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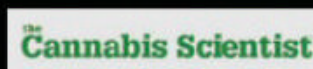
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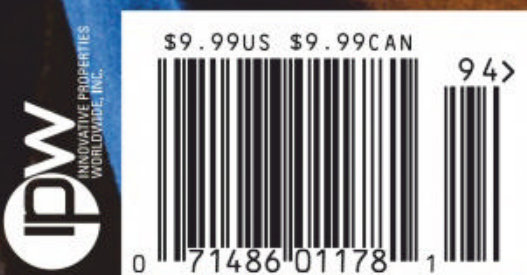
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FROM THE PUBLISHER



Charles Warner,
Publisher/Editor-in-Chief

The End is Only the Beginning

As 2019 comes to a close, I feel like my mind is spinning with memories of this decade. In addition to celebrating the five-year anniversary of our flagship publication *Innovation & Tech Today*, I saw one of my passion projects grow in *Cannabis & Tech Today*. Our team spoke with forward thinking influencers, attended industry-focused events, and reported the stories shaping the cannabis space. All this hard work has culminated in the winter issue of *Cannabis & Tech Today*, our very last of the 2010s.

Just like any of our winter editions, this issue reflectively closes out the year. Our Innovator of the Year section focuses on CannRx's Dr. William Levine, who is on a mission to promote THC bioavailability. We're also unveiling our Top 25 Most Innovative Products of 2019, an extended list hand-picked by our editors as our absolute favorites of the year. And, for the very first time, we are presenting our list of the Top 25 Cannabis Innovators of the Year, a collection of some of the incredible personalities we've featured, such as Gofire CEO Peter Calfee, Cannabis Science Conference Founder Josh Crossney, and Scottsdale Research Institute's Dr. Sue Sisley.

However, while we're putting a lot of attention on the past, it's time to look forward. This is most apparent with our two focus features President of Mexico Vicente Fox and musician Julian Marley, both major figures in the industry heading into 2020. Hearing Fox discuss the state of cannabis across North America and Julian Marley open up about the intersection between creativity and cannabis makes me unbelievably excited for the years to come in this incredible industry.

And, as per usual, we wanted this issue to put a spotlight on the trending topics in cannabis. Our Business section puts a focus on the female perspectives of the cannabusiness, with a panel focusing on women in the industry and the TribeTokes co-founders putting a spotlight on the need for more gender diversity in the arena. *High Times* CEO Kraig Fox also reveals the interesting position cannabis publications are in, something we know a thing or two about. Additionally, former NFL lineman Eugene Monroe discusses the current opioid crisis in the league and how cannabis reform could be the solution.

As we take a look forward, the 2020s will be an incredibly interesting time for cannabis in our country. As November 3, 2020 approaches, it's nearly impossible not to think of the upcoming election and comparing where each candidate stands on the substance, with some all-in on legalization and reform and others with more unclear or negative positions. With that, I leave you with this message: research as much as possible, have discussions with everyone you can, and maintain hope that the upward trajectory of cannabis will continue throughout the new decade.

A handwritten signature in dark ink, appearing to read 'Ch Warner', with a long horizontal line extending to the right.



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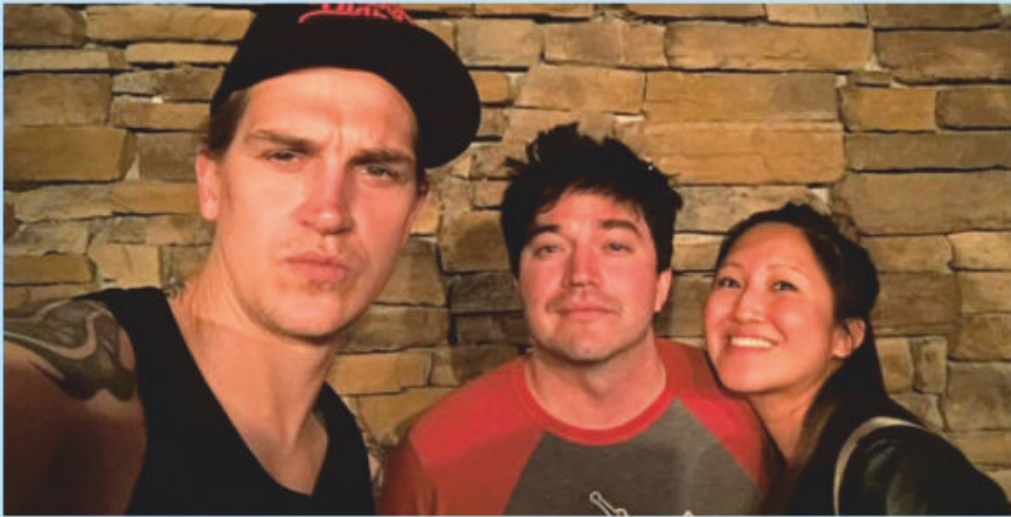
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SINCE LAST ISSUE...



JAY MINUS SILENT BOB

During the leadup to the release of *Jay and Silent Bob Reboot*, Jason Mewes took to the road with a standup tour, telling comical stories from his time growing up, meeting and collaborating with Kevin Smith, and learning the process of filmmaking. Some of his most memorable stories came from his high school days, including going to comic book conventions and wearing his underwear on the outside of his pants on a bet. Associate Editor Anthony Elio, who conducted an interview with Mewes for the Fall issue of *Cannabis & Tech Today*, attended the Denver show and got to meet him afterwards. “Wow, didn’t know you’d be so handsome!” the comedian quipped.



ANOTHER NIGHT TO REMEMBER

Being the only publication focused on the tech and science aspects of cannabis, it’s no surprise that we’ve gotten some recognition in the industry. We didn’t come home from the recent Cannabis Business Awards in Los Angeles empty handed, as *Cannabis & Tech Today* was officially recognized as the premier cannabis tech publication. Editor-in-Chief Charles Warner (left) received the award, and can be seen celebrating with Senior Video Editor Adam Saldaña (right). We look forward to continuing to create award-winning publications and expanding our trophy case!

SPECIAL THANKS TO:

Zoe Wilder, Annie Graf, John Barrett, Juan Garcia, Colton Peterson, Linda Marsicano

This publication is dedicated to the dreamers, the innovators, the collaborators, and the doers – who can’t be bothered by those saying it can’t be done. Nicholas and Aria, the future is yours!

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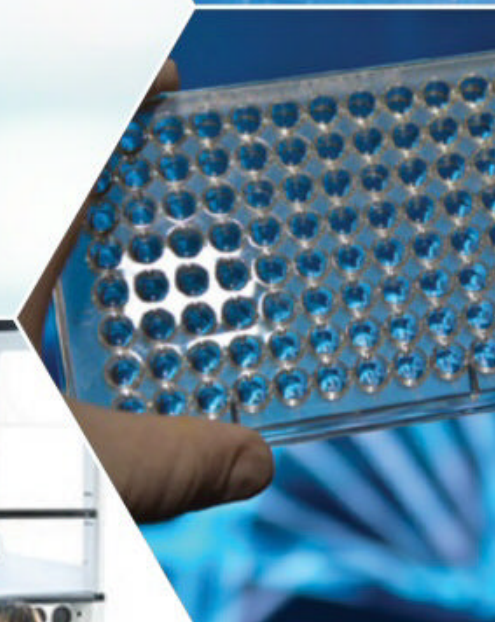
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By Patricia Miller

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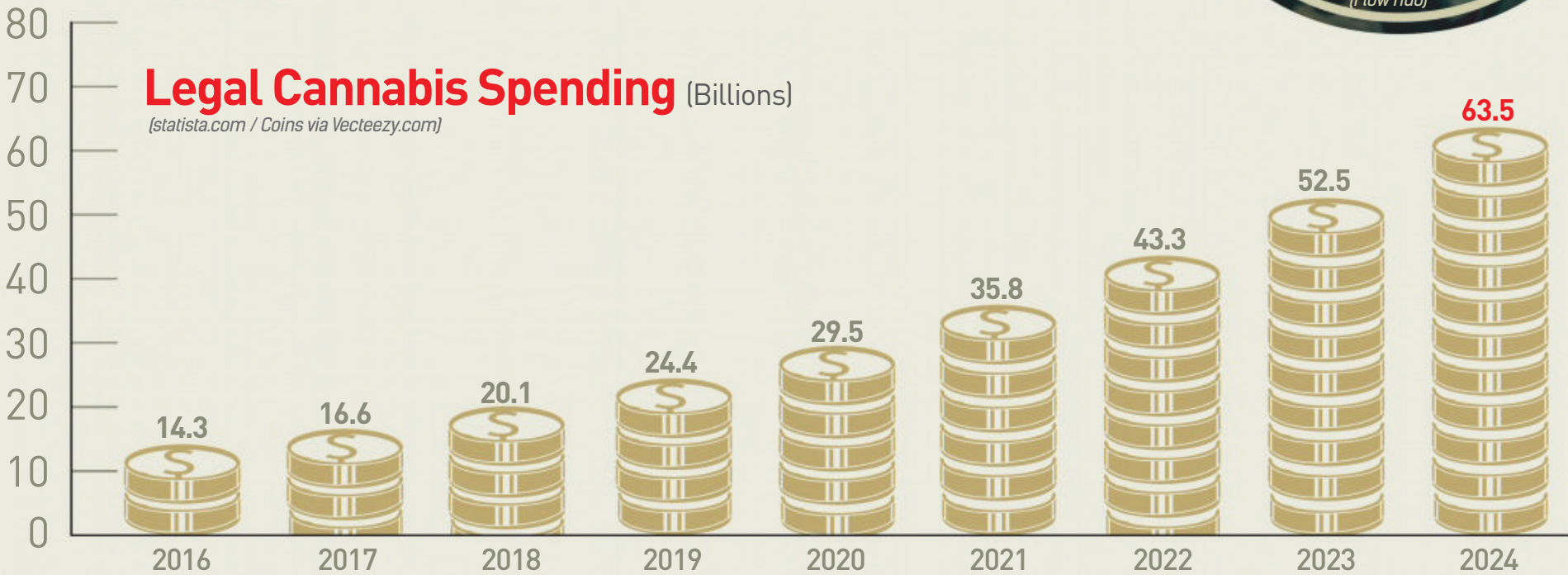
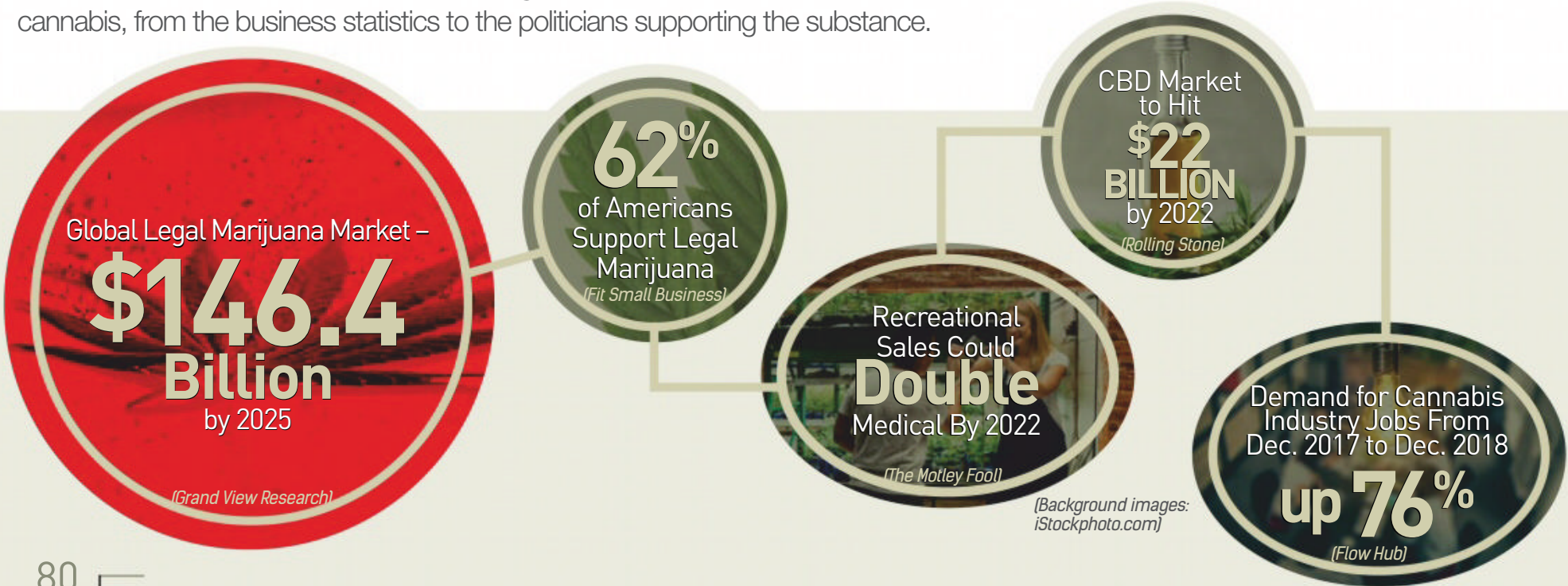
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by the NUMBERS

A look at the metrics shaping the cannabis business market — and our lives

The 2010s were an unprecedented time for the cannabis industry, seeing incredible expansion both legally and economically. However, there's still plenty of room for growth, and the new decade could present plenty of opportunities, especially with election day on November 3, 2020. With 2020 rearing its head, let's take a look at how this next year and beyond will have an effect on cannabis, from the business statistics to the politicians supporting the substance.



2020

Presidential Candidates Who Have Voiced Support For Cannabis

Illinois Marijuana Sales Launching Jan 1, 2020¹

Cannabis Sales in Oregon Predicted to Top \$1 Billion by 2020²

Cannabis Could Outearn NFL by 2020³

Maine – Recreational Cannabis Sales by Spring 2020⁴

Candidate	Medical	Recreational	Candidate	Medical	Recreational
Donald Trump	X	—	Beto O'Rourke	X	X
Tulsi Gabbard	X	X	John Delaney	X	—
Joe Sestak	—	—	Michael Bennet	X	X
Marianne Williamson	X	X	Bernie Sanders	X	X
Wayne Messam	—	—	Elizabeth Warren	X	X
Andrew Yang	X	X	Kamala Harris	X	X
Steve Bullock	X	—	Cory Booker	X	X
Pete Buttigieg	X	X	Amy Klobuchar	X	X
Julián Castro	X	X	Tom Steyer	X	X
Joe Biden	—	—			

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New West Summit

According to the event’s own wording, the New West Summit focuses on “quality over quantity.” Looking at the numerous innovators present at the event, it’s safe to say that they got the best of both worlds. Featuring two days of discussions from stars such as Alicia Silverstone and Killer Mike, as well as over fifty exhibitors, the New West Summit brought together the best of the cannabis industry. Additionally, the event featured two previous *Cannabis & Tech Today* cover stars, with both Dr. Sue Sisley and Arcview Vice President and Co-Founder Steve DeAngelo drawing huge crowds.



Photos By Mike Rosati @mikerosati



NCIA California Cannabis Business Conference

One of the greatest aspects of cannabis events is the ability to spread knowledge and share ideas between members of the industry. This is a main focus of the National Cannabis Industry Association’s (NCIA) California Cannabis Business Conference, which looked to empower entrepreneurs with the tools needed to succeed in the burgeoning cannabis space. Considering the numerous events NCIA throws each year, the California Cannabis Business Conference was truly one to remember.



Photos courtesy of NCIA



CWCBExpo Los Angeles

Taking place at the massive Los Angeles Convention Center, the Cannabis World Congress & Business Exposition’s L.A. event looks at cannabis through both local and national lenses. While there were numerous exhibitors, one that definitely caught our eye was Cannabis Talk 101, a news-focused radio show keying in on the numerous aspects of the substance, from social media to legislation and beyond. The event also showcased an immense list of speakers, including Grasslands Founder and CEO Ricardo Baca, Think and Grow Lab Co-Founder Sherri Franklin, truCrowd CEO Florence Hardy, and Women Grow President Gia Moron.



Photos IPW/Adam Saldaña

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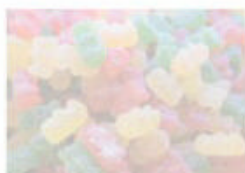
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WHAT YOU NEED TO KNOW ABOUT GROW ROOM STANDARDS

There aren't any, yet...

By Geoff Brown

Photo iStockphoto.com/FatCamera

Just as the cannabis industry has grown at a rapid rate over the past five years, the grow room environment has also experienced significant evolution.

Growers are seeking to produce massive harvests and secure a place in the market, and in doing so are coming up against some major challenges associated with producing at scale. This is a new frontier for many and a new field that requires different ways of thinking. One of the top challenges with scaling up cannabis production is the lack of standards in place. It's seriously hurting the industry right now by contributing to an information vacuum, especially as it relates to HVAC systems.

In the mainstream, engineers rely on proven and documented standards in order to properly handle buildings they are not familiar with. An example are codes published by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE). However, ASHRAE's codes are geared towards residential and commercial buildings that are primarily designed for humans. There are currently no ASHRAE standards that relate directly to indoor plant environments and few of their standards are sufficient to address the unique needs of these spaces.

Even the folks who think they have found the answers to the challenges posed by commercial

cannabis production are not inclined to share information or insights. This "secret sauce" mentality has exacerbated the challenges by ensuring no research- or data-sharing occurs in the industry. If this secrecy continues, there can be no hope for developing industry standards and best practices.

As a result, engineers are without guidance as they get involved in the design and construction of modern grow rooms. They wind up inventing solutions based largely on guesswork and the application of best practices from other environments or industries.

Standards in any industry are critical. They are a set of principles that everyone has agreed on and can be followed uniformly to ensure ideal outcomes. As the International Standards Organization says, standards answer the important question, "What is the best way of doing this?"

You may think some standards would have been created in the 25 years of medical cannabis. While it's certainly true that some things have changed since that industry got started, it isn't necessarily true that the experience of the industry has translated into formalized guidelines. Nor would those standards reflect the extraordinary advancements made in industry technologies just in the past couple of years. The main standards borne out of medical

grows are governmental regulations relating to quality of crop and specific chemical contents. But these are of little help to someone building a new operation today with questions relating to facility design and operation. The medical grows of before are not necessarily similar to what is being built today, especially for adult use grows — which, as a reminder, are expected to be the fastest-growing market segment in cannabis for the next few years.

The American Society of Agricultural and Biological Engineers (ASABE) has taken notice of the vacuum that exists today and has partnered with ASHRAE to create a new guideline for indoor growing environments: ASABE X653 guideline "Heating, Ventilating, and Air Conditioning (HVAC) for Indoor Plant Environments without Sunlight." This guideline is intended to provide clarity for engineers regarding the design and operation of isolated indoor plant environments, and hopefully install a new standard for engineers and grow operators to base their designs off of.

Learn more about HVAC design, specification, selection, installation, and operating, and order your free copy of *Getting Grow Rooms Right* at AgronomicIQ.com/book. ♦

Geoff Brown is the Director of Agronomic IQ. For more information, visit AgronomicIQ.com.

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The Importance of Water Balance

By Louie Fox

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As discussed in the previous Plant Empowerment feature, balance is essential when it comes to getting the most out of growth. However, while the previous entry put the spotlight on assimilates balance, that's hardly the only factor when it comes to stimulating growth. Water balance is also a major part of the process, as seen with evaporation and substrate systems. Let's take a look at some of the key facts behind water balance and how to get the most out of your H₂O.

What is Water Balance?

A plant's water balance represents the equilibrium between evaporation and water uptake. This balance is vital to growth as, if the evaporation surpasses the water uptake, the internal water tension (also known as plant turgor) decreases. In this case, water is often diverted from fruits and leaves, resulting in shrinkage. This tends not to be an issue, as rehydration occurs once there is a restoration of water availability. However, if this imbalance occurs for too long, stomata may close to lessen evaporation, hindering CO₂ uptake as well as slowing photosynthesis and growth.

Energy is the Key

While many believe that greenhouse air is a key component in evaporation rate, energy is actually the driving force. Evaporation is quite energy intensive, with a general rate of 2.5 Mega Joules per kilo. There are a number of ways for plants to derive this energy from the environment around them. These include visible radiation from the sun or even lamps, also known as short wave radiation. There is also long wave heat radiation, which can also come from the aforementioned lamps and sun, but also from heating pipes. Energy can also be derived from convection from the air around plants, but only if there is air movement and the plant's leaves are at a lower temperature than the air around them.

Evaporation Meets Irrigation

Additionally, it is very important to calculate the balance between irrigation and plant needs. This can be done by adding together all the energy inputs, resulting in a complete evaporation energy flow that is expressed in W/m². Hoogendoorn's iSii irrigation control software calculates this flow in terms of

Joules/cm². Each time there is a certain sum reached, the very next drip cycle may begin, similar to tactics regarding solar radiation. However, unlike those strategies, the energy inputs are taken from additional factors from the sun and the complete sum focuses on the inside situation, in order to account for whitewash and retractable shading screens.

The Power of the Substrate System

In order to get the best out of your water balance, as well as manage root zone water, it's vital to have a substrate system. While designing such a system may not be common knowledge, there are four major factors to focus on. These include planning the function of the system, designing an optimal layout, making the most of control potential, and noting targets for climate and crop changes. While it will take some planning and calculating, it's just one more step to optimizing your water balance. ❖

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Has CBD Gone Too Far?

By Anthony Elio

The golden age of CBD is here! The substance is everywhere, skyrocketing in popularity in what seems like an extremely short amount of time. And, just like me with my goth phase in high school, people are going all in on this new trend. This means that it's been incorporated into a large number of products, such as lotions, edibles, and even bath bombs. However, just like my high school goth phase, they may have gone too far. Let's take a look at the strange, weird, and odd products that have integrated CBD.

The Laws of Drinking CBD-Infused Claws

The easy-to-drink White Claw took the world by storm over the summer, making flavored seltzer a new household name and causing many to accidentally drink too much and make a scene at their sister's graduation. (Sorry, Lauren.) Well, it looks as though CBD was the next to follow the trend, as CBD-infused seltzers have given us a brand new way to drink fizzy clear water. As long as we don't get some kind of CBD-infused Four Loko in the future, I'm cool with this.

Silly Kids, CBD is for Adults

Most of us grew up in a time when colorful cartoon characters such as Toucan Sam, Cap'n Crunch, and Tony the Tiger would convince us that a future of high blood pressure would be worth enjoying delicious, colorful breakfast cereals. Of course, now that we're all grown up, we know that Pop Tarts are obviously the healthier option. However, some of these grown-ups have decided to make the classic breakfast choice more beneficial, as seen with new, originally-named CBD cereals such as "Captain Crunchy Munch Berries" and "Fruit Poofs." They must be cuckoo for copyright infringement.

In Through the Out Door

CBD has been incorporated into quite a few edible and drinkable products recently, such as gummies, chocolates, and teas. However, for those who find eating and drinking to be too difficult, there's another way to get your CBD fix. That's right, the tried and true suppository is the latest vehicle for CBD, just in case you've got a hankering for some cannabidiol but are feeling a bit cheeky. I'd like to apologize to all of our subscribers who just had to read that.

Yes I Lubrican!

For those of you with children, you might want to get them out of the room before you read this. Well, if you're reading this out loud, that is. This final entry is about, ahem, adult hugging. Yes, my dear readers, CBD has found its way into lubricants, which are used for... y'know... the birds and the bees. Now, if you'll excuse me, my hands are far too sweaty to keep typing after dispensing such saucy dialogue. ❖



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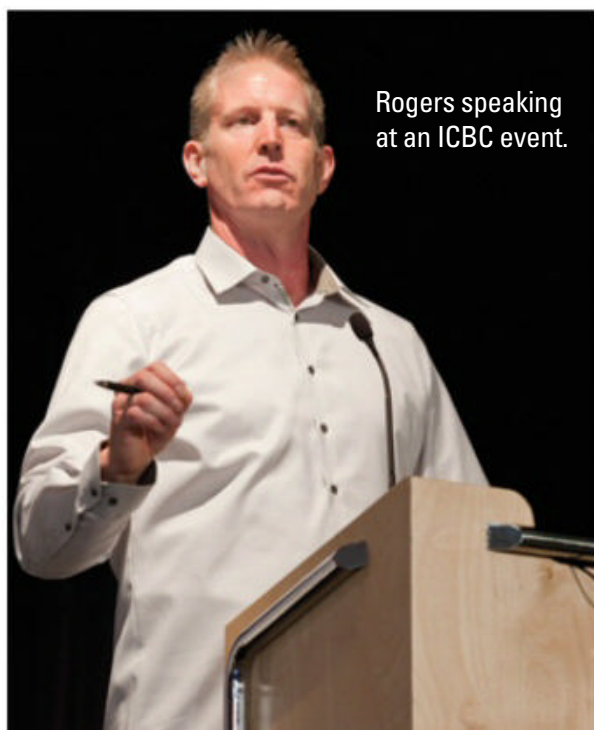
How the International Cannabis Business Conference Brings the World (and the Cannabusiness) Together

By Louie Fox

While it may seem as though the U.S. has become the United States of Cannabis in the 2010s due to rapidly growing legalization, the world as a whole has begun to embrace the substance. According to *The Motley Fool's* list of projected cannabis spending by 2024, while the United States may be number one (with a potential \$30.1 billion), Germany, Canada, Mexico, and the U.K. all look to make a major splash in the industry. In fact, outside of the U.K., each country is predicted to become a billion (or multibillion) dollar industry by 2024.

Because of this prosperous future for cannabis outside of the U.S., it is vital to start recognizing the potential economic power that it has around the globe. This potential worldwide growth presents unlimited opportunities for collaboration beyond borders, something the International Cannabis Business Conference (ICBC) looks to achieve.

With numerous intercontinental events each year, the ICBC has one main goal: furthering the professional spirit of the cannabis industry by gathering entrepreneurs far and wide to network together and share ideas and strategies. This approach has brought together



Rogers speaking at an ICBC event.



ICBC CEO Alex Rogers speaks with U.S. Representative Earl Blumenauer (D-OR) on the left and former U.S. Representative Dana Rohrabacher (R-CA) on the right.

