BECKLEY FOUNDATION

SCIENTIFIC PROGRAMME

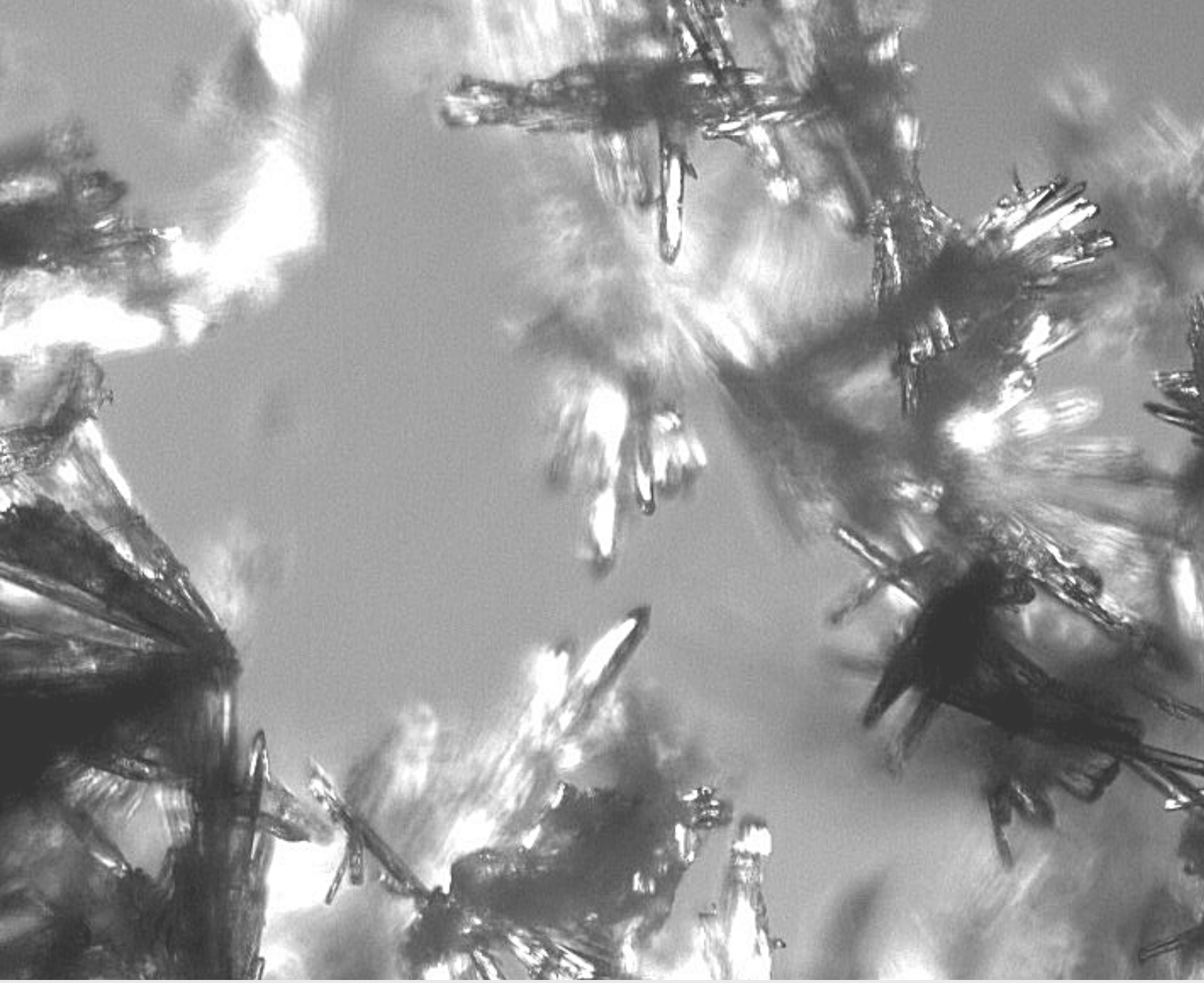
2018

BECKLEY FOUNDATION

The Beckley Foundation is a UK-based think tank and UN-accredited NGO founded by Amanda Feilding in 1998. We conduct pioneering scientific research in order to further our understanding of consciousness and reveal the mechanisms underlying the medical and cognitive benefits of psychedelics, cannabis and MDMA. We advocate the legal regulation of all drugs in order to reduce harms at all stages of the supply chain. Combining science and policy, we are driving evidence-based drug policy reform on a global level.

The Scientific Programme is led by Amanda Feilding, who develops collaborative partnerships with leading scientists and institutions around the world. Through these collaborations we develop and conduct pioneering research. The studies and clinical trials focus on cannabis and psychedelics (including psilocybin, LSD, ayahuasca, DMT and 5-MeO-DMT), and MDMA. We investigate the action of these substances in the human brain, using the latest developments in neuroscience and brain imaging technology. Our research and clinical trials aim to increase our understanding of consciousness, and to use this knowledge to treat mental and physical illness, expand awareness, and enhance well-being and creativity.

The Policy Programme brings together leading international scientists, politicians and experts to provide a rigorous, independent review of current global drug policies, and to develop a scientific evidence-base on which to build balanced alternative policies. In 1998 we were among the first to bring scientific evidence to this field. We convene seminars and produce policy reports which shed light on different areas around this complex issue, and demonstrate how the *legal* regulation of drug markets could reduce the harms caused by both the drugs themselves, and by the collateral consequences of prohibition. We collaborate globally with political leaders and give presentations at international fora such as the UN.



Many thanks to our donors!

Our Science, Policy and Education Programmes rely exclusively on the generosity of our supporters. The Beckley Foundation would like to sincerely thank its donors for their kind contributions, and ask all interested parties to help us develop and expand our science, policy and outreach programmes.

Donations of any amount are greatly appreciated and will help fund our upcoming studies into the therapeutic effects of psychedelic drugs, cannabis, and MDMA, as well as our other programmes.

To donate, please visit **beckleyfoundation.org/donate**

LSD Crystals – Photo by Nick Cozzi

AMANDA FEILDING AND THE BECKLEY FOUNDATION

"Psychedelics are a key to unlock a deeper level of the psyche. They can transform the individual in ways that modern science is only just beginning to understand."

