regulations, a caregiver can only have five patients—any more, and they have to open a dispensary. But opening a dispensary incurs a tremendous amount of overhead, including an exorbitant license fee (\$7,500 for up to 300 patients, \$12,500 for 300 to 500 patients, \$18,500 for anything over 500 patients), rent and utilities on the store, plus rent & utilities on a separate warehouse to grow the medicine, which requires another \$1250 fee. All of this expense will put most mom-and-pop operations out of business and translate into higher markups on the product—forcing patients to drive further and pay more for their meds. Many activists and patients have accused some of the largest dispensaries of hiring lobbyists to influence the legislative process to favor them rather than the patients. I ask Lee if he was involved.

“I’m one of the big boys, and I never paid anybody any money,” he affirms, “but I know that our police department hired lobbyists.” He does, however, favor limiting the number of dispensaries. There are currently around 176 stores in Colorado Springs; Lee believes that within a year or two there will only be a handful left open.

“I told our city council we needed seven dispensaries and that’s it, because I didn’t want Colorado Springs to turn into the same thing that LA did. They told me I was trying to create a monopoly. I said, ‘I only want to own one of the seven—how is that a monopoly?’” Why put such a strict limit on the number of dispensaries? Lee believes it’s better for the patients to have a few shops who truly know how to grow quality product rather than scores of places where the motives or quality of the establishment may be questionable.

“Do you realize how many people don’t know how to grow? What kinds of products are they going to put out? Too many people got involved in this industry that have no business here. They aren’t about the patients, they’re about what they can make from it. I’m in this to help people.”

The new law also stipulates that, as of September 1st 2010, all dispensaries are required to grow 70 percent of the cannabis they sell and can only purchase 30 percent from another dispensary or grower. The number of plants you can grow is limited to 2000, unless you have an “infusible” license, in which case there’s no limit.

“They’re forcing us to grow thousands of plants. Before, I had 14 growers working for me, and I issued a 1099 tax form for each grow. I had to make sure that the growers declared the money.”

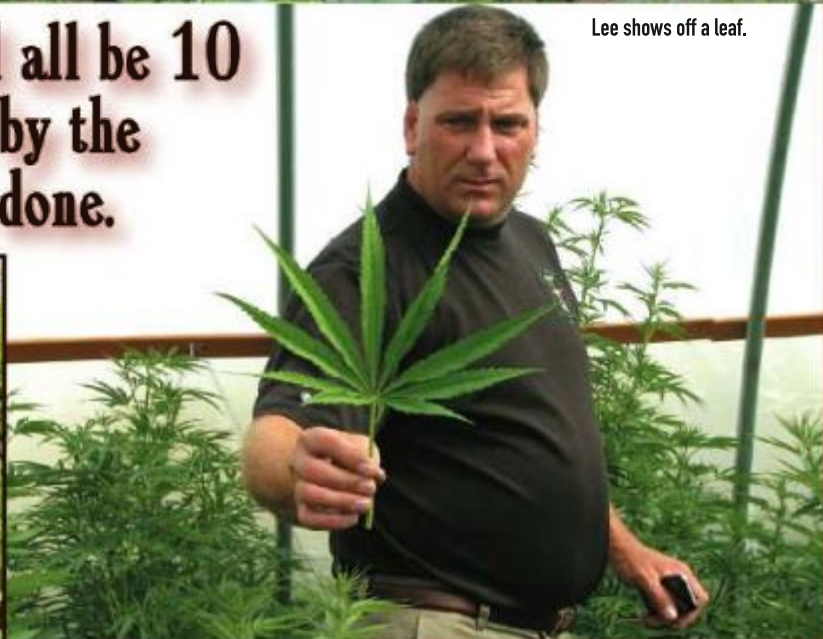


Inside the greenhouse garden.

These plants will all be 10 to 12 feet tall by the time they are done.



Halfway to harvest.



Lee shows off a leaf.

The *Colorado Springs Gazette* recently reported that in 2010 the town brought in almost \$325,000 in tax revenue from the sale of medical marijuana—up from \$110,000 the year before, and Lee claims to have paid 88 percent of that figure. “I offered them 4% extra on top of the 7.6% sales tax if they used it in a green manner,” he says. “If a piece of the forest burns down, replant it. If the parks have no money, help them and put a plaque up that says, ‘Paid for by medical marijuana patients.’ You know what they did with the 4%? They hired lobbyists.”

Finally, we arrive at an isolated house in the country surrounded by open land. Out in the field behind the house we see his pride and joy: an outdoor greenhouse the size of an airplane hangar.

“I removed nine feet of dirt—48 semi truckloads—and brought in my own mixture of sand and compost,” he tells me as we enter. “Then I built a 30’ x 97’ greenhouse on top of it. We live in the highest wind area in the state so we put up a 15-kilowatt wind turbine to power it. I make enough money on it that it’s still paying for itself.”

Inside are close to a thousand plants, each between four and six feet tall. They’re still vegetating, so there isn’t much in the way of buds yet, but they’re quite impressive nonetheless—particularly one gigantic bush, which he tells me is Black Domina.

“You’ve got everything you could possibly imagine in here ... at least 70 different strains, all females. Sean spends three to four hours in here every day. The plants that are in here now are going to be trees—these will all be 10 to 12 feet tall by the time they are done.”

Now that’s what I call a garden of the gods.

In the face of all the politics and posturing, Lee’s main message to the politicians and dispensary owners of Colorado is that they should stay focused on helping the patients and growing the best medicine possible.

“They need to realize what goes into growing this plant. They hire growers that have a college degree in botany but never grew weed in their life, that don’t love the plant. If you don’t put love into the plant, you don’t get love out of the plant. Until you add love into the equation, you just have a plant. That’s the bottom line.” ✨

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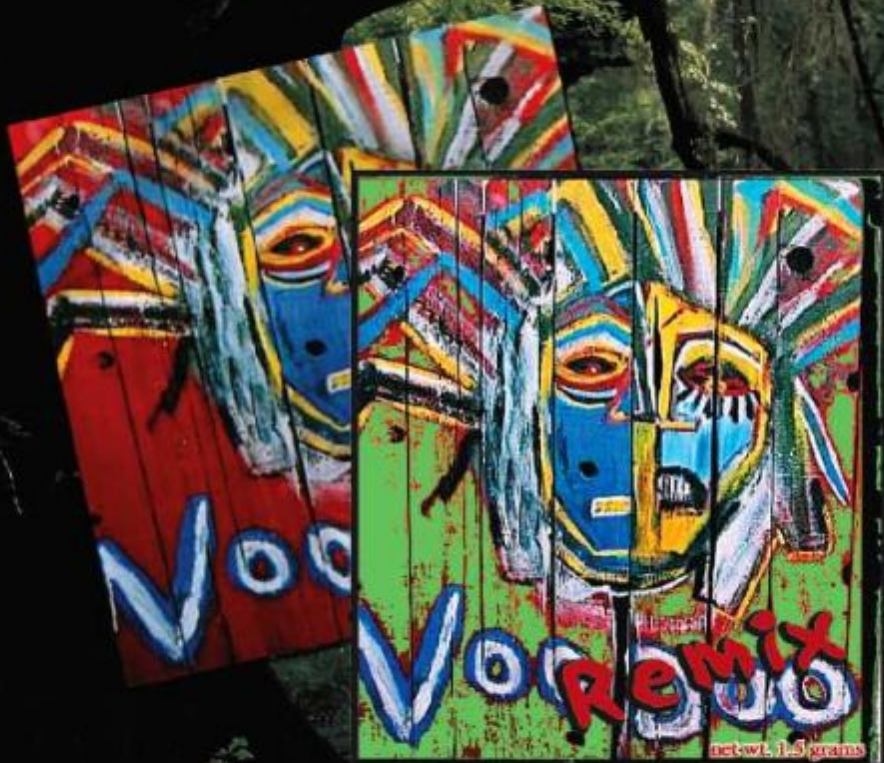
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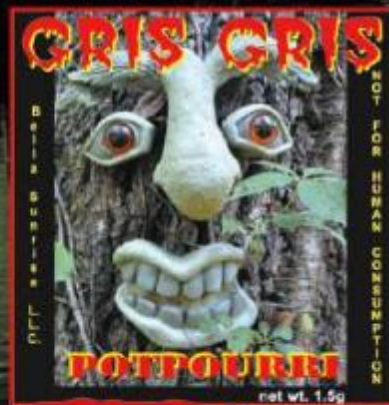
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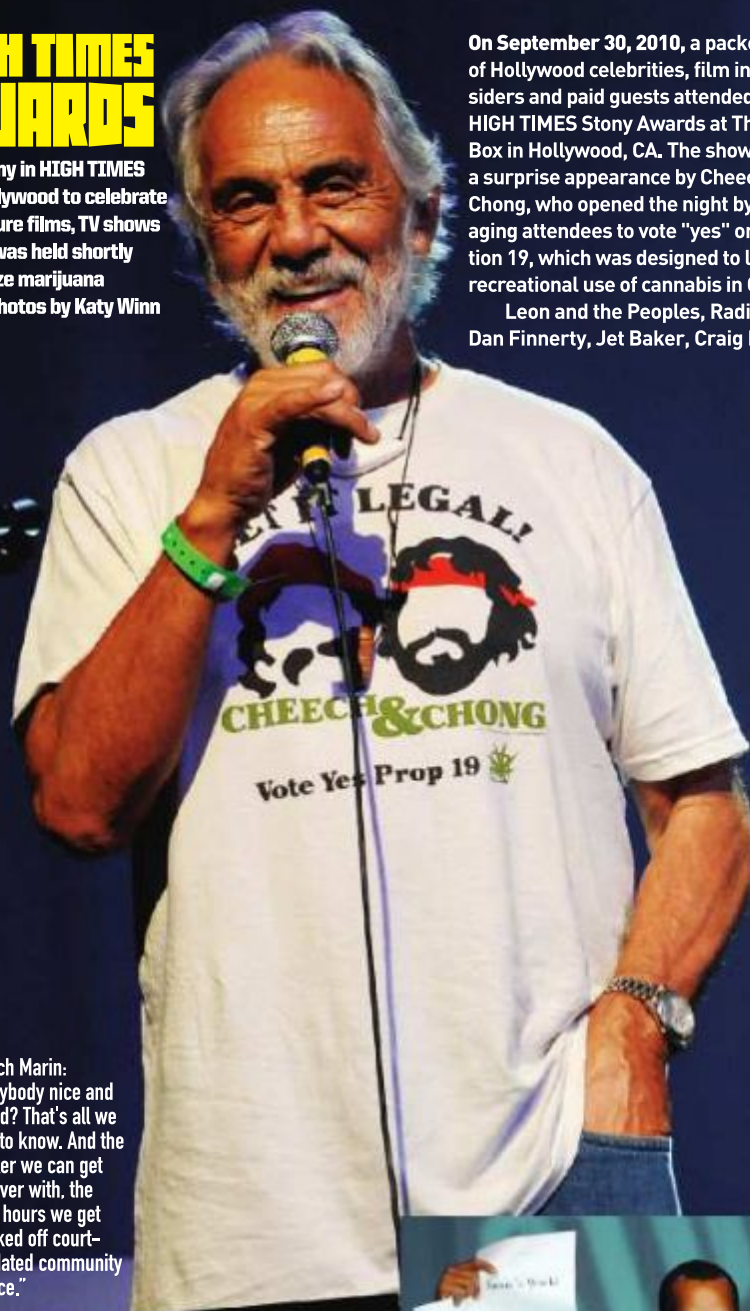
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THE 10TH HIGH TIMES STONY AWARDS

The most lavish Stonys ceremony in HIGH TIMES history was recently held in Hollywood to celebrate the year's greatest counterculture films, TV shows and Internet videos. The show was held shortly before an historic vote to legalize marijuana in California. By Steven Hager, photos by Katy Winn

On September 30, 2010, a packed crowd of Hollywood celebrities, film industry insiders and paid guests attended the 10th HIGH TIMES Stony Awards at The Music Box in Hollywood, CA. The show featured a surprise appearance by Cheech and Chong, who opened the night by encouraging attendees to vote "yes" on Proposition 19, which was designed to legalize recreational use of cannabis in California. Leon and the Peoples, Radio Traffic, Dan Finnerty, Jet Baker, Craig Robinson

Miss HIGH TIMES 2010 Brittany Wagoner and Miss HT 2007 Sarah Newton get the crowd all riled up.



