Institute of Cannabis Research
COLORADO STATE UNIVERSITY PUEBLO

March 2022 ENewsletter Vol. 10

Introducing Elyse Contreras, new member of the ICR Governing Board

Ms. Elyse Contreras

Family, health and hard work are Elyse Contreras' core values. Elyse is an epidemiologist at the Colorado Department of Public Health and Environment (CDPHE), where she manages two programs; the Marijuana Health Monitoring Program and the Marijuana Research Grants Program. She recently joined the ICR Governing Board as a designated member delegated by CDPHE's Executive Director Jill Hunskaker Ryan.

Elyse found her passion for public health in 2010 when she began working for the state's Tuberculosis Program. She went on to work for the Refugee Health Program for two years before joining the marijuana programs in 2014. Elyse holds a masters degree in public health epidemiology. Prior to working for the State of Colorado, Elyse worked in the private sector for 10 years.

In addition to the ICR Governing Board, Elyse serves on several state and national public health committees and workgroups. She is the chairperson of Colorado's Retail Marijuana Health Advisory Committee and co-chair of the Council of State and Territorial Epidemiologists' Cannabis Subcommittee. She has also authored and contributed to multiple publications on the intersection of public health and marijuana legalization.

Elyse is a Colorado native whose family has resided in Aurora since the early 1960's. Her father came to Colorado from Venezuela in 1968. Her mother's family came in 1963. Elyse's grandfather, a pilot and WWII veteran, would take her to visit the near-by military bases of Fitzsimmons and Lowry. Coincidently Elyse would later attend graduate school on the former Fitzsimmons (now University of Colorado Anschutz campus) and work on the former Lowry Air Force Base (where her office at the state lab is located).

Elyse still resides in Aurora (in her grandparents former home) with her husband John Ayala their son Luca (a 5th generation Coloradan). They enjoy spending time with family, hiking and traveling to the Caribbean. Elyse hopes to promote the importance of family, health and hard work in her son and future generations of Coloradans.

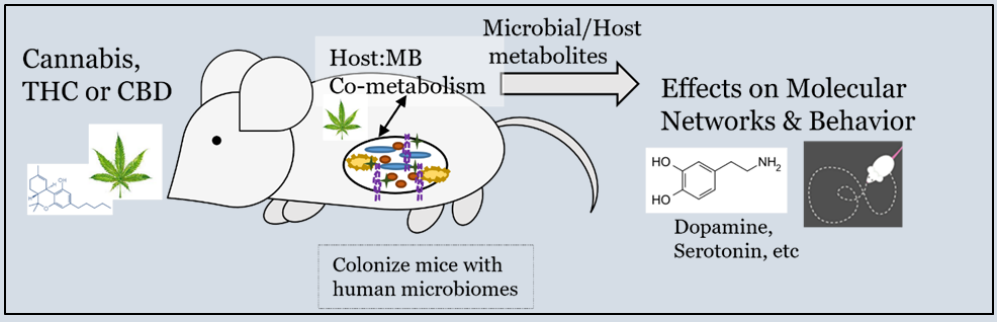
In this Issue:

Nichole Reisdorph, PhD: Microbiome-mediated effects of *Cannabis* and CBD on neurotransmitter-related molecular networks and anxiety