Amanda Feilding

Amanda Feilding has been called the 'hidden hand' behind the renaissance of psychedelic science, and her contribution to global drug policy reform has also been pivotal and widely acknowledged.

Amanda was first introduced to LSD in the mid-1960s, at the height of the first wave of scientific research into psychedelics. Impressed by its capacity to initiate mystical states of consciousness and heighten creativity, she quickly recognised its transformative and therapeutic power. Inspired by her experiences, she began studying the mechanisms underlying the effects of psychedelic substances and dedicated herself to exploring ways of harnessing their potential to enhance wellbeing.

In 1996, Amanda set up *The Foundation to Further Consciousness*, changing its name to *The Beckley Foundation* in 1998. She realised that the potential of cannabis and the psychedelics could only be harnessed through carrying out scientific research of the highest standard. Through the Foundation, she set about using cutting-edge brain-imaging technologies to examine the neural changes underlying altered states of consciousness. Her long-held aim is to further our understanding of brain function under the influence of various psychoactive substances, so that we can better utilise the immense potential of these compounds to improve our mental and physical health.

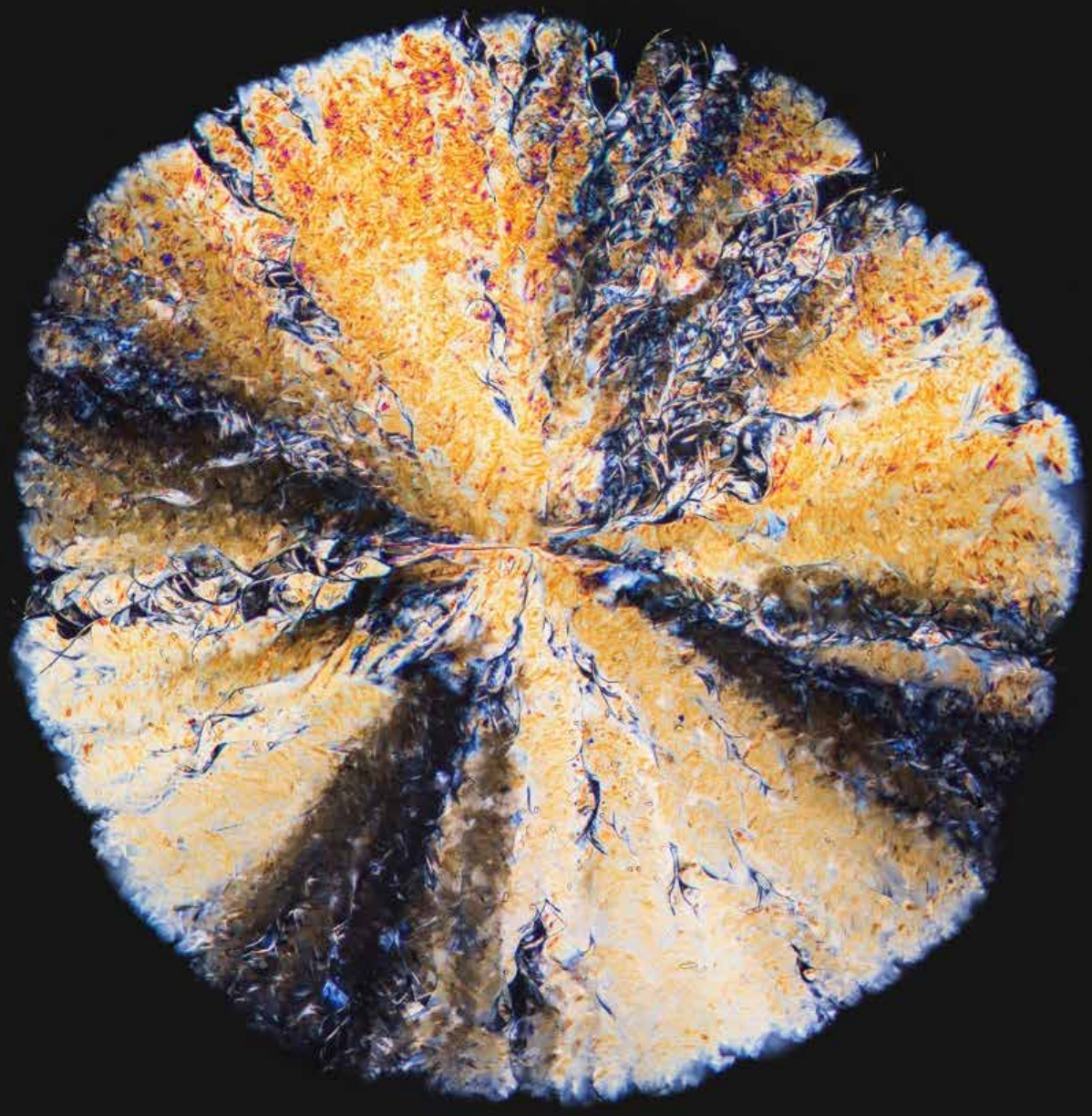
Having watched the development of the 'War on Drugs' with dismay, Amanda felt compelled to do whatever she could to draw attention to its devastating and unintended consequences. Bringing together a network of scientists, politicians and drug policy analysts, she was among the first to begin creating a scientific evidence-base to help reform global drug policies, in order to better protect health, reduce harms and economic costs, and uphold human rights.

From 1998, she initiated and hosted a series of 11 seminars in the House of Lords, discussing key policy issues and drawing attention to the then ignored topics of cannabis and psychedelics. These seminars, and the papers arising from them, were highly influential in changing attitudes among thinkers and policy-makers worldwide.

Through the Beckley Foundation, Amanda continues to bridge the divide between science and drug policy; her pioneering psychedelic research is providing the scientific evidence upon which a case for drug policy reform can be built. Such reform will, in turn, allow for further research on these currently prohibited substances to progress and hopefully result in their rescheduling and the availability of psychedelic-assisted psychotherapy for those in need.

 Amanda Feilding – Photo by Imogen Freeland

DMT Crystal, Cross polarisation microscope.
Photo by Maurice Mikkers



"Through the Beckley Foundation, Feilding has spent the last two decades working tirelessly to change the perception of drugs around the world, from advising international governments to conducting ground-breaking studies."