Cheech Marin: "Everybody nice and stoned? That's all we want to know. And the quicker we can get this over with, the more hours we get knocked off court-mandated community service."



Super High Me's Doug Benson.



Pauly Shore presents the Stony for Best Comedy.



Hot Tub Time Machine's Craig Robinson and The Nasty Delicious sing "Mary Jane."



Director Kevin Asch (left) accepted the Stony for Holy Rollers and lit up a joint and the glass Stony bong onstage.



Jesse Ventura's son, Tyrel, accepts the Stony for his father's TV show Conspiracy Theory.



Leon and the Peoples opened the show with their hit "Weed's Gonna Come Around."



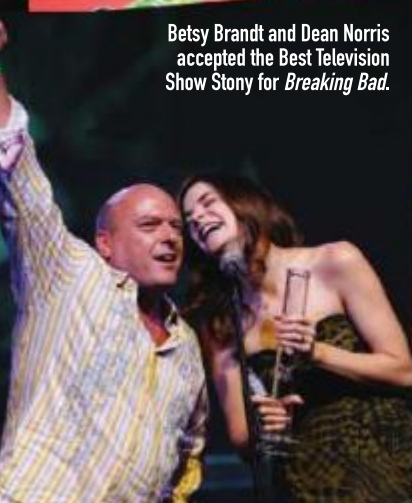
Donald Faison of Scrubs announces the Internet Video Award winner.



Dan Fogler of Brother Sam wants more ammo for his bong.



Ken Davitian of Borat waxes philosophic.



Betsy Brandt and Dean Norris accepted the Best Television Show Stony for Breaking Bad.



Natasha Lewin interviews Zach from Zachariah and the Lobos Riders.

and the Nasty Delicious, and Zachariah and the Lobos Riders all gave rousing performances.

Immediately after the show, while Zachariah and the Lobos Riders were still performing, the VIPs headed up to the roof for an exclusive after-party, which featured gourmet food, chocolate treats and a three-hour open bar.

Special thanks to LEDZ lighting for the green carpet by Hollywood Rentals, Ganja Juice for bringing incredible Ganja Smoothies, Aqua Lab Technologies for making sure everything bubbles, Sheldon Black for providing beautiful functional trophies and, most especially, Apothecary Genetics, without whom this lush event never could have happened at all. 🌿



Dan Herer accepts the Lifetime Achievement Award on behalf of his father.

Radio Traffic performs "California Dreamin'".



Kelsey Ford of Adventureland.



Daniel Franzese of Mean Girls lights up onstage.

Best Internet Video Award winners for The Day After California Legalizes.



Alexis Arquette accepted Drew Barrymore's Stony for Stonette of the Year.

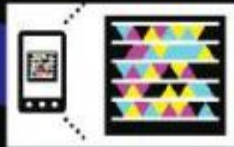


Len Richmond receives a Stony for What if Cannabis Cured Cancer.

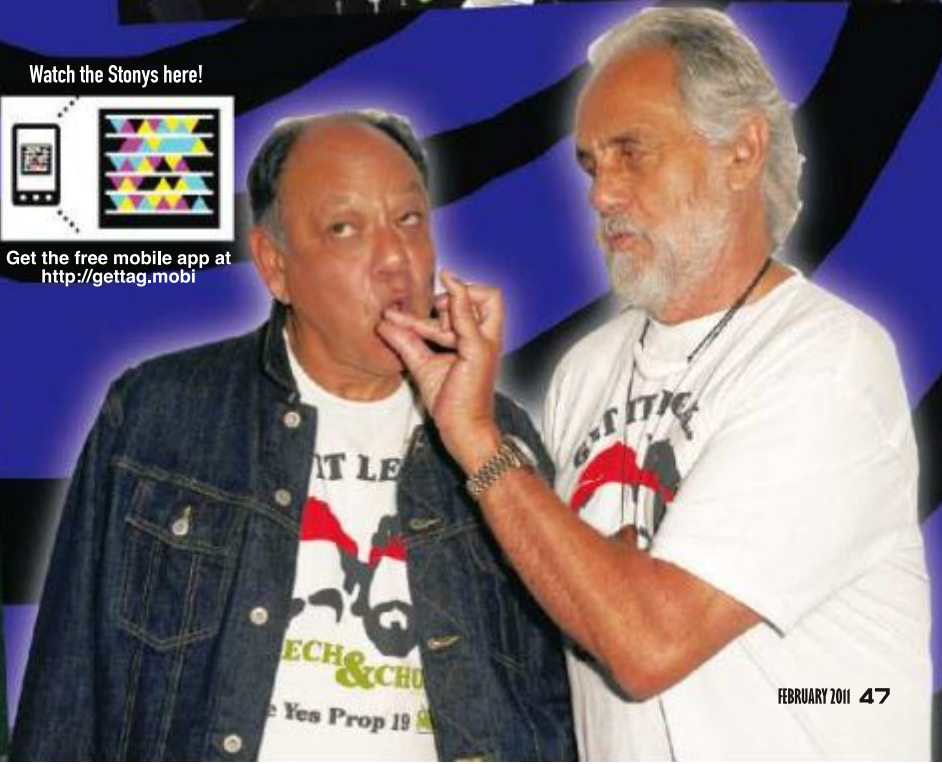


All the ganja girls love the Stonys.

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WATER WORKS

PART 1: INDOOR HYDRO

Successful cannabis cultivators are, by necessity, experts in water. And hydro growing makes more sense when it's considered alongside its older, more conventional brother: outdoor organic growing. By studying these two extremes—indoor hydro and outdoor organic—this two-part series is meant to help growers toward a cost-effective strategy for delivering water to their plants for every grow technique out there. Whether you measure your reservoir in gallons or in the thousands of gallons, we've got some very practical advice—and even a little bit of history—to help steer you away from common mistakes. By Hugh Jiëlder

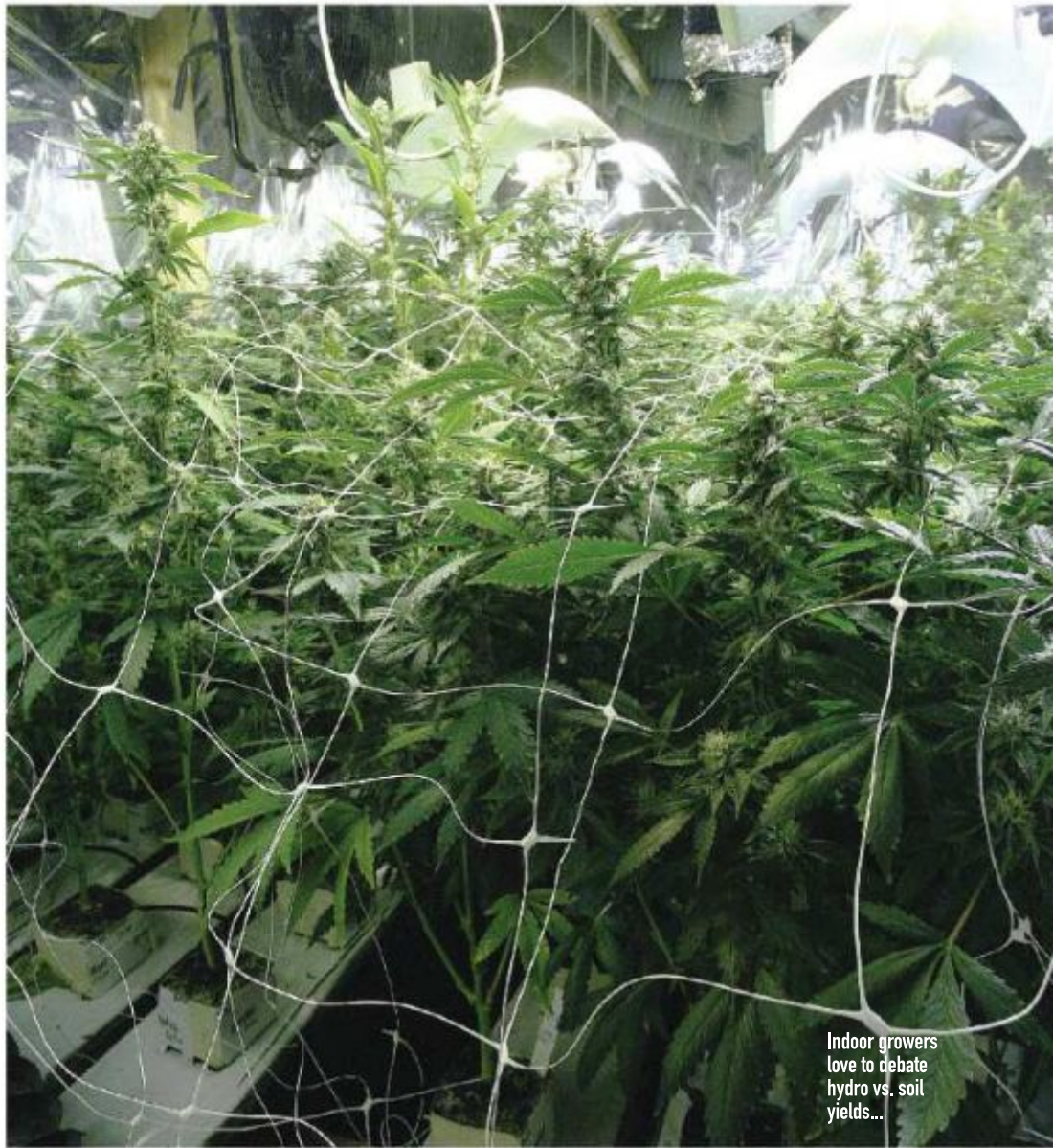
A Very Brief History of Hydroponics

Hydroponic growing was the natural consequence of scientific advances in understanding plant biology. It took humankind 260 years to figure it out from the first recorded experiments, but by studying the composition of plants and the substances they use to grow, people eventually learned how to imitate—some would even say *improve upon*—nature.

When people started studying plants in earnest in the 17th century, their first guess was that the plants were, in effect, cannibalizing the soil as they grew. But simple experiments revealed that the soil never actually changed in weight as plants grew, and experimenters were forced to reckon with the introduction of nutrients from the air and water instead.

Once it was discovered that plant matter consists of 80 percent to 95 percent water, the notion of water culture naturally followed. Once the water is removed, 90 percent of the matter that remains is carbon (C), oxygen (O) and hydrogen (H)—the most fundamental building blocks, which plants extract from water and the air. This means that when we talk about the other elements required to grow plants—the elements of the nutrient feed—we're really only talking about a minuscule amount of the plant's total wet biological mass.

In 1860 German scientists discovered that normal plant growth could be achieved in the absence of a living-soil food web and conventional soil structures by immersing the roots in an aqueous solution of salts. The most important salts—the so-called macrolelements—include nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulfur (S). With further investigation, scientists discovered seven additional elements required by plants in relatively small quantities. These are known as the microelements: iron (Fe), chlorine (Cl), manganese (Mn), boron (B), zinc (Zn), copper (Cu) and molybdenum (Mo).



Indoor growers love to debate hydro vs. soil yields...

Does Hydro Yield More Than Soil?