Dr. Nichole Reisdorph is a Professor in the Department of Pharmaceutical Sciences at the University of Colorado Anschutz Medical Campus. Nichole's research program focuses on understanding how specific components of foods and natural products lead to changes in both our physical and mental health. For example, orally consumed *Cannabis* and cannabidiol (CBD) products are becoming widely used supplements for a range of health disorders, including depression and anxiety. However, although up to 25% of *Cannabis* users are ingesting "edibles", such as oils, beverages, gummies, and baked goods, the health consequences of orally consuming *Cannabis* products are still largely unknown. Personal reports and some early research studies suggest that effects of orally consumed tetrahydrocannabinol (THC), CBD, and *Cannabis* products are largely dependent on the individual. We hypothesize that some of this variability in a person's response is due to differences in an individual's gut microbiome (MB) composition. Our research aims to unravel the complex relationship between host:microbiome co-metabolism of CBD/THC/*Cannabis* and better understand downstream effects on health. Towards this, we are conducting integrated microbiome/metabolome studies of germ-free (GF) and human colonized (HC) mice following oral consumption of green tea and are now expanding these studies to include oral consumption of THC, CBD, and *Cannabis*. In these studies, human gut bacteria from human fecal samples are used to colonize mice without their own MB (i.e. germ-free). Following colonization, we compare how individual, human MBs metabolize *Cannabis* and can quantitate the effects of *Cannabis* on molecular networks, including neurochemical networks known to be involved in mental health. These include dopamine, serotonin, kynurenine, epinephrine, and several endocannabinoids. To date, we have seen significant differences in brain and plasma levels of several of these neurochemicals and endocannabinoids when THC/CBD is delivered orally or via injection to mice. In addition, our studies have shown that levels of neurochemicals can vary when THC/CBD are given alone to mice versus when they are given as part of a complex Cannabis extract. Through the Institute of *Cannabis* Research (ICR) funding, we are now conducting behavioral studies in mice to determine the effect of host:MB metabolism of *Cannabis* on anxiety behaviors and relating these to neurochemicals.

Dr. Reisdorph is also the Director of the Skaggs School of Pharmacy Mass Spectrometry Facility which specializes in quantitative small molecule and peptide assays and discovery-based metabolomics. This includes a quantitative assay for neurochemicals, endocannabinoids, THC, CBD, and several THC metabolites; these assays have been applied to whole and extracted *Cannabis*, plasma, brain, and/or adipose tissue. As a Core Director, Nichole collaborates on clinical projects spanning from epilepsy and diabetes to nutrition and aging; this gives Nichole a broad perspective on several human diseases. Finally, Nichole's lab offers training in the fields of proteomics and metabolomics. Their hands on workshops have reached over 400 international participants since 2004 and they plan to hold their first "Analytical Procedures in *Cannabis* Research" in 2023.

The research underway in Dr. Reisdorph's lab will help determine if an individual's gut microbiome plays a role in how he/she/they metabolize CBD, THC, and other *Cannabis* molecules when orally ingested. In addition, our research will help understand the effects of CBD and *Cannabis* on anxiety and depression by conducting behavioral studies and measuring important neurochemicals known to be related to anxiety/depression.



Journal of Cannabis Research

The *Journal of Cannabis Research* (JCR) is the official publication of the Institute of Cannabis Research. It is the only broadly multidisciplinary journal of cannabis research, encompassing not only clinical and scientific research, but also research into social, business, economic, legal, environmental, and ethical impacts of cannabis use and the changing legal status of cannabis. To learn more about the aims and scope of the journal as well as submission guidelines, please visit:

Journal of Cannabis Research

Here are two recently published articles in the JCR that may be of interest:

Ethical perspectives of certified public accountants and the cannabis industry

A mixed methods analysis of cannabis use routines for chronic pain management

Donate Here

The Institute of Cannabis Research is now accepting donations to support future cannabis research. You, our friends, colleagues and supporters, have the ability to help us continue to support cutting edge research by donating to the ICR Research Fund. We hope you will consider contributing to this important opportunity to enhance our understanding of the applications and impacts of cannabis. All donations contributed are tax deductible. Please consider a year-end donation. To donate or to get more information please click on the donate button above.

Institute of Cannabis Research at Colorado State University Pueblo

Cannabis Research Webinar Series

Jefferson Thomas Jefferson University | Lambert Center for the Study of Medicinal Cannabis & Hemp

March Webinar: The ICR and Lambert Center are pleased to host Dr. Simon Haroutounian for the webinar on March 10th at 1:00PM MT.

Dr. Simon Haroutounian

Register Here

Title: Cannabinoids for pain: is effectiveness in the eye of the beholder?