The Telegraph

50

Amanda Feilding has co-authored over 50 papers in influential scientific journals as a result of her collaborative research projects.

THE BECKLEY/IMPERIAL RESEARCH PROGRAMME

The *Beckley/Imperial Research Programme* has been a highly productive partnership between Amanda Feilding and Prof David Nutt, co-founders and directors of the Programme, and Dr Robin Carhart-Harris, lead investigator. The collaboration began in 2005, when Amanda approached David about forming a partnership to investigate the effects of psychedelics and cannabis on brain function. Many new scientists have since joined the team.

The Programme has carried out pioneering brain imaging studies with LSD, psilocybin, DMT and MDMA, using fMRI and MEG. These have greatly expanded our understanding of how psychedelics work in the brain, and have provided invaluable insights into the nature of different states of consciousness and how they can aid the treatment of mental illnesses.

PSILOCYBIN RESEARCH

In 2012, the findings of the psilocybin brain imaging study were published to world acclaim, and led to the Medical Research Council awarding a grant to study the efficacy of psilocybin for the treatment of depression. This pilot study was published in 2016 in *The Lancet Psychiatry*, with remarkably positive results: 67% of subjects with treatment-resistant depression were in remission one week after taking psilocybin, and 42% remained depression-free three months later. This is an unprecedented achievement, as participants had suffered from depression for an average of 18 years and had failed to respond to any other treatment.

The study was extended to bring the total number of participants to 20 and to observe the longer term effects of the psilocybin treatment. Results supported the earlier findings and helped further elucidate the ways in which psilocybin brings about a beneficial therapeutic outcome.

LSD RESEARCH

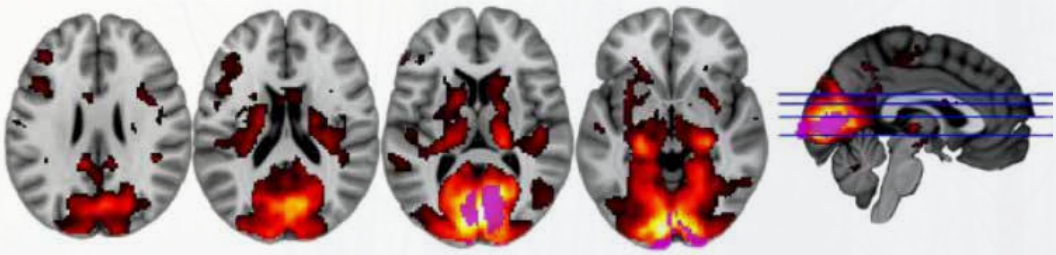
In 2014, the *Beckley/Imperial Research Programme* started the **first-ever brain imaging study with LSD**, a long-standing ambition of Amanda's. Results were published in PNAS in 2016 and launched at the Royal Society, London, to global acclaim. We showed marked changes in brain blood-flow, neural activity, and network communication patterns that correlated strongly with the drug's hallucinatory and other consciousness-altering properties.

LSD was shown to decrease connectivity between key regions of the brain's *Default Mode Network* (DMN) that are involved in processing various aspects of selfhood – such as autobiographical memories and self-awareness, thinking about the past, and planning the future. This effect correlated strongly with the subjective experience of 'ego dissolution', implying the importance of the DMN for maintaining the boundaries of the ego.

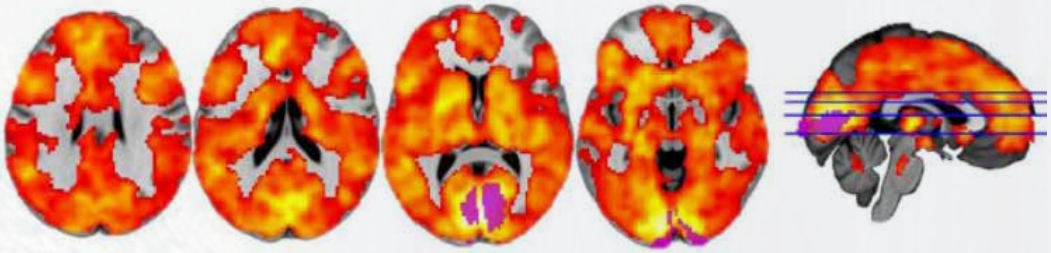
At the same time, LSD causes a dramatic increase in connectivity between other regions of the brain that are normally highly segregated. This can induce more free-flowing patterns of cognition, allowing users to become more creative and break free from rigid modes of thought and behaviour – such as those underlying psychological disorders like depression and addiction.

These results have significant implications for the neurobiology of consciousness, as well as for potential applications of LSD as a valuable tool for psychotherapy.

PLACEBO



LSD



Beckley/Imperial Research Programme - 2016 *PNAS*
Neural correlates of the LSD experience revealed by multimodal neuroimaging shows dramatically increased connectivity between the visual centre and the rest of the brain.

BECKLEY/IMPERIAL LSD RESEARCH PROGRAMME

WHAT'S COMING NEXT

SHEDDING LIGHT ON LSD

Collaboration with Dr Tobias Buchborn and Prof Thomas Knopfel, Imperial College

In this pioneering project, we employ refined techniques of optogenetic electrophysiology and make neurons within the living brain emit a light whenever they are activated. In this way, we can zoom into the very key cells of the brain that are targeted by LSD (e.g., cortical pyramidal cells), and illuminate their distinctive responses to the drug. We will investigate the effects on blood vessels and on neuronal functioning and integrate these results with the changes observed at the behavioural level.

RECONSTRUCTION OF THE VISUAL HALLUCINATIONS EXPERIENCED ON LSD

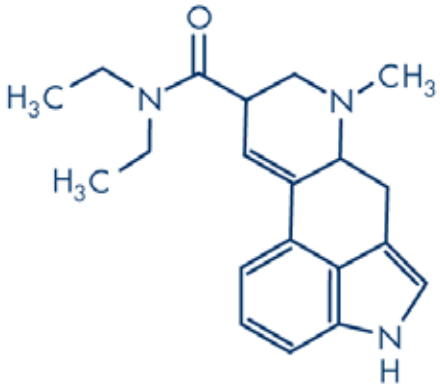
Led by Leor Roseman, a collaboration between UC Berkeley and the Beckley/ Imperial Research Programme

Study participants will watch videos while their brain activity is monitored using fMRI. Using this neuroimaging data, a sophisticated artificial intelligence model will try to delineate what the subject is seeing with their eyes closed under LSD and will reconstruct a video of this psychedelic imagery.