We now live in a world of plastics and electronics, which together have made many variations on automated hydro techniques affordable. Although there are now numerous ways to introduce water, nutrients and air to the roots, this range of techniques varies tremendously in terms of difficulty—and the set of problems that one encounters depends, to a large extent, on the chosen technique. People who have decided to grow cannabis for the first time, hydro or not, should try to find the technique that best suits their personality and schedule. If you're attentive to detail, prefer to micromanage, and have the time to monitor your system on the order of once a day, then hydro is your style.

Hydro generally became popular when growers discovered that it could, with proper diligence, generate higher yields than soil in terms of indoor growing. Biologists sometimes point to the various problems that can manifest in soil-based environments when trying to explain this increase, such as lack of nutrients, bad soil structure, and outbreaks of pathogenic pests and diseases inherent to (poor) soil.

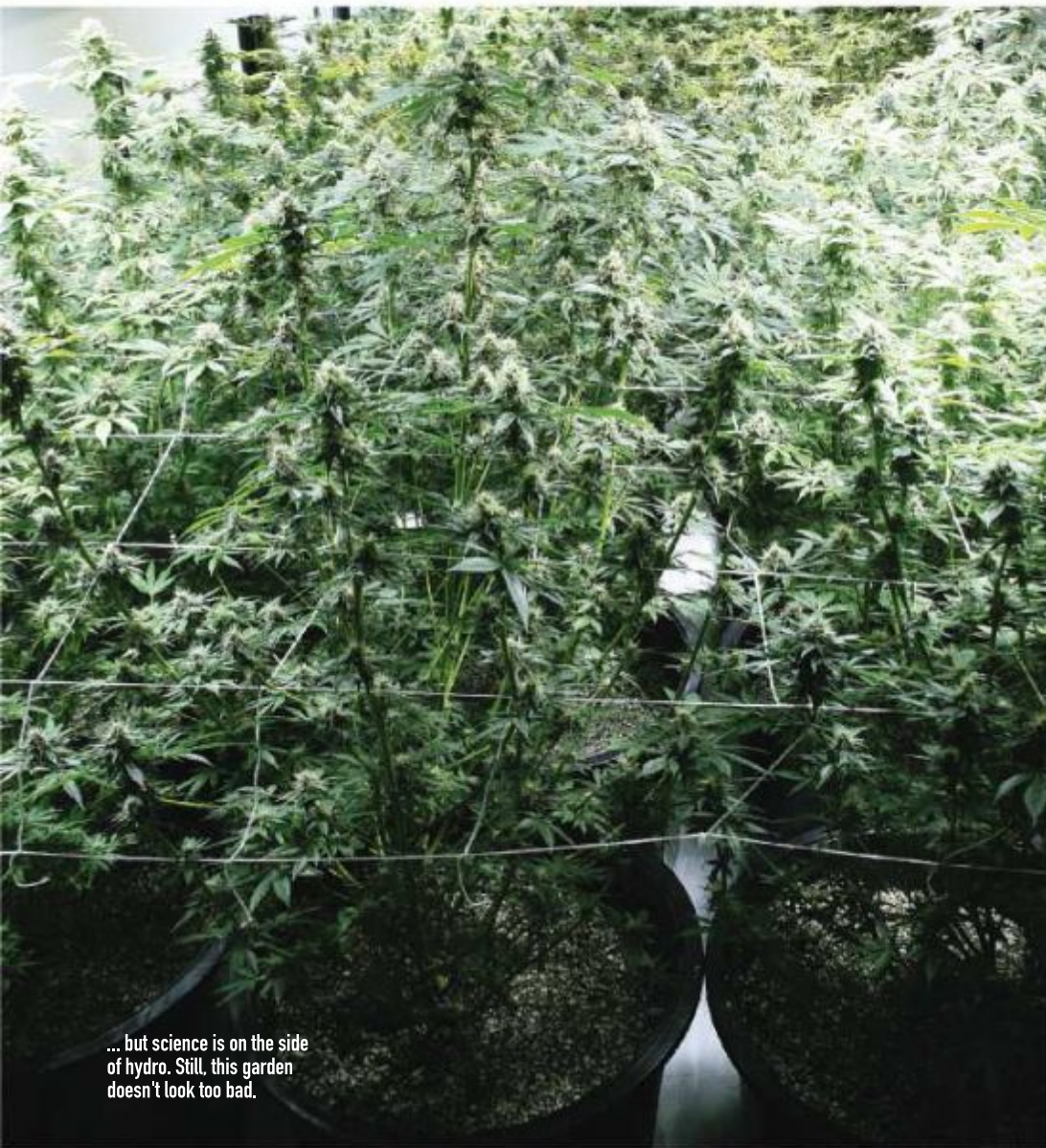
But it's also worth noting some of the other basic differences between soil and hydro as potential causes for the yield difference. For instance, roots that are regularly bathed in fresh nutrient solution generally don't have to work

as hard as roots in soil to acquire their nutrients. Organically grown plants, for example, are known to spend much of their resources feeding mycorrhizal fungi, which in turn do most of the legwork transporting nutrients to the plants' root zone.

In a general sense, when a plant cell is required to break a bond in order to accumulate some molecule it desires in the organic world, it typically must invest some chemical energy in the process. The point of hydro is to make this process as easy as possible for the plant by bypassing the soil food web and directly delivering the raw materials that the plant desires to its roots. By reducing the energy expense associated with acquiring nutrients, the plants can, in theory, focus more of their energy on topside production.

There is also the benefit of increased oxygen availability to the roots. In outdoor organic (i.e., soil-based) growing, oxygen hitches a ride to the root zone with each occasional watering. Hydro, by comparison, provides a more sustained delivery of oxygen to the roots, though the hydro medium also, by its very nature, dries out faster than soil.

In the end, though, and in practical terms, cannabis growers shouldn't expect higher yields using hydro until they've mastered the various problems that come with the technique.



... but science is on the side of hydro. Still, this garden doesn't look too bad.

Water Sources

Whether they preferred consuming it in tea, coffee, wine or beer, the ancient cultures of the world learned to process their water supply in ways that made it safe to drink. In the American colonies, for instance, it became clear that people who drank beer instead of surface water were less susceptible to cholera and other waterborne pathogens. We now know that the natural sources of groundwater—the water from streams, lakes and manmade wells—tend to contain amounts of calcium, magnesium and other microelements that vary with rainfall. The fluctuations occur because rainfall itself tends to have very minimal alkalinity (i.e., levels of salts). Tap water, on the other hand, is high in alkalinity; this is also known as “hard water.” The “hardness” of tap water can alter the action of soap by preventing it from lathering and making it difficult to wash off. Over time, these minerals precipitate out and accumulate on the inside surfaces of pipes in a process commonly called “scaling.” Not surprisingly, scaling can, over time, damage appliances that work using tap water.

Subterranean well water differs from surface water in that its consumption will not result in waterborne diseases in humans—provided, of course, that the well

has been properly cleaned and sealed. To ensure that tap water can be consumed by humans, it's treated in the United States with fluoride, chlorine and, more recently, chloramines. The concentrations of chlorine and chloramines in tap water aren't sufficient by themselves to directly induce nutrient toxicity in plants. But their presence does affect plant yields in strictly organic grow systems using living soil, since these chemicals are meant to destroy microorganisms and keep tap water free of harmful pathogens.

Generally speaking, the fact that chlorine and chloramines indiscriminately destroy the microorganisms within grow media isn't necessarily a bad thing for hydro growers. Soilless growers basically have to make a decision as to whether or not they want to culture living organisms within their medium. If the hydro grow is already using strong synthetic nutrients, then filtering tap water is arguably irrelevant because, given sufficiently high N-P-K (nitrogen-phosphorous-potassium) use, the nutes are already killing off the media's ecology. Many hydro nutrient programs today offer the choice of using unfiltered tap water by providing optional calcium and magnesium components to their feed programs. If it's there already in reasonable amounts, then growers don't have any need to spend money on it.

Filtering Waterborne Contaminants

Carbon is the most *adsorbent* material known, which means that materials bind easily to its surface. (This, by the way, is different from *absorption*, which means “to take in, suck up, make part of an existent whole.”) When carbon is steamed to 1,800°F, it forms microscopic pores and pockets that dramatically increase its surface area. A teaspoon of this “activated” carbon is often said to have a surface area equivalent to a football field. Since these carbon crevices automatically trap certain substances suspended in water using nothing more than water-line pressure, activated carbon filters that will capture contaminants down to about a micron in size are relatively cheap to manufacture. Most multistage water-filtration systems will accordingly integrate carbon filters into their early stages.

It's important to realize, when we talk about contaminants in water, that there are several orders of magnitude in the scales we're discussing. Here's an approximate rundown:

Dust grains	5 - 1,000 microns
Mold spores	10 - 30 microns
Mold	3 - 12 microns
Bacteria	0.3 - 60 microns
Viruses	0.005 - 0.3 microns
Pesticides and herbicides	0.001 microns
Carbon dioxide molecules	0.00065 microns
Oxygen molecules	0.0005 microns

Since the filter required to eliminate dust-grain-sized sediments is clearly different in micron size from the one used to deal with things like viruses, pesticides and herbicides, filters tend to come in multiple stages. Deploying multiple stages also extends the lifetime of the finest filters in the chain, which are always placed at its end. This is especially true of reverse-osmosis (RO) machines, whose super-fine membranes are susceptible to problems like degradation and hard-water scaling.



This faucet has scaling from minerals in unfiltered well water.

Reverse Osmosis

Osmosis is defined as the tendency of two solutions connected by a semi-permeable membrane to equalize their water concentrations. For example, in experiments involving one solution with pure water and another with contaminated water, water molecules from the pure-water side will naturally tend to move through the membrane and dilute the contaminated water. The process of osmosis is actually how plant cells acquire nutrients from the outside world.

Reverse osmosis stops and reverses this equalization process using water pressure to push water molecules through the membrane away from its tap-water source. RO machines are unique because they can be created to block molecule-size substances (measuring 0.0005 microns) using billions of tiny holes in their membranes. A lot of hydro growers use RO systems these days, so it's worth it to discuss them in depth, especially since they can be very complex devices.

An RO unit has two outputs: wastewater (a.k.a. "brine") and "pure" water. Back pressure applied to the wastewater output with a flow restrictor determines how much pure water flows through the membrane to the pure-water output. The more constrained the flow restrictor's output is, the higher the pressure at the membrane and thus the more water going through the membrane. The more water that goes through the membrane, the more "efficient" the RO unit is (i.e., less wastewater) and the longer the membrane will last.

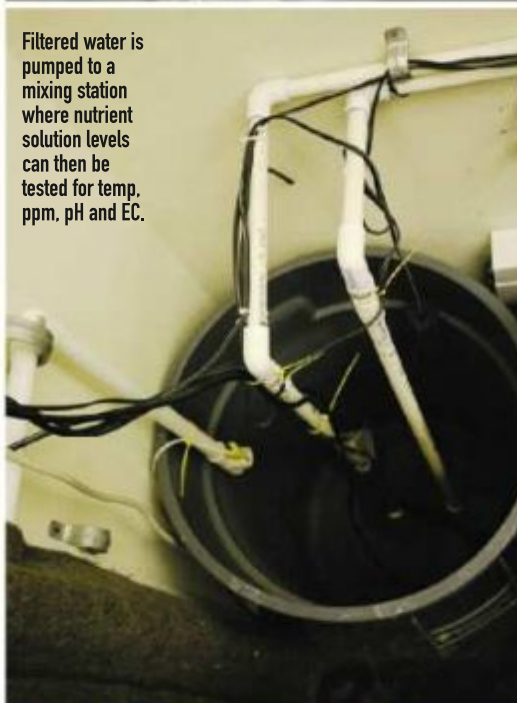
This back pressure can clearly never exceed the tap line's pressure, as this is where the pressure comes from in the first place. If the tap line's pressure is stable and at least 60 psi (pounds per square inch), then an RO system will perform just fine. If the pressure varies and often falls below 50 psi, the system's pressure should be stabilized with a booster pump.