Dr. Simon Haroutounian is the Chief of the Clinical Research for the Washington University Pain Center and Division of Clinical and Translational Research, an Associate Professor of Anesthesiology, and the Chief of Clinical Research at the Washington University Pain Center. Dr. Haroutounian obtained his BSc.Pharm and MSc.Pharm degrees, as well as his PhD, from the Hebrew University of Jerusalem. He has completed a Fulbright doctoral fellowship in pain outcomes research at the University of Utah, and a post-doctoral fellowship in clinical pain research at the Danish Pain Research Center in Aarhus, Denmark.

He has been involved in numerous studies and initiatives for understanding the mechanisms of cannabinoid medicated analgesia and synthesizing the evidence of the efficacy and safety of cannabis and cannabinoid-based medicine for the treatment of pain.

Dr. Haroutounian also serves on the International Association for the Study of Pain's task force on cannabis and cannabinoid analgesia to systematically examine the evidence on analgesic pharmacology of cannabinoids and preclinical evidence on their efficacy in animal models of injury-related or pathological persistent pain; the clinical efficacy of cannabis, cannabinoids, and cannabis-based medicines for pain; harms related to long-term use of cannabinoids; as well as societal issues and policy implications related to the use of these compounds for pain management.

April Webinar: The ICR and Lambert Center are pleased to host Dr. Marsha Rosner for the webinar on April 14th at 1:00PM MT.

Dr. Marsha Rosner

Register Here

Title: Cannabidiol inhibits SARS-CoV-2 replication through induction of the host ER stress and innate immune responses

The current focus of my laboratory is to understand fundamental signaling mechanisms leading to the generation of tumor cells and their progression to metastatic disease, particularly in triple-negative breast cancer that lacks targeted therapies. We use systems level approaches including activity-based proteomics, RNAseq, ChIPseq, and mass spectrometry as well as computational, molecular, biophysical, cellular and mouse model-based methodologies to identify and characterize key regulators of tumor growth and metastasis. As an additional tool, we have utilized a specific physiological suppressor of metastasis, Raf Kinase Inhibitory Protein (RKIP or PEBP1), and a downstream target of RKIP in cells, BACH1, to identify both molecular and cellular mediators of metastasis.

Our recent studies have shown that regulators of metastasis control multiple processes within the tumor cell microenvironment including metabolism, redox state, extracellular matrix, and recruitment and programming of tumor-associated macrophages. These factors also direct extracellular vesicles (exosomes) secreted by tumor cells to reprogram other cells in the body toward a pro-metastatic phenotype. Correlating omic-generated data from these studies with clinical data from cancer patients led to the identification of novel signaling modules that we used to build gene signatures that predict the metastatic potential of a tumor. More recently, our studies have led us to potential therapeutic treatments based on the concept of targeting key regulators of tumorigenesis, mimicking the action of metastasis suppressors such as RKIP or reprogramming signaling networks in cells to sensitize tumors to therapeutic agents.

May Webinar: **The ICR and Lambert Center are pleased to host Dr. Jamie Lo for the webinar on May at 1:00PM MT.** *(Link to this webinar will be provided via our webpage soon)*

Dr. Jamie Lo

Title: Chronic edible dosing of Δ9-tetrahydrocannabinol (THC) in non-human primates reduces systemic platelet activity and function

Dr. Lo specializes in caring for women with high-risk pregnancies, which include complex maternal or fetal medical issues. She believes that each pregnancy and birth experience is unique and requires individualized care. Dr. Lo finds satisfaction in helping women achieve a healthier pregnancy and delivery, especially those who may otherwise not be able to safely have children. Her current research focus is on the effect of maternal substance use and other environmental factors on placental development and offspring outcomes in pregnancy. Additionally, she is study the impact of chronic cannabis use on male and female reproductive health, pregnancy and offspring outcomes.