SELF-BLINDED LSD MICRODOSING SURVEY

Collaboration with Imperial College and the Mount Sinai hospital in New York

Because sceptics are quick to attribute the observed benefits of microdosing to the placebo effect, this soon-to-be-launched community trial will be following people who are already microdosing under their own initiative, and incorporate a novel self-blinding procedure that mimics important elements of placebo control, allowing us to confirm, in controlled conditions, the short and intermediate effects of LSD within a large number of participants for the first time.



LSD molecule

OLD GAME, NEW SCIENCE: INVESTIGATING THE EFFECTS OF LSD MICRODOSING ON MOOD AND COGNITIVE FUNCTIONS

Led by Amanda Feilding with Robin Carhart-Harris, Eline Haijen and David Nutt

Many of the advocates of LSD microdosing – especially those working in artistic and technological fields – are most attracted by its positive impact on creativity and insight. But capturing a moment of insight, rather than relying on self-reported judgments, presents a challenge. In facing this challenge, Amanda was inspired by her personal experience as a Go player, a unique board game that requires fusing logical thinking and creativity.

Amanda, together with the team, designed this first double-blind controlled study to explore the physiological and psychological effects of repeated microdosing. Two groups of 24 participants will receive either twice-weekly microdoses of LSD or a placebo over a one-month period. Changes in brain activity will be measured using EEG, and we will use subjective reports, questionnaires, and tasks – including Go playing – to assess the effects of microdosing on mood, cognitive flexibility, creativity, and both emotional and intellectual insight.

This study will generate the first scientific knowledge of this novel approach to taking psychedelics and will pave the way for future research that will explore the diversity of its application – therapeutic, cognition boosting, and creativity enhancing.

The total number of atoms in the universe is 10^{82}, but the number of possible Go games is 10^{360}. That's roughly equal to the number you'd get if you squared the number of atoms in the universe, then squared that number again.

BECKLEY FOUNDATION LSD RESEARCH PROGRAMME

HARVESTING THE FULL POTENTIAL OF LSD

In 2017 Amanda expanded the *Beckley LSD Programme* by setting up two new collaborative Programmes. The first with Prof Sidarta Ribeiro and his colleagues at the *University Federal of Rio Grande do Norte* and the *D'Or Institute*, and the second with Prof Jan Ramaekers at *Maastricht University*. Through both these Programmes we will widen and deepen our understanding of the effects of LSD at the genetic, molecular, cellular, vascular, brain networks and behavioural levels.

THE BECKLEY/BRAZIL PSYCHEDELIC PROGRAMME

LSD DOSE-RESPONSE NEUROIMAGING STUDY

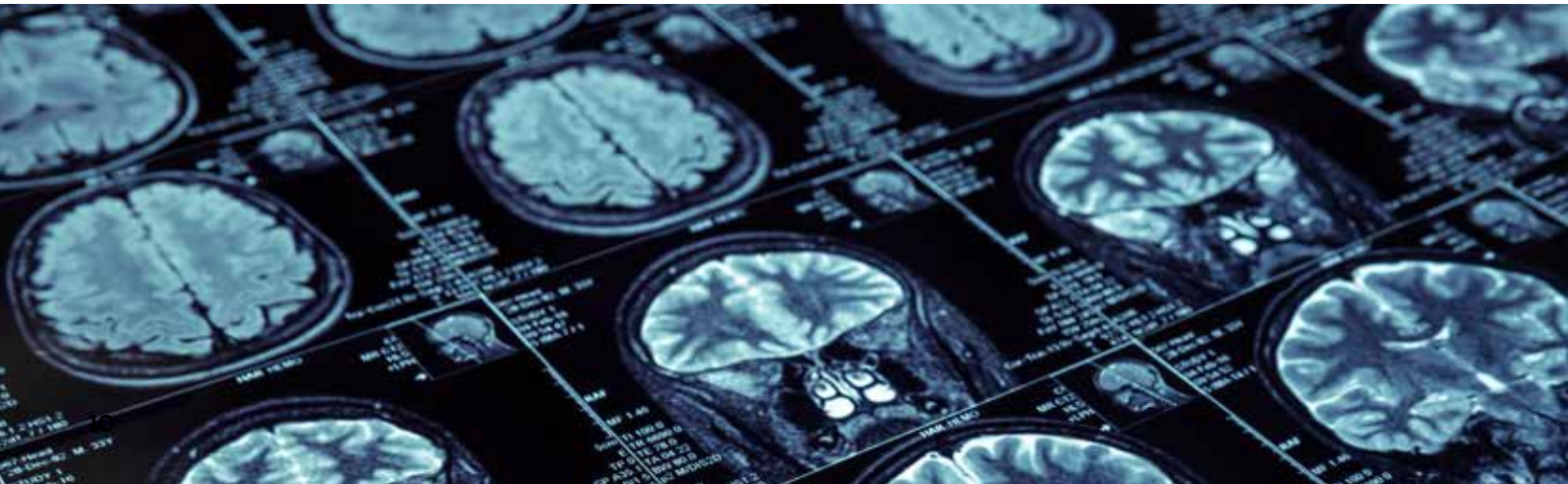
with Prof Sidarta Ribeiro from the University Federal of Rio Grande do Norte, and Prof Luis Fernando Tófoli from UNICAMP in Sao Paulo

To complement our *Beckley/Imperial* LSD neuroimaging study of 2016, this study will use fMRI to investigate the effects of varying micro and macro-doses of LSD – from 0 to 250 mics – on brain function, with a special focus on investigating changes in cerebral blood flow/volume, functional connectivity, and the way these changes relate to subjective effects. This study will also provide key information regarding LSD's pharmacokinetics and pharmacodynamics, by looking at changes such as blood markers of neural growth and inflammation, cortisol, glucose metabolism, etc.