Something to consider about this process is that, even with ideal water-line pressure, RO systems tend to waste a lot of water. Approximately two to 10 gallons of wastewater are flushed down the drain for every gallon of filtered water produced—and systems that re-inject the wastewater back into the RO input prematurely damage the membrane. A better solution is a so-called "permeate" pump, which can reduce this wastewater by up to 80 percent, even though it also slightly increases the pure-water output's total dissolved salts (TDS). The most sophisticated RO systems implement both booster and permeate pumps.

As with other water-based appliances, hard-water scaling is a problem for semi-permeable RO membranes. To deal with this issue, water can be chemically treated before it enters the membrane with lime, soda, ash or lye. Such a water softener will convert the soluble calcium and magnesium into a sludge that comes out the bottom of the softener before it reaches the RO membrane. Some RO systems also come with a fast-flush feature that permits the tap-water input to bypass the flow restrictor, allowing unfiltered water to "wash" the membrane. Flushing the membrane once a week for 30 seconds should extend the membrane's lifetime. Note that this could easily be automated using a timer,



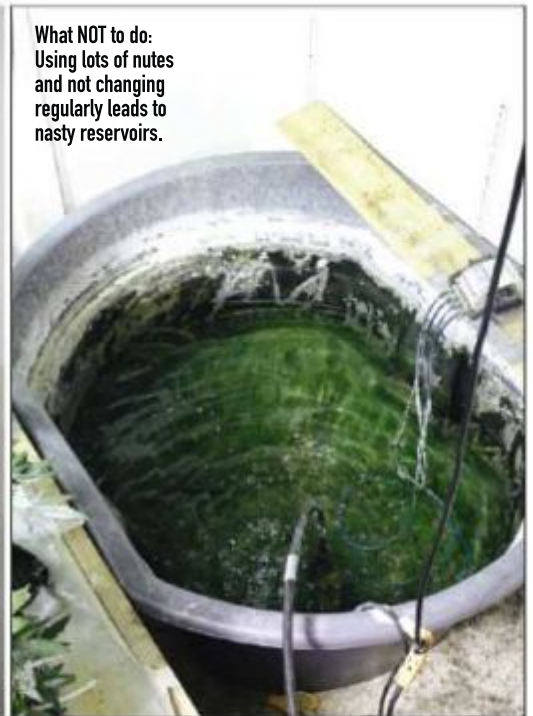
Filter systems like this one are easy to find and simple to install on main water lines.



Filtered water is pumped to a mixing station where nutrient solution levels can then be tested for temp, ppm, pH and EC.



Thin lines are often used for feeding, so low ppms and good pressure are needed.



What NOT to do: Using lots of nutes and not changing regularly leads to nasty reservoirs.

a solenoid valve and a couple of plumbing tees.

The membranes are also susceptible to degradation from both chlorine and extreme pH. As you can see, RO systems are very complex, and these various threats to the membrane from run-of-the-mill tap water suggest that RO systems set up without any strategy for extending the membrane's lifetime will ultimately cost more than they should in replacement membranes (which tend to be expensive).

RO growers should also closely monitor their RO water's level of TDS over time; as the membrane starts to degrade, the TDS can increase. Keep in mind that RO systems aren't perfect to begin with: They'll start by passing (i.e., letting through) around 2 percent of the contaminants, and an older membrane can pass as much as 20 percent. For this reason, residential units shouldn't be used to filter water that exceeds 2,000 ppm, and a booster pump can be necessary to RO-filter water with a TDS exceeding 1,000 ppm.

One should also keep in mind that RO membranes are rated at 77°F, and water production can decrease by about 2 percent for every one degree below that temperature. This means that RO systems should not be connected directly to a cold-water source; growers will instead want to find the proper mixture of cold and hot water from their pipes. In high-output RO units, water temperature is an important factor in throughput. That's because RO systems tend to be slow overall—on the order of a gallon per hour.

In terms of throughput, RO systems don't compete at all with activated-carbon multistage whole-house filters. These filters may generate slightly higher levels of TDS, but they can also fill a 25-gallon bucket in a matter of just five or 10 minutes. And some new whole-house filter units remove enough contaminants to actually brew compost teas—which suggests that they work quite well. An RO system's slow throughput adds additional complexity to an already complex device, as it requires a float-controlled valve for stopping the flow of pure water when the bin has been fully prefilled.

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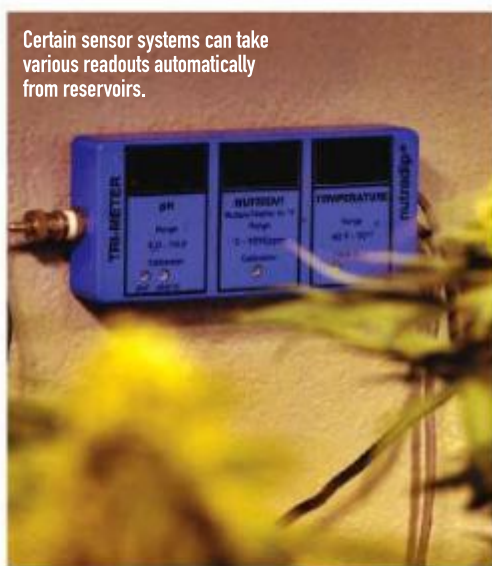
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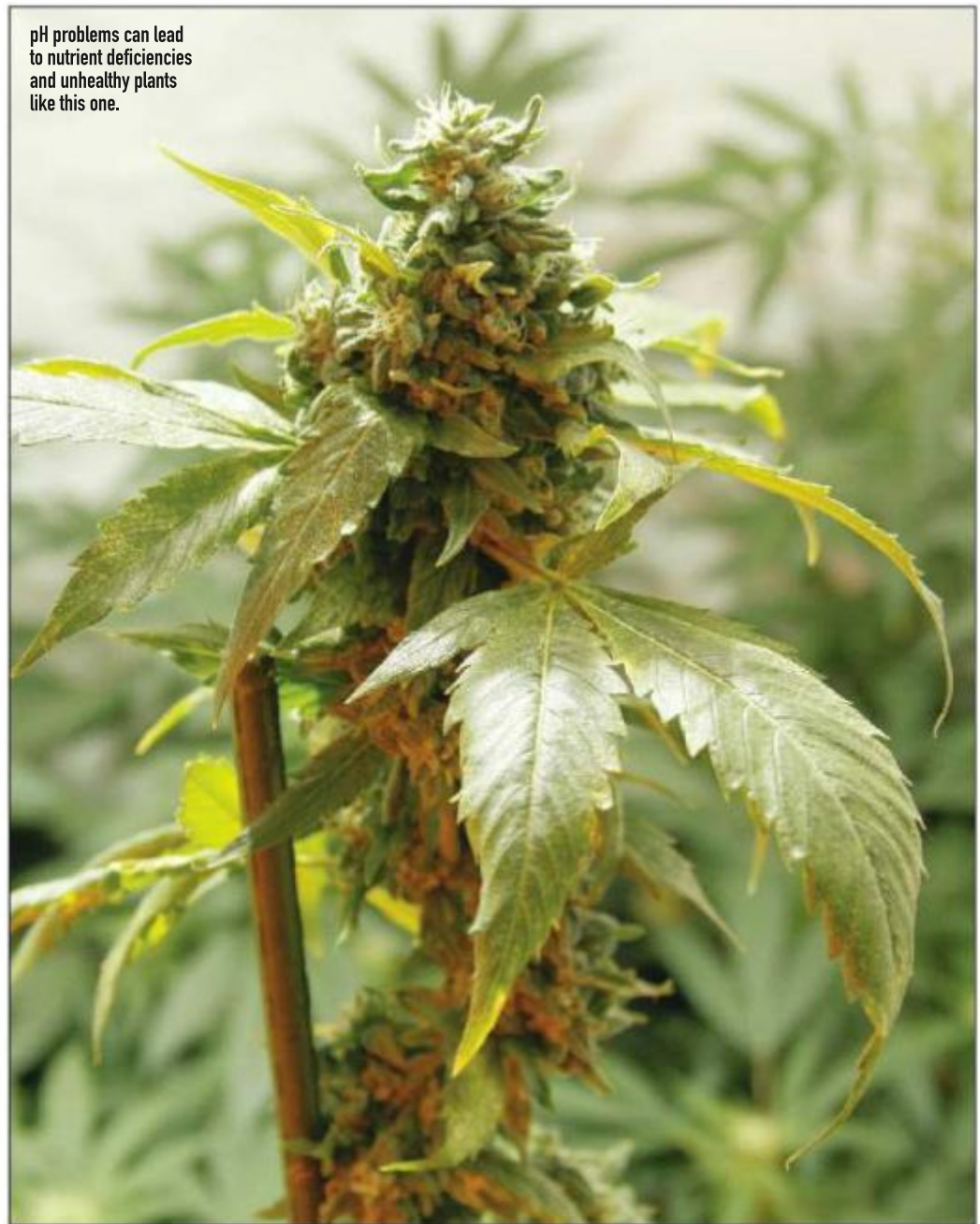
Alkalinity

Since the quantity of total dissolved solids, in parts per million, is directly proportional to the solution's conductivity, TDS gives us a useful measure for the concentration of salts in a nutrient reservoir. Plants have a preferred range for nutrient-solution TDS for the same reason that osmosis occurs: Specific alkalinities will cause certain necessary molecules to naturally diffuse through the plants' cell walls. Once out of that range, osmosis can reverse.

Not all salts conduct the same, so TDS measurements don't differentiate among the various elements. But for specific applications like cannabis growing, where the chemicals involved are often the same from one feeding to the next, it's the relative differences in TDS that can help growers understand how hard they're throttling their plants today compared to last week. By carefully measuring both TDS and pH using a continuous monitor as the reservoir is made, the grower can also identify mistakes in reservoir mixing before its contents are delivered to the plants.



Certain sensor systems can take various readouts automatically from reservoirs.



pH problems can lead to nutrient deficiencies and unhealthy plants like this one.

Pragmatic pH Concerns

Basically, pH is a measure of how many hydrogen ions are available in a substance like a nutrient solution. Since the chemistry can get complicated, many growers have only a vague notion of what pH really is. And that's okay—what matters most is that they pay close attention to their reservoir's pH level, since cannabis has a preferred range within which it ideally absorbs the nutrients it needs.

It can be a bit dicey to use a hydro system without a continuous pH monitor immersed in the recirculating reservoir; many a grower has awoken in the morning to find their nutrient solution out of the plants' preferred range. It's also important to realize that pH is a logarithmic measurement, meaning that a shift from 5.5 to 6.5 actually represents a *tenfold* change in the ratio of ion concentrations—and that explains pretty simply why plants don't like to be out of their preferred range.

A pH of 1 is very acidic; 7 is neutral, and 14 is basic. The average pH of American tap water tends to be around 8.0. Cannabis prefers a range of 5.5 to 6.5 when grown hydroponically. (Plants in living soil can grow better at the higher end of this spectrum—around 6.2—because that's the pH that the cannabis plant's fungal and bacterial helpers demand.)

As hydro-grown plants drink from their reservoir, they tend to take up water far faster than the essential mineral elements. Since this, in turn, causes the reservoir's pH to climb, growers tend to start their reservoirs at around 5.5. Plus, they can generally avoid trouble by regularly changing their reservoirs. Given a reasonable buffering capacity, a typical reservoir can last around five to seven days before the pH shifts a full 10 points, from 5.5 to 6.5. Some growers intercede once the pH rises to 6.2 or 6.3: They might simply add pH down to the reservoir, or they can opt to top it off with pH-adjusted calcium and magnesium in order to better stabilize the reservoir's pH (since plants don't tend to overdose easily on calcium and magnesium).