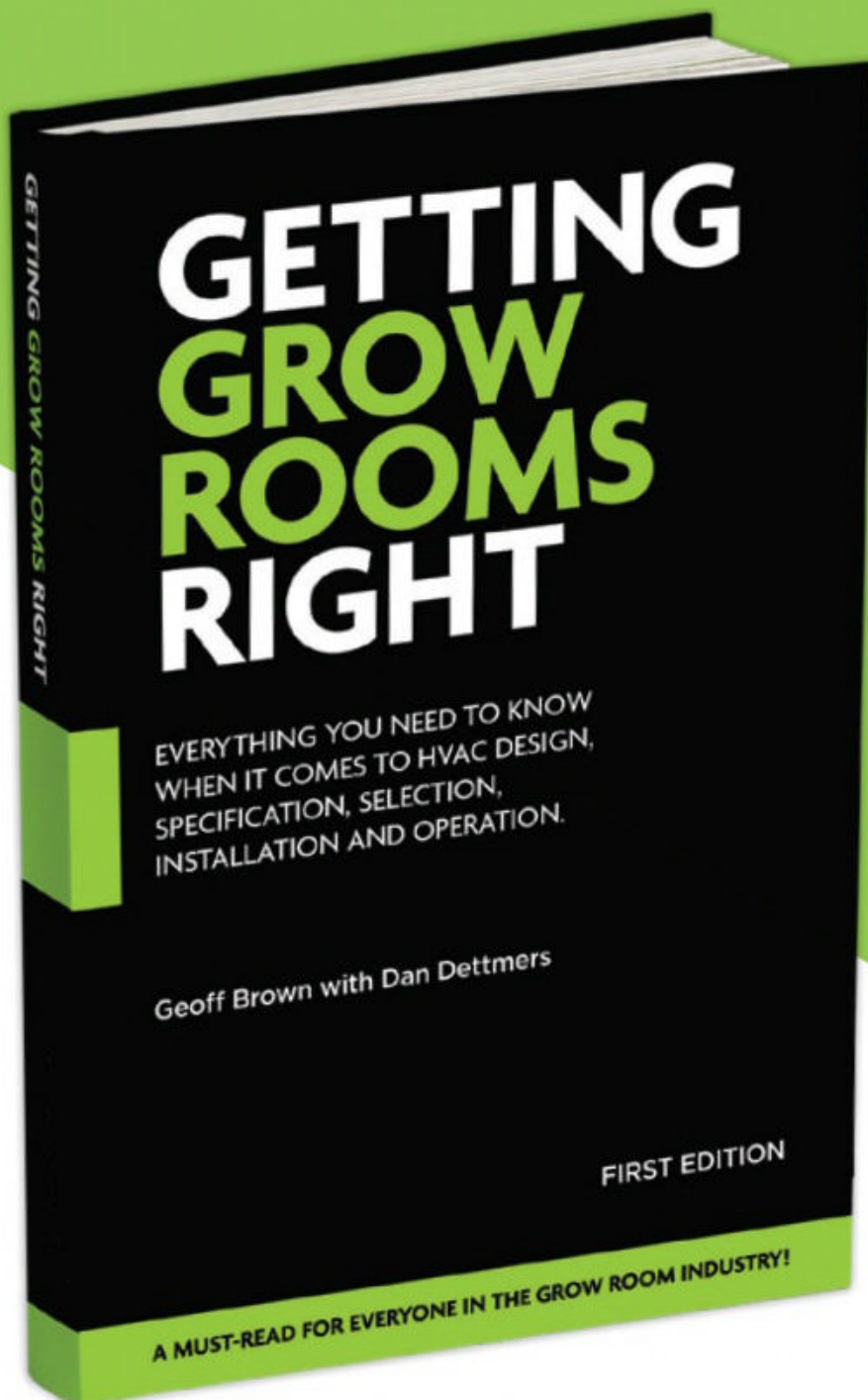
policymakers and business personalities from over 60 different nations, as well as numerous established keynote speakers, such as Gateway Proven Strategies Founding Partner Charles Feldman, the “Godfather of Cannabis Research” Dr. Raphael Mechoulam, and even punk rocker-turned spoken word artist Henry Rollins.

And, as they say, the proof is in the pudding. ICBC CEO and Executive Producer Alex Rogers recalls a mutually beneficial meeting between established Canadian producers and interested German licensed producers from an event in Berlin: “The German cannabis agency announced the domestic cultivation bid the day before the event. They mandated that all domestics applicants must partner with a previously established legal cannabis cultivator. This in turn, created a mad rush for German/Canadian partnerships... Scores of millions of dollars were done in business that weekend.” Clearly, the event’s focus on collaboration has

paid off for the cannabis market across the globe.

But, as Rogers will tell you himself, while the future is bright for the international market, there is still work to be done. “Banking is a huge issue due to prohibition policies. It will be a while before things smooth out, but at least we are moving in the right direction and more countries are getting on the right side of history.”

Heading into 2020, the ICBC looks to continue this theme of progressive unity, with events in Vancouver, Berlin, San Francisco, Barcelona, and Bern. Undoubtedly, these conferences will present many opportunities, fulfilling the vision of innovators such as Rogers, who puts it best: “It is vital to the future success of the cannabis industry that cannabis entrepreneurs, innovators, and investors all get in the same room together to network and collaborate.” ❖



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2019

TOP 25 INNOVATORS

Cultivation, technology, research, business, advocacy, social justice, legislation: there are so many aspects that build up the cannabis industry. Each year, people from all over are working to advance cannabis in their own respective ways, resulting in industry-changing innovations and successes. Here, we're taking a look at the Top 25 Cannabis Innovators of 2019, those individuals and companies who we believe are making the most change in this burgeoning industry.



Orange Photonics

In an industry full of varying regulations, product quality is of the utmost importance. Unfortunately, not every startup has the privilege to employ a full cannabis testing lab, limiting opportunities for some. Orange Photonics' LightLab technology helps fill this void, allowing cultivators to measure everything from THC and CBD content to trim and terpenes, using the same spectroscopy and chromatography techniques found in a testing laboratory. What started as an idea for a coffee analyzer has brought portability to the cannabis testing lab.

RayWear

As most of us should know, over-exposure to UV rays can be very harmful. Whether your cannabis cultivation facility is indoors or outdoors, chances are you're taking in a lot of UV radiation everyday. To protect cultivators, Daniel Jordan founded the protective clothing company RayWear. The clothing is breathable, durable, and comfortable, allowing workers to go about their tasks with ease, without having to worry about the risk of skin cancer.



Daniela Vergara, University of Colorado, Boulder

As the Director of the Agricultural Genomics Foundation and as a postdoctoral researcher at the University of Colorado, Boulder, Daniela Vergara has made a considerable impact on the way cultivators look at their crops. "In order to understand how to cultivate the plants properly, we need to understand the genome," Vergara said of her research. It's her scientific contributions that will drive the future of genetic research in cannabis, making cultivation more reliable, consistent, and accurate.

Noa Kahner, Founder & CEO of Kahner Global

As the founder and CEO of Kahner Global, Noa Kahner is not only a major player in cannabis investment, she also organizes thought-provoking conferences centered around the entrepreneurial potential of the cannabis industry through strategic partnerships. The most prominent of her events is the Cannabis Private Investment Summit, an event focusing on professional investors and family offices within the industry.



Colleen Lanier, Executive Director of the Hemp Industries Association

For the past five years, Colleen Lanier has worked tirelessly to advocate on behalf of the Hemp Industries Association and Vote Hemp to build awareness and acceptance for this versatile crop. Her work finally led to the passing of the 2018 Farm Bill on December 20, 2018, which officially removed hemp as a Schedule I drug.



Vince Sanders, CEO of CBD American Shaman

It's well known at this point CBD's potential as a world-changing medication, but it was a surprise to Vince Sanders when he first developed a CBD oil for his uncle with cancer. The end result was CBD American Shaman, a leading CBD company which developed a patented nanotechnology process to improve the bioavailability of the CBD in their products.

Josh Crossney, Founder & CEO of Cannabis Science Conference

In a burgeoning industry, there are few things more important than sharing ideas with the goal of innovation. This prompted Josh Crossney to found the Cannabis Science Conference, the industry's leading science- and research-based event. Explaining the origins, he said, "I realized early on that there was a lack of information, [a place] where the world's leading researchers and experts could really have a platform to come and share their important data and research."



Nina Parks, CEO of Mirage Medicinal; Co-founder of Supernova Women

The cannabis industry is always in need of business leaders and advocates. Nina Parks is both, with her passion and drive at the forefront throughout her ventures. She is the founder and CEO of Mirage Medicinal, a cannabis delivery service based out of San Francisco. Additionally, she is the co-founder of Supernova Women, an organization that supports women of color within the world of cannabis entrepreneurship.

Chanda Macias, Chairwoman of the Board at Women Grow; CEO of National Holistic

Chanda Macias has quickly made herself a leader in the cannabis industry, both as a business leader and a social advocate. Macias is the owner of the National Holistic Healing Center (NHHC), a company dedicated to providing alternative medicine to individuals with debilitating medical conditions. NHHC provides education, support, medical cannabis, and cannabis-infused products. All the while, Macias acts as Chairwoman of the Board at Women Grow, helping to connect, educate, inspire, and empower the next generation of cannabis industry leaders.



LumiGrow

For indoor growing operations, few things are as important as lighting. LumiGrow is a smart lighting company working to develop AI solutions for cannabis cultivation operations. LumiGrow is innovating grow light technology with their TopLight and BarLight smart fixtures, wirelessly controlled by the company's smartPAR software to optimize yield, quality, and custom plant traits.



Adam Klaasmeyer & Royce Birnbaum, Founders of CEAD.ai

Artificial intelligence is finding a home in every industry, and cannabis is no different. CEAD.ai, founded by Adam Klaasmeyer and Royce Birnbaum, is one of the first companies to apply this technology to cannabis cultivation and production, bringing cannabis into the “fourth industrial revolution.” CEAD utilizes industry leading data gathering to provide automation solutions for cultivators, monitoring aspects such as plant nutrition, growth rates, life cycles, and predictive pest outbreaks, as well as the movements of the growers. The AI applies data to predict harvest yields, forecast and prevent common cultivation issues, and offer a whole new level of control.

Ricardo Baca, Founder of Grasslands: A Journalism-Minded Agency

As with any new industry, the cannabis space is in need of consistent, reliable information. As the former Editor-in-Chief at *The Cannabist*, Ricardo Baca is putting his experience into his new communications firm, Grasslands: A Journalism-Minded Agency. The company has expanded rapidly this year, purchasing a \$1.2 million Denver headquarters, while growing their staff and client list, all while providing leading services to cannabis businesses.

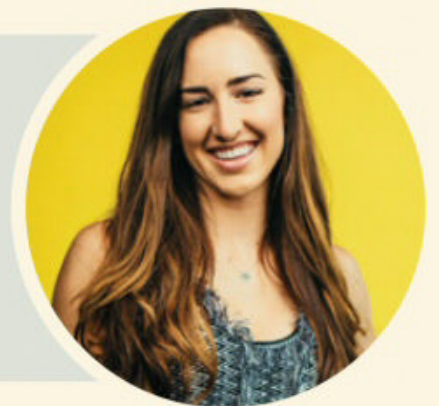


Cam Battley, Chief Corporate Officer at Aurora Cannabis

There are few companies that have experienced such rapid growth as Aurora Cannabis. The publicly traded juggernaut started selling medical marijuana from its headquarters in Cremona, Alberta in 2016. Since then, its operations have spread to 23 countries, making the company the second largest producer of cannabis on the planet. Their gregarious frontman, Cam Battley, touts the company’s achievements with the same enthusiasm one would expect from a boxing promoter. His background in bio-pharmaceuticals gives Battley an air of confidence that’s backed by an expansive knowledge of industry best practices.

Codie Sanchez, Managing Director & Partner at Entourage Effect Capital

She successfully built an asset-management business in Latin America. She served as an investment consultant at companies such as Facebook, Apple, and Amazon. Now, Sanchez is applying her investment skills to the cannabis industry, becoming one of the sector’s leading investors. The cannabis investment space is blossoming, and at times can even be erratic, and Codie Sanchez is at the forefront as the Managing Director of Entourage Effect Capital, a private equity firm specifically focused on investing in the legalized cannabis industry.



Patrick Vo, President & CEO of BioTrackTHC

Based in Fort Lauderdale, BioTrackTHC’s seed-to-sale software and tracking technology helps businesses remain compliant with tracking and reporting requirements in each state throughout the U.S. With differing regulations from state to state, it’s vital that companies stay on top of changing rules, tracking their products throughout the supply chain to ensure quality, both for the consumer and local governments. BioTrackTHC’s software helps both businesses and governments make sure that consumers are receiving safe, high-quality, and reliable products.

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Roz McCarthy, Founder of Minorities for Medical Marijuana

With people of color suffering at a disproportionate rate from the war on drugs, and now holding only a minority of executive positions in the cannabis sector, social justice must be a core value of this industry. That's why Roz McCarthy started Minorities for Medical Marijuana, which looks to make this industry more inclusive by utilizing education, events, and advocacy. The organization is working toward the decriminalization of cannabis possession, creating a diversity plan for license applicants, pushing a bill to resist a monopoly in the medical marijuana industry, and helping expunge past cannabis-related charges.

Shanel Lindsay, CEO of Ardent Cannabis

Whether microdosing or using for recreational or medicinal needs, decarboxylation is an essential first step in order to cook cannabis at home. The NOVA decarboxylator, invented by Shanel Lindsay and Ardent Cannabis, helps users get the most out of their product. With the NOVA, users can get almost 100mg of THC out of just a half of a gram of cannabis. This technology is especially helpful for those who are looking to microdose for pain or need a consistent, reliable dosage of THC.



Roger Volodarsky, CEO of Puffco

If you're a cannabis enthusiast, it's likely that you've heard of Puffco – and maybe you've even used one of their products. CEO Roger Volodarsky's first invention, the Puffco Pro, was awarded Best Vaporizer of the Year by *High Times* in 2015. Since then, Volodarsky has continued to innovate and shape the cannabis vaping and technology sector, most recently the Puffco Peak. Innovation follows Volodarsky wherever he goes as his company continues to churn out industry-leading technologies.

Jessica Billingsley, CEO of MJFreeway

MJ Freeway is a world leader in cannabis compliance technology, helping companies ensure they are keeping up with government regulations with the latest data and software. Speaking on the company's culture of innovation, CEO Jessica Billingsley said, "One of MJ Freeway's three core values is: 'Be part of the solution,' and that really speaks to innovation because it speaks to not just what the client is asking for, but what is their actual problem and how do we solve that better?"



Jeff Chen, Founder & Director of the UCLA Cannabis Research Initiative

Dr. Jeff Chen is one of the leading cannabis researchers in the country and is currently the director of the UCLA Cannabis Research Initiative. He has spent the past four years working at the intersection of academia, industry, nonprofit, and government to accelerate research into the health effects of cannabis. He's spoken at events across the world and is a published author in cancer research. He's furthered cannabis academia, forming some of the first cannabis clubs and courses at an American university.



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Ziel

In sizable markets, such as Colorado, Nevada, or Canada, growers are required to report Total Yeast and Mold Count as part of their required regulatory compliance. If numbers exceed established minimums, whole crops and millions of dollars can be lost. However, there are technologies from the food industry that are now helping keep cannabis “clean.” Ziel is a leading company that has developed radio frequency (RF) technology to keep cannabis clean and safe. Ziel’s RF technology is non-toxic, organic, chemical-free, scalable, and effective, while preserving total THC, flavor, and aroma.

Zaffia LaPlante, President & Founder of Hempergy

Now that hemp is legal both in Canada and the United States, innovators can finally embrace this “Swiss Army knife” crop and use it to its full potential. Hempergy, founded by Zaffia LaPlante, has gone so far as producing sustainable building material out of the substance. “Our goal is to use hemp as a sustainable feedstock for construction, cosmetic, and textile purposes,” LaPlante said of her company.



Philip Preston, President of PolyScience

Philip Preston has been working in precision temperature control most of his life. What he’s learned from temperature control in the culinary arts, he is now bringing to the cannabis industry. After seeing the medicinal benefits of cannabis, Preston has worked for the past 10 years to bring flow-through chillers and precision temperature control devices to cannabis laboratories all over the world.

Peter Calfee, CEO of Gofire

One of cannabis’ most pressing issues is dosing. It can be difficult to accurately dose with edibles and even vaping technology. This is especially a problem when you’re using the substance medicinally. That is why Peter Calfee and Gofire developed the Gofire Health Suite, which provides consistent, controlled dosing for consumers. A smartphone app and inhaler combine to create the Suite, giving consumers repeated doses. Consistency across dosing, chemical profile, and regimen not only creates a better solution for patients and consumers, but also has the potential to propel forward cannabis research and cannabis’ potential as FDA-approved medicine.



Dr. Sue Sisley, Scottsdale Research Institute

Cannabis research is absolutely vital to the industry, bringing knowledge and legitimacy to both companies and consumers. This is why Dr. Sue Sisley’s work is so important, not just because of her research, but her work to break down barriers to entry put up by the FDA and DEA. As a trailblazer in cannabis research, Dr. Sisley has been working for 14 years to push cannabis through the FDA drug development process. She’s one of the few scientists in the country to hold a DEA Schedule 1 research license. When, three years ago, the DEA announced that they would accept applications for third-party cultivators to grow cannabis for research, Sisley’s group was one of the first to apply. Three years later, no applications have been processed, and Sisley was forced to file a lawsuit against the DEA due to the lack of response. She’s one of the few people taking cannabis research as seriously as it must be taken, and she’s taking the fight directly to those in charge.



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Dr. William Levine

Cannabis & Tech Today's 2019 Innovator of the Year

By Patricia Miller

How quickly does your cannabis take effect? Is it the same every time? How much of what you pay for is actually being absorbed by your body? These are important questions for consumers and they're even more important for doctors who want to prescribe medical cannabis to their patients.

When we can answer those questions, the industry will take a rapid leap forward. Researchers could conduct more accurate and repeatable studies. Doctors could confidently tell a patient what to expect from the medicine they've been given, including how quickly it will take effect, how long a duration it will have, and how to create an effective dosing regimen for their needs.

That's why we chose CannRx Founder and Chief Scientific Officer Dr. William Levine as our Innovator of the Year. In August 2019, CannRx released new data about their proprietary technology CannTrap. This development, though still in trial stages, allows ingested cannabis to be absorbed 100 percent by the body. Normally, cannabis and cannabis-derived products have a bioavailability of six to eighteen percent.

CannTrap carries cannabinoids so effectively that it reduces the amount of time a person has to wait for the cannabinoids to take effect. Their pharmacokinetic research shows that the technology can reduce the maximum dose waiting period from two hours to just 30 minutes. If taken sublingually, that waiting period is reduced to five minutes. Better still, CannTrap can deliver a controlled release, offering short-term or prolonged effects to suit the needs of the consumer.

We spoke with Dr. Levine to learn more about the science behind this technology and how it stands to completely disrupt the industry as we know it.



***Cannabis & Tech Today:* CannTrap is a molecular delivery system, would you explain what that means?**

Dr. William Levine: It's actually a pretty simple system. The way our bodies work is that, as we absorb materials, like nutritional materials, or drugs, or any particles into our body, the body distributes it throughout the bloodstream by anchoring it to a protein carrier molecule. So the protein basically picks up the nutritional material and delivers it throughout the body into the areas where it's needed. It uses the same system to remove toxins from the bloodstream by transporting the toxins to the filtration system where they're screened. So, we mimicked the natural blood transportation system by building a protein carrier that is actually food-

based. Some proteins we use are from natural food supplements and some of them are actually derived from cannabis.

We pulled the proteins out of cannabis, which people aren't really using. Then we use those as part of our carrier system. I like to think of it, visually, as a fisherman's vest. Basically, the protein molecule has a lot of different pockets and it loads up the cannabinoids, terpenes, and all the other flavonoids and bioactive material into the pockets and brings them to the target where they need to be.

What it does is fascinating because clinically, it increases the bioavailability of cannabis by a five-fold figure. So it's a dramatic change in the speed with which it goes into the body, the



amounts that go into the body, and the control that we have over how much time it will actually stay active in your system. In a sense, it's a platform that can make every single cannabis product better and safer.

C&T Today: Would that mean you could make one edible active for two hours and another active for four hours using CannTrap?

WL: Conceptually, yes. It's very needed if you think about it, because sometimes you want to have something just for a short burst, and other

times you may want it to stay in your system for a longer period of time, depending on the reason why you're taking it.

C&T Today: You're using this formulation in some of CannRx's proprietary blends, is that right?

WL: Yes. We really believe in the CannTrap delivery system, so if a product can use that system, we prefer to use it. For example, when someone takes a sublingual dose, it's placed by dropper under the tongue. Well, most of that is actually being swallowed. About five percent is

absorbed, but most of it is being swallowed and the five percent that is absorbed is being absorbed relatively poorly. But when we CannTrap that material, we actually get a very rapid increase into the bloodstream for about five minutes and we can actually control that to be gone in an hour or two. So you can have a very short, powerful effect and then have it cleaned out of your system.

C&T Today: Is this something you intend to license to other companies so that it can be used more broadly?

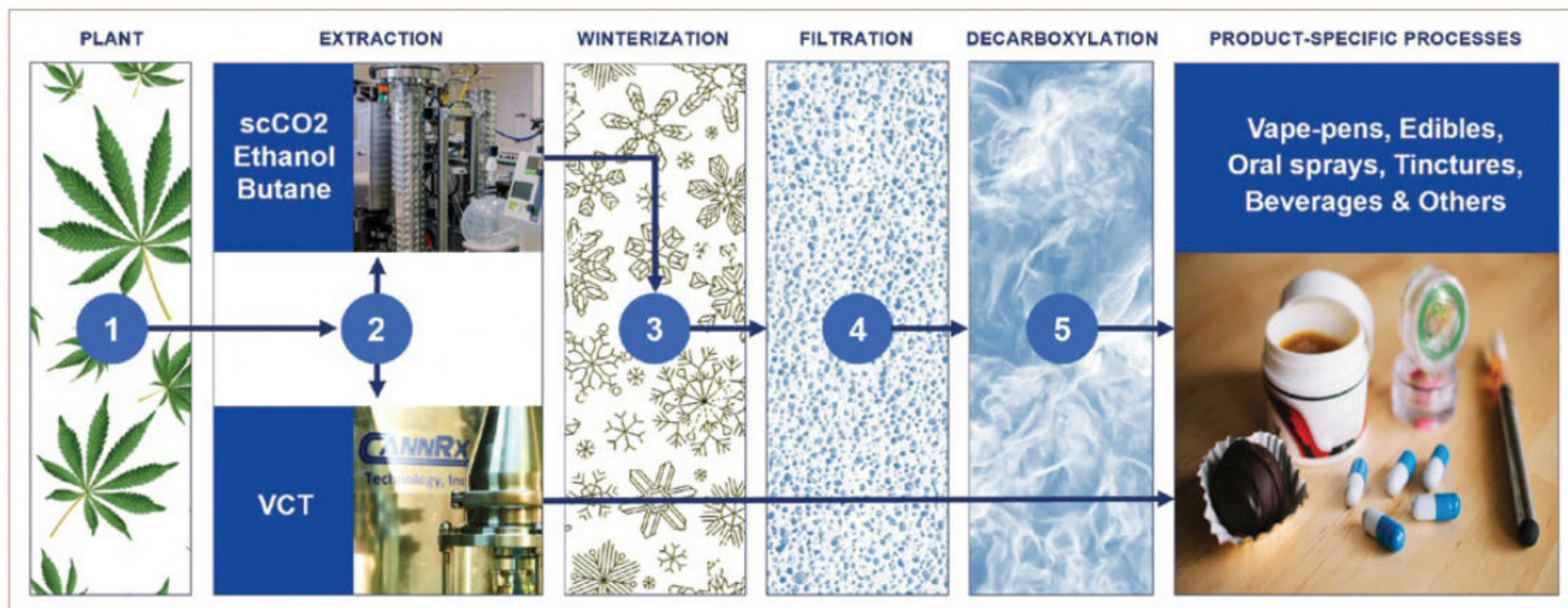
WL: The answer is yes. We certainly don't want to keep this only to ourselves, but we like to work with quality partners. We feel we've created something that's really a game-changer in the industry so we want to make sure it's used in a positive way. We don't want to license this technology out to everybody because the industry isn't ready for it. What we'd like to do is develop strong partnerships with quality partners that would enable us to share the same ethical concerns and scientifically-driven product-development programs that we value and partner with those companies, specifically.

C&T Today: What would some of your ethical concerns be?

WL: I wouldn't necessarily be interested in creating a very high-powered high for the industry. That could lead to uncontrollable effects. We've created something that has a much higher bioavailability than anybody has ever seen before. So, we need to develop this in a way that creates the best results for consumers.

C&T Today: How does CannTrap help reduce heavy metals and toxins?

WL: You know, it's very interesting because we uncovered that as we were actually looking at all of the toxins associated with the plant when it's harvested and then extracted. We actually ran it through a battery of tests that indicated all the potential toxins, different hydrocarbons, formaldehyde, which are naturally in the plant. They can become concentrated in a lot of the solvent-based systems, because when you extract you're putting the plant into a strong solvent and then you're taking out a concentrated material of whatever was in there.



Whatever percentage of toxin material that was there beforehand — it's more concentrated now. And so what the CannTrap does is that it doesn't bind to them. So, when we actually do the protein binding, the proteins will not pick up those toxins. It will leave them in the solution.

C&T Today: How will this advance medical cannabis research?

WL: Controlled bioavailability, onset, and dosing are critical to be able to look at a product's effect. There's one thing we really want: if you look at the world of medical cannabis, you need to standardize the quality of the materials that you're delivering to the patient, but you also need to have some sort of standardization as to how you're getting it into the system so that you can measure that. So, the CannTrap will provide a platform for us to develop efficaciously-driven drugs. When you take this, you know that you'll get an effect like you would if you took an Ibuprofen for pain in your shoulder. You know that about 30 or 45 minutes later your shoulder is going to be feeling better. We want that kind of predictability with cannabis.

C&T Today: Absolutely, that would change everything.

WL: Then I think there will be a lot more uptake. The world has changed, but doctors are a little more slow to change for the simple reason that they are responsible for the safety of

their patients. They can't go trying things that are untested and they're not wrong. The FDA suffers from the same issues; they're charged with protecting the safety of citizens. But, this will go a long way toward giving doctors the confidence that this product can be used medically.