INVESTIGATING LSD'S MOLECULAR AND CELLULAR MECHANISMS OF ACTION

with Prof Sidarta Ribeiro from the University Federal of Rio Grande do Norte and Prof Stevens Rehen from the D'Or Institute in Brazil

As part of the B*eckley/Brazil Psychedelic Research Programme*, we are undertaking a series of experiments designed to characterise the effects of LSD at the molecular and cellular levels, with a particular focus on its action on key mechanisms such as **neuroplasticity, inflammation and neurogenesis**. Our collaborators at the *D'Or Institute* have already undertaken the first research showing that psychedelics affect molecular signalling related to learning and memory in the human brain tissue, using laboratory-made 'minibrains'. This new approach has been considered a real breakthrough in neuroscience, and our current studies hold great promise for considerably deepening our understanding of the mechanisms of action of LSD.

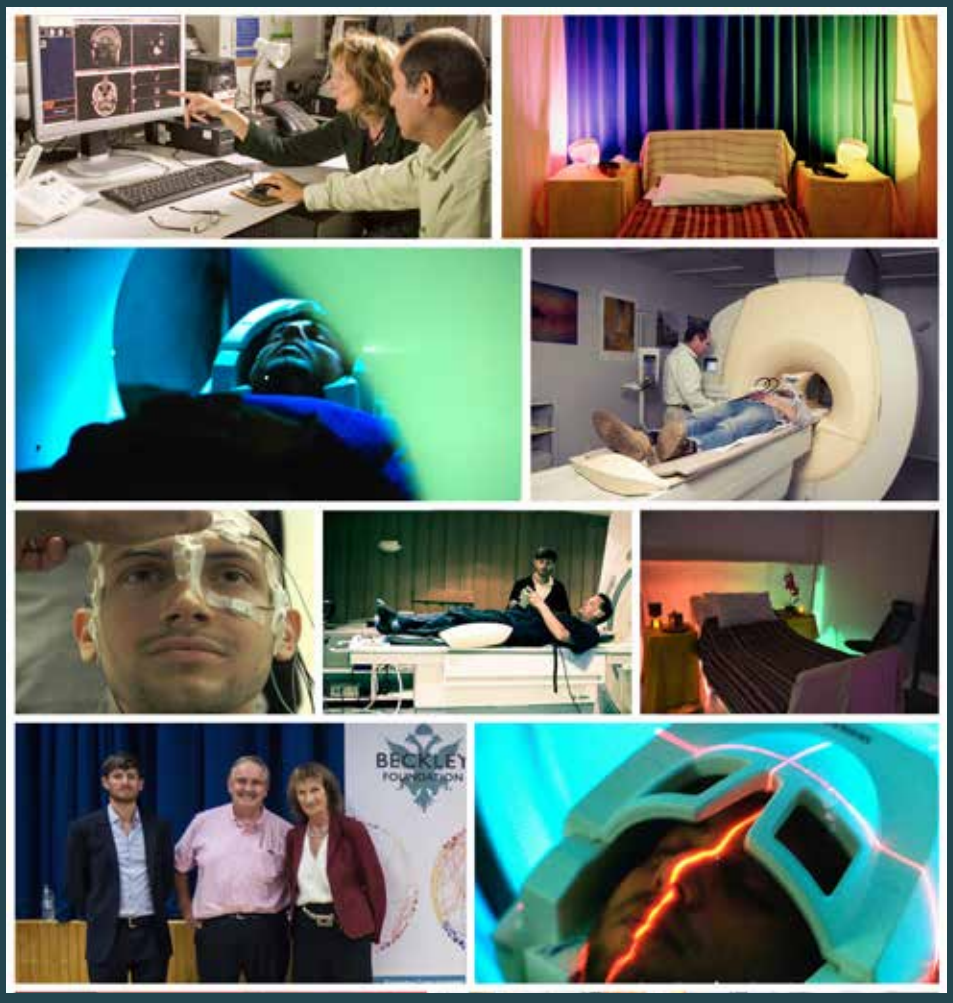


THE BECKLEY/MAASTRICHT PSYCHEDELIC PROGRAMME

COGNITIVE AND EMOTIONAL IMPACT OF MICRODOSES OF LSD

with Prof Jan Ramaekers and Dr Kim Kuypers at Maastricht University

Amanda set up this study in order to complement the *Beckley/Imperial* microdosing research project by assessing the short-term effects of various microdoses of LSD. Twenty-four participants will receive placebo and three different microdoses – from 5 to 20 mics – in a randomized and balanced cross-over design. After each dose, acute effects on cognitive performance, well-being, and resilience to pain and stress, will be assessed. Through this protocol, we hope to determine the different effects of various small doses of LSD on creativity, cognitive flexibility, and wellbeing. Additionally, blood samples will be analysed to assess markers of neuronal growth. Finally, vital signs will be closely monitored to establish the safety profile of the drug.



BECKLEY FOUNDATION PSILOCYBIN RESEARCH PROGRAMME

MORE GROUNDBREAKING STUDIES ON PSILOCYBIN

PSILOCYBIN FOR CREATIVITY

Collaboration with Prof Jan Ramaekers and Dr Kim Kuypers as part of the Beckley/Maastricht Psychedelic Programme

This project aims to examine whether psilocybin can facilitate an individual's ability to devalue previously learned associations by enhancing creative thinking. The mechanisms underlying this phenomenon will be studied using behavioural measures and neuroimaging (MRI spectroscopy and fMRI). This research will deepen our limited understanding of how psychedelics can expand creative capacity, and in doing so, will reveal potential therapeutic targets for altering maladaptive learning mechanisms characteristic of mental illness.

PSILOCYBIN FOR SMOKING CESSATION

Collaboration with Prof Roland Griffiths and Dr Matthew Johnson at Johns Hopkins University

In 2014 we completed a very successful small-scale pilot study investigating psilocybin-assisted psychotherapy to overcome nicotine addiction in 15 participants. With an unprecedented success rate, 80% of participants were still completely abstinent at the 6-month follow-up, and no adverse events were observed. With the next best treatment working for only 30% of individuals, this is a very promising finding that demands further investigation. We are now conducting a larger trial, where a further 30 participants are being randomized to a psilocybin condition or a nicotine replacement therapy (NRT) condition. Using fMRI, this study will help uncover the neural mechanisms underlying psilocybin's anti-addictive properties.