Solutions that lack alkalinity (i.e., have low TDS) will tend to fluctuate more in pH. In other words, distilled and reverse-osmosis water sources can lack the buffering salts required to maintain a stable pH. This is why the minerals contained in tap water, if they're at a reasonable level (say around 150 ppm), can actually help to keep reservoirs pH-stable. Keep in mind, though, that American tap water can vary from approximately 60 ppm all the way up to the EPA limit of

500 ppm. On the higher end of that scale—in the Los Angeles area, for instance—it makes sense to perform some sort of filtration in order to better control what's being fed to the plants.

Some of the hydroponic-growing systems available today feature automatic-dosing capabilities. Most book-smart growers have seen the chart showing all the various nutrient uptakes based on pH. The inherent implication of this chart is that a changing pH in a recirculating nutrient reservoir isn't *necessarily* a bad thing: In theory, pH swings permit plants to hit each of those individual sweet spots for nutrient uptake, and there's no reason to fear them unless the grower, for whatever reason, desires a safety net.

At the same time, growers who don't regularly calibrate their pH meters are of the unnecessary-risk-taking variety. Even with the temperature compensation that's now pretty standard in pH meters, the devices do occasionally lose their bearings sufficient to take the reservoir out of cannabis's preferred range. Also, since the glass-bulb-variety pH monitors are very easy to damage, it's always wise to have a backup handheld meter to resort to just in case the continuous meter displays unusual readings.

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A/C units, fans and water chillers all help keep water and air temps down.

Hydroponic Nutrient Temperatures

Nutrient temperature can separate a successful hydro grow from a problematic one. Because water is such a good conductor of heat, it tends to quickly swing toward the growroom's temperature. In practice, this means that soil-based systems exhibit fewer adverse consequences from violent temperature swings up or down, as happens frequently outdoors. The soil can be thought of as a temperature anchor for the plant that resists these fluctuations.

There are dangers to a cannabis plant, in terms of both growth rate and pathogens, when the nutrient solution's temperature swings (in either direction) from the optimal range of 68°F to 74°F. Therefore, when a plant's roots sit in water, it's the responsibility of the aqua-grower to closely monitor and control the nutrient temperatures. Ideally, a nutrient reservoir should be insulated from any extreme temperature

swings; in the absence of any water heaters or chillers, the aqua-grower can simply opt to keep his overall growroom temperature stable. Many such growers have managed to raise huge yielders even though they've kept their growroom's ambient temperature at 72°F, both day and night.

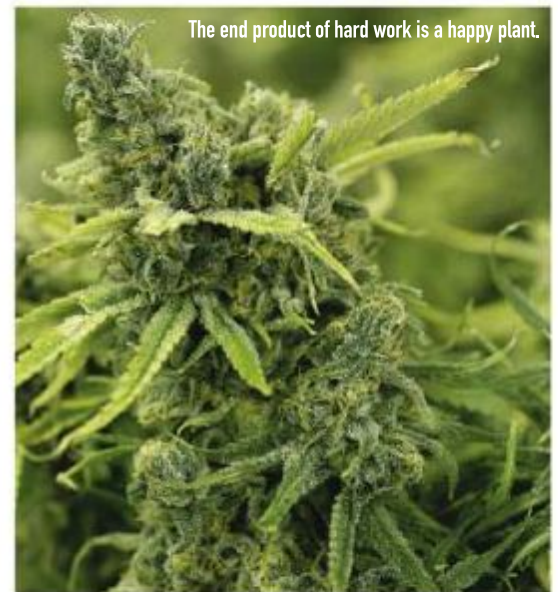
Since roots require oxygen, and since oxygen kills pathogenic anaerobic microorganisms, hydro growers tend to actively oxygenate their reservoirs, which makes the nutrient solution last longer before going sour. And since a reservoir's oxygen-carrying capacity decreases with higher temperatures, this is yet another reason to be wary of high temps when using a hydro setup. Hydro growers who don't culture living organisms in their medium might wish to consider the regular use of hydrogen peroxide in their reservoirs, as this can also insulate them from the dangers of high nutrient temps.

Nobody Said It Was Easy

Some hydro growers have noticed that a new system will steadily decrease in yields from crop to crop. What's going on?

A less-than-random guess would be: salt deposits in the pipes and tubes. Compared to the simplicity of hand-watered soil, the complicated nutrient passage-ways of hydro create a complex cleaning situation. Like calcium and magnesium precipitating out of hard water, salts can bond over time to the inner walls of hydro tubing and slowly bleed garbage into a carefully calibrated reservoir solution. Precipitated hydro salts are, in practice, really more like glue than salt: They possess an incredible electric bond and squeeze into the tiniest crevices in plastics. The most consistent hydro systems tend to have lots of disposable, replaceable tubing as well as containers that are simple to clean.

But hey—nobody said that hydro growing was easy. If the thought of a strict cleaning regimen or manually steering your plants disturbs your laidback style and personal being, then you might be in denial about your soil-growing tendencies.



The end product of hard work is a happy plant.

The Future of Hydro Cannabis

With medical-cannabis growers in California discussing warehouse-scale cooperatives and collectives, the kind of commercial greenhouse services that have traditionally been too expensive for mom-and-pop hydro operations might become more affordable within these new models. We've already seen this happen with THC and CBD testing.

For example, there may come a day (not too far off) when a hydroponic grower will submit plant leaves to a lab that measures the level of each essential element within the tissue, for the purpose of analyzing and adjusting the grower's nutrient-feed program. This is actually already happening within the commercial hydroponic-greenhouse industry.

In this brave new world where we're growing our own medicine, nutrient toxicity or deficiency within a hydro grow can limit the efficacy of the medicine itself. And as growers struggle to distinguish their products from their competitors in the absence of the prior inflated pricing structure, those who are attentive to detail might consider things like leaf-tissue analysis as a way of improving that which they thought had already been perfected. Because if we know anything for sure, it's that cannabis growers will go to any lengths to grow the best cannabis out there. ✨

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One of the oldest cities in the world, and holy in several religions, Varanasi is famous for its festivals of fire, smoke and rebirth.



IN SEARCH OF L

A journey through India's sacred sites uncovers an ancient Amsterdam called Varanasi, where *sadhus* smoke the holy hashish known as *charas* and travelers drink the legal pot smoothies called *bhong*. Story & photos by Jason Kron

The 6:55 a.m. *Shatabdi Express* waited lifeless in the motionless dark on another foggy Delhi dawn. I found a seat by the window, felt groggy, wrestled my head against the wall. To my right, my sister was consumed with her Blackberry. My dad peered past both of us out the window. This was his trip—taking us back to the land he'd first visited 40 years ago as a young man when he backpacked across the world.

The sun rose quietly as we pulled out of India's steaming capital. The train was carrying us into the Himalayas, to the holy city of Haridwar on the rapids of the Ganges River, to witness the festival of Kumbh Mela, supposedly the largest gathering of humanity on the planet.

India was to be a whirlwind tour for our family, an unceasing juggernaut of new and intense experiences. We needed it. The family seemed broken; my father and I hadn't really spoken in years. Which made Kumbh Mela a fitting start.

Thousands of years ago, or the story goes, the god Lord Shiva captured the elixir of life, but

in flight spilled drops of it here in the Ganges. Now, once every 12 years, tens of millions of people gather in Haridwar to dip themselves into the sacred water and break Karma's cycle of life. And I'd learned something else: For the religion's wise men, the *sadhus*, the use of cannabis was central to worshipping Lord Shiva, and there'd be a lot of it at the festival. My father warned us that we'd see things we never saw before. I had high expectations.

It was nearly noon when the train screeched to a halt. Two days ago, I'd been in Chicago, watching the Super Bowl on an airport TV in the sleeting snow; now, we were definitely someplace else. Hindu monasteries towered like card castles. Billboards showed wise men wrapped in flowers begging to keep the Earth clean. In town, we took a cable car to a Hindu temple perched on a mountaintop overlooking the valley below. Pilgrims had been coming here for thousands of years, barefoot and penniless, adorning the shrines with flowers and

candles and coconut shavings, ringing the golden bells.

And smoking hash.

India is reputed to be the birthplace of the cannabis plant, and the Ganges River its motherly cradle. In Hinduism's holy scriptures, cannabis is considered one of the fruits of the gods. Lord Shiva, the god of destruction and transformation, smoked hashish for a thousand years and used it to purify his elixir of life. Since then, the plant has become a part of Hindu culture, used not just recreationally but also medicinally and spiritually, as a way to cleanse the soul.

There are three main forms of cannabis in India: regular marijuana; *bhong*, a powder made from ground-up cannabis leaves, often mixed into drinks; and *charas*, the special hand-rolled hashish that Lord Shiva is famous for preferring. *Charas* is considered the most virtuous of the three, and the most potent. Made in the Himalayas, *charas* is popular through-

out the country. At the mountaintop temples in Hardwar, the sadhus sit in circles puffing charas, their bodies painted and still, channeling the spirituality of the Himalayas. Blue waves of heavily armed soldiers fanned out across the old stone *ghats*, but the sadhus were allowed to smoke their hash.

"It is part of the ritual," said Jon, an Argentine traveling with his girlfriend through India for three months. He told me that he'd smoked with the sadhus the previous night—and despite the police presence, there was no problem. He had bought it from a religious pilgrim in one of the stone alleyways in the nearby village of Rishikesh. "It's treated as a sacrament," he said.

Charas is made by rubbing cannabis resin slowly and tightly between the palms until it's heated into a cream. Up to nine grams can be made in a day, but the faster you rub, the lower the quality. To obtain the best quality, hashmakers may produce only a gram or two of charas in a day. The sadhus traditionally smoke it out of a clay pipe called a *chillum*.

Meanwhile, if I wanted to have an experience, Jon said, I should go to the city of Varanasi further down the river and try some bhang, another form of cannabis, commonly

consumed in a drink. It was famous in Varanasi, and very powerful. And it was legal. It seemed serendipitous, if not downright suspicious, when Varanasi turned out to be the next destination on my family's tour. Varanasi is the pulsing, ancient Jerusalem of the East, perhaps the oldest city in the world and sacred in several major religions. Over three million people live there, many of them foreigners, and the streets are charged with energy. There is

also a popular drug culture centered on the famous bhang, which is served in restaurants, hostels and specialty shops. I was anxious to get out and explore Varanasi as soon as we arrived, but it wasn't until the afternoon of our second day that I managed to break away from the family.

I rather quickly met a stranger named Sara at the Lotus Lounge, a canopied rooftop cafe overlooking Mansarovar Ghat. Sara was

from Greece and had been in Varanasi for a month. Every Monday, she came to the Lotus Lounge for Hindi lessons, and she said I could sit with her while she waited. She lit a cigarette, and I asked her about bhang: Was it still popular? Was it easy to find? Sara opened her purse and asked me if I would like to try some. "I pour it on top of my salad," she said. "If you order a

In Hinduism's holy scriptures, cannabis is considered one of the fruits of the gods.

DRD SHIVA



A cannabis emporium awaits travelers on the banks of the Ganges river.

MORE BHANG FOR YOUR BUCC



Pure bhang poured into a cup of Masala tea.

Bhang's not only good enough to whip up as an offering to Lord Shiva, but this divinely delicious cannabis concoction also makes the most of your marijuana dollar by literally squeezing every last drop of THC out of your buds and leaves. Try this traditional recipe and you may find that bhang's not only more economical than smoking, but also more spiritual.