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COLORADO STATE UNIVERSITY PUEBLO

CANNABIS CULTIVATION
Webinar Series

VOLCANI INSTITUTE CELEBRATING 100 YEARS

March Webinar: **The ICR Hemp Farmers Association is pleased to announce our second webinar in our new series of Cultivation and Management Webinars Series. We will be hosting Dr. Mitchell Westmoreland on March 16th at 11:00AM MST**

Dr. Mitchell Westmoreland

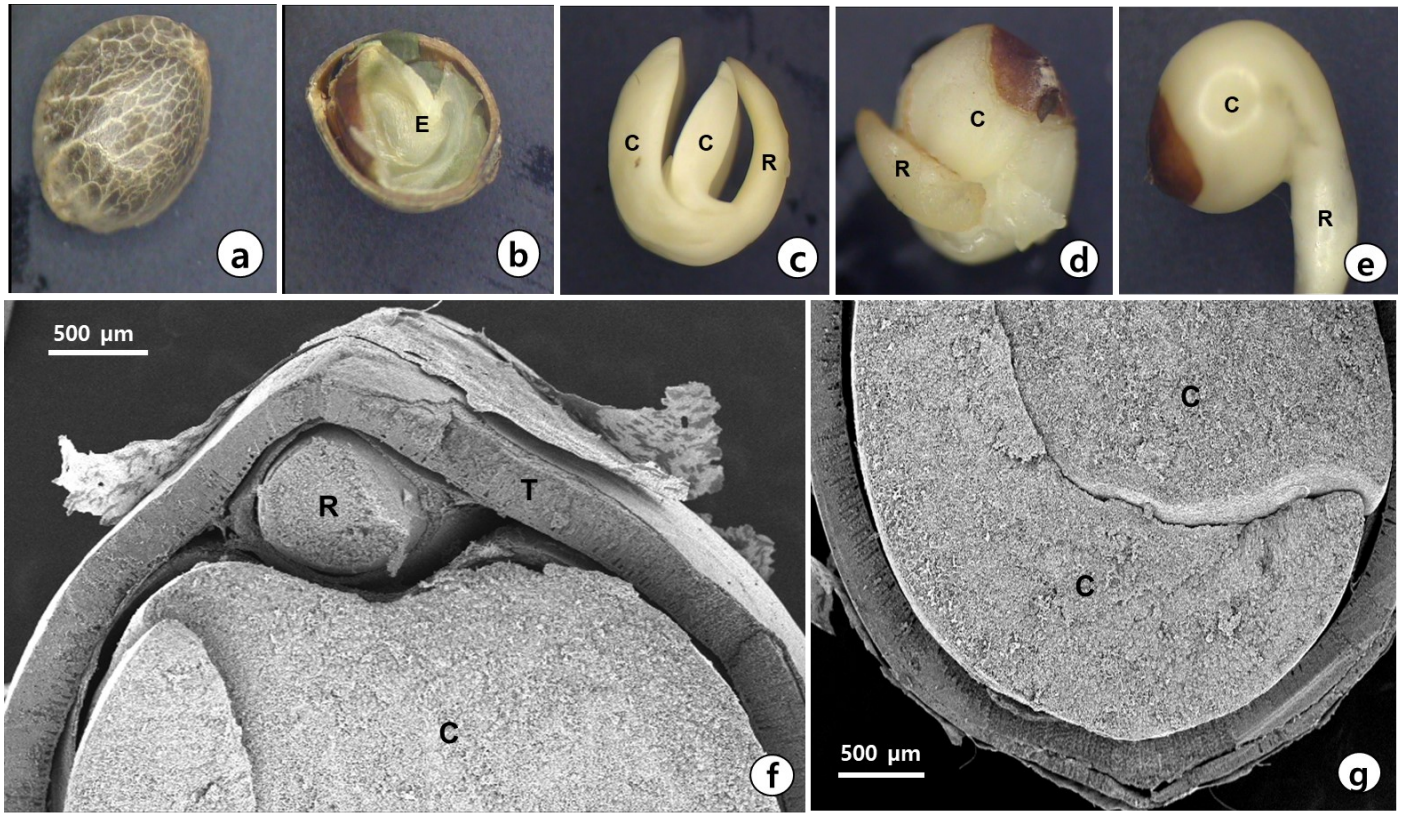
Register Here

Title: Toward a sustainable approach to phosphorus fertilization in *Cannabis* cultivation