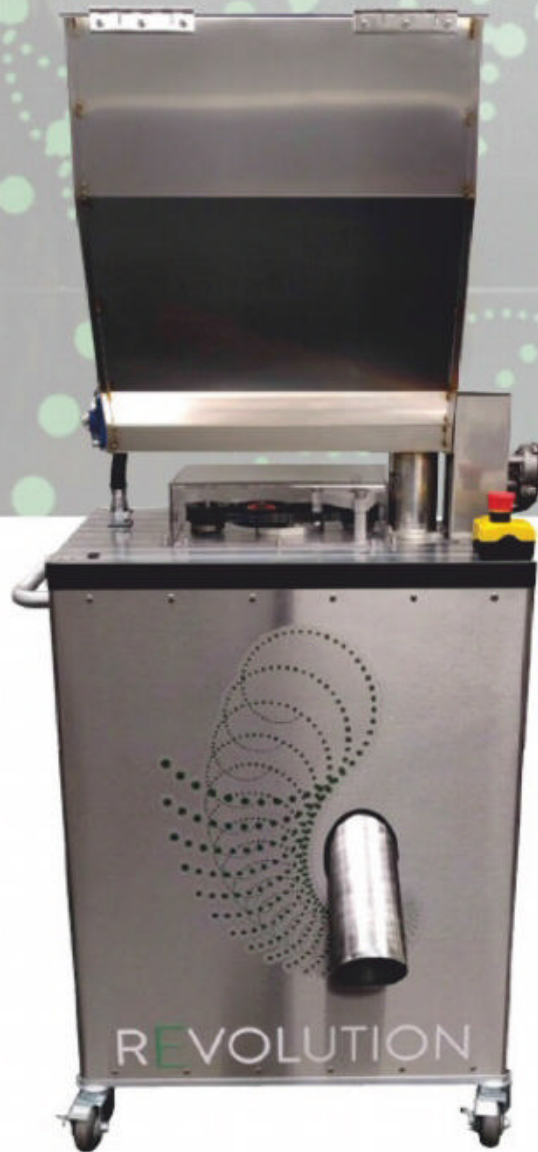
C&T Today: Are there any unexpected ways you think this might impact the industry?

WL: It's a game-changer in concept, because it does two things which are critical: number one, it improves the qualities that we talked about. But number two, and this is equally important,

it doesn't change the molecular structure of the cannabis. Why do I say that that's so important? Think of all of our ethno-botanical safety data over the years and of all those different people that have used cannabis and are supportive of cannabis. If you change the molecular structure with some modification, you've changed the potential toxicity. So, all that safety data gets thrown out the window. So the beauty of this system is that we haven't changed the molecules at all. The molecules remain as safe as they were before and as predictable as they were before. All we've done is improved the capacity to get them into the body and control the dosing. ♦



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Crafted *with* Care

How craft cannabis is providing a sustainable alternative to commercial crops.

By Ebby Stone

Let's face it, Earth is in trouble. Whether it's Greta Thunberg giving us all the angry eye, raging forest fires, ocean trash gyres, or Venice underwater, there are some clear indications that our actions are not sustainable. Behaviors and buying patterns that have become second nature are actually doing profound damage in ways we seldom acknowledge.

The ugly truth is that it's every person's responsibility to make conscious purchasing decisions. For every item on the shelf there's a story — how it was created, who made it, how it arrived here, and where it will go when you've finished using it. The same is true of cannabis and so far, the industry is off to an unsustainable start. However, craft cannabis cultivation could change that perception and help paint the industry in a greener light.

It's easy to assume every nug on the shelf was carefully tended and every input thoughtfully sourced. After all, it was once the plant of hippies and tree huggers. But, the sad truth of legalization is that many of the products we eagerly scoop up for low prices were mass produced with no regard for how many resources were required to grow them. Much of the herb that people are ingesting is covered in pesticides, herbicides, mold, and mildew.

Despite being a heavily regulated industry, there is no government body handing out

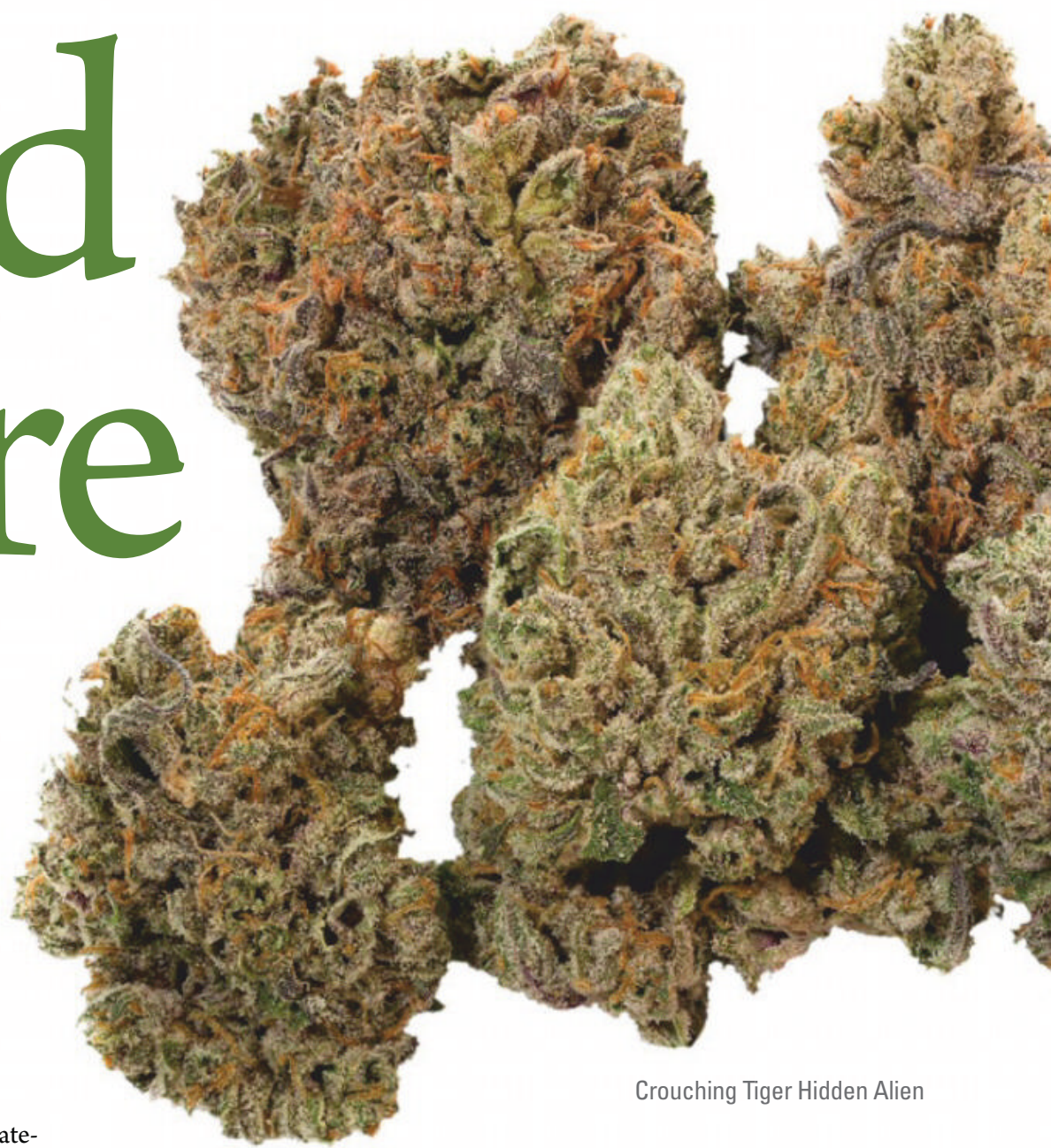
organic certifications to cannabis growers, though there are some commendable state-funded programs in many legalized states. So, who is responsible for knowing what's in the cannabis we buy? It's largely up to the consumer.

In states like Colorado, Washington, and Oregon, there's a movement that's rapidly gaining speed: craft cannabis. Much like craft breweries, with dedicated brewmasters curating the best possible beverages, craft cultivators grow lovingly tended flower for connoisseurs and socially conscious customers.

Craft cultivators care about what they're growing. They're conscious of what goes on to the plant, what goes into the plant, and what their customers ultimately end up consuming.

During a tour of AlpinStash, an award-winning Colorado-based small batch cultivation facility, Founder Danny Murr-Sloat explained the importance of craft growers, "The corporate takeover of cannabis is a real thing and it's only going to get more consolidated."

His advice to consumers? "Mega corporations are already in this space and quickly expanding, but craft producers will always exist, so I would



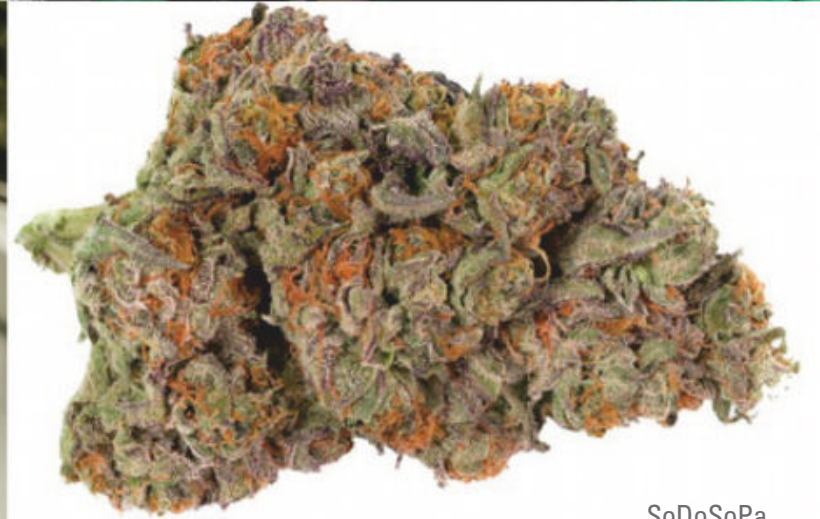
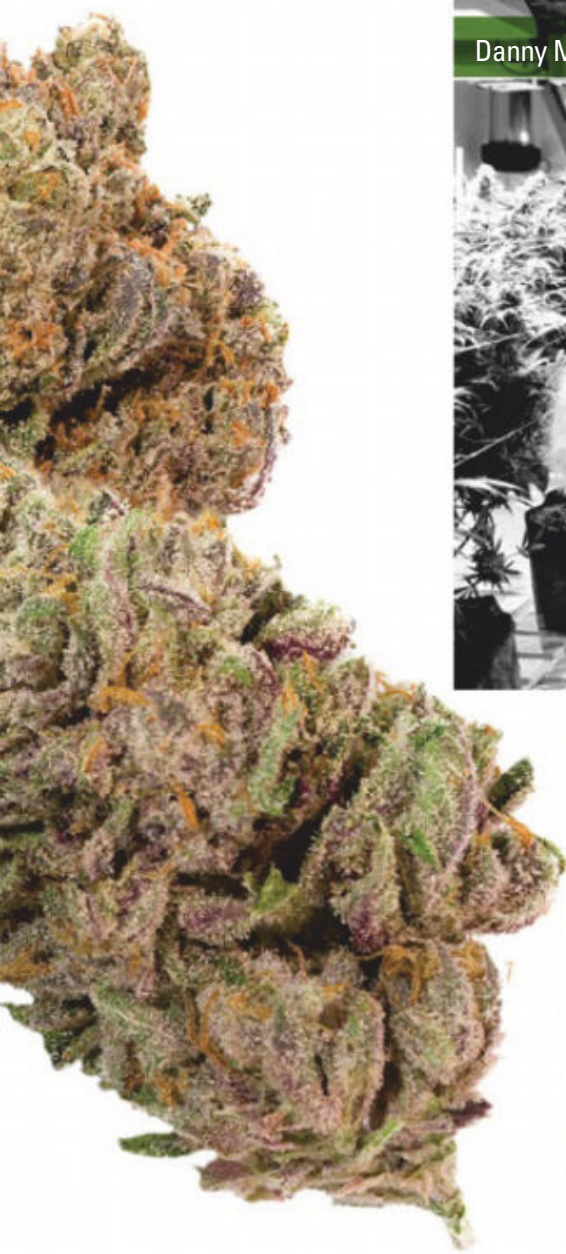
Crouching Tiger Hidden Alien

encourage people to find those folks and support them."

There are a few key components of a craft product. Typically, they are high quality, hand-picked, hand-trimmed, hand-cured, small batch, and organic. There's a connoisseur element to the finished product as well, with each plant being a truly exceptional representation of its cultivar.

Executive Director of the International Cannabis Farmers Association Kristin Nevedal explained it succinctly in an interview with *MJBiz Magazine*, "You have to represent the most sought-after expression of the strain."

Each element of the grow has to be carefully considered for sustainability and integrity. To use Nevedal's terminology, craft growers have a "seed-to-package mindfulness all the way through," which defines the quality of their product. Nutrients, for example, are one of the most essential elements for any grow. In the craft business, those inputs have to be thoughtfully sourced.



SoDoSoPa

Sustainable, Natural Nutrients

Murr-Sloat discussed some of the inputs AlpinStash uses for their crops: “The important thing is to start off with high-quality, sustainably and ethically-sourced ingredients. We use Nectar For the Gods; they’re a sustainably-sourced and naturally-focused nutrient company out of Eugene, Oregon.”

He explained, “They use cattle bones from organic farms or organic slaughterhouses for the bone meal. A lot of these nutrients are byproducts of waste from other industries that have been repurposed.” Repurposing waste from other industries is an exceptional way to reduce landfill fodder and these inputs have a less toxic impact on the Earth.

As Murr-Sloat shared, “Synthetic nutrients can be terrible for the environment. For example, phosphorus, which is one of the main nutrients used in flowering, is actually strip mined in Morocco under terrible conditions. It comes out of the ground radioactive so they ship it to the states and we scrub it of radioactivity, ship it

back, and then they package it and ship it back to the U.S. for distribution. Plus, it’s a finite resource. Synthetics can also go into the groundwater and really mess it up.” Those same nutrients, like phosphorus, can be naturally sourced from bone meal or aquaponic waste.

Small Batch Advantages

Craft growers also tend to operate in small batches. AlpinStash, for example, harvests in batches of eight to 16 plants. Small batches allow the grower to spend quality time with each plant. They can detect stress, pests, or disease much earlier in the growth cycle. Fewer plant deaths means less wasted water, nutrients, and resources.

Smaller grows are often able to use less electricity in their operations. Murr-Sloat shared, “We use 315-watt lights in these rooms so we have a much smaller electrical draw. A lot of people shoot for about a pound of yield per 1000 watts. We’re able to hit a pound per 315-watt light.” His grow keeps their CMH lights close to the plants, allowing more usable energy

to reach them. Spending so much time with each harvest, he can quickly tell if they’re receiving too much light or not enough and adjust accordingly.

Pruning and Trimming

The pruning process is usually performed by hand, giving the grower even more time to inspect their crops and ensure quality. At AlpinStash, each plant was hand pruned by the company’s staff of three people. Every stalk was accessible with excellent air flow, yet he doesn’t prune as much as some. He likes to leave plenty of large leaves for catching light. Even in this regard, Murr-Sloat shows a reverence for the plant in its natural state: “Our view is that these plants have evolved over billions of years to be how they are, so if we can help them optimize that’s what we like to do, as opposed to changing everything.”

During harvest, each batch is hand trimmed by experts who strive to preserve the integrity of the buds. This is a far cry from the industrial-grade machinery that mills most commercial



buds. Machine trimming, some growers argue, causes buds to lose flavor, potency, and trichomes.

A Well-crafted Cure

An often overlooked element of quality control occurs during the curing process. Many industrial operations cure their products in plastic bins or even neglect to cure at all, allowing their product to “cure” on store shelves. A poor cure can result in a harsh hit, less flavor, and a less enjoyable smoke. Murr-Sloat explains, “The difference between an expensive whiskey and a cheap whiskey is partially because one has been barrel aged for 10-12 years. It improves the flavor, it’s much smoother, and overall a more enjoyable experience. It’s the same with curing here.”

For AlpinStash, and many craft growers, it’s ideal to cure one’s harvest in glass for at least three to four weeks. “We take our time to cure. We cure it in glass and we’ll actually ship it to

the dispensary in the glass jars in which it was cured. That way we know we’ve done everything we can to give the end user the best experience they can have. That’s a point of pride,” notes Murr-Sloat.

Packaging and Distribution

All of this loving care has to make it to store shelves. Some retailers prefer not to carry connoisseur cannabis, fearing the price too high and the sales too slow. Murr-Sloat shared their initial struggles with finding quality retail partners and building brand recognition: “We do what we can with branding, but it really comes down to a store caring enough. Our price point is on the higher end so that scares a lot of people away, but we are small enough that we can just focus on the stores that do care about quality and truly want to have a connoisseur product and not just one that’s called that.”

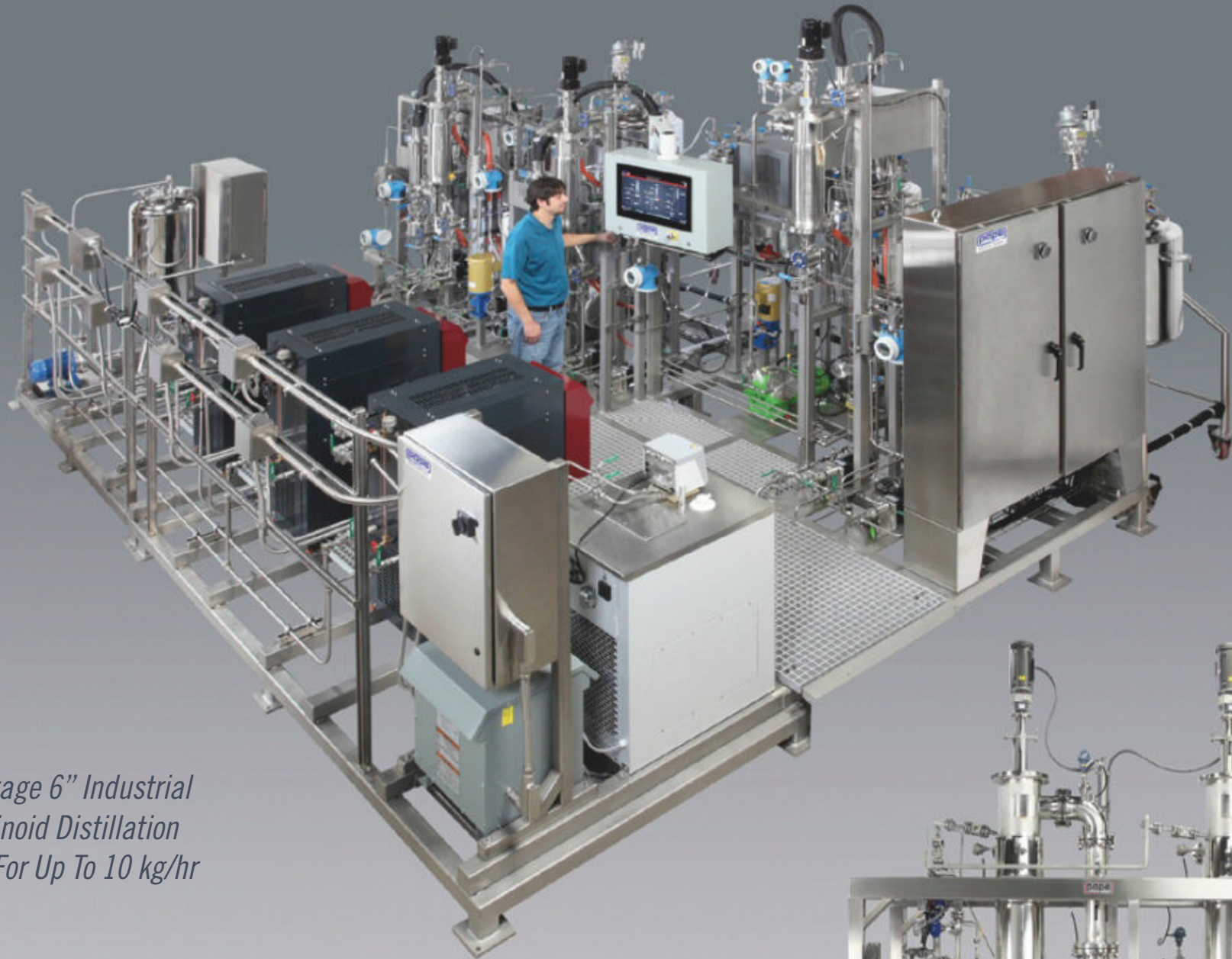
Even packaging plays an important part in craft cannabis. Many craft cultivators package

their products for retail in glass jars, preserving the shape, smell, and quality of their products. Glass jars are easily recyclable and don’t add to the growing piles of plastic waste accumulating from the cannabis industry.

What role does the average person play in making cannabis a sustainable industry? They make their values known with their dollars. When purchasing cannabis, consider who grew it, what went into it, how it was cured, how it was shipped, and how it’s packaged.

Beyond inputs and packaging, the craft movement is really about heart. The people who take the time to care for their plants this way do so because they’re passionate and they care about the future of cannabis. Perhaps Murr-Sloat says it best: “We put our hearts and souls into the products that we produce. We go the extra mile to give the end user the best experience they can have and that’s what makes this truly a craft product.” ♦

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One Plant for the Planet

Hemp entrepreneur Morris Beegle reveals how hemp could help solve the plastic problem.

By Patricia Miller

In the cannabis space, there are people who are passionate about the plant and there are people who came for the cash. When speaking with Morris Beegle, there is no doubt why he works with hemp; he believes it will save the world. And for my part, I hope he's right.

Beegle is the president and co-founder of the We Are For Better Alternatives (WAFBA) family of companies, which include an array of hemp-centric businesses and events. His NoCo Hemp Expo is among the largest hemp conferences in the world and is just one of the award-winning projects he spearheads each year. Whether he's creating hemp guitars and musical instruments, manufacturing commercial-grade hemp paper, or hosting his monthly podcast *Let's Talk Hemp*, Beegle is consistently on the front lines of the hemp movement.

In this exclusive interview, Beegle shares his anger about the state of the world and his passion about hemp's role in saving it.

Cannabis & Tech Today: Why are you so passionate about hemp?

Morris Beegle: I think hemp can have a significant impact on helping our planet and our species moving forward. We're in a very precarious time in human history. It seems that we're entering into another mass extinction. Look at human behavior over the last hundred years, since the Industrial Revolution. Look at how we're doing things, depleting the Earth's resources, burning up fossil fuels, how we grow our industrial crops, and our livestock, and the impact that's having on our water, and our oceans, and our atmosphere, and other species and ecosystems. How can we change course from this? Or can we even do it at this point?

But if we can, I think that the agriculture piece is where things have to change. And can hemp come in? Can we start looking at these different ways, organic and regenerative ways, to grow lots of hemp and other crops as well? Where it's



Morris Beegle plays a hemp guitar created by one of his many businesses, Silver Mountain Hemp. The pioneering company manufactures musical instruments, including guitars and speaker boxes, from all-natural hemp.

not conventional, it's not spraying stuff all over crops and the chemicals and fertilizers all run into the water. We have to change that. Hemp can potentially lead the way in the course of the next five, ten, twenty, or thirty years.

So that's why I'm into it, because I think it is a key component in helping people become aware of everything going on around us — with our environment and climate — and all these practices that still need to be contained in the coming decades. Otherwise, we're going to be f****ed.

So that's where I come from. And just as a general thing, I don't think anybody should be in jail who wants to use the cannabis plant. I think that's all bull****. It's been bull**** for 80 years, and if people want to use cannabis medicinally or recreationally, they should be able to, because it's a f****ing amazing plant. Nobody should be in jail for this plant. Period.

C&T Today: Aside from the many events



you've created, what facets of the hemp industry are you most excited about?

MB: Events are really just one part of what we do. We also have a hemp paper company that does marketing materials. We want to see hemp



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paper come back into the marketplace, be significant, and disrupt the wood pulp paper industry.

We would like to see that done, more so than chopping down trees and using that material to build the industry, which is harder on the Earth and more disruptive to ecosystems. We would also like to see hemp getting into the plastics market, the biofuels market, and the building materials market and start disrupting those.

C&T Today: What are some of the most impressive technologies you've seen applied to the hemp space?

MB: There are lots of people working on bioplastics and the composite side of the plant. There's a hemp wood company that just popped up in Kentucky that's doing flooring, counters, tiling, and cabinets. I'd love to see more of that in the marketplace.

There are some supercapacitor companies popping up that are doing R & D to utilize hemp fiber as a grafting replacement for nano carbon fiber sheets for supercapacitors. I'm excited to see that.

Then, on the plastic side of things, the composite side of things, we can start replacing bottles and packaging and various plastic-based products with some of these bio materials. We're heading in the right direction, where we can fully replace that stuff in 20-40 years. We have to get rid of the whole petroleum plastic side of



things and find materials that will biodegrade and be less impactful on our Earth.

I'm excited about people investing energy and bandwidth looking at how these technologies really will change our world. We're at the beginning. I'm excited about the fiber side and building materials and just trying to make a cleaner planet on the industrial side.

I think the food and nutritional side is complex, with our food system and agriculture, and just how big of a beast that side of it is, and the damage and devastation it's doing to our planet. It's mind boggling.

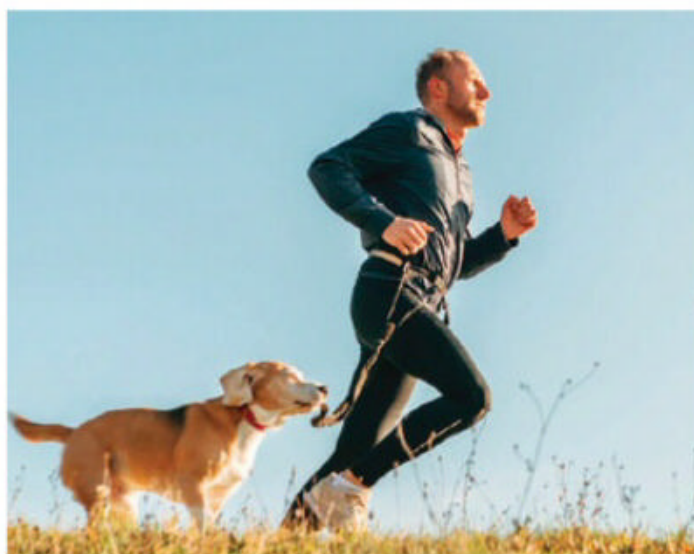
I hope we can make a change and that hemp is part of the platform that raises awareness. That's what I would really like to see. It can be that common denominator that brings people

together. We've got an Earth problem here and we need to look at how we can fix it.

C&T Today: Do you think eventually the cannabis industry will adopt more sustainable practices?

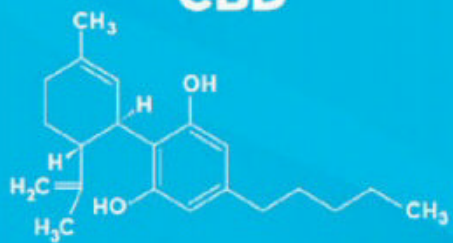
MB: I absolutely do. I think the vast majority of people in the cannabis space care about the planet. And they care about the plant, and they would prefer to have eco packaging solutions and less plastic. Unfortunately, we're just stuck in this world of plastic right now and it's not just the cannabis industry. This is all industries.