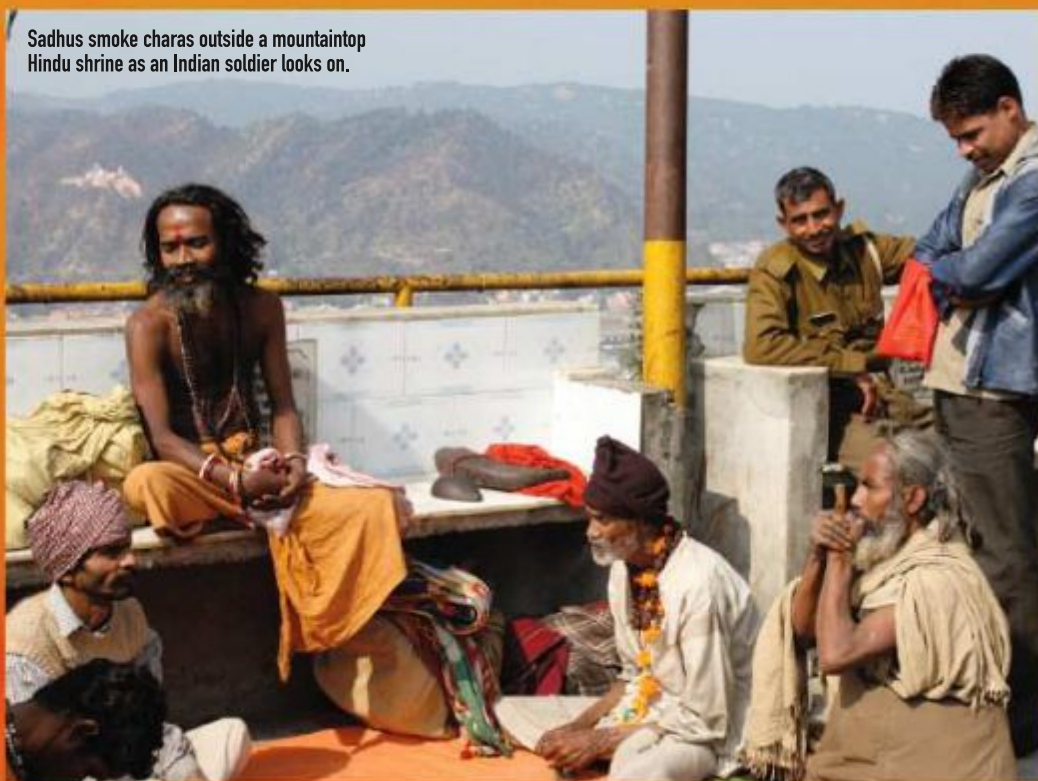
INGREDIENTS

- 2 cups water
- 1 oz marijuana
- 4 cups warm milk
- 2 tbsp blanched chopped almonds
- 1/8 tsp garam masala (a mixture of cloves, cinnamon and cardamom)
- 1/4 tsp powdered ginger
- 1/2 to 1 tsp rosewater
- 1 cup sugar

Bring the water to a rapid boil and pour it into a clean teapot. Remove any seeds or twigs from the marijuana, add it into the teapot, and cover. Let this brew steep for about seven minutes. Strain the "tea" through a piece of muslin cloth into a bowl, squeezing the leaves and flowers with your hands to extract any remaining liquid.

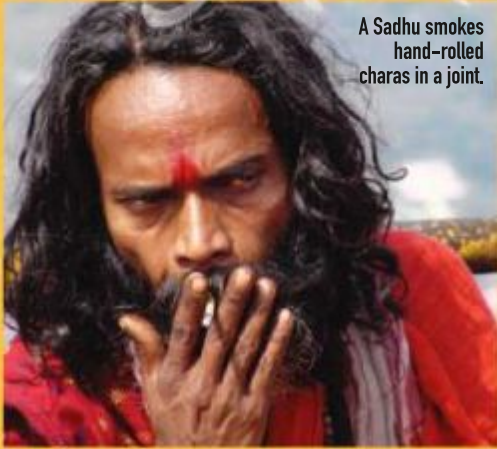
Place the leaves and flowers into a mortar and add two teaspoons of warm milk. Slowly but firmly grind the leaves and milk together. Collect the marijuana and squeeze out as much milk as you can into a separate bowl. Repeat this process until you've used about 1/2 cup of the milk (about four to five times).

By this time, the marijuana will have turned into a pulpy mass. Add the chopped almonds and some more warm milk and grind in the mortar until a fine paste is formed. Squeeze this paste and add the liquid to the milk as before. Repeat a few more times until all that's left are some fibers and nut meal. Discard this residue. Combine the milk with the marijuana water and add the garam masala, powdered ginger and rosewater to taste. Stir in the sugar and remaining milk. Chill, serve and enjoy.



Sadhus smoke charas outside a mountaintop Hindu shrine as an Indian soldier looks on.

IN SEARCH OF LORD SHIVA



A Sadhu smokes hand-rolled charas in a joint.



Rounds of orange-flavored bhang lassi are sold openly in downtown Varanasi.

cup of tea, I'll put some in."

She placed a plastic medicine bottle in front of me filled with a fine green powder. I picked it up and held it close. It smelled plant-ish.

"I get it at a bhang shop on Godaulia Street," she said, "near the ATM." At \$6 a bottle, she added, it was a good deal. The store also sold bhang cookies and the infamous *lassi*, a bhang-infused yogurt drink, for less than \$1. Signs for bhang shops could be seen all through town, written in Hindi, Spanish, English and Hebrew—and it wasn't the only high available in Varanasi. Charas was everywhere, and marijuana and opium were sold in government-run shops nearby. "Most of Varanasi is stoned," Sara said.

Once my tea came, Sara screwed off the top of her medicine bottle and sprinkled some into my cup. "It's more of a deep feeling, more heavy," she said, stirring. "Wait about 20 minutes and you'll feel it."

I sipped the masala tea. It was sweet, and I couldn't taste the bhang—Sara had mixed it well. Her tutor walked in and Sara excused herself, leaving me at a table near the edge of the rooftop cafe. Then my phone rang. It was my father, inviting me to walk around with him and check out the city. I was surprised and wanted to say yes, but my mind was already sparkling.

Not that I'm a novice—I've smoked herb all over the world, from the valleys of Ethiopia to the backseat of a BMW driving along the riverbanks of Cairo. I've lit spliffs on the beaches of South Africa as the sun crashes into the ocean, along the Pacific coast of Mexico as the first light of dawn breaks on New Year's Day, and on rooftops under the stars from New York to Tel Aviv. But nothing is quite like Varanasi. It rings with stimuli; it's trippy without tripping. And the bhang takes you swimming through the carnival.

I stumbled through the maze of ancient alleyways and crooked buildings, finding golden medieval shrines tucked in between crooks in the street. Cyber cafes and silk houses and sitar shops. The slithering smell of incense against a wall. When I reached the edge of the old city, the alleyway dropped out onto Godaulia Street, a pedestrian boulevard thronged with families, motorcycles, *tuk-tuks* and lonesome cattle. Hijacked power cables swung overhead; below

"It's more of a deep feeling, more heavy," Sarah said, stirring. "Wait about 20 minutes and you'll feel it."

them, the bhang shops sprang out on every corner, advertising their fresh lassi. The place was like some venerable, ancient Amsterdam.

I entered a shop. Inside, a family of six sat at a table, the two parents drinking a milky white juice. The owner came over and pointed at the glasses. "Lassi," he said, and asked if I wanted some.

"Maybe tomorrow," I told him—just now I wanted six cookies and a medicine bottle of pure bhang. Made from the ground-up leaves of the cannabis plant itself, bhang is the most popular and affordable form of cannabis in India. It can be found all across the north of the country, in specialty shops like this one or in the cafes, bars and restaurants that dot the Ganges River.

But Varanasi's by far the most famous place for bhang, made in stalls on the street where men grind leaves with a mortar and pestle into a fine paste, then douse it in milk, ghee and spices. Pistachio nuts and rose petals are sometimes added as well. Later, this blend will be mixed into sweeter yogurt drinks or baked into sugar cookies. In its pure form, bhang has an earthy, almost mildewy taste, but the cookies and drinks make it tasty and potent. A glass of strong lassi can put a veteran into a stupor. Fortunately, it comes in different strengths as well as different flavors.

I looked at the family beside me sipping

their bhang. This was classic. Bhang is as old as Varanasi itself. Like charas, Lord Shiva drank bhang regularly. For him, it was an avatar of life's essence—and to many of the world's nearly one billion Hindus, it still is. To me, it always has been as well.

The father teased his children with the drink, pulling it back every time their tiny fists came close to the glass. I thought of my own father and longed to share this moment with him. The shopkeeper returned, his hands full of cookies, triangles of dough surrounding a patch of green bhang. I took a big bite out of one, wrapped the rest in a bag and stuffed it in my back pocket. I looked around before leaving, nervous about the police van parked outside.

The shopkeeper laughed and waved me out, mumbling something in rickety English that sounded like "Don't worry."

I decided I wouldn't: Life is good. I stepped outside and a motorcycle swerved past me. A cow stood in the middle of traffic, jangling its bell. I felt my back pocket to make sure the cookies were still there. Another boy around my age walked past me, heading inside the shop. He's getting his. I've got mine.

Then I went down to the ghats by the river where the sadhus smoke their charas, and sat on the steps with the other believers, slowly eating my cookie and feeling that flood overtake me—the rush of life. ✨

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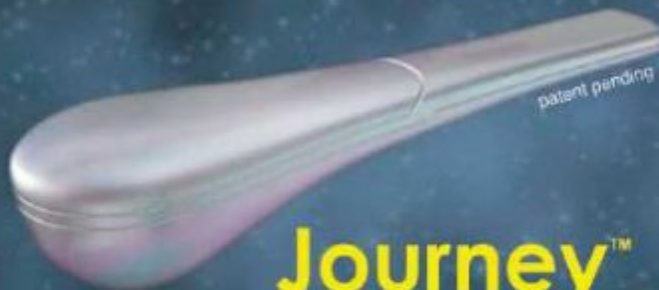
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CALIFORNIA DREAM ROOM

Hydroponic gardening has become one of the most popular methods for indoor cannabis cultivation over the past two decades. We all know that hydro has the potential for big yields and excellent quality, but getting there isn't always easy. That's why we've dedicated the February issue to hydroponics for the past 12 years. The growroom shot exclusively for this year's Hydro Report is perhaps one of the best ever recorded by HIGH TIMES—and, of course, its home is in the great state of California. By Nico Escondido

A simple philosophy exemplified: If you're going to do it, do it right.

Mind-Blowing Marijuana

Let's take a look at the questions that everyone wants answers to: What type of hydro system is running in this room? How many plants are in there? How many lights were used? How much did this room yield? HOW DID THEY DO IT?!

Beginning at the end is a good place to start so that we all understand exactly what we're dealing with. This is a professional-grade, very high-end commercial grow operation where no expense was spared. Unfortunately, this system is definitely not something you can set up overnight. The room yielded, at its peak, 37 pounds of primo Blue Dream. That works out to just over 0.75 grams per watt, as the room carried 22 1,000-watt high-pressure sodium (HPS) lamps. When it comes to massive, industrial-sized hydroponic systems, this yield is certainly above the average of 1 pound per 1,000-watt lamp (roughly 0.50 grams per watt).



Perfect climate control + fully automated top-feed hydro + cleanliness and attention to detail = Dream Room.



But the most impressive thing about this hydro room was the sheer size, layout and overall environment created by the growers and growroom architects. Upon walking into the brightly lit room, it immediately became apparent that this was a sterile environment. Everything was kept extremely clean and in order. Floors were regularly washed and swept; walls were whitewashed with glossy white paint; and there wasn't a single insect or hint of mildew to be seen anywhere. Even the 500-gallon reservoirs were drained and hand-scrubbed, inside and out, every few weeks. These growers took serious pride in their work, and it showed.

Holding a total of 352 plants in 11 raised 4' x 8' trays (32 plants per tray), the room had two 1,000-watt HPS lamps over each table. Plants were grown out of 5-gallon smart pots, which are basically fabric container bags that offer excellent breathability so that root systems get the oxygen they need (remember, roots use oxygen while leaves use carbon dioxide) and the root zones maintain a constant cooler temperature (the roots of mature plants generally like a temperature of 75°F). The medium used in the containers was a simple homemade mixture of coco coir and perlite at a ratio of two parts coco to one part perlite. This combo aided in creating an airy medium for optimal air penetration as well as good water retention, keeping the root zone moist at all times.