Mitchell Westmoreland is a Ph.D. candidate working under Dr. Bruce Bugbee in the Crop Physiology Laboratory at Utah State University. He received his B.S. in Biology from Utah State University in 2018, after which he worked for the USDA Forage and Range Research Laboratory in Logan, UT before beginning his graduate work. His research deals with the cultivation and physiology of medical *Cannabis*, with a focus on the influence of electric lighting, mineral nutrition, and temperature on flower yield and quality. Westmoreland teaches an undergraduate course on the science of medical *Cannabis* cultivation, as well as an online course that is open to the public. He has published in the journal PLoS One and has been an invited speaker at Cannabis Business Times' Cannabis Conference and is a member of The American Society for Horticultural Science and Sigma Xi, The Scientific Research Honor Society.

The upcoming April speaker will be Dr. Punya Nachappa and the May speaker is Dr. Whitney Cranshaw. More information and registration links will be forthcoming and can be found on our webpage within the next few weeks.

A Deeper Look at Hemp - Scanning electron microscopy images presented by Dr. Eunsoo Kim, Visiting Scientist - ICR



Stereoscopic light micrographs (a-e) and scanning electron micrographs (f-g) show the features of a hemp seed.

a. Whole hemp seed.

b. Median transverse sectioned hemp seed contains an embryo (E).

c. An extracted embryo which is curved so that it's axis is U-shaped, consists of two cotyledons (C) and a radicle (R).

d. A swollen embryo after soaking.

e. A germinating embryo in which the radicle rapidly elongates from the seed and becomes a primary root.

f. SEM micrograph of a seed shows an embryo structure containing two cotyledons and a radicle surrounded by testa (T).

g. SEM micrograph of a seed shows two cotyledons which are rich in protein and lipid bodies.

2022 VIRTUAL CANNABIS RESEARCH CONFERENCE

AUGUST 8-10

HOSTED BY

Oregon State University Global Hemp Innovation Center

Institute of Cannabis Research COLORADO STATE UNIVERSITY-PUEBLO

CALL FOR ABSTRACTS NOW OPEN FOR 2022

VIRTUAL CANNABIS RESEARCH CONFERENCE

Oregon State University's Global Hemp Innovation Center (GHIC), in partnership with Colorado State University's Institute for Cannabis Research (ICR), announced today the Call for Abstracts for the 2022 Virtual Cannabis Research Conference (CRC). The conference will be held online from August 8-10th.

Hemp researchers believe hemp has the potential to become a major agricultural commodity in the United States and abroad, with hemp plant fiber being used in manufactured products, including clothing, construction materials, and packaging. Hemp seed oil is being investigated for use in foods and feed, nutraceuticals, and cosmetics. And extracted chemicals for use in pharmaceuticals, aromas, and flavors.

Authors may submit abstracts in eight multidisciplinary topic areas, including:

1. Business and Economic Development
2. Education
3. Genetics, Growth, and Culture
4. Human Health and Medicine
5. Livestock and Companion Animals/Pets
6. Materials, Processing, and Product Manufacturing
7. Policy and Legal Landscape
8. Quality Control, Chemistry, and Analytics

Authors may request either platform or poster presentation formats and must designate one of the eight program Session Topics for the presentation of their abstracts. Abstracts will be assigned to appropriate conference sessions by the Program Committee. Session assignments will comply with author preferences on a space-available basis and may not always accommodate author requests.

This 5th annual conference will bring together leading cannabis researchers, innovators, business owners, trainees, and other attendees with expertise in cannabis science from across the country and overseas. The virtual conference will include presentations, live Q & A, an interactive exhibit hall and poster hall, along with a community lounge with real-time engagement.

The deadline to submit an abstract is April 4.

For complete Abstract Guidelines and to submit an abstract, visit **CannabisResearchConference.net**.