I think you'll see, with entrepreneurs who are tech savvy and really into technology, that there will be investment money and there will be solutions, we just have to implement them on a large scale that can really have an impact. ❖



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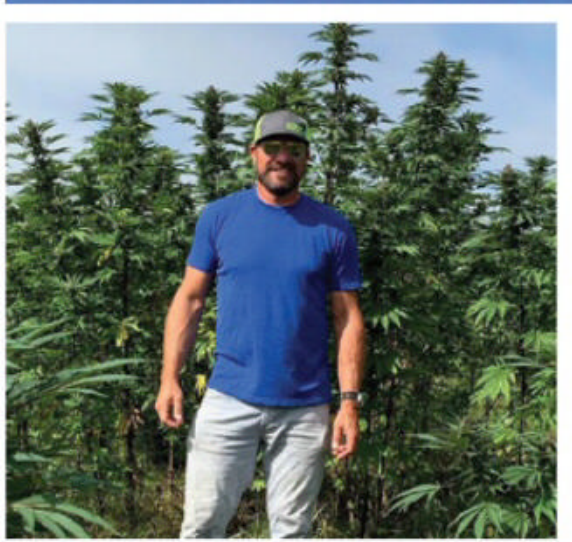
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Know Your Source

Why Hall of Fame Skier and President of Yudah CBD Chad Fleischer Champions Organic Growing

By Kevin Campbell



Chad Fleischer spent most of his life skiing, but now he spends most of his time producing the highest quality CBD products possible to help people's ailments.



As any athlete knows, years of competing beat up your body. But, few athletes may be as attuned to this idea as Hall of Famer Skier Chad Fleischer. Fleischer was victim to one of the most famous wipe outs in ski history in 1995, crashing at 97 miles per hour in Kitzbuehel. Many other crashes, and the wear and tear that comes with the life of an athlete, left Fleischer with pain in his back, hips, and knees at the end of his career.

He turned to painkillers, as many athletes in pain do, until one day he was introduced to CBD. Years later, Fleischer is now the President and Co-Founder of Yudah CBD, a vertically

integrated, organic, hemp-based CBD company. Speaking with Fleischer, his passion and fervor for hemp and CBD comes out naturally, as if he can't contain certain excitements and frustrations pertaining to his work.

What you may not expect, however, is that Fleischer's specialties lie in irrigation, soil preparation, and plot layouts, focusing specifically on bringing automation to the agricultural process.

Due to this, he is very engaged in the organic growing processes of his company, visiting the Wisconsin farms 10-14 days a month. And as

their operation expands, so too will the amount of time Fleischer spends at the farm. "The operations are huge," Fleischer explained. "We've got an extraction facility that will be producing 200 kilograms of winterized crude oil per day." If that doesn't sound like a lot, Fleischer assures it is: "I'm pretty sure that we'll be the largest hydrocarbon extraction facility in the world."

Fleischer's passion for organic growing is clear in the vertical integration of his company. "It's never out of our possession," he explained, "and we know exactly how it was grown, who grew it, how it was harvested, every single step of the



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chain.” If you know where your product comes from, you can avoid a lot of the “garbage,” as Fleischer describes it, that is currently in circulation. “It is truly a world-changing medicine and there are people making a lot of garbage. They’re buying garbage and they’re making garbage with garbage.” With so many CBD products in circulation, how does one differentiate from the garbage and the good stuff?

First off, Fleischer champions knowing your product came from a clean, organic source. “I truly believe our country needs to outlaw the importation of CBD from other countries,” Fleischer explained. “We’re at a point where [U.S. production] is sustainable. We need to support American farmers, but most importantly, China is growing hemp to purge their soil of contaminants, which are heavy metals, herbicides, and pesticides ... And they’re shipping all of that crap to the United States and they’re selling it to us because there are companies that are willing to buy that garbage ... And that’s very, very scary to me as an individual, and I think it’s a great concern for our country, because China is not taking the time to get rid of those particulates, and I don’t think anybody that’s importing it, buying it from China, is doing anything but putting it in the product lines.”

In this case, it makes sense why Fleischer would stay so involved in his production process, to intimately know his





Chad Fleischer (left) on his farm in Wisconsin.

product from seed to sale. “We grow organically; don’t use anything on our plants whatsoever. And the material is in our possession from the time we grow it in the field to when we harvest it, we dry it, we extract it. Then, in this case, with our company, we’re in the vertical chain, so we make the products, too.” It’s this process that allows Fleischer and Yudah to champion organic and sustainable growing practices.

In fact, Fleischer avoids using outside materials as much as he can. “For instance, our hydrocarbon extraction, we don’t take other people’s material and run it because we’re at max capacity as it is,” he explained. But, if they were to take outside material from somewhere else, “they’re going to be very heavily vetted and they’re going to sign some documents that are making damn sure that they know what they’re getting themselves into if their materials have any herbicides or pesticides and they told us they didn’t.”

When you know the source of your product, and you know that it was grown, processed, and produced with integrity, then you can rest assured that you are dealing with something of a higher quality. Fleischer concluded, “I just know that we know who our source is, and it’s us. I think that’s the number one point I would drive home.” ♦

For Chad Fleischer’s full interview with Cannabis & Tech Today, visit www.cannatechtoday.com/chad-fleischer

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YES WE CAN

Female founders discuss diversity, activism, and the challenges of the cannabusiness.

By Patricia Miller

Since the inception of *Cannabis & Tech Today*, we've spoken with industry-leading female entrepreneurs to discover their secrets for success. In this exclusive panel, they share their concerns, their advice, and their experiences as some of the first women to pioneer the space.

What's one of the biggest issues you would fix in the cannabis industry?



Shanel Lindsay

Founder and President of Ardent Cannabis Shanel Lindsay:

Recently, a big report came out showing that acetaminophen is the leading cause of one out of every three liver failures in the United States. When that came out I thought, "Wow, I'm glad I didn't take that route [for pain management]." When I think about that, when I think about how many women could be benefiting from cannabis for pain relief... Also, I'm a lawyer and in the law field, I saw a lot of women who use alcohol to relax. And a lot of women who use pills, like benzos, and I've seen it have a very negative impact on a lot of women's lives.

I look at the alternative, which would have been cannabis for them, and being able to use edibles or topicals or teas to get that same

relaxation and anxiety relief, and I think that's an area that isn't really being serviced in the industry right now.

Founder of Sensi Vapes Tara Jane Forrest:

I would say it would be to allow banking for cannabis companies. And the reason why isn't for existing businesses to have a way of collaborating and not feel the need to remain black market, but it's more for other individuals who want to join the community of cannabis companies who may not be able to self-fund. To have women, people of color, minorities joining



Tara Jane Forrest

the cannabis industry, funding needs to be made available, and the only way to do that is by first passing [the SAFE Banking Act] in Congress and changing the banking regulations.

What might the public not understand in terms of the current state of diversity within cannabis?

Founder and CEO of Minorities for Medical Marijuana Roz McCarthy: If you did a survey of board members for the top 25 cannabis companies globally to find a person of color, you may find five. You see very few people of color and women of color in executive decision-making, officer, or board positions.



Roz McCarthy

What I'm trying to bring to the table, not only for the public, but more importantly to our cannabis community and industry, is that we're no different than the Nikes, the Deltas, the Uniteds, the Coca-Colas, and their commitment to diversity and inclusion. And it should be even more so for cannabis, because this industry was built on the backs of black and brown people who have gone to jail. They were the pioneers. They were the ones that basically took the risk and said, "Hey, I want to try to feed my family." It was illegal, but that whole model of doing business is not far from what you see now in regard to business.

WOMEN(NABIS)!

Co-founder of Supernova Women

Nina Parks: In 2015, California started moving towards adult-use legalization. As we were reading the legislation, there were actually blocks: things that were making it so people who had former convictions weren't able to participate, which is crazy. How could you block people from selling weed for selling weed? It seemed really illogical to me. So, I began going to meetings in 2015 in Oakland because Oakland was the only local jurisdiction that was actually talking about transitioning to adult use.

There, I was able to link up with four other really amazing individuals to co-found an organization for women of color called "Supernova Women." We really established ourselves as a group that was trying to support language that was more equitable and also help educate people all over the



Nina Parks

country on what the potential opportunities were for women of color in the cannabis industry and how there was a need for more representation of women of color as well as people who had been formerly incarcerated to participate in the emerging cannabis economies that are coming up all around the state.

What advice would you offer female entrepreneurs entering the cannabis industry?

Co-founder and CEO of Peak Extracts

Katie Stem: You need female allies and you need friends and family to support you. This is a tough industry. There's a ton of hours that you have to put in. It's really stressful. It's really important to have male allies who are feminists themselves, who are willing to step in and advocate for you when you run into these kinds of problems.



Katie Stem

Cannabis is this weird convergence of many different male-dominated industries like business and chemistry, especially if you're doing extraction. So, it's important that we have support and people to call on when we need help.

Co-founder and CEO of MJ Freeway Jessica

Billingsley: Ask for help from other women and from anyone. I think women are often a bit more shy about asking for help, asking for that introduction. I think, in cannabis more than most other industries, there is really a culture and ideal that maybe starts in the "true believer" roots, around how can we build this industry a

bit differently and perhaps treat each other differently.

We launched a campaign called "The One Woman Challenge" focused on this idea. There's actually a lower percentage of women in tech today than 25 years ago, so we talk a lot about



Jessica Billingsley

getting women into STEM and STEM school and programs for girls in STEM. I think it's really important that people are focusing on that, but there is a second gate that people don't really talk about, which is the fact that 56 percent of women who do go into tech drop out in the first 10 years.

So, that's the other piece of the "One Woman Challenge." It really pertains to helping women and that doesn't only mean women helping other women, it could mean anyone helping women. And the idea is that it doesn't have to be some big giant commitment, just help in one small way. One introduction, one coffee, one mentoring session — all those little drops in the bucket can actually become a well of real change. ♦

For more insights from women in the industry, check out www.cannatechtoday.com/female-founders/.

Taking CBD Higher

The founders of TribeTokes discuss changing the CBD industry for the better.

By Anthony Elio



Stereotypes around cannabis are certainly nothing new. For many still, the stereotypical “stoner” archetype, complete with a tie dye shirt and room filled with Pink Floyd posters, remains a view of the common cannabis user. The founders of TribeTokes are looking to shatter that image. A luxury-focused brand that offers sleek vaporizers, high-end beauty products, and even metallic tattoos with cannabis imagery, the company looks to be more of a “lifestyle” brand, serving the intersection of professionals and cannabis

enthusiasts. In this exclusive interview, TribeTokes Co-Founders Degelis Tufts and Kym Byrnes discuss the origins of their company and what is holding the CBD industry back.

Cannabis & Tech Today: How did you two originally start TribeTokes?

Degelis Tufts: We started the company after the last presidential election actually, when we were really starting to see a big change with some of the bigger states legalizing, and you could just feel that tide coming, and this is

something that we felt really strongly about. But you have to wait until the trends are moving in the right direction.

We spent a bunch of time out in California when we were starting the brand, just to kind of see what trends were really accelerating there. We felt like vaping and concentrates were a cleaner way to consume; it’s more discreet. Even people who love flower are sometimes just looking for an option that isn’t smelly.

Kym Byrnes: Something more discreet. And sexier.



WRAZEL

The Business of Cannabis

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C&T Today: What are some of the current CBD trends that you two are interested in?

KB: We're seeing a lot of interest from the fitness community, because it's for pain management, inflammation; it's very good for post-workout recovery. We have a CBD eye cream, it's incredible and can help with puffiness around the eyes. And then for athletes we have a skin cream and tinctures in addition to topical for working out and training.

DT: It's the new duct tape or Windex. "Just put CBD on it." You know, it's true. My sister got stung by a jellyfish on vacation, she put our eye cream on it and the swelling went down. It was kind of one of those weird wonder drugs.

C&T Today: What do you think is going to need to happen so people don't see CBD as a fad?

DT: Well, you know whatever happens, it doesn't matter if people see it as a fad or not. Remember when people thought yoga was a fad? And here it is 30 years later and it's still going strong. There are just as many yoga and Pilates studios on the street as there are bodegas. So, it's just really, we love to make little pixie terms for s*** and say, "Oh it's a fad, oh it's this." But really, at the end of the day, science and facts are what's going to come into play. And I think that the fact is, people are sick of chemicals and Big Pharma and they're looking for a holistic way to live their life. And CBD, there are 99 problems and CBD solves 86 of them.

KB: Just to add on to that, I think the difference between when something is a fad or more of a secular change in behavior is if it's truly helping people. So, if people are finding real value out of it, they're not going to just stop buying it. I think things that are characterized as a fad are not really delivering true value, it's just more of a preference. But for CBD, it seems like it's actually helping people.

C&T Today: What do you think is holding back the CBD industry?

DT: The government. It's really disappointing. I mean, there's been really fantastic progress, but we just read a couple of days ago that Massachusetts is putting all these restrictions on CBD, despite the fact that adult use cannabis is legalized. There are issues, despite how far we've



come, with regulations, with payment processing. The list goes on, and of course all of the social justice and social equity that we're pumping into the system, it's still not enough to actually fight our legislators. We have to make a scene and really push for it, because when we don't, exactly what's happening in Massachusetts is going to happen everywhere.

C&T Today: How are you working to improve the industry?

DT: They say just be the change you want to see in the world, and I think one thing we do is we hire women in the community. There are a lot of men in suits entering the space, and I think we're trying to be an example for women entrepreneurs who are interested in entering. The other thing is transparency around what's in the products. We recently added QR codes to the back of our vape packaging that you can scan and it takes you right to the lab results, just making it really easy for people.

KB: I think, as a company, we are built by girls and we empower women in our community to do better and be better and get themselves involved in something that I think Des and I have found to be life-changing. So just leading by example and trying to support the growth in the industry. Again, quality products, fair service, best business practices. And of course, making sure that we have the products and the things that our customers want and deserve.

DT: Something that I want to do, we noticed that CBD is expensive and there are people who need it ... I think eventually starting a nonprofit, getting patients access to products. When I first started, I called my aunt, my cousin got sick and I said, "Hey, have you tried CBD? There's a lot of research coming out." And she was like, "I did read that, but I can't afford it." She didn't know at the time that I was going into this space. That's tough. At some point, I think, that would be interesting. ❖

Connecting the Cannabis Industry

How Wrazel is bringing the cannabis industry together

Brian Barbuto is an accomplished entrepreneur, founder, real estate developer, inventor, and investor and he's recently launched Wrazel. Wrazel connects everyone in the cannabis industry, bringing together buyers and sellers of cannabis-entitled buildings, land, businesses, and every cannabis product. Wrazel connects investors, lenders, and capital providers to the parties in need of funds. But more importantly than just connecting, Wrazel's technology driven platform is vertically integrated and provides the tools to vet, negotiate, and complete any cannabis business transaction.

Cannabis & Tech Today: What inspired you to help cannabis companies raise capital?

Brian Barbuto: While we live in an age where technology provides instant access and engagement for most industries, this is not true for the cannabis industry. Couple that problem with the potential to treat disease and illness with cannabinoids only found in cannabis and there couldn't be a better inspiration or reason to do what we do.

C&T Today: What are some of the challenges Wrazel has faced in its growth?

BB: Federal illegality is obviously not too big of a concern of those who've jumped all into the cannabis arena. But it's a bit of a hurdle for sophisticated investors who know far too little about the real lay of the cannabis landscape. This is the reason Wrazel launched its news vertical. Factual inspiration is powerful and why most of the investors we're speaking with are becoming more comfortable with cannabis-oriented investment opportunities.

C&T Today: How can investors access the Wrazel Marketplace?

BB: Wrazel.com. It's that easy, and it's free. We are open to both non-accredited and accredited



investors. Opportunities to non-accredited investors are limited to Reg A offerings, while accredited investors enjoy full access. Whether you actually attend or live stream into one of our "Live Pitch Nights," investors are required to complete an investor profile on Wrazel. These events are full of information you'd find difficult sourcing elsewhere and investors love them.

C&T Today: How do you see the industry evolving over the next several years?

BB: The bubble created by high-valued cannabis IPOs will pop. CBD products will get traction because they will prove to be effective. More states will continue to legalize cannabis, and eventually the Fed will too. Investors will jump into the market because the opportunities are just too good. Eventually big pharma and tobacco will begin to control the market. All of this translates to big



wins by today's smart startups with the financial capability to properly market their product or service while they dial in a successful and scalable business model before they IPO or exit through M&A. The time to jump into the world of cannabis is now. ❖

Outspoken

The former President of Mexico has become one of the world's most forthright cannabis supporters.

By Alex Moersen

There are few politicians, either current or former, who have taken strong stances in support of cannabis legalization. And no one in politics has been as outspoken as Former President of Mexico Vicente Fox. Following his presidency, Fox openly expressed his support for the legalization and regulation of not only cannabis, but all drugs.

As a former politician and businessman, Fox has brought his expertise to the cannabis industry by speaking at a variety of events across the world and joining the boards of Khiron and Helix TCS, two leading companies in the space. Working in the cannabis industry, he has championed ethics and collaboration above all else. In this exclusive interview, Fox discusses the future of cannabis in Latin America, why ethics are of the utmost importance, and what businesses need to know about the Mexican cannabis market.

Cannabis & Tech Today: What do you envision for the future of the cannabis market in Latin America?

Vicente Fox: With Khiron and Helix, we're working in all markets in Latin America. We're already working, in the case of Khiron, in markets like Peru, of course, Columbia, Chile, Uruguay, Brazil, Argentina. So Khiron is the leading company in Latin America as far as medical use is concerned. We do have operations and we have people and executives in all of these markets. They are building a new facility in Uruguay to provide the markets around, like Chile, like Uruguay, like Brazil, like Paraguay and others.

So Latin America is moving quite fast. I would



Photo: Gage Skidmore/wikimedia commons

say, with more solid ground than what is going in the United States now. So, this is what is happening in Latin America. Everything is optimistic.

C&T Today: What potential does a legal market of cannabis have to limit the illicit market that is largely run by the cartels?

VF: Well, I think there's a great potential because who wants to be in this war on drugs [where there are] killings that we hear about everyday? Especially like Mexico, among others.

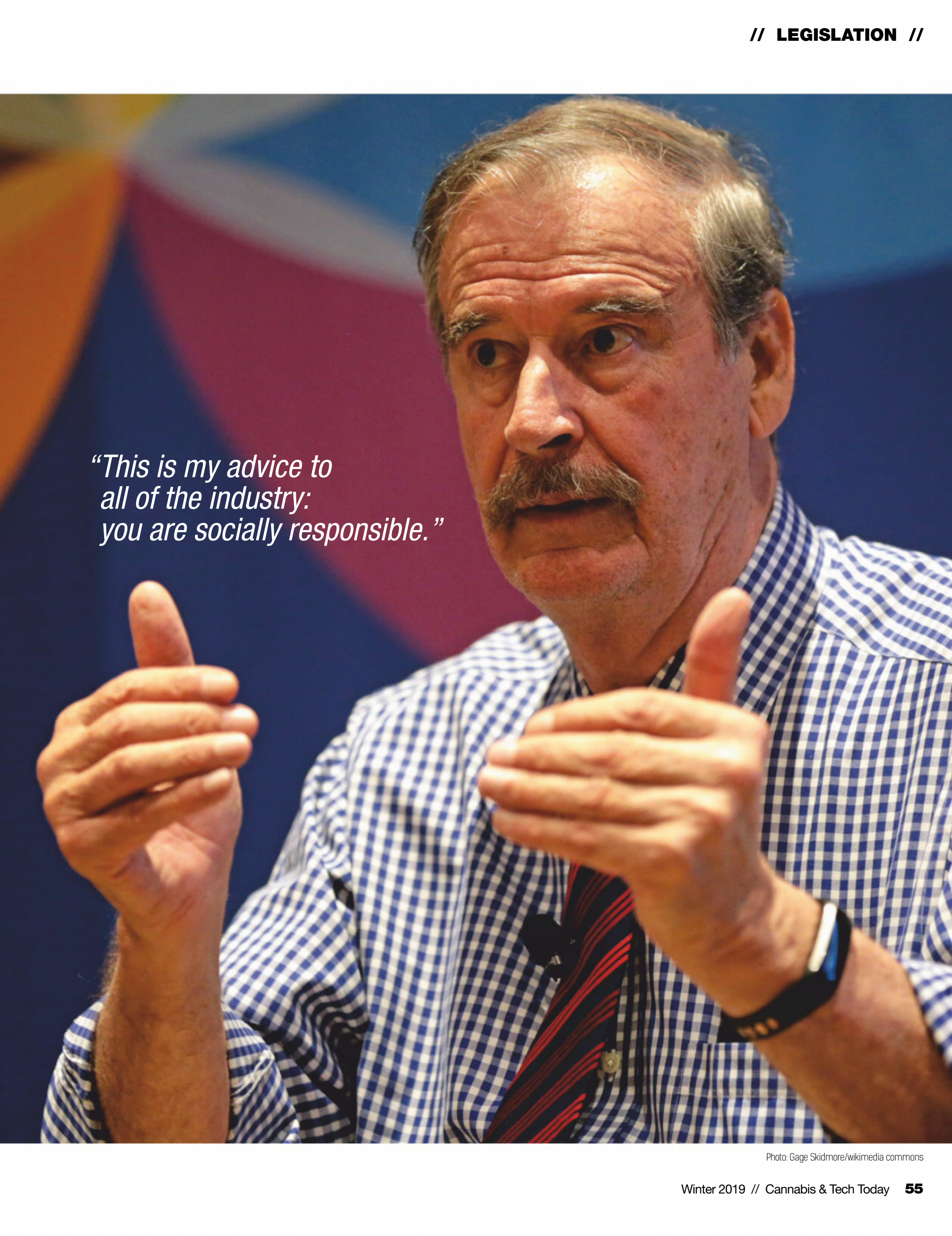
Instead of them being underground, it's legal. [They would] be able to become farmers, businessmen, a corporation that pays taxes that has all legal support.

I have witnessed this throughout different

markets in the United States, in the case of California, the case of Washington State, the case of Vancouver, Canada, and so on. Once the door is open, once it is legal, you see a transfer of talent, investment, and business that were on the criminal side into a legal, fruitful, and secure side.

So it's happening. I have friends that I met 10 years ago since I started becoming an activist. At that time, [they were] on the criminal side. Today, I find them on the legal business side. So it's fantastic, this transfer.

C&T Today: There are a lot of people eager to get involved in a potential legal cannabis market in Mexico, from investors to business leaders. What should they know before jumping into it?



*“This is my advice to
all of the industry:
you are socially responsible.”*

Photo: Gage Skidmore/wikimedia commons



Vicente Fox served as the 55th President of Mexico from 2000 to 2006. Prior to that, he was the CEO of Coca Cola Latin America. Photo: Gage Skidmore/wikimedia commons

VF: Well, first thing you need to know is that it's legal. It is supported in the Constitution and the laws of the country and this is already there. If you have been approved for medical use, it's legal now. We just need the regulation, so number one is that.

Number two is, have your company, have your product, have your prices, have your marketing ready, because it's going to be a big market. I'm sure Mexico will become, right after Canada, the second largest country – over 100 million people here – that through legalization opens great opportunities for investors, for entrepreneurs, for companies that are already in the marketplace.

So everyone's ready to go. We just have to wait for this final processing of the bill in Congress.

C&T Today: You once told *Business Insider*, "If we don't act with ethics, if we don't act with responsibility, we are going to become greedy and just look after the profits and money. It will not work. We will fail." In light of that, what do you foresee happening when major mainstream corporations enter the industry and how can the cannabis industry maintain a solid code of ethics as it continues to grow?

VF: Well that's my claim in every speech I do and every information or publication I make. We have to behave. We have to comply. We have to make sure that we're building an industry for the future. Those that are after making quick

money in this industry will not make it.

So here again, I am on the board of Helix, I am on the board of Khiron, because they do have that behavior. They are examples of ethics in compliance like no others, and now we're working to make sure that fake products, illegal products are eradicated from the marketplace and are substituted by the right products that comply with all these regulations of authorities, that comply with all regulations and demands from the health industry and the ministries of health in every nation. Otherwise, it will be a short term, terrific failure.

C&T Today: About a year ago, the Israeli Government passed a law to allow the export of cannabis. How do you envision the international cannabis market in the coming years as countries begin to collaborate with one another?

WF: The industry in the cannabis space is highly dependent on regulations and on the legal framework that each nation comes up with. That's why we have convoked the industry to form associations of producers, associations of products to source, associations of retailers of the industry, and

one general broad association to represent the industry to make sure that we all work together to get the right regulations, get the right approvals, so that we're going to have a healthy, solid market.

At the same time, we have to work on a PR program, on a lobbying program, to influence authorities and governments and [educate] authorities within governments on how to go about making this industry an industry that really brings benefits to the consumer.

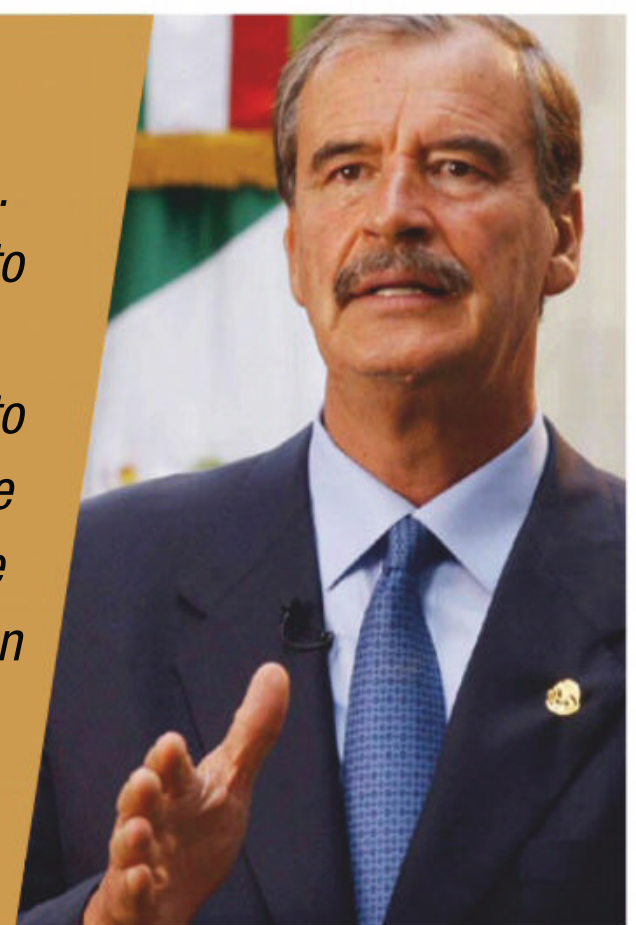
We work together, and this is where Helix and Khiron are real leaders because we are working to build up a market, to expand that market, and then pick our share of that market. [If] we start competing and attacking each other, we'll get nowhere. So this strategy is very sound and it's what we're doing.

C&T Today: Do you have an opinion on how the current U.S. Administration is handling cannabis legalization and what do you see in the future of U.S. cannabis?

VF: Well, the United States is not making the best of the opportunities that this industry represents, because it does not have federal approval, does not have federal legal framework, and you see countries like Canada, Israel all of a sudden becoming leaders in the world arena.