The reservoirs used in this system were two light-sealed, 500-gallon cylindrical tanks. One was a backup tank with a reverse-osmosis (RO) filter that fed the primary nutrient tank with fresh water. To top it off, the main tank was insulated and chilled with a 2-hp (horsepower) water chiller, thereby decreasing the chances of mold or other pathogens growing inside.

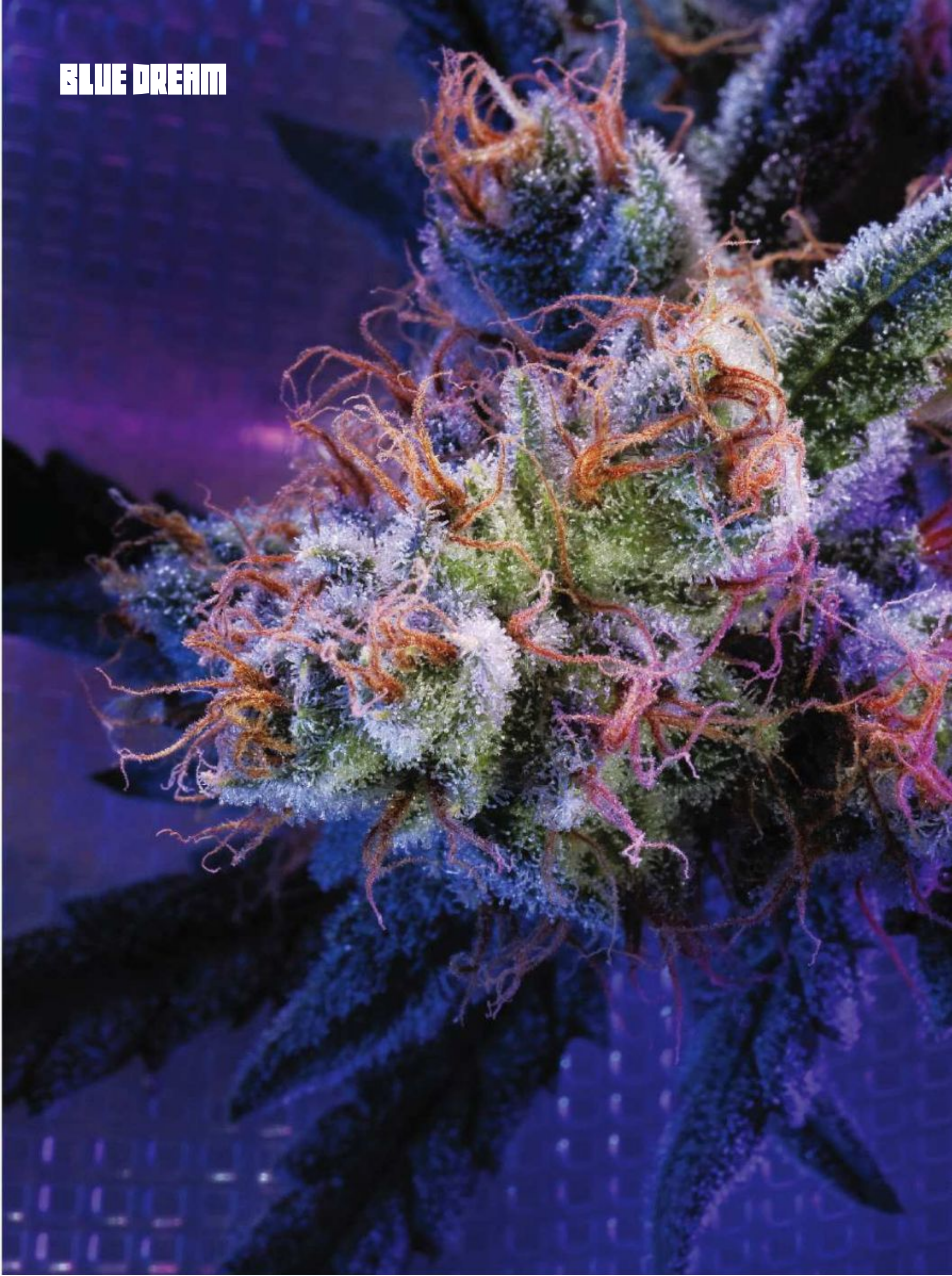
The system itself that fed off these massive water tanks utilized a full constant-pressure, top-feed, drip-irrigation system controlled by a Rain Bird sprinkler timer. Each tray had its own solenoid, meaning that each one operated as its own zone on the timer. Dual sediment reducers (filters) were on the lines coming out of the feed tank, both before *and* after the constant-pressure pump. That pump was an out-of-tank, high-end, 1-hp unit (manufactured by Brighton Irrigation) that maintained a constant and equal

Holding a total of 352 plants, the room yielded 37 pounds of primo Blue Dream.

pressure at all of the drip-emitter sites from water on to water off. The drip emitters were actually yellow-top high-pressure emitters that spray out the nutrient solution, creating a nice, even foam on the surface of the medium that helped the water and nutrients to penetrate and fully soak down. These high-pressure emitters sat atop small stakes that moved easily around within the containers as the root systems expanded. All runoff was drained from holes in the bottom and sides of the containers and then collected by trays and run directly to waste (i.e., to a drain so as not to be reused). Every plant was fed twice a day for 30 seconds, and each tray table was watered in a rotation, one at a time, so that each feed cycle lasted approximately six minutes (12 minutes total for the day) for the entire growroom.

Finally, when it came to atmosphere control, these growers spared no expense, dropping in two 5-ton AC units, one of which was sunk into a specially constructed back room next to the garden that exhausted to the building's exterior, and the other of which came standard with the building site and sat on top of the roof. The room as a whole operated at a cool 68°F, even in the middle of a California heat wave. Some of this temperature control also had to do with the fact that the 2' x 6' walls of the room were insulated with top-of-the-line R-19 Pink Fiberglas insulation and then covered with a layer of soundproofing. The growroom was 100 percent light-, sound- and air-sealed, which added an extra layer of security for both the growers and the garden. Because the garden's air was kept on a closed, recirculating system, no airborne pathogens could penetrate the room, keeping pests and diseases outside. As the two industrial AC units cooled and circulated the growroom air, six carbon Can-Filter 150s scrubbed it to reduce odors and remove impurities. These filters were fitted with 14" flanges and corresponding maximum-cfm inline fans to move the air through the filters and back into the growroom.

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This top-feed system was solidly constructed with no flaws or pressure leaks.



Trough trays are attached to table sides to collect drainage in this other top-fed, rockwool system.



Spray-emitters evenly distribute nutrient solution around container bags.



A high-powered pump is used to move nutrient solution from reservoir through irrigation lines.

Understanding Hydroponics

Strictly speaking, hydroponics is the growth of plants in a soilless medium. Thus, there are technically quite a few grow mediums available these days that would fit this category of growing: rockwool, clay aggregates, lava or volcanic rocks, coco coir, perlite and vermiculite, just to name a few. Then there are soilless mixtures that look and feel very similar to earth topsoil, but are actually sphagnum- or peat-moss-based.

Another component of hydroponic gardening—one that isn't actually a part of the definition of the term "hydroponics," but is almost always found in any hydro system—is the automated water delivery associated with hydro growing. The amazing setup described here is technically known as a top-feed drip-emitter system, though in this case the "drippers" were actually high-pressure spray emitters. The plants themselves grow on the kind of tray tables traditionally used in flood-and-drain (or ebb-and-flow) hydroponic systems; these trays are flooded so that the medium can soak up the nutrient solution. The solution then runs out of the containers and is collected by the trays, which either drain the solution to waste, or back to the reservoir to be recycled.

Recycling nutrient solution can be a dangerous move, as it requires diligent measuring of pH

and EC levels. Reusing nutrient solution can cause large fluctuations in these levels with each use and subsequent runoff and recollection. This creates the need for more reservoir changes and man-hours of effort. Recycling systems aren't for growers who simply want to plug in their system and walk away. Thus, most hydro growers—like those responsible for the growroom in this article—use drain-to-waste systems that direct the runoff to sewer drains, never to be seen (or used) again.

The medium used for a particular setup can ultimately be the deciding factor in whether or not the nutrient solution is reused—and it can also determine the type of system that a grower chooses. Hydroponic grow mediums can be very finicky, and which type to use should be the first consideration of any grower when choosing a hydro system. Some hydroponic mediums offer much less stability when it comes to buffering (i.e., protecting) fragile root systems from intense feeding programs.

The easiest and most widely used mediums for new hydro growers are the soilless mixes. Beginner growers can use store-bought mixes such as the Pro-Mix or Sunshine brands, while the most advanced growers tend to buy the essential components and then mix their own concoctions

to suit their garden's needs. These mixtures, whether store-bought or homemade, generally use the same bases: peat moss, sphagnum or coco coir. Additives such as wood chips or lava rocks help create an airy medium so that oxygen can get to the roots. Other additives, such as perlite and vermiculite, not only keep the medium loose, but also retain moisture long after watering to help prevent roots from drying out and plants from getting thirsty between feedings.

Advanced hydro growers often choose soilless mixes because they come as close to real topsoil as possible, with all of the benefits and none of the hazards. Natural earth topsoil often carries insects and diseases, and it may also have high levels of clay or low levels of the nutrients necessary for plant growth. As a result, advanced hydro growers often choose coco coir as their base medium. Coco coir is simply the fibrous insides of coconut shells that have been processed and sterilized. Coco comes in a variety of formats, from longer, stringy fibers to more condensed chips or cubes, to even more finely ground particles and powder. Coco coir is an excellent option because it hits on all three major requirements for a grow medium: It keeps the medium airy, it holds a lot of moisture, and it surrounds and buffers root systems nearly as well as soil.

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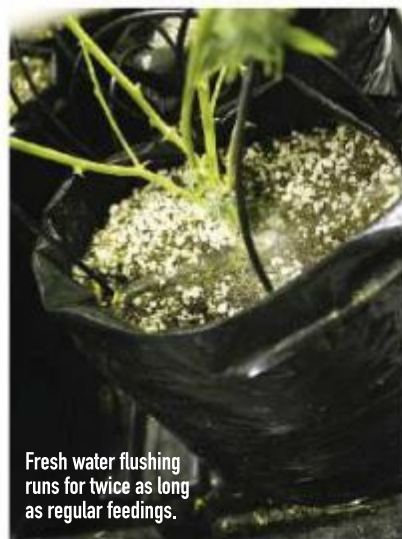
Tray tables that drain-to-waste make flushing extremely easy on growers.

Notes on pH, EC and Flushing

While it isn't necessary for every hydroponic gardener to construct a growroom of this magnitude, it is essential for all levels of hydro growers to understand the complex nuances associated with hydroponic gardening. These aspects include monitoring pH and EC (electrical conductivity) levels, as well as identifying deficiencies that can indicate nutrient lockup (within the root system) or nutrient burn (on a plant's leaves and stems).

pH is a measure of your water or nutrient solution's acidity or alkalinity. Solutions with pH levels below neutral (7.0) are acidic, while levels greater than 7.0 are alkaline or basic. Hydroponically grown plants need their solutions to fall between 4.5 and 6.5 for optimum nutrient uptake. If the pH is wrong, all the nutrients are wrong; however, pH levels can be easily adjusted with pH up or pH down solutions. The growroom described in this report was equipped with an automatic pH mini-doser as a security precaution: If the growers missed taking a reading or a high fluctuation occurred, the electronic meter would automatically detect the problem and inject the correct amount of pH up or down into the tank to bring the level back to below 6.5. As an added note, pH measurements should always be taken from the runoff after feedings, as this is a better indication of pH levels in the nutrient solution, medium and root zone.