"The best way to overcome the taboo and re-integrate psychedelics into the fabric of society is by undertaking the very best scientific research"

Amanda Feilding

BECKLEY FOUNDATION CANNABIS RESEARCH PROGRAMME

UNEARTHING THE THERAPEUTIC POTENTIAL OF PLANT CANNABINOIDS

BECKLEY/EXETER RESEARCH PROGRAMME

Co-directed by Prof Celia Morgan and Amanda Feilding, Exeter University, UK

Cannabidiol (CBD) is one of the main non-psychoactive constituent of cannabis, and anecdotal evidence and preclinical trials suggest it has great potential to treat a number of conditions, including addiction, pain, and anxiety - we are currently investigating its potential to overcome addiction. Using brain imaging, we hope to further our understanding of the brain mechanisms underlying the therapeutic benefits of this major cannabinoid.

We are also undertaking an exciting new project at the *Beckley/Exeter Cannabis Centre* at the *University of Exeter*. Working with our partners in Canada, we are bringing the latest innovative technology to cannabis research in the UK. Using highly specialised equipment to analyse the cannabinoid, terpene and flavonoid content of different strains of cannabis, we will formulate cannabis-based medicines to treat specific conditions such as pain, addiction, and anxiety, and also to boost cognitive functioning, including memory.

EFFECTS OF DIFFERENT STRAINS OF CANNABIS ON BRAIN FUNCTION

Collaboration with Prof Val Curran and Dr Matthew Wall, University College London

This study used fMRI to compare the effects of two different strains of cannabis on brain function – one with *high* THC content and minimal CBD and the other with a *balanced* CBD/THC ratio. High-THC cannabis was found to disrupt certain brain networks, notably the *Default Mode Network* and the *Salience Network*, while CBD helped counteract these effects. These findings, part of which were initially broadcast on the *Channel 4 TV programme Drugs Live: The Cannabis Trial*, are important for developing harm-reduction strategies given the growing popularity and availability of high-THC cannabis worldwide.

BECKLEY FOUNDATION AYAHUASCA RESEARCH PROGRAMME

BRIDGING THE GAP BETWEEN TRADITIONAL MEDICINE AND MODERN SCIENCE

AYAHUASCA AND DMT

For centuries, if not millennia, indigenous Amazonian shamans have used ayahuasca to heal the physical, emotional and spiritual ills of their communities. This visionary brew contains the psychoactive compound DMT, as well as other chemicals called monoamine oxidase inhibitors (MAOIs) which block the enzymes in the human body that normally break down DMT before it reaches the brain.

Like many psychedelics, DMT interacts with serotonin receptors in the brain in order to elevate mood and enhance emotional wellbeing. Because of this, the compound has been successfully used to treat a range of psychological disorders, though much more research is needed in order to illuminate the neurobiological mechanisms behind this therapeutic effect.

THE EFFECT OF DMT ON THE HUMAN BRAIN USING FMRI AND EEG

Led by Chris Timmerman, Beckley/Imperial Research Programme

This study is using EEG, fMRI and questionnaires to examine how alterations in brain activity relate to changes in subjective experience under DMT. It is hoped that the results will give insight into the therapeutic properties of this powerful psychedelic compound and reveal the different mechanisms underlying the effects of LSD and DMT.

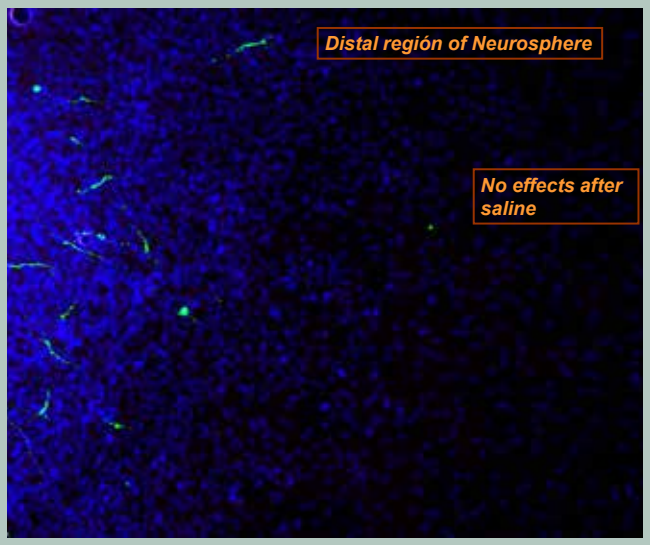
SURVEYING THE EFFECTS OF AYAHUASCA ON QUALITY OF LIFE, WELLBEING AND HEALTH

Collaboration with ICEERS and the Temple of the Way of Light, Peru

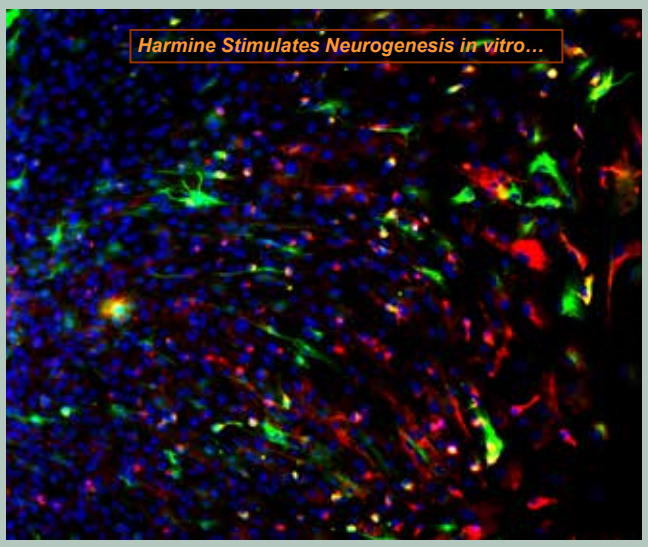
For years people have spoken about the profound healing potential of ayahuasca, but few studies have attempted to explore this systematically. This project evaluates the long-term effects of ayahuasca, when ingested in a ritual setting, on the personal development and mental and emotional wellbeing of Western users. Collecting data from hundreds of participants over two years, we aim to generate much-needed scientific evidence about ayahuasca's benefits and risks, while also examining its potential to treat depression, anxiety, grief and post-traumatic stress disorder, among other conditions.