The United States has to think twice if you're going to keep this kind of solution that is not

"We have to behave. We have to comply. We have to make sure that we're building an industry for the future."





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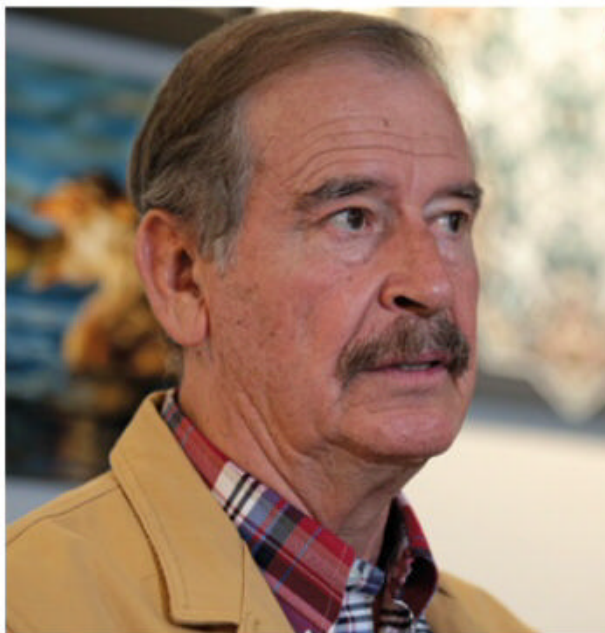
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“Once the door is open, once it is legal, you see a transfer of talent, investment, and business that were on the criminal side into a legal, fruitful, and secure side.”

Photo: Gage Skidmore/wikimedia commons

working fluently, having approvals at local and state levels and having provincials at a greater level. That’s reframing the industry from progress in the United States, and yet you see that progress in those states that have taken the step to legalize, to regulate, both medical and recreational use.

Federal authorities of the United States have to convince themselves that there’s a lot to lose for the U.S. economy and the jobs that that nation needs, and a lot to gain if they join in.

C&T Today: I understand you are also the former CEO of Coca-Cola Latin America. Are there any lessons you’ve learned from working in the food and beverage industry that you’ve been able to apply to the cannabis industry?

VF: Lesson one is that you have to first build a market. In the case of Coca-Cola, [it was the] soft drink market ... Throughout long, long decades, all soft drinks were looking for consumers and developing markets. Once you have that, then you compete. This is exactly one thing that we have to do or cannabis will fail.

Number two is that you have to put consumers as the very first priority, and, in this case, Khiron has this strategy of keeping patients as the number one priority. It’s about not how many kilos you sell or might well control. It’s how many patients you attend and how many patients you attend by bringing in good things to them. So they give them good products, high quality products, products that deliver the promises that they marketed with.

I think the experience of Coca-Cola is, in parts, exactly like this new industry. The big difference is that it took Coca-Cola to get to 200 markets about 80 to 100 years.

This cannabis product has taken five years [to be] in half of the cultures and economies of the world. Moving pretty fast.

So you have to be innovative. You have to be online to take positions every minute of the day, every day of the week, and every week of the year. It takes a moving, dynamic constructing of markets and strategies and product, so a lot of research is needed. A lot of investment in research. A lot of investment in innovation to develop new products like Khiron has. This greater product that is a great success in Columbia is a beauty/wellness product with a hint of cannabis.

You see products coming out for different uses. So innovation and creation is the name of the game in the cannabis space.

C&T Today: In what ways can businesses and governments better work together in order to advance the cannabis industry?

VF: It has to be 100 percent relationship. We both are going to be responsible in general to the consumer. There’s no way you can advance on an industry like this and not be in full contact with the government and the government to not be smart enough to be in full contact with the private sector. It’s the way businesses grow. It’s the way businesses prosper. So it’s a must that we work together.

C&T Today: Earlier this year, you joined the board of Helix TCS, as you mentioned. And there are many companies you could have partnered with but you chose Helix. What was it about them that initially attracted you?

VF: Well number one, the kind of product they have and they are the supplier of the main

industry of cannabis, bringing in security, bringing in traceability to the product. So far, a service that is most important to all those that get into the business. That’s why I joined in with them. Plus the fact that we share the idea of full compliance, full behavior, full ethics and moral attitude. We just found each other and we decided to go forth.

In the case of Khiron, they were generous enough to donate a very important amount of money for us to construct this therapy hospital place that we have in San Miguel de Allende for one of the foundations I run. We made a big foundation there and we are attending, right now, over 300 brain damaged persons. They’ve made the foundation not to sell the product. No, we didn’t have any tension there yet ... They did it because they’re generous, because they have to be in good shape with the community because they feel socially responsible. And this is my advice to all of the industry: you are socially responsible ...

C&T Today: In just a few weeks, MJBizCon will be coming to Las Vegas and I know you will be in attendance. You’ve spoken at and attended many events in North America. What value do you feel these cannabis events bring to the industry?

VF: All of us need to gather, to exchange, to learn, to share the knowledge that we have. For this industry that is new, that is beginning, it’s absolutely indispensable for any participant or any potential participant to attend these meetings to learn, to get to know how to network with the rest of the industry. It’s just fantastic to be there. I’ve been doing it for 10 years, doing conferences once and again for the industry and that’s why I’m known in the industry, that’s why I know how the industry is working because it’s so attached in my mind.

This is an industry in the future. This is a great solution for violence in Mexico and for taking away money from the cartels by legalizing drugs. And by the way, I’m absolutely in a position of, I think all drugs – each and every one of them – should be legalized. We should leave the responsibility to the consumer, to the human being, what he wants to do with his body, with his health. Let him take the decision. Give him enough information so that he can decide whether to go forward or not. So that’s why I’m so passionate about this and I will keep on doing it for a long, long time. ❖



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Clearing the Vapor

Is the panic around vaping valid or over-dramaticized? We dive into this issue to find out the real dangers of vaping, how this could affect the cannabis industry, and how consumers can stay healthy.

By Alex Moersen

In early September 2019, President Trump expressed an urgency to ban vaping products. In the wake of this announcement, the Center for Drug Control (CDC) reported that 1,299 confirmed and probable lung injury cases were associated with e-cigarette or vaping products. In addition, the CDC confirmed 26 deaths related to vaping products. However, this wasn't the first instance of bad press for vaping.



A History of the Vaping Crisis

Like many of today's technologies, vaping and e-cigarettes seemed to skyrocket in popularity overnight. The credit is largely due to Juul. Founded in 2015, the company set out to develop a cigarette alternative for those trying to wean themselves off of smoking. Since then, the company has become a verb, and in 2017 claimed over a third of the e-cigarette market, generating \$224 million in revenue. But, just as

the company was skyrocketing, it began to receive scrutiny for how many minors were using their products, prompting a full investigation from the FDA and a crackdown on those selling Juuls to minors. Despite the negative press, sales continued to soar.

Then, in April 2019, Democrats in the U.S. Senate launched an investigation into Juul's social media and advertising practices (the majority of their Twitter followers are minors), along with its billion-dollar deal with tobacco giant Altria. Two months later, the U.S. House of Representatives announced its own investigation into Juul.



Vaping, since its inception, has largely been marketed as a healthy alternative to smoking. When it comes to cannabis, it also claimed to allow for more precise dosing. However, the

problem with the rapid rollout of modern technology is that it often takes a few years for proper research to be conducted, often long after the product has been popularized. "The shift to 'panic' consists of two parts," explains Oleg Maryasis, founder of Lock & Key, a hemp and CBD oil company. "First, there was a complete lack of consumer education before the panic, resulting in consumers being completely naive regarding the contents of the products they were inhaling. Once people began getting sick and dying, the panic began due to the lack of understanding of the causes."

This is what made it so jarring when the CDC announced on October 10, 2019, that 1,299 people had suffered lung injury due to vaping, and 29 deaths had been vaping-related. By October 22, that death count reached 34.



What is the Cause?

The issue in question has expanded far beyond Juul, with government officials looking at all vaping technology. Even worse for the cannabis industry, a September 2019 report from the CDC suggested that THC specifically may have a role in this outbreak of lung injury. “The latest findings from the investigation into lung injuries associated with e-cigarette use, or vaping, suggest THC products play a role in the outbreak. Most of the people (77%) in this outbreak reported using THC-containing products, or both THC-containing products and nicotine-containing products.” While nothing is proven yet and the investigation is still ongoing, this is not a great start for the cannabis industry, with which vaping is closely associated.

However, the focus as of late hasn’t necessarily been on THC or nicotine, but rather the other materials in these products; things like Vitamin E acetate, heavy metals, etc. “The investigations are revealing the cause of these horrific cases are for a number of reasons, all of which have to do with the integrity of the concentrate being ingested and the quality of the technology being used to ingest it,” explained Peter Calfee, CEO of Gofire, a leading company in vaping technology.

In mid-October 2019, Gofire released a statement calling for companies to cease using additives in their products. “In our statement, we wanted to call out some specific additives like Vitamin E Acetate and Propylene Glycol because they are among the most commonly used in the industry. Traditionally, Vitamin E Acetate is used in dermatology in various skin creams and other products. Propylene Glycol is used in the production of certain polymers and is also used in some oral, topical, and intravenous pharmaceuticals. Both substances are approved for those stated uses in the United States. However, when you heat these chemical compounds they can become very dangerous and they were never intended to be used for inhalation.” (See story on page 64).

Legislative Action

What will a crackdown on vaping products look like for the cannabis industry? Already, we’re seeing a handful of states, including Colorado, raise their minimum e-cigarette purchase age to 21, and a bill introduced in April 2019, if passed, would raise the national minimum age to 21. Luckily, discussions have moved away from a full-on vaping ban. Following up his call to ban all vaping products, Trump turned to Twitter: “While I like the Vaping alternative to Cigarettes, we need to make sure this



Photo iStockphoto.com/Pascal Kiszon

alternative is SAFE for ALL! Let's get counterfeits off the market, and keep young children from Vaping!"

While an all-out ban on vaping products may be an extreme response, most people should agree that some sort of regulation over vaping is in order. As Maryasis expresses, "Without logical regulations, the burden is the consumer's to do their due diligence and be cautious with what they consume." And while consumers should be knowledgeable of what they're consuming, it is also on the part of businesses and the government to make sure the consumer is protected. In our interview with him, Former President of Mexico Vicente Fox expressed the importance of protecting the consumer: "Government presence, government regulations, and especially health authorities have generally been taking care of the consumer, because, on the one side, you have many fake products that have to be abolished from the marketplace."

Since it is a separate entity, federal regulations for vaping can be implemented before federal cannabis regulations come along. "Although

vaping would be the overlapping middle in a Venn diagram between cannabis and nicotine, safe vaping regulations/protocols can definitely be set up before federal legalization of cannabis," Maryasis explains. "With that said, such regulations would be followed only by legal businesses, whereas the underground-market would remain lawless until legalization comes about. Unfortunately, most of the illnesses and deaths have been from products made and sold by the underground market."

The Solution

The solution is two-fold: regulation and education. The government needs to step in and regulate what companies can and can't put in their products. Luckily, this step is already beginning. However, it may be difficult for federal regulation to reach the illicit market, at least in the case of cannabis vapes, until the substance is legal on the federal level.

In the meantime, those legal companies who do care about their customers also need to police themselves and others in the industry. When Gofire was readying to release their statement on vaping additives, they were

hesitant at first, not wanting to create more alarm around the subject. "But, we ultimately felt it was – and is – the right thing to do, to hold ourselves and the industry accountable," Calfee said. "It was really disturbing when we began to see the reports of illness and deaths. We felt a moral obligation to lead."

Finally, it is important that consumers educate themselves on the potential dangers of vaping and know the products that they are using. Calfee offers a few tips for consumers: "Once you've found a product you want to use, be sure to review its ingredients and make sure it doesn't contain anything you don't want. Pay attention to the product brands you're using and make sure they are reputable and concerned with safety. Ask questions when you're at a retailer. Check out the websites of the brands you purchase. The brands on Gofire's platform all provide verified third-party lab results available to view in the Gofire app ... Finally, never use black market products, plain and simple, and never use products when you can't identify exactly what you're putting in your body." ♦

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Vaping's Haze

Will identifying the culprit of 'vaping illness' make it safer?

By Zoe Evans-Agnew & Josh Kaplan



Chance Ammirata took to Twitter after his lung collapsed from what his doctors called a 'vaping-related illness.' Below a graphic photo of his lungs covered in black dots, he wrote in all caps, "PLEASE RETREWEET[,] THIS IS EFFECTING THE WORLD AND WE ARE THE ONES WHO CAN EFFECT [SIC] CHANGE. DO NOT STOP SHARING[,] SAVE LIVES..." Other teens across the country have been following Ammirata's example and posting on social media about the respiratory problems they have encountered because of vaping. With over a quarter of high school students reporting using battery-powered vaping devices, alarms are ringing. But is vaping in general the cause of these respiratory emergencies, or is it a unique blend of chemical additives found in a handful of vape products to blame?

In the summer of 2019, reports began to circulate about unknown illnesses related to vaping. Many were similar to Ammirata's, others also involved severe gastrointestinal symptoms. The first cases were identified in Illinois and Wisconsin, but the epidemic quickly spread to almost all 50 states. Over two thousand have been hospitalized, many requiring mechanical ventilation, and nearly 40 have died. Speculation over their etiology quickly spread. 84-percent of these patients reported THC in their vapor products, causing many to blame THC or the chemicals used to dilute THC. As the popularity of vaping cannabis increases for both recreational and medicinal use, it's critical to know if THC is the culprit and if vaping cannabis can be a "safe" alternative to combusting flower.

On November 8th, Dr. Anne Schuchat, the deputy director of the Center for Disease Control held a press briefing to reveal the suspected culprit at the center of the reported illnesses: Vitamin E acetate. Vitamin E is used as an additive in many vaping products and was a common factor in the reported hospitalizations. Some E-cigarettes and battery-powered delivery devices use chemicals like vitamin E acetate as a thickening agent and dilutant for the active ingredients like nicotine or THC. Vitamin E is a cheap additive that's often used in low-quality products and those found in illicit markets. Manufacturers like the appeal of vitamin E because it allows them to cut down on the amount of pure THC in the product while maintaining the strong viscous quality important for measuring high THC concentrations that appeal to recreational users. While vitamin E products have long been used in topical treatments such as hand creams, there is little research on the effects of heating and inhaling them.

Vitamin E acetate resembles an oil, which when heated, can stick to the side of the lungs and interfere with their function. Vitamin E's

long carbon chain is highly lipophobic and binds to the lung's liner fluid and disrupts the membrane's ability to take in oxygen and expel carbon dioxide. The liner fluid of the lungs is highly sensitive to this destabilization and many of the lung cells that can no longer function properly eventually die. And cell death isn't the end. Vitamin E also compromises the lung's ability to fight off infection by directly interfering with immune cells, thereby increasing the risk for other respiratory problems.

Market forces will likely heed the CDC's warning about Vitamin E and phase out the additive even if regulations aren't directly established. Yet, users aren't necessarily in the clear. Other additives used over the years, like propylene glycol, can irritate the lungs and eyes. While early studies did not directly link PG to pulmonary illnesses, a lack of studies doesn't imply safety. Vaping has only recently exploded in popularity, with general use increasing eight-fold in the United States over the last 10 years, so it has only recently entered the toxicologist's radar. To date, few studies have investigated the effect of consuming these vaping additives, and even fewer have studied their effects after being heated. That's an important distinction. When solvents are heated, they often change their chemical properties, highlighting the importance of actually studying their effects after heating. Furthermore, the heating coils in vape devices remain a potential culprit. One study out of Johns Hopkins linked the presence of toxic metals, such as lead, nickel, and manganese to the heating coils of some e-cigarettes. Therefore, all elements of the vaping process, from liquid to device, need to be considered when seeking a safe product.

Despite these concerns, this doom-and-gloom portrait may be unfair. With the booming legal recreational and medicinal markets, many companies are designing products with the consumer's health in mind. As a result, they have

taken strides to limit risk by delivering distilled cannabis oil without harmful additives or contaminants. Some have even developed vaping devices that aerosolize cannabinoids and terpenes at their optimal vaporization temperatures so as to not overheat, denature, or produce harmful byproducts. They may be more expensive, but in the long run, one's health is worth it. Users can protect themselves by confirming with the manufacturer that their product is solely comprised of cannabis distillate and is free of additives. Further, potential users should avoid products that have been modified post-production by the retailer or in illicit markets.

These important health considerations may not be feasible for all vape users because of a limited legal marketplace for purchasing safe products under 21. Even for those who are of legal purchasing age, the mismatch between rising rates of vaping with prohibitive cost and access limitations to safer products highlights the need for increased regulation over battery-powered vape devices and their contents. While additives like vitamin E acetate should be banned, broadly restricting access to vape products may not be the solution. In an industry that has already observed that restricting access to cannabis often leads to use of more dangerous synthetic cannabimimetics (e.g., Spice, K2), restricting access to vape products may force people towards the more dangerous products sold in the illicit marketplace. Instead, regulation should center around enabling increased access to empirically-determined, safer products and providing meaningful information about the risk of consuming specific additives as opposed to broad warnings that don't apply to all products. The vaping illness epidemic has sent shockwaves across the country, but in response, while some reaction is necessary, we must caution overreaction and not exacerbate the problem. ♦

Turning Research Into Revenue

By Emily Vey

Sowing the Seeds

Ian Pedersen, medical hemp researcher and founder of Source CBD, has been into cannabis for a long time to say the least. More than half his life has been dedicated to this sacred plant. After first being introduced to it by his brother back in his early teens, by the time he was 19 in the late 90s he started experimenting with early cultivating techniques. After more than 20 years, he now runs one of the top CBD companies in the industry with over 10 million in retail sales from products he specifically developed. For this and many other reasons he is a well-known consultant and genuine early pioneer within the cannabis industry.

“I grew up in northern Arizona, which sat at the heart of the southwest cannabis craze. I started studying cultivation in the late 90s. I enjoyed the beauty of growing and nurturing something from start to finish,” Pedersen notes. During those many years, “I also worked as a chef as my day job and despite cannabis being highly illegal in Arizona at the time, clandestinely I still had that drive to know more about the plant and my passion ultimately stayed strong through the years even with the adversity I was about to encounter based on my love for this plant.”

How I Got Over

In January of 2010, medical cannabis in Arizona had been voted into legislation and the state was two months away from issuing actual patient cards. “I had been distributing medical grade cannabis leading up to this and one thing led to another which ended up with the local Narcotics Taskforce known as P.A.N.T. raiding my house looking for large quantities of cannabis and hash,” Pedersen recalls. “At this

time, I would have gotten 10-20 years in prison if they had caught me with what they had hoped to. Fortunately, I wasn’t the type of guy to keep anything that incriminating around, so when they showed up they found nothing more than what would amount to personal use and ultimately could cost me probation at the worst.

The officers pushed me to reveal my sources, however, having little proof on hand that I was the kingpin they were looking for, I was able to keep my honor and walked cleanly, retaining a lawyer after little evidence was provided by the state. This was my clear exit from distributing cannabis into the not yet legal market and my first step towards later working with the very same officials and even police departments who would have previously condemned me for who I was. I often think of the many people that have paid a huge price for cannabis under the hypocrisy of prohibition, I was fortunate to transition out unscathed.”

A Cannabis Business Model

When Arizona made finally cannabis legal in 2010, Pedersen decided it was time to get down to business. He remembers, “It was an amazing time of growth in the cannabis industry, and I was pumped to be right in the thick of things, with all the experience I had amassed, and take part in a new industry and contribute to its growth, working to forward the industry with some of the greatest, most innovative minds of our generation. I dove right in.”

He began with the first compassionate caregiver organization in Arizona, AZ Medical Marijuana Caregivers, which secured the maximum capability of patients the first month. He then had the opportunity to launch the

largest state-licensed industrial cultivation center of that time in Arizona in 2012. From there, he consulted in the launch of one of the first state-licensed dispensaries in his hometown area of Cottonwood. He then began working alongside regulators and health department officials to come to the best consensus for moving forward with applying policies controls and standards to support the needs of medical marijuana patients in Arizona. Together, they researched and developed optimal dosing protocols, standardizing them across the board.

At this same time, the idea for Source CBD was born. With all the knowledge they had about this miraculous source of natural medicine, they couldn’t sit idly by. It was time to help spread the word about CBD and create and bring a quality product to market.

Finding a Source

As a chef of many years, Pedersen recognized that having the best ingredients was critical for any recipe. That influenced his approach to CBD: “The problem for us as consumers is that it’s hard to know the source of anything we get. We didn’t want it to be hard with CBD.” So, Source CBD began looking for the highest quality ingredients possible to create their own hemp-derived CBD tincture. They travelled the world, visiting farm after farm, talking to cultivators, reviewing harvesting practices, and taking copious notes. Then they brought those notes home. They wanted only the best ingredients, from sources they could trust, and a manufacturing process they could oversee from beginning to end.

Perhaps their biggest push, though, came after Pedersen’s wife, Chance, was hired for a photoshoot back in 2013. There, she met

Breanna and her newborn daughter Kyrsten, who, due to complications after her birth, was not expected to survive very long. Heartbroken, Chance kept in touch with Breanna and Kyrsten, who thankfully pulled through, but began having seizures. By three, Kyrsten was having as many as 12 seizures a day, so the Source team got to work.

The team headed to the lab and developed a proprietary combination of the highest quality, legal CBD available. They made sure it was 100-percent organic. And they made it more bioavailable by using coconut oil as a carrier. They didn't add any flavors (and still don't) to keep it as natural as possible, and so no preservatives are needed. They worked and reworked it until it was perfect.

After much encouragement, Breanna began using CBD with Kyrsten, who went from as many as 12 seizures a day to virtually none. And the foundation of the Source CBD formula has stayed the same ever since.

From there, Source CBD moved into the animal wellness sphere. Pedersen began working with Out of Africa, a wildlife park and sanctuary in Arizona. There, his scientific research with rare and exotic animals (including a tiger, a lion, and a python) has led to some incredible discoveries in treating ailments such as cancer, seizures, and anxiety. Pedersen is a regular fixture at the Wheel Barrel Ranch in Camp Verde, where for years he has been working with trainers and horse owners to ease their animals' arthritis and resulting symptoms.

Because of this work, Pedersen has become an accredited lecturer with the International Academy of Compounding Pharmacists, leading to research alongside world-renowned pharmacists like Dr. Jennifer Burch in furthering the existing body of knowledge on the benefits of CBD. He's been brought in to consult on numerous cannabis projects across North America and is honored to have been able to use this knowledge and experience to help other budding "canna-preneurs" who are just starting out.

Moving Forward

For Source, research and development is critical. For any company to grow, there has to



Source CBD Founder
Ian Pedersen

be a constant, steady flow of innovation. In the cannabis industry, it's even more important. Innovation can't happen without looking at the newest research into CBD, of which, thankfully, there is a great deal. It also means the continual testing of every batch that leaves the Source production facility to ensure quality and purity. And when it's time to make a change, they make it. Even if something's not broken, that doesn't mean you can't make it better.

Innovation, for them, also means staying up to date with the newest technology in regard to everything from new and exciting uses of

cannabinoids, terpenes, and phyla rich plant compounds to growing to extraction to sustainable processing and packaging.

After generating millions in revenue, they're in over 300 locations across the United States and growing rapidly. The future looks grand for those in the CBD industry and for those who are truly dedicated to helping others, and it will be exciting to see what's in store, both for Source, and for the industry as a whole. ❖

For more info on Ian Pedersen and Source CBD, please visit them online at www.sourcecbd hemp.com.

Tackling Opioid Addiction

Retired NFL player Eugene Monroe's mission to change how the NFL views cannabis and opiates

By Anthony Elio

On September 13, 2015, Eugene Monroe suited up for the NFL season opener as he and the Baltimore Ravens squared off against the Denver Broncos. The game would set the stage for a competitive NFL season and, in what may have been a surprise to many, would be Monroe's final season opener. After sustaining a concussion in the close matchup, Monroe, an offensive tackle, would miss the next week's game. It was this injury that helped fuel Monroe's decision to retire from the league after only seven years. Monroe showed prowess blocking for quarterbacks, but he would do his greatest work after hanging up his cleats.

Ever since he made the decision, Monroe has openly advocated for the NFL to change their policies on marijuana and remove it from their list of banned substances, as well as to cease their overprescription of opioids for athletes. The retired lineman has also officially entered the cannabusiness as a partner for Green Thumb Industries, a medical cannabis provider with a focus on high-quality retail spaces and cultivation facilities. We discussed the commonplace usage of opioids in pro sports and the possible path for cannabis acceptance in the NFL in this exclusive interview.

Cannabis & Tech Today: With all your time in NFL locker rooms, did you see how common opioid usage had become?

Eugene Monroe: Yeah. It was common as soon as I entered the league. We were given opioids before every game, just even preventatively, I guess. They hand every player a bag of pills. Every player that was active for the game, knowing that there's going to be some pain. I don't believe that practice is in existence anymore. They didn't do it in Baltimore.

But that created sort of an underground drug



trade within the locker room, right? You had guys that were getting pills from the team and not everybody took them. So there were also people in the locker room that wanted more than the two or however many were in the bag that they were given, so they were bartering for them.

Now you've got this shadow illegal drug trade going on with players abusing opioids that were given out by the team. The NFL certainly tried to tighten down those practices, but the access to opioids is still there whenever you need it.

C&T Today: I've spoken to players before that would utilize cannabis on the day of a matchup. Did you ever find yourself partaking on game day?