But why exactly is pH so important, and how does it relate to the EC of nutrient solutions and their uptake by roots? The pH of a nutrient solution is an indication of an electrical molecular battle going on at root level. Nutrients, water, grow medium, air gases and roots all have varying electrical charges, and these charges determine how nutrients are absorbed by the plant's roots. An EC meter measures this electrical conductivity and gives growers a small idea about what's going on in their plants' root zones. EC and ppm (parts per million) meters actually measure the same thing: how fast electrons are moving through a solution. When nutrients (known as salts) are added to pure water, the EC increases (as it also does when the temperature of the solution goes up). However, as the salts increase in water with more nutrient additives, the salts' EC begins to challenge the roots' EC for water attraction; and at higher levels of ppm or EC within a nutrient solution, the



Fresh water flushing runs for twice as long as regular feedings.

nutrients will actually begin to steal water from the root systems.

Once these levels reach a high enough point (3,000 ppm or an EC over 4.0), root systems become unable to absorb water or nutrients at their necessary rate, and nutrient lockup begins to set in. This will cause mild to severe deficiencies on the topsides of plants, and if it isn't identified and corrected quickly, this lockup could kill an entire garden. In every hydroponic system, from flood-and-drain tables to deep-water culture (DWC) buckets, it's important for growers to not only continually take meter readings, but also to carefully inspect the leaves and stems for signs that there may be a problem down below, including discoloration of leaves, molting, paling or spotting. The leaves may also begin to curl or even wilt.

Using a ppm or EC meter is the best way to catch this problem early and even prevent it. Once signs start showing on the plant's topside, it will be much more difficult to fix. The only thing a grower can do once lockup sets in at the root zone and the signs become apparent on the plant itself is to start a vigorous flushing program.

To do this, reservoirs must be completely emptied, cleaned and filled with pure, neutral water with zero nutrients. Grow mediums must then be completely flushed out periodically (at least twice daily) to remove all impurities and salt buildups left over in the grow medium and root structures. This process can take up to a few days to complete, depending on the severity of the problem.

Final Tally

For those of you keeping score at home, a growroom of this caliber grows approximately 272 grams of excellent indoor cannabis per day given the 56-day flowering period of the Blue Dream strain. Taking into account the fact that these plants all started from clone, as well as the time it takes to root cuttings and vegetate plants—for a total cycle of about 80 days—this growroom yields approximately 190 grams *a day*. Do that four times a year and life ain't bad.

But as we know, it isn't easy, and it's certainly not for everyone. For starters, significant startup capital is needed to build a dream room like this, not to mention considerable experience and knowledge. And it's definitely not as simple as outdoor cultivation, where the power of the sun is free and its natural light second to none. But if you're living in or close to a city where there's significant market demand for high-quality medical cannabis, a well-constructed and properly maintained hydroponic growroom can be an attractive option if you have what it takes.

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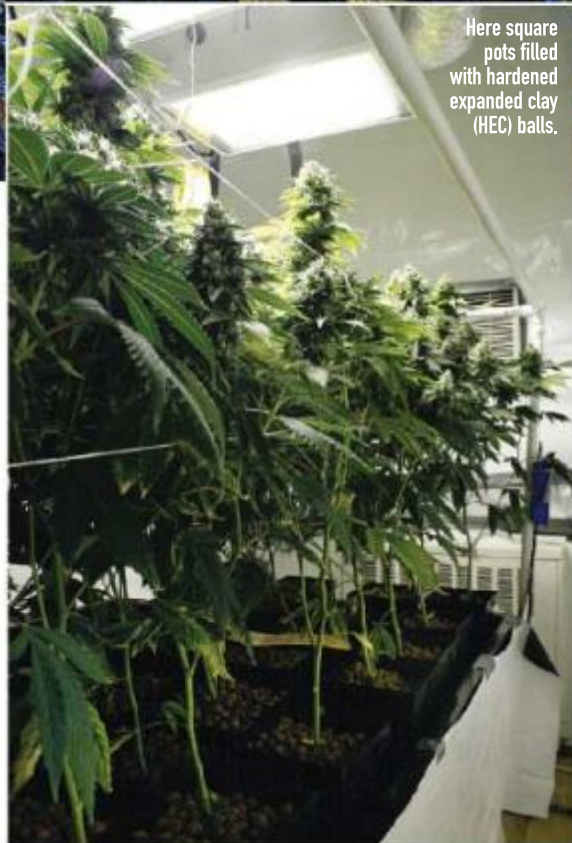
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Popular Types of Hydro Systems

Hydroponic systems come in a wide variety of shapes, sizes and formats. They can be simple and passive (no moving parts, such as a wick system) or complex and active (utilizing pumps, timers and lots of hosing). Hydro systems can be purchased at any hydroponic store or online wholesaler, but they're also surprisingly easy to build at home if you're the do-it-yourself type keen on saving a few bucks. Here are a few of the most common hydroponic systems in use today.



Here square pots filled with hardened expanded clay (HEC) balls.

And here rockwool cubes are used in a flood-and-drain system.

Flood-and-Drain (a.k.a. Ebb-and-Flow) Systems

One of the more popular hydroponic setups around, flood-and-drain systems are easy to use and can fit in a relatively small space (4' x 4') or fill entire commercial-sized areas, such as indoor warehouses or greenhouses, by using many large (4' x 8') flood trays.

In these systems, trays commonly sit on top of raised tables and are flooded nearly to the brim and then allowed to sit for a few minutes before draining. Once drained, the nutrient solution can either be reused or sent off as waste, depending largely on the medium and nutrients used. In flood-and-drain hydroponics, the most widely used grow medium is rockwool. A popular method is to use large (anywhere from 4" to 8") rockwool blocks to hold the plants. These blocks usually sit atop longer rockwool slabs or an absorption or capillary mat of some kind so that roots can grow further into another

medium for added stability.

As the tray tables flood, the grow medium is completely saturated and will remain fairly wet for hours. Nutrient solution is pumped from large reservoirs up and into trays. An overflow fitting inside the tray ensures that it will not overflow. Growers using flood-and-drain systems can choose to set their pump timers to multiple short feedings or less frequent longer feedings, depending on the stage of growth, nutrient program and genetics being used.

Flood-and-drain systems are generally regarded as "sea of green" (SOG) setups, as they don't grow very large plants. To grow larger gardens using these systems, advanced growers install some sort of trellising framework, usually in the form of 4" or 6" netting. This helps to branch out and stabilize the plants, while also allowing better light penetration to the lower branches for better yield.



This garden will bush out immensely and a screen will be overlaid to spread the canopy.

Nutrient-Film Technique (NFT) Systems

Nutrient-film technique systems are some of the most interesting hydroponic setups out there, but their time is rapidly coming to an end, as the newer hydro systems are more efficient and better at growing large plants. Still, NFT systems are useful in SOG setups where plant height is an issue and growers want to tightly pack loads of plants together.

NFT systems work just as the name suggests: by passing a thin film of nutrient solution over the roots of suspended plants. These systems often use troughs or narrow trays (similar to gutters) to contain plants that are either suspended in net pots or sitting directly in the bottom of the tray. If plants are sitting directly in the tray, capillary matting will be placed underneath to help stabilize and wick up the nutrient solution passing over the

roots. If plants are suspended, the roots dangle to the bottom of the trays, where the nutrient film is passed over them for uptake.

Trays or troughs that are covered have the added benefits of increased humidity around the root zone and keeping mold and algae from forming. Trough systems should be as smooth as possible to aid the flow of the nutrient film. Pumps move water and nutrients from reservoirs to the top of the troughs, which are usually tilted at a slight decline (1/4") so that gravity will pull the solution to the bottom of the troughs, where it's then collected and either drained to waste or siphoned back to the reservoir to be reused. The covered troughs have given way to variations on this system, and in some cases have led growers to convert to aeroponic systems by simply installing mister heads or spray nozzles inside the enclosed troughs.



NFT tubes are enclosed to keep humidity locked in.



Here nutrient solution is collected and run back into the reservoir for recycling.

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Deep-Water Culture (DWC) Systems

Deep-water culture systems are usually constructed with large (5-gallon) buckets and are sometimes referred to as “bucket systems.” In this setup, plants are held in net pots filled with clay pebbles or a similar type of stone. Plants may be rooted in rockwool or peat plugs as seedlings or clones first and then transplanted into the net pots, which sit suspended in a hole cut in the lid of the bucket.

DWC systems may consist of a single bucket, but they usually comprise multiple buckets that are connected together via hoses that circle back to a main reservoir. The reservoir holds the nutrient solution and a submersible pump that works on a timer. The pump periodically fills the buckets with water and nutrients that saturate the hanging root system inside each bucket. When the pump stops, the nutrient solution drains back into the main reservoir to be reused in the next feeding.

A DWC system is excellent for small indoor growrooms with higher ceilings, as the buckets tend to produce tall, robust plants. The extra air available to the root system when the buckets aren't full enable large root structures to form, which in turn leads to fully developed mature plants. Up to 10 buckets can be linked together via hosing and fed from a single 50-gallon reservoir.

DWC systems are generally good yielders as root balls grow large; (top) more than a dozen DWC buckets connected via feed lines.





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Tilted tables are ideal for collecting runoff in top-feed systems; (inset) Rockwool cubes and slabs are top-fed via spaghetti lines.

Top-Feed Drip-Emitter Systems

Top-feed drip-emitter systems have now overtaken flood-and-drain tables as the most common hydroponic setup used by indoor hydro growers. These systems contrast with flood-and-drain tables by allowing growers to precisely control the exact amounts of nutrient solution fed to each plant. Both drip and spray emitters come rated by output volume, so growers can easily calculate how long they want to feed their garden.



Emitter systems are predominantly used with either rockwool or soilless mixtures that sit inside trays used to collect the runoff. These are the same trays (usually 4' x 4' or 4' x 8') that are used in flood-and-drain setups. The rockwool medium can be in any format, including large cubes, long slabs or crouton-sized pellets in container pots. Soilless mixtures tend to work best, however, and are held in either container pots or bags. Most top-feed drip-emitter systems drain to waste, as the grow medium—especially soilless mixes—tends to add too many impurities to the nutrient solution. In these drain-to-waste setups, larger reservoirs are needed to feed the garden two or even three times daily. ✨



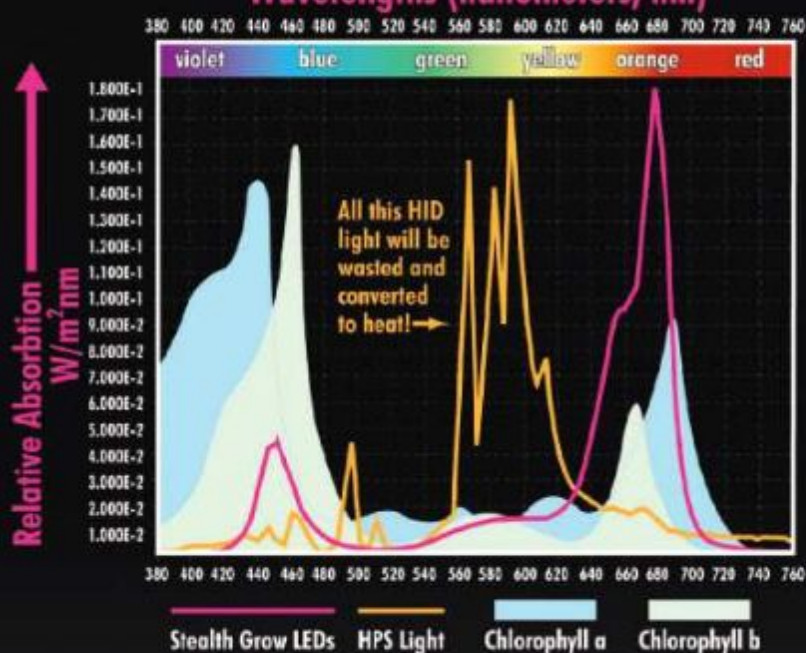
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