THE BECKLEY/SANT PAU RESEARCH PROGRAMME

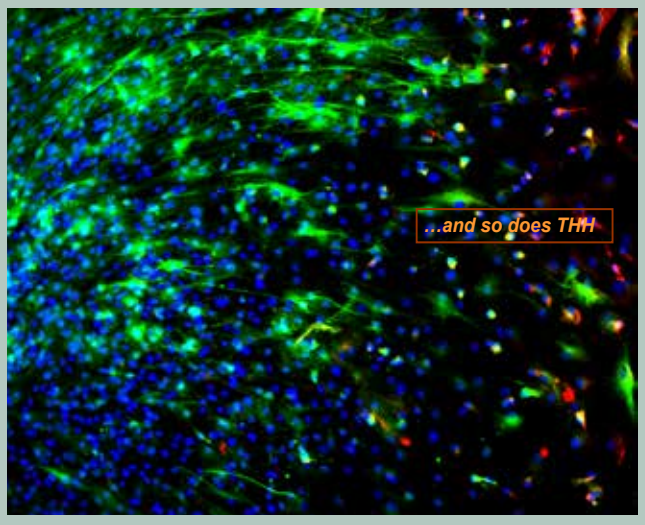
The collaboration between Dr Jordi Riba and Amanda Feilding was initiated in 2013 to investigate the actions of ayahuasca, DMT, and 5-MeO-DMT at a molecular, structural, and functional level in the brain, and to examine their effects in both new and experienced users. Using pharmacological techniques and brain imaging methods such as fMRI and spectroscopy, we are investigating how changes in neural activity caused by these substances lead to an increase in mindfulness capacities and other interesting psychological phenomena.



Our latest study, in collaboration with the *Spanish National Research Council*, revealed for the first time that components of the visionary Amazonian brew ayahuasca have the potential to promote the birth of new neurons (neurogenesis). Preliminary results show that the addition of harmine and tetrahydroharmine to cell cultures containing neural stem cells dramatically increases the growth of new neurons and their maturation.



If these findings can be replicated *in vivo*, our research could open up a new avenue of treatment for psychiatric and neurodegenerative disorders such as depression, Alzheimer's disease, and Parkinson's disease.



Additional studies in development include:

- A clinical trial investigating the effect of pharmahuasca for the treatment of post-traumatic stress disorder resulting from childhood trauma.
- The first ever study to investigate the neurobiological and immunological effects of 5-MeO-DMT.
- A brain imaging study investigating the phenomenology of experiencing 'entities' after DMT intake.

Color code:
Blue staining: cell nuclei (marks all cells)
Green staining: young neurons

SELECTED SCIENTIFIC PAPERS

BECKLEY/IMPERIAL RESEARCH PROGRAMME

Co-directed by Prof David Nutt & Amanda Feilding

Psilocybin with psychological support for treatment-resistant depression: an open-label feasibility study. Carhart-Harris RL, Bolstridge M, Rucker J, ...Feilding A, ... Nutt DJ (2016). *The Lancet Psychiatry,* 3(7), 619-627

Neural correlates of the LSD experience revealed by multimodal neuroimaging. Carhart-Harris RL, Muthukumaraswamy S, Roseman L, Kaelen M, ..., Feilding A, Nutt DJ (2016). *PNAS,* 113(17), 4853-4858

LSD modulates music-induced imagery via changes in parahippocampal connectivity. Kaelen M, Roseman L, ...,Feilding A, Muthukumaraswamy S, Nutt DJ, Carhart-Harris R (2016). *European Neuropsychopharmacology,* 26(7), 1099-1109

Increased global functional connectivity correlates with LSD-induced ego dissolution. Tagliazucchi E, Roseman L, Kaelen M, ..., Feilding A, Nutt DJ, Carhart-Harris R (2016). *Current Biology,* 28(8), 1043-1050

Psilocybin with psychological support for treatment-resistant depression: six-month follow-up. Carhart-Harris RL, ..., Feilding A, Taylor D, Curran HV, Nutt DJ (2017), *Psychopharmacology (Berl),* In Press

Increased amygdala responses to emotional faces after psilocybin for treatment-resistant depression. Roseman L, Demetriou L, Wall MB, Nutt DJ, Carhart-Harris RL (2017), *Neuropsychopharmacology,* In Press

Altered Insula connectivity under MDMA. Walpola IC, Nest T, Roseman L, Erritzoe D, Feilding A, Nutt DJ, Carhart-Harris RL (2017). *Neuropsychopharmacology,* 42(11):2152-2162

The entropic brain: a theory of conscious states informed by neuroimaging research with psychedelic drugs. Carhart-Harris RL, Leech R, Hellyer P, ..., Feilding A, Nutt DJ (2014). *Frontiers in Human Neuroscience*, 8(20), 1-22

Neural correlates of the psychedelic state as determined by fMRI studies with psilocybin. Carhart-Harris RL, Erritzoe D, Williams T, ... , Feilding A, Wise R, Nutt DJ (2012). *PNAS,* 109(6), 2138-214

The Effects of Acutely Administered 3, 4-MDMA on Spontaneous Brain Function in Healthy Volunteers Measured with ASL and BOLD Resting State Functional Connectivity. Carhart-Harris RL, Murphy K, Leech R, ..., Feilding A, Curran HV, Nutt DJ (2015). *Biological Psychiatry,* 778(8), 554-562

COLLABORATION WITH JOHNS HOPKINS UNIVERSITY

Pilot study of the 5-HT2AR agonist psilocybin in the treatment of tobacco addiction. Johnson MW, Garcia-Romeu A, Cosimano MP, Griffiths RR (2014). *Journal of Psychopharmacology,* 28(11); 983-992

COLLABORATION WITH UCL LONDON

Investigating the interaction between schizotypy, divergent thinking and cannabis use. Schafer G, Feilding A, Morgan CJ, ..., Curran HV (2012). *Consciousness and Cognition*, 21(1), 292-298

Dissociable effects of cannabis with and without cannabidiol on the human brain's resting-state networks. Matthew B. Wall, Rebecca Pope, ..., Amanda Feilding, David J. Nutt, & H. Valerie Curran. In preparation