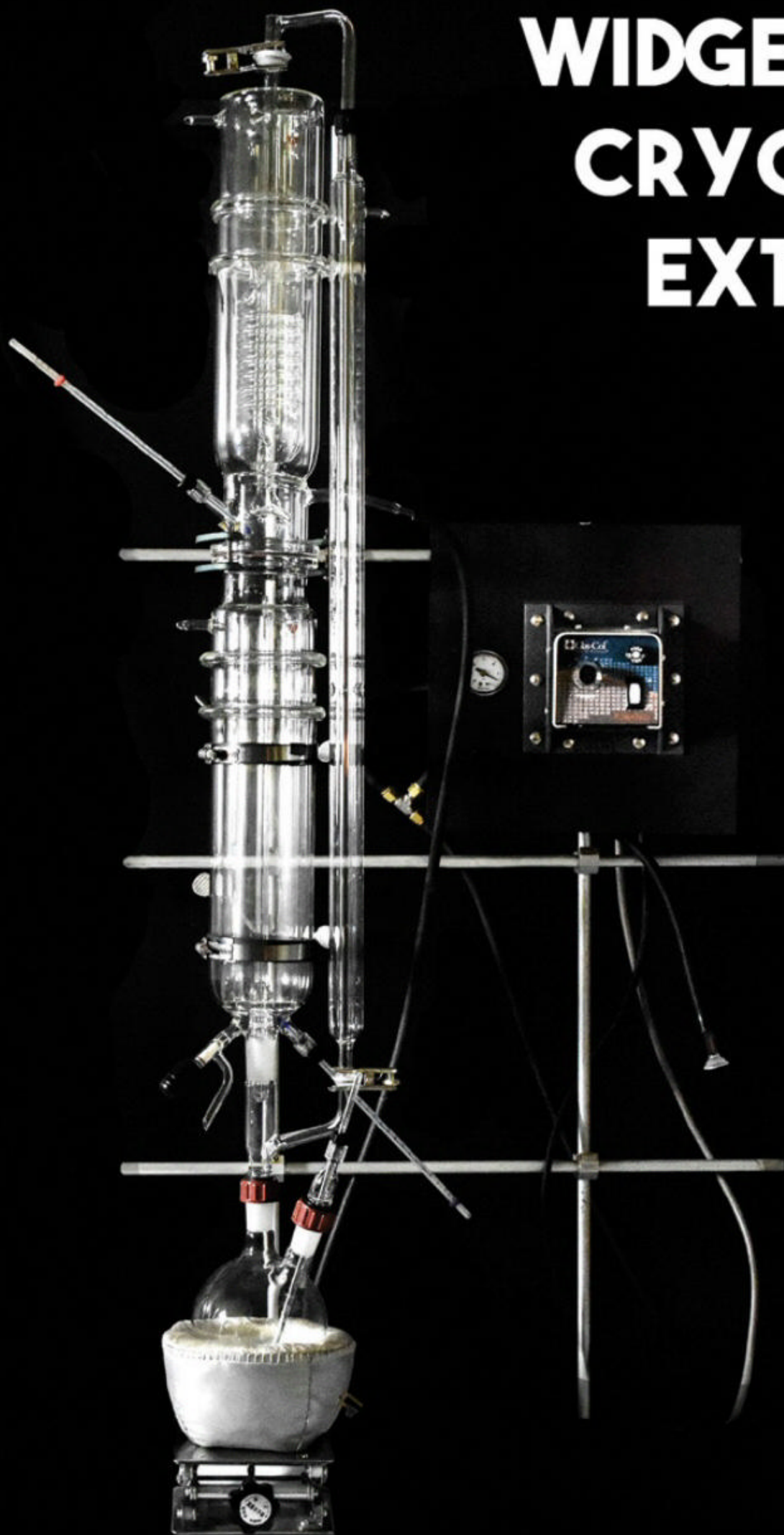
EM: No. I kind of wish, knowing what I know now, that I'd used cannabis more frequently.

Especially with this specific purpose of dealing with pain and the anxiety and stress. But you know, I was taking the pills that the team doc gave me. I would always get a prescription for pain meds and also anti-inflammatories, to deal with acute injuries and swelling, and some chronic stuff too.

I was taking anti-inflammatories every single day. While they're not opioids, reducing that inflammation reduces pain too, so I really did that from college on. I hurt my knee for the first time my first year at UVA. And I really needed to manage the inflammation in that knee for the rest of my playing career. Now that I don't play, I've noticed that I'm able to manage that inflammation just using cannabis.

It's just baffling that it's not available for even that use. And when I noticed that cannabis was good for inflammation, I was using CBD

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“All of the players are curious, even if they don't consume cannabis, because no one wants to be in pain.”

formulations. At that point, I was just experimenting with CBD and finding that while it wasn't necessarily making a huge impact on my pain per se, I was feeling better.

C&T Today: With so many voices and results such as yours, you'd think the NFL would embrace cannabis.

EM: I don't think the NFL needs to embrace cannabis. I think that's the wrong way to approach it. The NFL doesn't necessarily embrace Percocet. We're just saying remove [cannabis] from the banned substance list.

Like, why are you still punishing guys for something that's becoming legal? If a player from Baltimore's roster would've tested over the limit for cannabinoids leading into this season, he would've been punished for it. But in the state of Maryland, he can go to any physician that's registered to recommend it and go through the process to get his legal medical marijuana card here in the state.

And furthermore, there are players that live in places where it's fully legal and they can go and purchase their pain medicine just like they could go to CVS. But if they do so, they're punished. It's crazy. And we're really beyond the point, I think, of talking about whether or not it's

effective. We all know it's effective. We need to talk about the policy and making changes and providing education.

C&T Today: The next few years are going to be really interesting to see.

EM: You know, I always say that it's been great having ex-players speak about their usage. I think what we saw is that the biggest impact and movement in conversation is really born when a player is still playing and does this.

So I just hope that there's someone that's playing now that has made that decision and is willing to step up and really fight for themselves and the rest of the league on this issue. It's been a lot of black guys doing this and the cannabis policy has overwhelmingly affected black players.

And when you look at all of the sports, the sports with the highest level of minorities have the most strict policies against consuming cannabis. I wonder what this looks like when the star white quarterback is fighting for the use of cannabis. For example, if Tom Brady is saying, “Okay, I consume cannabis for my pain, I do this after a game, it helps me, I feel good.” Who's going to argue the face of the NFL saying he uses cannabis?

C&T Today: I've spoken with Ricky

Williams, Eben Britton, and Shaun Smith, all former players that advocate for cannabis. Are you in contact with many former players that are now advocates as well?

EM: Yeah. Many of us were friends before and now we've got even more reason, more things in common. And I think it's been cool to see everyone's story and how they're really all similar. You see players that are hurting and want a healthier solution. It's simple.

It's very telling when you have the NFL on the other side touting all of these falsehoods about this. I remember Roger Goodell talking about smoking cannabis and I believe that day I had a CBD tincture and I was like, “Man, are they really that outdated?”

Like, who are they getting their information from? Why are they pedaling misinformation to players knowing that it's as easy as a Google search now to see that things are different? Let's be open and talk about this like we would anything else.

The taboo is still there, but it's dissipating. All of the players are curious, even if they don't consume cannabis, because no one wants to be in pain. They also don't want to be addicted to opiates. ❖

INSIDE STAR MANUFACTURING'S

CBD FACILITY

CBD is one of the most challenging areas for product manufacturers today. We visited Star Manufacturing to learn how they are combining state-of-the-art technology with industry-leading best practices to produce safe, compliant products that exceed the expectations of their brand partners.

When you enter Star's facility, you immediately notice that it feels more like a pharmaceutical company than a co-packing facility. The site boasts a 100,000-square-foot, FDA-registered and cGMP-certified manufacturing space. Star's CEO earned his PhD in Pharmaceuticals from the University of Arizona and has been creating advanced cosmetics and dermatologicals for over 25 years.

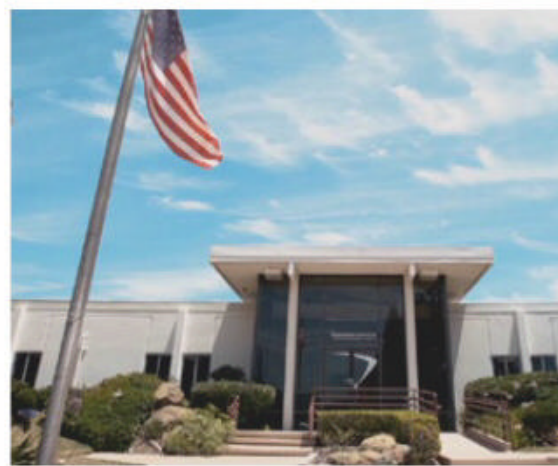
Star's formulation team includes two full-time cosmetic chemists that specialize in natural and organic products. On the day of our visit they are working on a new line of creams and salves formulated to bring relief to muscles and joints. Today, they are reviewing the ingredients where we learn that these products will need to conform to some of the industry's highest standards as they'll be sold at outlets including Sephora and Whole Foods.



As Star's Vice President explained, "It all starts with Good Manufacturing Practices. We work closely with our producers, establishing third party testing procedures that ensure all of our materials are free from pesticides, residual solvents, heavy metals and that they've undergone anti-microbial testing."

Star's commitment to quality is evident in their ISO-certified, in-house testing laboratory. Each day, the lab performs dozens of tests to ensure each product and formulation have the correct proportion of ingredients. An extensive framework of SOPs confirms each product meets or exceeds the claims on its label.

The factory floor is laid out with manufacturing cells on either side of a long hallway that circles the building. Each manufacturing cell has large windows that enable visitors to see the products being made without compromising the production areas. An extensive HVAC system regulates temperature and humidity and creates positive pressure



areas in the manufacturing cells acting as an invisible barrier to contaminants when doors are opened and closed.

Star has a broad range of capabilities. Two liquid fill lines produce as many as 75,000 30ml bottles each shift. Hot and cold fill stations produce lotions, moisturizers, creams, salves, and sticks. One cell is dedicated to chapstick, while others produce capsules, softgels, and nutritional gummies.

Everything at Star is done according to a highly detailed standard operating procedure (SOP). Software tracks each ingredient from the time and place it is purchased until it is placed in a product and leaves the factory. Technicians input notes detailing cleaning procedures and room conditions. The entire production process is a well-oiled machine ensuring the health and safety of every product made at Star.

By the time we conclude our tour, we have a new appreciation for all of the hard work and care that go into creating the products we take for granted on the shelves of our stores. Thank you to the team at Star for giving us the opportunity to see this exciting world.



Killer Cannabinoids?

A mysterious illness is plaguing the cannabis community. We investigate who gets it, what causes it, and how to treat it.

By Patricia Miller



Photo iStockphoto.com/ipopba



“I felt like I was dying every day. It was just like, ‘When am I going to stop throwing up?’” ~ Alice Moon

“I just vomited. It went on for about 30 minutes. It was humiliating, embarrassing, and completely mystifying... It literally felt like somebody ripped into my stomach and was pulling it inside out.”

This incident was Joe Dolce’s first indication that something was wrong. Dolce is the former editor of *Details* magazine, author of *Brave New Weed*, and host of the Brave New Weed podcast.

Shortly after his first episode of vomiting, he discovered he was suffering from Cannabinoid Hyperemesis Syndrome (CHS), a relatively unknown condition that affects millions of people across the globe. Those afflicted report repeated bouts of severe nausea, abdominal pain, and vomiting.

What is CHS?

In an interview with President and CEO of Opiant Pharmaceuticals Dr. Roger Crystal, we

discussed the increasing prevalence of Acute Cannabinoid Overdose, which differs sharply from CHS. He was quick to clarify that CHS is not an overdose and is not necessarily preceded by ingesting a large amount of cannabis products.

Dr. Crystal explains, “Hyperemesis is a spontaneous condition typically affecting people who are using cannabis chronically. It always happens out of the blue. It’s not necessarily that someone, one night, decides to take an extraordinary amount of cannabis. These are often people who, out of the blue one day, have profound vomiting.”

People suffering from the condition are deeply impacted by its symptoms. Dr. Crystal elaborates, “It’s extremely problematic for people. This is something that is also a concern as we increase legalization and habitual use of cannabis, and something for which we do not have any treatment currently.”

Who is Affected and How is it Treated?

Unlike cyclic vomiting syndrome, CHS seems to only affect daily long-term users of cannabis. Many suffering from the condition report that hot showers reduce the symptoms for a short time. Strangely, traditional therapies for treating nausea and vomiting are ineffective.

Currently, there is no treatment or cure, aside from giving up cannabis all together, forever.

Now, imagine working in the cannabis industry and finding yourself plagued with this terrible, mysterious illness. For one unlucky edible reviewer, Alice Moon, her world was about to be turned upside down.

“I passed out in the front yard one day because I was puking so much that I couldn’t cling to the toilet bowl anymore.” Moon describes laying in the grass, vomiting again and again, as her

neighbors watched. She continued, “One day a neighbor came up like, ‘Can I help you?’ And I just burst into tears because no one knew how to help me and there was nothing they could do.”

This feeling of helplessness is echoed by many people suffering from the condition. The syndrome was first documented by J.H. Allen and colleagues in 2004. Their article titled, “Cannabinoid hyperemesis: cyclical hyperemesis in association with chronic cannabis abuse,” was the first to describe the symptoms affecting 19 patients in South Australia. Since then, relatively little research has gone into studying the illness.

Reports of people suffering from the condition are rising. This could be attributed to increasingly widespread legalization and an overall lessening of stigma associated with the substance. People feel more comfortable talking with their doctors about it and are more inclined to report their symptoms to healthcare workers.

The number of people impacted is still

unknown, but one study from the New York University School of Medicine estimates that nearly three million Americans may suffer from CHS.

Could Pesticides Cause CHS?

Many people, even those afflicted, are reluctant to accept this condition is caused solely by cannabis use. Some argue it must be contaminants, pesticides, or herbicides that are making people sick.

Leafly recently interviewed cannabis researcher and neurologist Dr. Ethan Russo to find out if pesticide poisoning could be the culprit behind CHS. Russo notes, “As much as I decry the use of pesticides on cannabis, their toxicity profile does not match the symptom complex or time course of CHS.”

It’s also worth noting that those suffering from CHS often treat their symptoms with hot showers. Pesticide poisoning is not affected by hot bathing.

Alice Moon and Joe Dolce also disagree with the assumption that these symptoms are caused

by pesticides. Dolce was quick to note, “I’ve had some of the finest cannabis grown by some of the finest growers in the world and I’m certain there were no pesticides used on their products.”

Moon considered pesticides as a plausible explanation. She shared, “After the first episode, I quit using cannabis for three months and then I started lightly smoking again and I was using pesticide-free weed because everyone kept saying, ‘It’s pesticides, it’s pesticides!’” Her symptoms came back anyway. She tried using just CBD at the urging of her friends who insisted CBD would help counteract the nausea. She became more sick than ever, with her final bout of vomiting lasting for 16 days.

“I felt like I was dying every day. It was just like, ‘When am I going to stop throwing up?’ Because it was non-stop throwing up. There was nothing I could hold down,” Moon recalls.

The Science Behind the Sickness

The obvious question is, why does this illness cause vomiting when so many studies cite

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cannabis as a treatment for nausea? In a study published by the National Institute of Health in 2011, researchers Jonathan Galli and colleagues tried to find that connection.

Galli notes, “The cannabinoids demonstrate opposing effects on the emesis [vomit] response. A disruption in this balance causing the pro-emetic properties to overcome the anti-emetic effects may explain the paradox observed in cannabinoid hyperemesis syndrome.” In other words, an improper balance of cannabinoids can suppress anti-nausea properties and have the reverse effect, actually encouraging vomiting.

THC is also stored in lipids (body fat), and can be released into the body during times of increased stress or food deprivation. If someone suffering from CHS hadn’t eaten in days due to vomiting, their body may begin burning fat as a response to hunger. That fat would release more THC into the system, causing more vomiting.

Concerning Complications

This condition can have additional complications. Moon suffered from a hernia, kidney dysfunction, stomach ulcers, and a bacterial infection in her gut as a result of prolonged vomiting and dehydration. These complications can be life threatening. In one case, a young man named Brian Denny was repeatedly hospitalized for symptoms of the condition. In a few short months, he lost 40 pounds and his mother watched helplessly as his kidney function continued to decline from dehydration. He passed away suddenly, in his home, after complaining that his back hurt and he couldn’t breathe. The coroner’s official cause of death was dehydration due to cannabinoid hyperemesis syndrome.

The implications are rarely so dire, but should be taken seriously. Some people become so sensitive to the substance that they can’t even touch items containing cannabinoids. Moon explained, “Some people have flare ups from eating chocolate or having coffee or eating food with black pepper. Those three foods all have naturally occurring cannabinoids. So there are some people who literally can’t even touch those foods with getting sick.”



“I just vomited. It went on for about 30 minutes. It was humiliating, embarrassing, and completely mystifying...”
~ Joe Dolce



“Hyperemesis is a spontaneous condition typically affecting people who are using cannabis chronically. It always happens out of the blue.” ~ Dr. Roger Crystal

Healing with Heat

Surprisingly, a derivative of another food seems to provide some relief. Capsaicin, a naturally-occurring element in chili peppers, can help. Used as a topical cream, capsaicin-derived ointments are providing some relief from the nausea and stomach pain.

Recent research shows cannabinoids interact with our TRPV1 peripheral nervous system nociceptor. According to Leah Hatfield in *Emergency Physicians Monthly*, “[TRPV1] is noted to have activity in both pain relief and body heat regulation. TRPV1 is activated by cannabinoids, nociceptive heat stimuli (i.e. hot baths), and capsaicin.”

Hatfield explains, “Chronic use of cannabinoids is thought to downregulate TRPV1 signaling, leading to altered gastric motility, nausea, and vomiting. Topical capsaicin produces a strong heat sensation upon contact with the skin acting as a potent TRPV1 agonist, alleviating the gastrointestinal symptom complex associated with CHS.”

Cannabinoid Cessation

The condition is so poorly understood that many people suffering from CHS are being misdiagnosed. Moon spoke to the severity of the issue: “It’s just so misunderstood. There are a handful of people who have had their

gallbladders removed because doctors didn’t know about CHS — literally organs removed. Personally, I’ve spoken with three people who have gone through that.”

For Alice Moon, her only relief came from giving up cannabinoids completely. Second-hand smoke, even coffee or cannabinoid-containing items, are completely off the table. This seems to be the only sure way to stop the condition from recurring, and that’s a problem.

Many people use cannabis for pain relief, for pleasure, or for combatting depression or anxiety. For those people, it can be very difficult to give up the substance all together.

When I asked Dolce what he found most surprising about the illness, he shared that what most surprised him is that he continues to smoke. “Maybe I’m completely a masochist at some point, but cannabis still brings me more pleasure than displeasure at this point. It hasn’t happened in maybe a year, so I feel that maybe I’ve gone over the hump. But I have to say, I’m still a little nervous.” ❖

To hear Patricia Miller speak with Joe Dolce about his CHS experience, check out BraveNewWeed.com. To learn more about CHS, please visit www.cannatechtoday.com/CHS for a list of resources from this article.



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Fad or Fact? A Deeper Look at CBD

By Anthony Elio

If there's one thing that the U.S. seems to enjoy, it's health fads. There has been no shortage of health-conscious trends that have made their way into the public eye only to become yesterday's news in a matter of months. Keto dieting, kale integration, juice cleansing, gluten avoidance, and even colonic hydrotherapy are just a few examples of health fads that seemed like they were going to change the world, only to quickly become a relic of their time. This has led to CBD being considered a wonder drug by some and snake oil by others.

There's no doubt that CBD is very much "in" right now. The numbers back this up, looking at Statista's list of CBD sales over the years: \$108.1 million in 2014, \$262.2 million in 2016, \$512.7 million in 2018, and a projected \$1.812 billion in 2022. Beyond the profits, curiosities have greatly piqued, as Google Trends shows that "CBD" has been searched more often than the term "cannabis" since June 2017, peaking in popularity in May of this year.

However, in speaking with those outside of the cannabis world, the general public seems split, with conversations both online and in-person debating the validity of the substance and the sustainability of its popularity. Publications such as the *Chicago Tribune*, *The Guardian*, and *The Boston Globe* have questioned whether the CBD trend will continue, with others literally referring to it as a "fad."

Part of this skepticism may be the way the substance itself has been marketed. Going from a relatively unknown substance to popping up in every type of product from edibles to body lotion may make some users skeptical, as it harkens to the sudden "natural" trend of years past, where

suddenly potato chips and sodas were highlighting the "natural ingredients" they've incorporated.

This is backed up by experts within the field itself, such as Wayne Lee, who sees one sole reason for this CBD doubt: "On social media, billboards, dispensaries, and even in gas stations, we see CBD is constantly advertised ... CBD is available as oils and edibles, and is now being

introduced into many different beverages, foodstuffs, cosmetics and more." Considering he is the CEO of Lee Enterprises, the largest bioeconomy consulting group in the world, Lee's words should not be taken lightly.

Another issue stems from CBD's claimed benefits, which, depending on the manufacturer, seem to vary from easing anxiety to curing cancer. According to Dr. Brian Goodall, the

expert on cannabis, oil extractions, and nutraceutical formulations at Lee Enterprises Consulting, "I think the question is not a matter of the health benefits that people may not know about, but rather more of an issue as to whether these claims are real." Dr. Goodall also notes that, while there are proven benefits in terms of relaxation, stress relief, sleep enhancement, and an impact on certain forms of epilepsy, further research and testing are coming in the future.

But how can this "fad" perception of CBD actually be turned around? Because there is still a need for additional clarity in terms of medical benefits, CBD may need more of a word-of-mouth trial as it continues to grow. As Goodall explains, "For \$50, a consumer can buy drops from a dispensary or online and try it. If it helps, they will order again and tell their friends, and if it doesn't, then they won't. So the next 12-24 months will be a pivotal boom-or-bust time." Considering the aforementioned Statista article predicts CBD to be a \$1.5 billion industry within the next 24 months, time, and further research, will tell if CBD will become a health staple or be laid to rest among the likes of the Atkins and gluten-free diets." ♦



(Left) Dr. Brian Goodall (right) Lee Enterprises CEO Wayne Lee



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REGGAE ROYALTY



Photo Joey Clay Studio

How Julian Marley and his company JuJu Royal are bringing healing and hope to a global audience.

By Patricia Miller

In a technology-centered magazine, there are few opportunities to discuss spirituality. Yet, in this exclusive interview with Julian Marley, I'm reminded of the roots of the cannabis movement. Throughout its history, the herb has been part of rituals, part of healing, part of a deeper connection with the Earth and with each other. Marley brought that point home, always coming back to the root of the plant's culture and significance.

Perhaps it's the role of cannabis in Rastafari or the profound part it played in the music of Marley's father, Bob Marley, that inspires Julian to speak of the plant with such reverence. He's focused on the healing qualities of cannabis, centering his brand JuJu Royal around the compound cannabidiol (CBD). He believes in its ability to relieve pain, but more so believes it can cure diseases if only it were properly researched. His distress at the lack of scientific study stems from a deep, personal loss. Yet,

despite his suffering, the Grammy Award-nominated artist maintains his message of love and hope.

Here, we discuss spirituality, creativity, and higher consciousness through the lens of a reggae revolutionary.

Cannabis & Tech Today: You often speak about the spiritual effects of cannabis. How do you use the plant to enhance that part of your life?

Julian Marley: Well, it's spiritual because it goes with mankind. So, things God gave man dominion over are: things, freedom of thought, and freedom of action. This good herb enhances who you are. So I'm a spiritual person, when you partake of the herb, you find you go deeper into that meditation that you're going into. When you smoke herb, basically you find time for your thought process. You find time to sit back and really think, because

people's minds run so fast that we forget to eat. We forget to give thanks for life. So yes, smoke the herb. Remember to give thanks for life. And remember you have to take care of yourself.

As a spiritual person, when I smoke the herb it enhances my connection with my spirit, which connects to God almighty. Herb just enhances who you are. If you are a musician, you're going to play more music. If

you are a writer, you are going to write more. If you're doing wrong, you just have a bit more wrong. If you're doing right, you do right and you'll get the benefit from the right.

C&T Today: When you are brainstorming new music or creating a song, is it something you use every time?

JM: You use it when you want to use it. For me, yeah, we smoke herb when we're creating. But as we say, it just opens your channels to the inspiration that God is sending. Because it doesn't even matter how much you smoke, if you don't get inspiration, you don't come up with anything. There's inspiration with meditation.

C&T Today: Your father often sang about the intersection between cannabis and social issues. Is that something you try to speak to in your music?

JM: Yes. When you smoke herb, it's a social thing, as you know. Herb is even more enhancing than if you drink some wine. Picture when you're going to have some wine with your friends; you sit down and you drink and talk. So the thing with herb, you sit down, you talk, and you reason about life. You reason about certain things we have to find a solution for. So it's a positive result you're looking for when we smoke herb.

And if you're surrounded by good people, good brethren and sistrens, who can give you a good conversation, then that's where it's good. But if you're sitting down and listening to a lot of folly, then you're going to only go in more folly. As I say, it only enhances what you're doing. So if we're sitting down talking about Rastafari and social issues, we're going to talk and we're going to find the truth.





C&T Today: Have your tours around the U.S. changed since more states have embraced legalization?

JM: Well, I don't know, because we always have been smoking herb every time. We smoke herb no matter where it is. It's become more socially accepted. People are realizing the benefits of the plant. It's not like a cup of wine. You can only do one thing with a cup of wine, get drunk. You know what I'm saying? You can't extract it to do nothing else, but herb, you can cook it, you can bake it, you can build a rope, you can do a million things with one plant.

It's a magical plant. It's being acknowledged and given more acknowledgement because they have knowledge of it, but they're still trying to find out how to do this and how to do that with it instead of releasing it, letting the people get it, and letting the people be healed. But they're

Finding things that I want to offer the people, because everyone can find herb to smoke. There's a world full of herb, really. But this herb, do we know how to extract it to make something that can heal your body? Now, that is the new mission. So CBD is good for the body, good for aches. It helps with a lot of things, serious diseases, also.

So it became a passion to find deeper things that are in the plant. Because I heard that there are so many different elements, there are about 500 different natural chemicals in the plant. It's so fascinating. We can do a million things with that plant, if we extract the right ingredient.

And also, I've suffered recently the loss of my daughter to cancer. It was brain cancer. So this is why we've changed it into CBD. Because when I was looking, there was nothing. No one was



The newest addition to JuJu Royal's line of products is Extra Virgin Olive Oil infused with full spectrum CBD oil.

holding back the healing because they're trying to find out how to make some bucks. They want to make millions like cigarettes. Well, cigarettes kill people, herb frees the people. So, that's the problem.

C&T Today: Why does JuJu Royal carry only CBD products rather than whole plant products?

JM: CBD, for me, is healing for the body. Lately I have been more focused on body healing.

researching and everyone is fighting the education of the plant because they haven't found a way to make millions of dollars off it yet. Lives are in jeopardy because people are waiting to see how much money they can make.

C&T Today: Is CBD something your daughter was able to use to help ease some of her suffering?

JM: Some of, yes. But there was even more research that we heard, that the plant can actually help to cure cancer. It's not just a plant by itself, obviously, but just to know that the right research is not happening to really use the plant how it's needed, freely, without being run down by hospitals and governments. So while they give you drugs that mash you down, they want to keep the plant from being free.

Big education is a movement I'm very passionate about. And just knowing that yeah, it does help with pain, obviously, but it also can help in the healing of cancers and many different things. Well, without education, without the dosage, without the writings, you never know what to do.





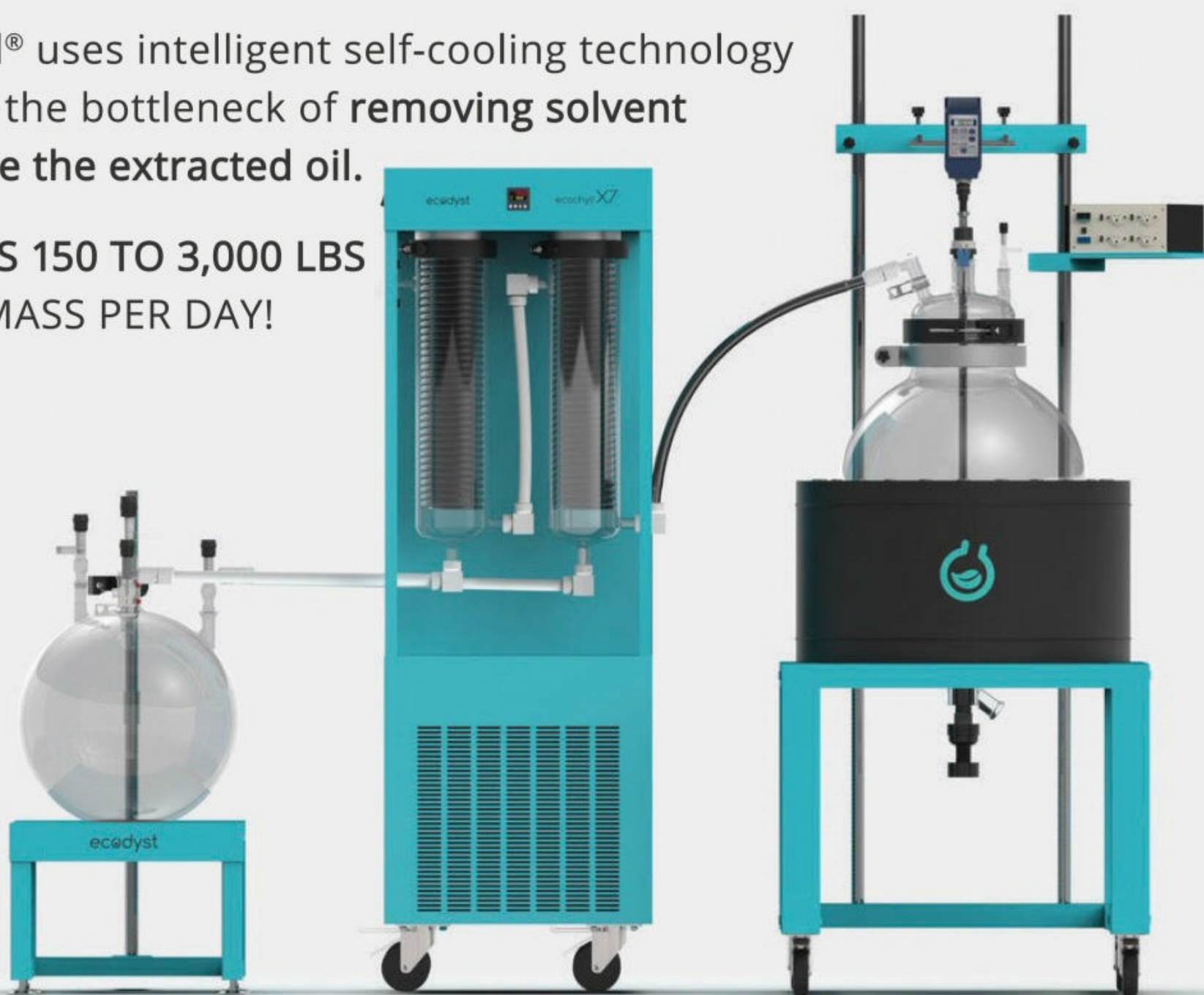
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“When I smoke the herb it enhances my connection with my spirit...”

Photo Joey Clay Studio

So that is how this is. It's a natural plant, you can do a million things. But what to do with it to cure? That's the question, what to do with it, because I've been doing research and it doesn't make any sense. Everyone has recreational herb. We all smoke herb. But do we all have the healing? Do we know how to boil it down and make tea? Or make something different out of it?

That is the kind of thought process I find myself in now, when it comes to the herb business.

C&T Today: You said you're working with CBD because it can help people, but I think sometimes the industry loses sight of that. Have you found that to be a surprising element of the cannabis industry?

JM: Yeah, it's so very surprising. They just look at it to make money. It's just money, money, money. They're not about the healing. But at some point they're going to realize they're going to need to find a new way, because they're going to get sick, too. And when they get sick, they're going to have to go right back to square one again.

The more they say, 'Oh yeah, we're making money, we're not doing any more research.' At some point they're going to have to research it, because that's the way the world is going. More and more things are attacking mankind and our health, things that people don't even understand. Yet we're surrounded by mother nature, who has everything for us.

C&T Today: Did your daughter's passing play a part in the development of *As I Am*, your most recent record?

JM: When it was released was when I found out... while it was happening. It has been a challenge for the album, because we have to deal with life first, and children, before we can go on tour and do these kind of things, you know?

We call it part of life's tribulations, because it's the only thing we can say. Here comes something trying to cut down what is positive and right. But as we say, Jah gives us enough fire that keeps the fire burning continuously. Because everything comes down to Jah. We say Jah, meaning God. So give thanks to God,

because if there is no God, if we have got no hope, then there would be no purpose to anything.

So give thanks for the consciousness of the herb. Give thanks to God. And continue the road in righteousness. It becomes a spiritual thing now.

C&T Today: I think there are so many people who are going through something similar to what you've experienced this year. Is there anything you'd like to say to those who might be struggling with the sorrow of loss?

JM: Well, speaking for the children, the children do not go through Armageddon. They don't go through the judgment, which we speak of, we speak about revelation, and the Bible speaks of judgment time, and heaven. We know that the children are in heaven. So the best thing we can do as adults is to get ourselves to heaven, too. Because that's the only way, that is the faith and the goodness, which keeps me moving. Since she's in heaven, that means I have got work to do because I want to go to heaven too, so we have to go do the right thing.

So, no one knows the time of judgment, so the judgment can be tomorrow morning and there will be people on earth. So, some people reach spiritually, and some people are here, and who is here has to do what we have to do until that time. So, it becomes spiritual food. We take the sorrows and turn it into — like lightning and thunder — strength, spiritual strength. It's just like lightning, a mighty force.

C&T Today: What's the most enduring message you hope fans will take away from your music?

JM: The most enduring message is love. Love. Have love. Let the love grow. And love cannot have any boundaries. Our sole reason for making music is just to free the people, give the people what is needed, and for me what's needed is consciousness, upliftment in our spiritual awareness. So, love each other, love God. Love each other and love God. That is one of the biggest messages. ❖

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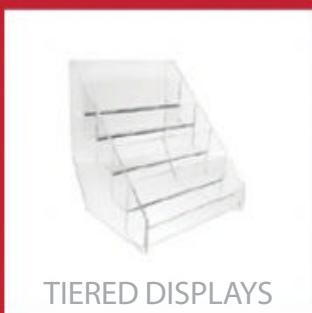
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Automation with a Human Touch

How automation and artificial intelligence are revolutionizing the cannabis industry

By Alex Moersen

To some, artificial intelligence (AI) may be categorized next to the likes of Bitcoin and blockchain: it's just another techie buzz word. For others, artificial intelligence could conjure up images of sentient robots hellbent on world domination. While artificial intelligence, in some ways, can be those things, what it is in practice often looks much different. The artificial intelligence that many people talk about today can also be referred to as machine learning, or the process by which software takes in data, learns patterns, and makes whatever adjustments it needs to make to achieve its goal. The goal in our case? Maximizing cannabis yields and sales.

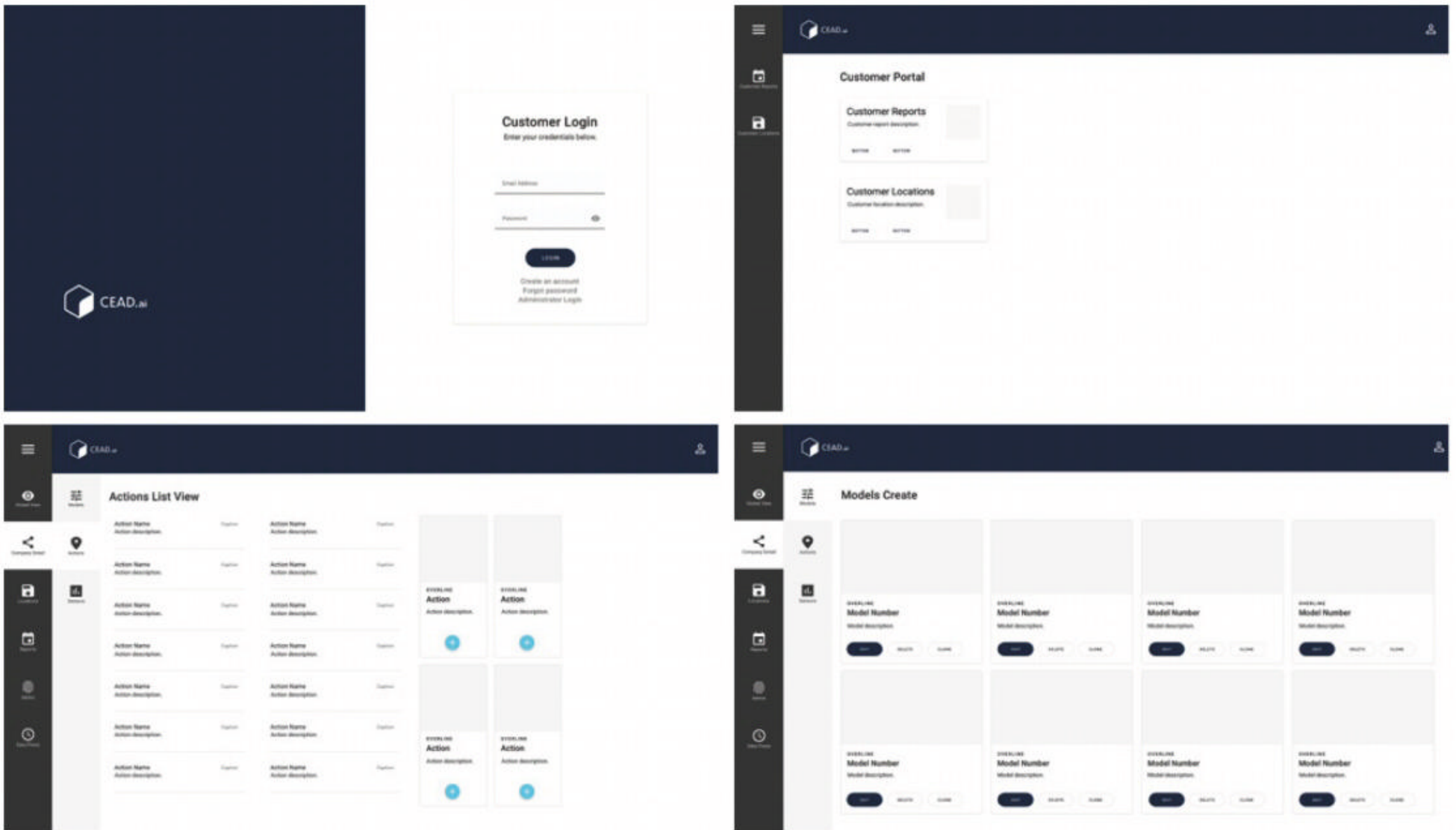
"Every industry is being shaken up by AI these days," explained Brad Newkirk, strategic leader at LumiGrow, a smart lighting company working to develop AI solutions for cannabis cultivators. "Cannabis is no different, except that its newness creates more opportunities." From cultivation and production to retail and sales, AI has numerous applications in the cannabis field. "Cultivators should look to autonomous growing techniques to improve their margin," Newkirk continued. "In the retail space, I've seen interactive experiences make product education easy and fun – increasing the likelihood of a sale. The medical market already fully embraces AI technologies as they explore relationships between treatment techniques and patient outcomes."

While, like Newkirk mentioned, AI has some applications within retail and the medical field, its most common implementation, at the moment, is in cultivation. "[Automation] brings environmental control, fertigation, and irrigation accuracy, which transfers into high quality, uniform crops," explained Justin Jacobs,

AST Field Tech at Argus Control, which provides automated control systems for cannabis horticulture. The point that Jacob makes highlights two important benefits of automation and AI technologies: efficiency and accuracy. Having this amount of consistent control and accuracy naturally leads to a more consistent product, which is important in an industry with regularly shifting regulations.

At the same time, this technology also makes the entire operation run more efficiently by seamlessly and automatically making adjustments and reducing labor. But don't think humans are without a role in this system. As explained by Adam Klaasmeyer, co-founder of CEAD.ai, an AI solutions company for the cannabis industry, "Automation reduces the requirements for labor, but also extends the abilities of existing employees by empowering them with new tools and data." By using water and energy more efficiently, as well as labor, automation and AI also make facilities more sustainable. "Our data shows that smart lighting can reduce energy





usage while keeping yields at optimal performance,” Newkirk claims.

And don’t think that artificial intelligence and automation being applied to cannabis is a new idea. In fact, nearly every single horticulture industry has incorporated these technologies. “Automation has been a proven part of the agricultural industry for decades,” Jacobs continued. Newkirk referred to cannabis as “just another crop.” He continued on to say, “The truth is that AI applications for cannabis will be similar to other wholesale or medicinal crops – it’s just that the research is in its infancy ... It will take time for AI to synchronize with specific plant genetics – but honestly, this is the same for all agricultural products ... The only difference is that cannabis technology may be developing quicker due to the fact that it’s just so profitable in comparison.”

So what does all of this look like in practice? It starts with data. The software learns the patterns of the plants (hence “machine learning”) over a period of time. Then, it’s able to automatically adjust things like temperature, moisture content, and a number of other environmental aspects. Klaasmeyer explained this idea of predictive analysis: “Predictive analysis makes

assumptions based on human experience that future results will follow patterns from the past. Currently, predictive analysis is limited by the volume, time, and cost constraints of human data analysts. An AI system is able to make assumptions, test, and learn autonomously.” By learning this data patterns, the AI can not only adjust climate, but also can predict things such as harvest yields and potential issues, such as disease or pest outbreaks. Newkirk explained how LumiGrow’s smart sensors can recognize airborne disease before plants are affected, giving cultivators the opportunity to take defensive action.

While this technology might sound like an easy fix, it doesn’t come without its issues. In fact, the three industry leaders we spoke to all highlighted different problems they’ve encountered while implementing this technology for clients. Jacobs specifically mentioned “the learning curve to bring growers up to speed to show the value automation can bring to their facilities, to show them they can trust the control system.” In the case of Klaasmeyer and CEAD.ai, one major challenge in implementing AI is “getting access to quality data to inform the system and correctly define the problem statements before training the

model.” Newkirk highlighted a number of challenges he’s faced: “The most common challenge I see when using AI is getting your new technology to work together with your older, ‘dumb,’ systems ... Another challenge is choosing which technology is right for you.”

These technologies are in no way quick fixes. Cultivators must take the time to learn the new system, and on the other end, the system will take time to learn the data patterns of the cultivation facility. According to Jacobs, “Automation is a long term investment that will pay off harvest after harvest.” While some aspects may still be in a state of infancy, this is the future of cultivation. “I think of the future of AI and horticulture as ‘Automation with a human touch,’” Newkirk expressed. “Growers will be given new technologies to make their jobs easier and their business’ more reliable ... We aren’t making growers irrelevant, we’re just making them super-growers.” And for those of you who still think AI will lead to robot overlords, Newkirk has some words of comfort. “Everyone mostly thinks AI means self-aware computers, but mostly that’s still science fiction. There’s no need to worry your grow equipment is plotting to take over the world – not yet, at least.” ♦

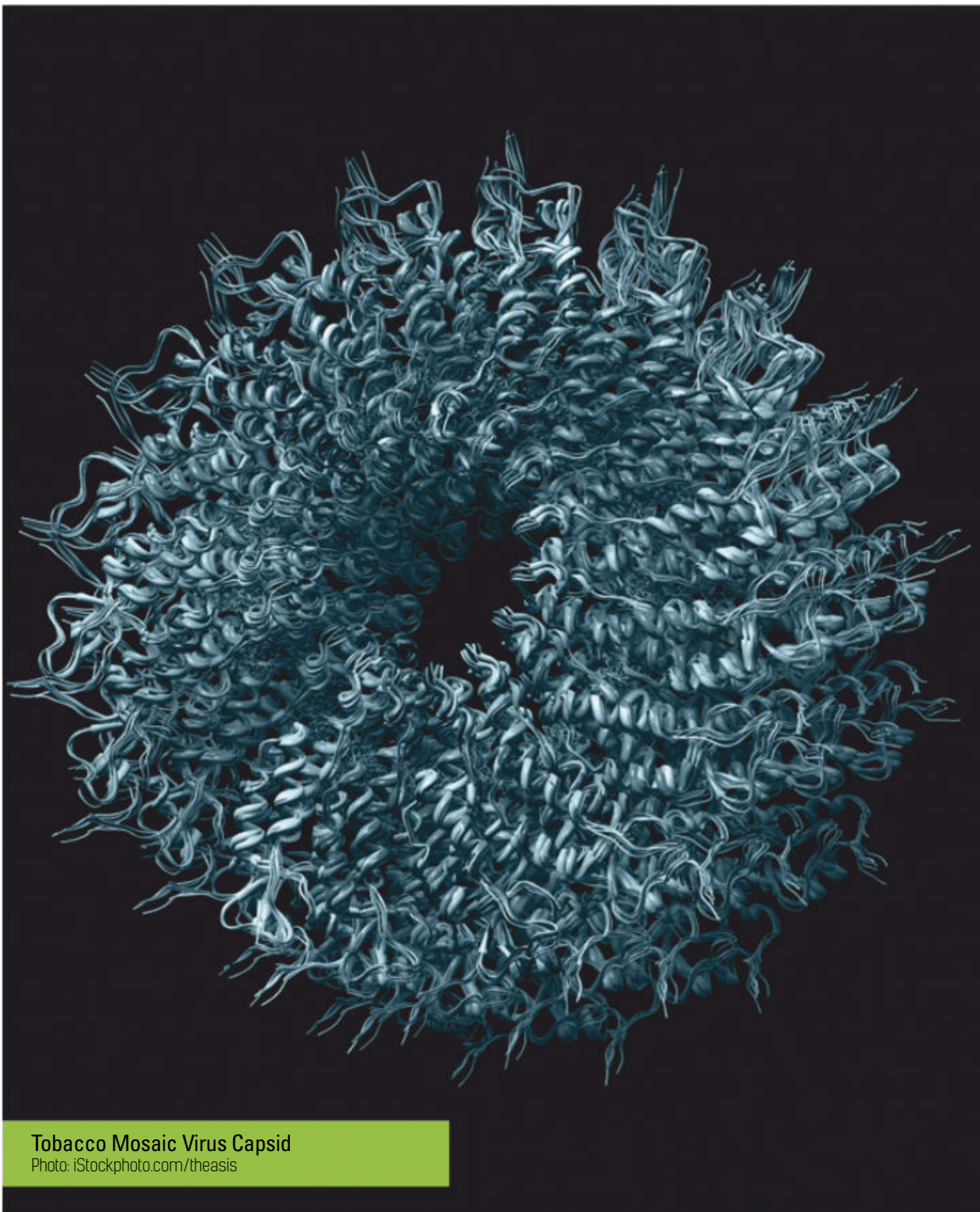
Viruses, Viroids, and Cannabis: A Brief Primer

By John Brunstein,
Chief Scientific Officer,
Segra International Corp

At one point not so long in the past, it was commonly said amongst the cannabis cultivation community that “cannabis doesn’t get viruses.” That cannabis’ closest cousin – hops – has multiple known viruses and viroids of significant impact should have been enough to put this statement in doubt. Today’s article should put this fallacy to rest and in the process give the reader a better understanding of what viruses and their lesser known relative, viroids, are; explain some of the challenges in detecting both novel and known viral and viroid agents in cannabis; and provide a list of some viral/viroid agents definitively known to infect cannabis.

An Introduction to Viruses and Viroids

Viruses are non-living, biological entities, with a nucleic acid genome coding for one or more requisite proteins. In the broadest overview possible, once inside a suitable host cell, viruses take advantage of cellular components to express the viral genome, replicate new copies of this genome, and package copies of this into a shell (capsid). Infectious particles consisting of a capsid and viral genome then exit the host cell and can be taken up by a new host cell, starting the cycle over again.



Tobacco Mosaic Virus Capsid
Photo: iStockphoto.com/theasis

While there are a lot of nuanced variations on this (type of nucleic acid; genome structure; replication mechanism; number, type, and roles of genes expressed; structure of capsid and possible lipid coating; method of virus release; and method of transmission or vectoring to new host cell) the overall picture is constant. Viruses are, in effect, a sort of intracellular parasite, and the damage to host vigor arises through misappropriation of cellular resources and application to benefit the virus, not the cell or organism as a whole.

While people are familiar with viruses, viroids are less commonly known. The simplest description of a viroid is that it's a virus which lacks the ability to make a capsid and can't generally transmit across distances between cells to infect new hosts. If you imagine a person on a

crowded transit bus and they have a viroid, that viroid doesn't have a viable way to survive environmental exposure and infect the other passengers; and the person isn't replicating themselves by clonal vegetative propagation, either.

Overall it's a pretty lousy biological strategy if you infect animals, but it's viable in plants where viroid "naked nucleic acids" can transport between cells via cell-to-cell fluid permeable junctions. Vegetative propagation with infected cells can lead to new infected plants, or the viroid could make it into seeds leading to new infected plants that way.

How Do Viruses Affect Cannabis?

Take home message from all this? If you are running a cultivation operation, having either

viruses or viroids in your plants is probably going to be detrimental. If you're bringing in new stock material, viruses are probably more worrisome than viroids, as they'll have a greater likelihood of infecting other plants in your operation.

What are the symptoms of viral infection in cannabis? For the ones we know – and frankly, likely for the ones we don't – symptoms include a spectrum of leaf wilting, chlorosis, necrotic spots, and similar pathologies. In fact, visual symptoms alone are generally not distinctive enough to say which virus is the cause, so if someone looking at your plants states "You've got Virus X," take it with a grain of salt. On the other hand, as remediation options are mostly the same across all viruses, it may be a bit of a moot point; you'll be looking at similar responses regardless of the exact culprit.

We know about viruses and viroids in a lot of other plants – how do we go about looking for them in cannabis, and, once found, how do we know if they're significantly pathogenic? Classical virology takes suspected diseased starting material and works by further growth, isolation, and characterization of the virus or viruses present in the material. It's slow, painstaking, requires a lot of trial and effort, but it's capable of discovering truly novel viruses. More often, molecular biology methods are employed, using modified low stringency (low specificity) PCR or hybridization-based approaches to identify "close relatives" to known viruses.

Another molecular biological approach is next generation sequencing "NGS," where you just sequence every bit of nucleic acid you can find out of a sample and then use bioinformatics to decipher what was there. This last approach requires neither that the agent grow (like classical virology) nor that it be closely similar to other viruses; as cost for this approach steadily declines, it is becoming the method of choice.

Once a virus is discovered, it's possible to develop high sensitivity, rapid, cost-effective molecular assays to screen material such as incoming clones for its presence or absence. Determining if they're pathogenic is most easily done by intentionally exposing healthy plants to a virus (or viroid) and watching if this results in pathology; in essence, fulfilling what's known as one of Koch's Postulates.

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The Most Common Viruses Infecting Cannabis

What are some of the viruses and viroids that have been definitively shown to infect cannabis? Here’s a list of six (eight, if you include name variations), but bear in mind that as more research is done, this will likely expand.

Established Viruses of Cannabis (2019)
Name: Hop Latent Viroid Genome: ssRNA, circular Comments: N/A
Name: Cannabis Cryptic Virus Genome: RNA Comments: Not presently correlated with any overt disease
Name: Hemp Streak Virus Genome: RNA Comments: Likely vectored by thrips
Name: Hemp Mosaic Virus (aka Sum-Hemp Rosette Virus) Genome: ssRNA, (+) polarity Comments: Tobamovirus family (relative of Tobacco Mosaic Virus)
Name: Cucumber Mosaic Virus Genome: ssRNA, 3 linear chromosomes Comments: Vectored by aphids
Name: Alfalfa Mosaic Virus (aka Lucerne Mosaic Virus) Genome: RNA, linear, 4 sections Comments: N/A

Note that all of these have RNA genomes, not DNA – this is a common trend in plant viruses. Unfortunately, this has repercussions. DNA is chemically stable and normally has high fidelity replication, meaning DNA-based viruses can be screened for in all sorts of plant material, even dried flower, and genetic sequences are usually fairly stable (making tests reliable). RNA is, however, chemically unstable, so you can’t meaningfully go looking for them in anything but fresh tissue (and ideally, from a visibly diseased site). A related problem is that RNA virus replication is usually highly inaccurate. This is actually an evolutionary strategy, where a single incoming virus can create high numbers of



Symptoms of Alfalfa Mosaic Virus on potato leaves. Photo: Howard F. Schwartz/Wikimedia Commons

randomly mutated progeny in what’s referred to as a “quasispecies swarm.” Somewhere among the swarm may be a sequence variation optimally suited to survival in that host cell, and it will outcompete its siblings. Unfortunately for us, this same variability may cause our targeted molecular assay to not detect the virus. The old adage “absence of proof is not proof of absence” is never more true than when testing for RNA viruses.

So, You Think You Might Have a Virus

So what can you do if you think you have a deleterious virus in your cannabis crops? Best practices include immediate quarantining (or even better, destruction) of suspect plants. Avoid any mechanical or physical transfer of material between suspect infected plants and healthy ones – use disposable protective gowns, gloves, and similar gear and replace this gear between handling suspect plants and healthy ones.

Another key vector – and this one can act to move viroids between plants, as well as viruses – can be insects such as thrips. These can get contaminated by being on or eating an infected plant, and then crawling or flying to a healthy one, bringing infectious agents with it; a process known as “vectoring.” If chemical pesticides aren’t

an option – and in this business, they’re not – consider using selected predatory insects to kill off the vector species.

In some cases, healthy cuttings may be salvaged from the periphery of a diseased plant, allowing recovered propagation of a prize clone while the bulk of the plant (and hopefully, all of the infected portion) is safely destroyed. Taking this approach to the extreme, plant tissue culture, particularly when established from primitive meristematic tissue (before vascularization gives viruses and viroids a chance to enter the cell), can be combined with hyperthermic growth of callus to ‘clear’ diseased material and allow ongoing propagation of clean starts.

Putting those clean starts in a contaminated grow house doesn’t help much, so a comprehensive regular sanitation program for all grow areas – using approved agents depending on jurisdiction such as dilute bleach or food safe quaternary amines – is a good preventative measure. Air baths, sticky mats, footwear covers and/or sanitation baths, disposable protective wear, HEPA filtration of air supplies and similar approaches all add layers of defence against introduction of diseased material to the facility and can. ❖

Talking with Kendall Livingston About the Kalvara Cannabis Cocktail

People consume cannabis differently than they did in years past. In fact, a 2016 national study showed that nearly one-third of adult respondents who had ever used cannabis reported consuming it in the form of an edible or beverage. Edibles are a popular way to consume cannabis, and that trend is growing. By 2022, the edibles market in this country is projected to reach \$3.4 billion, and cannabis beverage sales alone are expected to grow to \$374 million.

And yet, there can be disadvantages to edibles. Some of this has to do with a slower onset or uneven batching or mixing. Some consumers find them unreliable, with too high a risk of overmedicating.

Today's consumers prioritize products centered on precision and purity. Kalvara™ brings a solution to the market in the form of the Kalvara Cannabis Cocktail, which uses the highest quality of THC for one precise dose that will allow consumers to experience fast onset with no uncertain reaction.

We sat down with Kalvara Logistics, LLC Owner Kendall Livingston to learn more about how this THC beverage is bringing a better beverage solution to the edibles market.

Cannabis & Tech Today: How is Kalvara™ fulfilling a need in the THC world?

Kendall Livingston: Kalvara™ was born from a belief that enjoying the effects of cannabis could be easier, cleaner, and more consistent. From the start, our aim was to create a smoke-free, no-guesswork alternative to other cannabis consumables. Several of our founders have a

background in the beverage and spirits industries, and that experience helped develop an all-natural, cannabis-infused drink that delivers a great experience and a precise dose of THC every time.

C&T Today: How can Kalvara™ deliver such a precise dosage?

KL: Kalvara™ is able to achieve such precise dosing through utilization of the patented Vessl™ closure technology. Ten milligrams of THC are emulsified and inserted into each Vessl™ closure. The closure itself contains a chamber in which the THC beverage concentrate is stored. We then purge the closure of oxygen and pressurize with nitrogen to protect content and ensure maximal efficacy of the product at the point of consumption. Other products simply mix a total amount of THC into a product that is said to have multiple servings (such as a 100mg chocolate bar with 10mg square pieces). The problem with this outdated form of production is that the dosages become unreliable. One piece of chocolate may have 5mg THC where another piece may have 15. Other beverages in the industry have a similar problem due to THC oil separating in the bottle and leaving the consumer to shake and remix the product in hopes that they will pour their desired dosage.

Our use of the Vessl™ technology sets Kalvara™ apart by giving the consumer the control and the confidence of knowing what to expect each and every time they twist a of Kalvara™.

C&T Today: What is the Vessl™ closure?

KL: The Vessl™ closure is a key piece of technology in our beverage. It's essentially patented dosing and delivery system pressurized to protect content without the need of artificial preservatives. We insert the THC beverage concentrate inside the Vessl™ system, pressurize with nitrogen which evacuates the oxygen and keeps the beverage shelf-stable until ready to consume, without the use of artificial preservatives. As a result, the liquid has high bioavailability, which leads to a faster high – usually within only 15 minutes.

C&T Today: What does it taste like, anyway?

KL: I like to describe it as a light citrus flavor. It's also zero-calorie and sweetened with monk fruit, with no sugar and no preservatives. It's very light in flavor so you can consume it by itself, chilled or over ice. Some people enjoy it in a cocktail in place of alcohol. ♦

Learn more about Kalvara's Cannabis Cocktail at <http://www.kalvara.com>.





High Times Ahead

How CEO Kraig Fox is leading *High Times* into a new era of public listings and legalized cannabis.

By Patricia Miller

High Times Holding Company is among the best-known names in cannabis. Since its inception in 1974, the popular publication has grown from a monthly magazine to a media powerhouse, leveraging its brand to include events, cannabis products, a music label, even more magazines, and a video-on-demand platform. Now, the brand is working to become a publicly traded company — a move that may help legitimize other cannabis companies seeking a public listing.

Their new CEO Kraig Fox is tailor-made to take the company public. Fox has more than 25 years of experience working with some of the world's largest media and entertainment companies. Whether he was establishing Live Nation as the largest owner and operator of live entertainment promoters and producers, managing the intellectual property rights of Muhammad Ali and Elvis Presley, or establishing *American Idol* and *So You Think You Can Dance* as household names, Fox knows how to leverage a brand.

In this exclusive interview, Fox shares what has most surprised him about working with *High Times*, how the brand is evolving, and what's in store for the future of the cannabis industry.

Cannabis & Tech Today: Did you ever envision yourself working with cannabis in a professional capacity?

Kraig Fox: Not a chance. The 18-year-old me wouldn't have considered it in a million years because it was illegal. I never thought I'd be an executive in this industry because no one even thought that the cannabis industry would exist. The fact that teenagers today are growing up in a world where cannabis is 100 percent accepted, and in their mind literally no different than alcohol, is fascinating to me.

C&T Today: What have you found most surprising during your first six months as CEO of *High Times*?

KF: I don't know if surprising is the right word. I think "affirming" is probably a better way to explain my first six months at *High Times*. I took the position because I've fundamentally built my career as an executive in the media and entertainment business focused on brands.



Whether putting brands to radio, putting brands to concerts, or owning brands directly with [Muhammad] Ali and Elvis [Presley] and *American Idol*, it's always been about human behavior and the reaction to brands and content. When I took this position, it was because I fundamentally believe in the power of brands and the power of *High Times* as the only globally recognized cannabis brand.

Since I've gotten here, I think I may have even underestimated the value of this brand. I knew it was powerful. I just didn't realize how far behind the rest of the industry is in terms of building

brands and how far advanced *High Times* is in terms of its recognition globally. So, I guess it's a bit of a surprise, but if anything, I think I'd call it more of an affirmation.

C&T Today: You mentioned your work with Ali and Presley. How have those experiences translated to the work you're doing with *High Times*?

KF: Fundamentally, these experiences all have to do with understanding human behavior and the value of brands to deliver a message. That's really what brands do. They deliver a message to a consumer and then hopefully that message, in some way or another, results in an economic transaction, whether it's a ticket sold to a concert, whether it's listening to an ad on a radio station, whether it's a vendor buying a booth at a *High Times* event, or whether it's somebody, one day, walking into a *High Times* store to buy a cannabis product.

Those are the lessons you take with you, which is how do people interact with brands and how do brands use their power to create monetization events so that there's value throughout the chain with the consumer getting the most amount of value for their dollar spent?

People have a Spotify account and a Netflix account and sometimes a Hulu account, all three for a reason: because they believe the value they're getting back is worth more than the dollars they're paying. [Those brands] are over-delivering, and I think *High Times* has the same opportunity. I think those are the lessons I've taken from the other businesses I've worked with. Simply how people interact with brands and how consumers are willing to let brands monetize the interactions in a way that's fair for everybody but over-delivers for the consumers themselves.

I know I've said this before, but I believe that every industry needs three primary things to



thrive. One is trade credit, and hopefully with the Safe Banking Act that will really come into play for the cannabis industry.

The second is institutionalized distribution. That doesn't mean government mandated distribution. It means distribution so that everywhere in the value chain someone can make money. The example I like to use is if you had a Coca-Cola vending machine in a national park at the top of the Grand Canyon, and you bought a Coke for \$1.50, that for everybody along that value chain, there's money to be made. That's institutionalized distribution. That's how businesses survive.

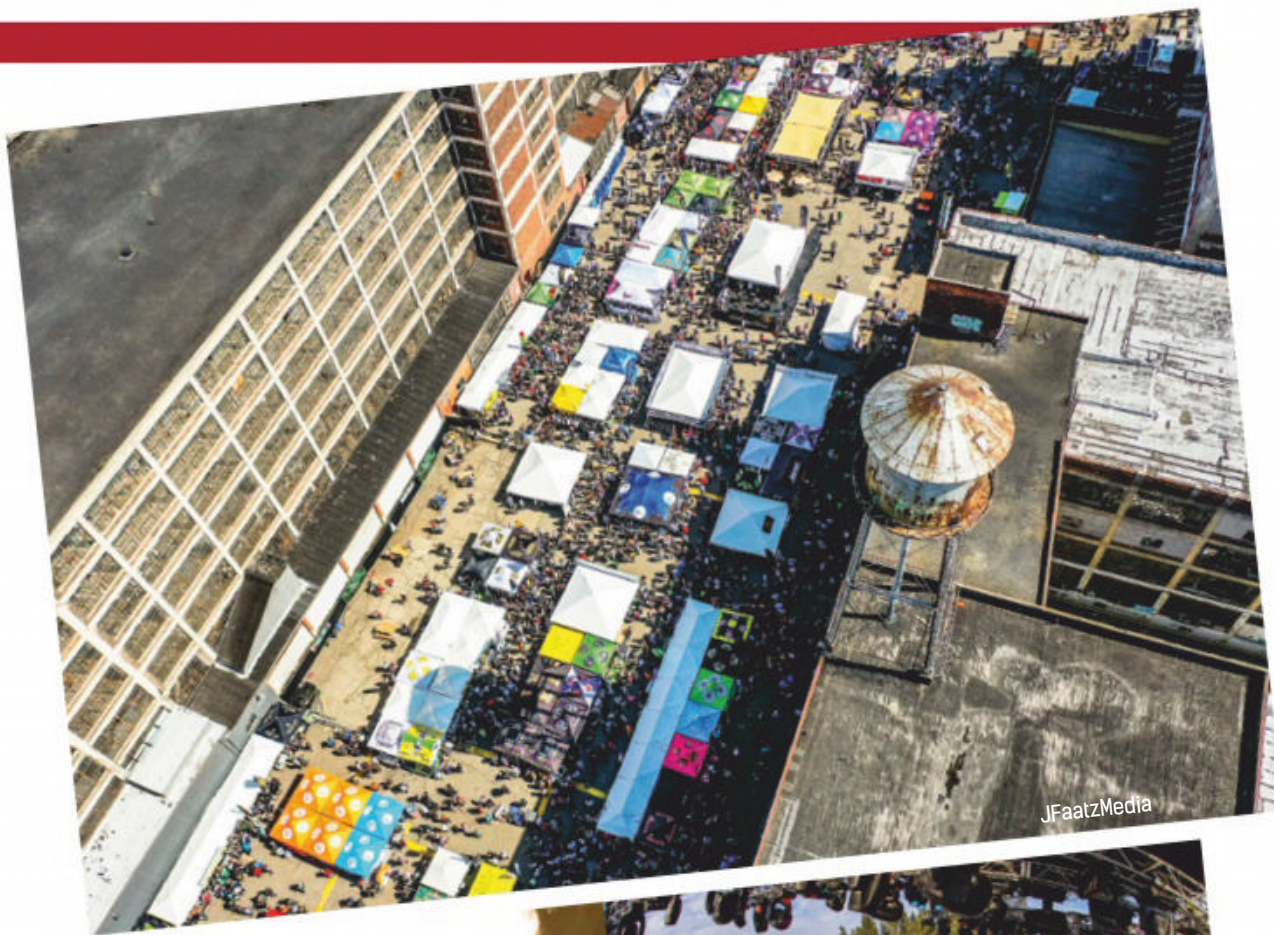
And I think lastly, maybe most importantly, the brand recognition itself. If you look at any consumer packaged goods industry, they're all brand based. The vast majority of Americans in particular pick up the brand name, over-the-counter drug when there's a generic option sitting right next to it with the exact same active ingredient for 20 percent less. It just shows the power of brand recognition and trust.

C&T Today: High Times has been in this industry since the 70s and their messaging has changed considerably in that time. How has the editorial focus shifted to reflect the legal landscape of cannabis?

KF: I told the staff from the moment I took the position that for probably 42 of the 45 years that *High Times* has existed, it's stood for what's commonly referred to as the "counterculture."

High Times has always pushed the envelope, whether it was regarding the legalization of cannabis, or pushing into psychedelics in the 80s, coming back to cannabis in the 90s and 2000s. It has historically stood for the counterculture.

But what's happening now is that what was the counterculture is now actually considered culture, and our content can progress forward within that evolution of perspective. I think if you look at the last few covers and compare them to the covers of only six months ago or a year ago, you're going to see a vastly different content experience.





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Our job was to stand up for this counterculture revolution. Our job now is to stand up for the cultural revolution, to stand up for patients that need access, parents that want access for their children, returning vets that need access, athletes, and just regular moms and pops who are consuming cannabis for the first time in their lives or for the first time in a very long time.

We've got an octogenarian population which is not spoken about that often, who are completely addicted to sleeping pills and painkillers, and who could probably be much better served consuming cannabinoids as an alternative.

I believe that as the largest brand in the industry, we can use the media engine underneath everything we do to move this industry forward. We have a responsibility to speak up for those that don't have the voice. But in addition, I think we have a responsibility to try to destigmatize this plant as often and as much as we can to make it accessible for the non-endemic advertisers. We're making a big push this year and into 2020 to do just that.

I think our partnership with the Clio Awards is going to start to show advertisers and mainstream Madison Avenue that the cannabis industry doesn't need to be stigmatized anymore. We have a big audience of consumers who are using our product and that audience is growing exponentially every day.

C&T Today: How does High Times deal with digital advertising restrictions so it can still effectively advertise to its target demographics?

KF: Our events are probably one of the biggest ways we reach our target demographic.

Companies affiliating with our events, sponsoring our events, are by definition saying that they are involved in the cannabis business without advertising their product directly.

Our events have anywhere from, for a smaller event, 2,000 or 3,000 people, to a larger event with 15,000 to 20,000 people a day attending. For the most part, everyone, or at least 95 percent of attendees, are cannabis consumers. These events are opportunities for brands to speak directly to consumers, show them their products, give them samples, whatever happens to be legal in that jurisdiction.

Then our digital assets and our print assets end up supporting all of those initiatives. We've had the same struggles that other companies have had with Instagram, in particular. We don't have that struggle with Facebook because it's a media platform for the business where we're able to put out branded content.

We do advertise and we do email blasts. We have a huge list so we're able to put other brands in the inbox of consumers. And we can do that, not just in the U.S. but globally. Obviously we utilize geotagging and respect the restrictions in certain areas.

But with our Instagram, we're very successful and we're very careful to keep Instagram about the content itself. If brands participate in our content, obviously we highlight that, but we try to do it in a way that it's more a brand activation than it is a direct advertisement. If it's a direct advertisement, it's easy to get people in trouble.

C&T Today: High Times Holding Company may soon be publicly listed on the stock exchange. How do you see that impacting the brand?

KF: We will be announcing our listing strategy imminently. I don't know that it has an impact on the *High Times* brand per se but it does support cannabis destigmatization. The more companies that list publicly, the less stigmatized the entire industry starts to become.

Just the fact that the U.S. primary exchanges, NASDAQ, New York Stock Exchange, won't let U.S. plant-centric companies trade publicly continues this stigmatization. Yes, there are legal reasons why they do it, but this is primarily based on the fear of being associated with something which is illegal at the federal level.

I think that the more companies that list publicly, *High Times* included, the sooner that the U.S. exchanges will start accepting these companies for trading and the less overall stigmatization there will be for the plant. I think as stigmatization goes away, hopefully public acceptance will continue to expand and legalization will follow. I think it's all a net positive even if the market's a little choppy right now.

C&T Today: How can cannabis companies best prepare for the future of the industry?

KF: The cannabis industry will follow every other industry. Ultimately, brands will rule the day like every other consumer packaged goods industry. I think that the brands with the most consumer trust are going to have the most amount of success. I believe that if you are trying to recreate the brand value of *High Times* today, I couldn't imagine you'd be able to do it for less than hundreds of millions of dollars to get to the same level of global recognition. That's the power of what I signed on for and that's the power of the future of this business. ♦



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Arcanum Soco Skin – With New Year's coming and a new gym membership on the way, you'll want a way to recharge. Utilizing menthol and CBD to enhance performance and recovery through increased blood flow, Sarco Skin by Arcanum deserves a place in your gym bag. **\$30** (8 pack)



TribeTokes Phoenix Quartz Crystal Pipe – Just because you love CBD flower doesn't mean you're a fan of using paper. Thanks to the sleek Phoenix Quartz Crystal Pipe, your CBD needs will be filled in an efficient, eye-catching manner. **\$40**



Futurola Super Shredder –

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TribeTokes Disposable CBD Vape Pen – First-time CBD vaporizer users may find it difficult to find a place to start. The TribeTokes Disposable CBD Vape Pen gives you everything you need right in the box, letting you start your CBD routine immediately. **\$60**

SkinKick Dope Kick Duo – If your New Year’s resolution includes clearer skin, you may want to consider incorporating CBD. The Skinkick Dope Kick Duo reinvigorates your skin in two simple steps, starting with the Daily Exfoliant Cleanser and finishing with the Dope Kick Lotion. **\$50**



LEVO II – Make infusing simple and convenient with the LEVO II, the ideal product for infusing oil and butter with everything from fruits to herbs. With connectivity to the LEVO app, three separate cycles, and dishwasher safe components, the LEVO II will be a welcome addition to your kitchen counter. **\$350**



Greenlane DaVinci MIQCRO – With the MIQCRO, DaVinci has taken the loose leaf vaporizer to the next level. The most compact premium vaporizer around, the DaVinci Miqro brings quality vaping with you wherever you go. **\$120**



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The Widgett Extraction System – The Widgett Extraction system utilizes a cryogenic solid-liquid extractor that is simple and inexpensive to operate with no winterization or filtration required. The system works with various solutions, and solvent can be stripped directly from the product flask for reuse. Suitable for residential, lab, and commercial use. **Prices vary on size.**



PHILTER Phlip – Eliminating secondhand smoke in a discreet manner, the PHILTER Phlip silicone sleeve attaches a proprietary filter to most popular stick and pen vaporizers. All you need to do is inhale from your vaporizer, flip, and exhale into the filter for an odorless, smokeless experience. **\$30**

Fritsch Pulverisette 11 – Homogenize samples for analysis. Cryogenic grinding option reduces difficult to grind edibles, biomass, and isolates into a homogenous, representative powder. Programmable SOP’s. Higher accuracy, sample integrity, uniformity, repeatability. Mitigate cross contamination, reduce cleaning. Grinding sets and knife variations. Dishwasher and autoclave safe or single use. Ensure user/sample safety. **Prices vary.**





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16

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25-26

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20-24

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Davos, Switzerland

29-30

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Cannabis Collaborative
Conference**
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FEB

4-6

**ArcView International
Investor Forum**
Los Angeles, CA

6-7

**International Cannabis
Business Conference**
San Francisco
San Francisco, CA

11

**Cannabis Private
Investment Summit**
Ft. Lauderdale, Florida

13-15

USA CBD Expo
Las Vegas, NV

19-20

**NCIA Northeast
Cannabis Business
Conference**
Boston, MA

26-29

Emerald Conference
San Diego, CA

MAR

12

**International
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20-22

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A NEW HORIZON

With 2019 calendars in the garbage can and New Year's resolutions ready to be made and broken, it's time to look to the future. While the 2010s were a revolution in terms of cannabis growth and legislation, there is still so much more potential for the substance. The spring issue's 2020 outlook will include insights from experts, bold predictions, and a view of possible pitfalls the industry may face in the new decade.

A TIMELINE OF TREATS

The edible side of cannabis has seen some major changes over the years, from a secretly stashed treat to a widely available packaged good. What was once a softly discussed taboo now has its very own cookbooks lining store shelves. But while we may have a grasp on the past few decades of edibles, where did the concept originate? The spring issue of *Cannabis & Tech Today* will go through the interesting history of edibles, which have dated back centuries, to their place in the current cannabis conversation.

TWO SIDES OF THE CANNABIS COIN

The debate over legislation is one that has been ramping up for years, and looks to rage through the 2020 election in November. With this in mind, we want to break down why and how the left and right differ on the substance. With exclusive quotes and perspectives from established Democrats and Republicans alike, our political roundtable will outline the political spectrum of cannabis, and possibly foretell how the substance will play into the 2020 Presidential Election.

MARIJUANA AT THE MOVIES

The representation of cannabis in media has evolved greatly over the years, as seen with modern entertainment such as Viceland's programs *Bong Appétit* and *Weediquette* and Netflix's Kathy Bates-led comedy *Disjointed*. From the adventures of Cheech & Chong to Seth Rogen and James Franco in *Pineapple Express* and beyond, our "Cannabis Cinema" piece will put a spotlight on how the substance has been seen on every kind of screen.

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Spanish Stuffed Mushrooms

16 Mushrooms, 8 Servings

What you'll need:

- 16 extra-large white button mushrooms
- 2 tablespoons olive oil
- 3/4 pound chorizo sausage
- 1 roma tomato, seeds and liquid removed, finely chopped
- 1/2 cup diced green onion
- 2 minced garlic cloves
- 1/2 jalapeño, seeded and finely chopped
- 6-8 teaspoons canna-olive oil
- 2/3 cups panko breadcrumbs
- 3 ounces cream cheese, softened
- 1/3 cup cotija cheese
- Salt & ground black pepper

Directions:

- Preheat oven to 325° F.
- Clean mushrooms using a paper towel to remove any dirt. Do not run under water.
 - To prepare mushrooms: Remove stems, finely chop, and set stems aside. Lightly coat each mushroom with olive oil, salt, and pepper; and place cap side up on a baking sheet for later use.
- In a sauté pan over medium heat, add 2 tablespoons olive oil and cook sausage until mostly cooked through, 4 to 5 minutes. Once the pink is mostly gone from the sausage add the minced garlic, chopped mushroom stems, diced green onion, and jalapeño to the pan. Cook until mushroom stems are tender.
- Take off the burner and add the canna-oil. Stir to thoroughly combine.
- Mix in the tomato, cheeses, breadcrumbs, and a pinch of salt and cracked black pepper.
- Fill mushroom caps with 1 ½ tablespoon of the filling and bake at 325° F for 20 minutes.



Bacon Wrapped Dates

16 Dates, 8 Servings

What you'll need:

- 16 pitted dates
- 2 tablespoons goat cheese
- 2-4 teaspoons canna-butter
- 8 slices bacon, cut in half

Directions:

- Heat oven to 325° F.
- Place the dates on your work surface and with a small knife make a slit in each and spread open.
- In a small bowl, combine the goat cheese with the butter until well mixed.
- Divide the mixture and press into each date, closing them up after filling.
- Wrap the bacon around each stuffed date.
- Place the dates bacon-seam down on a baking sheet.
- Bake until the bacon is cooked and crisp, about 10 minutes.

When you start a holiday meal with infused hors d'oeuvres, you are likely to feel the effects around dessert. Isn't that perfect? No need to overdo it. If you know your potency, stick to it. If you don't, go slow. Less is more.

I know the holidays are here when eggnog shows up in the stores. I actually have an infused eggnog recipe that is amazing. Hit me up if you want my recipe – Laurie@Laurieandmaryjane.com

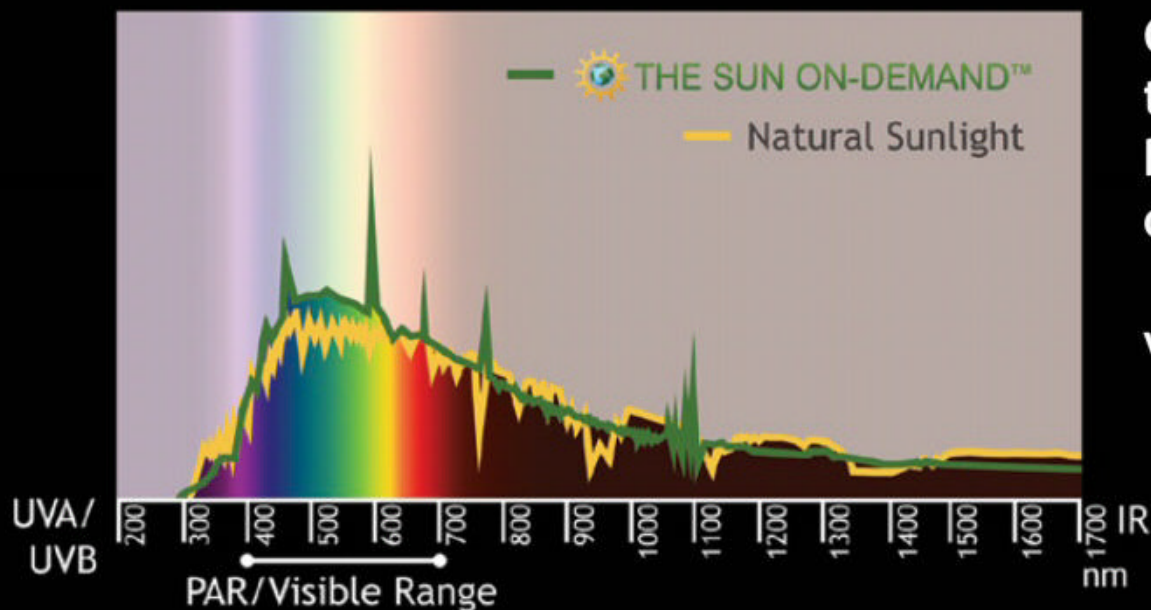
Happy Holidays from Laurie and MaryJane | #dontfeartheedible!

Laurie Wolf is the author of such cannabis cookbooks as Marijuana Edibles, HERB, The Medical Marijuana Dispensary, and Cooking with Cannabis. Her recipes have been featured in High Times, Dope Magazine, Culture, and more. She is also the founder of Laurie + MaryJane, an edible company offering everything from almond truffle bites to vegan chocolate cookies.

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A (Partially True) History of Cannabis

By Anthony Elio



The Beginning of Time

The universe is created. Planets, oceans, forests, and primitive life forms abound. Cannabis is also created, which God immediately hides in a hollowed out dictionary.

79 AD

Ancient Roman scientist and author Pliny the Elder notates the medical benefits of cannabis, mentioning its assistance with gout and cramped joints. His words should definitely be trusted, as only a true cannabis user would call themselves “Pliny the Elder.”

1600s AD

In an unpublished manuscript, it is revealed that William Shakespeare enjoyed utilizing cannabis as a mental stimulant. This explains the sharp change in tone found in Shakespeare’s later works, such as the buddy tragic comedy, “Dude, Where’s My Cressida?”

1700-1914 AD

Nothing interesting happens, cannabis or otherwise.

1915-1927 AD

States such as Utah, Arkansas, and Oregon begin passing cannabis prohibition laws. To put this in perspective, this was a time when trace amounts of cocaine could be found in cola and asbestos was still used in elementary schools.

1936

The Louis Gasnier-directed film *Reefer Madness* is released, looking to deter the youthful population from using the substance. However, franchise fatigue quickly sets in with a large amount of sequels and prequels released in the coming years, such as *Reefer Madness Returns*, *Reefer Madness Babies*, and *Reefer Madness vs. Mothra*.

1978

Joint is bogarted.

2018

After approving Question 778, Oklahoma makes history as the 30th U.S. state to embrace legalization of medical marijuana. This landmark decision also breaks ground as the first interesting thing related to Oklahoma.

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