BECKLEY/SANT PAU RESEARCH PROGRAMME

Co-directed by Dr Jordi Riba and Amanda Feilding

The alkaloids of Banisteriopsis caapi, the plant source of the Amazonian hallucinogen Ayahuasca, stimulate adult neurogenesis in vitro. Morales-Garcia J, de la Fuente Revenga M, Alonso-Gil S, ..., Feilding A, Perez-Castillo A, Riba J (2017) *Scientific Reports,* 7: 5309

Assessing the Psychedelic "After-Glow" in Ayahuasca Users: Post-Acute Neurometabolic and Functional Connectivity Changes Are Associated with Enhanced Mindfulness Capacities. Sampedro F, de la Fuente Revenga M, Valle M, ..., Feilding A, Riba J (2017) *The International Journal of Neuropsychopharmacology*, 20 (9) 698-711

Ayahuasca: pharmacology, neuroscience and therapeutic potential. Domínguez-Clavé E, Soler J, Friedlander P,..., Feilding A, Riba J (2016). *Brain Research Bulletin,* 126(1), 89-101

Exploring the therapeutic potential of Ayahuasca: Acute intake increases mindfulness-related capacities. Soler J, Elices M, Franquesa A Friedlander P, ..., Feilding A, Pascual JC, Riba J (2015). *Psychopharmacology*, 233(5), 823-829

COLLABORATION WITH KING'S COLLEGE LONDON

Cannabidiol inhibits THC-elicited paranoid symptoms and hippocampal-dependent memory impairment. Englund A, Morrison PD, Nottage J, ..., Feilding A, ..., Kapur S (2013). *Journal of Psychopharmacology*, 27(1), 19-27

Communication breakdown: delta-9 tetrahydrocannabinol effects on pre-speech neural coherence. Stone JM, Morrison PD, Brugger S, ..., Feilding A, ..., Ffytche DH (2012). *Molecular Psychiatry,* 17(6), 568-569

COLLABORATION WITH SECHENOV INSTITUTE OF PHYSIOLOGY

The effect of craniotomy on the intracranial hemodynamics and cerebrospinal fluid dynamics in humans. Moskalenko YE, Vaĭnshteĭn GB, Kravchenko TI, ..., Feilding A, ..., Medvedev SV (2008). *Human Physiology,* 34(3), 299-305

Biomechanical properties of the human cranium: aging aspects. Moskalenko YE, Vaĭnshteĭn GB, ..., Feilding A, ..., Panov AA (2008). *Journal of Evolutionary Biochemistry and Physiology,* 44(5), 605-614

RECENT COVERAGE OF BECKLEY IN THE MEDIA

Amanda Feilding has recently been featured in:

BBC Radio 4, The Economist, The Times, The New Statesman, The New York Times, The Guardian, Vice, The Independent, The Telegraph, Huffington Post, Huck Magazine, Forbes, Wired, ICON Magazine, and on the *National Geographic's Breakthrough Series: 'Addiction: A Psychedelic Cure?'*

Online and Print Media

- Microdosing: features in publications including *The Times, New Scientist, The Verge, and The Economist*
- LSD: over 3,500 articles in international and national press, including *The Sunday Times, The Guardian, Washington Post, The Financial Times, Frankfurter Allgemeine Zeitung, CNN, Scientific American*
- Psilocybin for Depression: 2,000 articles including *The Guardian* (77,000 shares), *The Spectator, The Mail Online, The Mirror and The Sun*

Television and Video

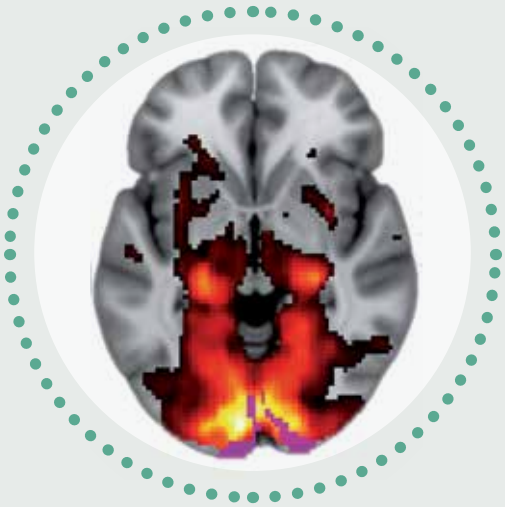
- Microdosing: *BBC London*
- LSD: live coverage on *BBC News* and *CNN*
- Psilocybin and Depression: *BBC Newsnight*
- Guardian Video: *"LSD 's impact on the brain revealed in groundbreaking images"* (over 6 million views)

Podcasts and Radio

- Psychedelic Research: *Memory Motel, Altered States: Philosophy Talk* (Stanford University)
- New Psychoactive Substances: *BBC Breakfast, Talk Radio* (UK), *Talk Radio* (Europe)

Social Media

- **Twitter:** Tweets earn 500,000 impressions per month. Followers include politicians, international journalists, healthcare professionals, academic researchers and leading research institutions
- **Facebook**: Post reach of up to 260,000. Fans include scientists, policymakers, top journalists and medical cannabis campaign groups



INSIGHTS FROM OUR SCIENCE RESEARCH PROGRAMME

PSYCHEDELICS: FROM THE ACUTE EXPERIENCE TO LONG-TERM CHANGES

After decades of misconception and media misrepresentation about how psychedelics alter consciousness, our cutting-edge scientific studies have begun to reveal that psychedelics occasion powerful, often transcendent, experiences that can lead to positive changes in mood, well-being, and personality that are immediately apparent, and that can last for days, weeks, or even years. Psychedelics can also transform a person's belief system and vision of the world by providing a new, deeper perspective.

PSYCHEDELICS CAN INDUCE EGO-DISSOLUTION AND MYSTICAL EXPERIENCE

The experience of self-transcendence and oneness with the universe, also known as 'ego-dissolution', is a key feature of the psychedelic experience and was reported by a majority of our research participants, who often described it as one of the most personally significant and spiritually meaningful experiences of their lives. This so-called 'peak' experience is also, interestingly, associated with long-lasting beneficial changes, including positive outcomes in the therapeutic process.

THE NEURAL CORRELATE OF THE PSYCHEDELIC EXPERIENCE

Using neuroimaging techniques such as fMRI, MEG and EEG, our research is starting to unravel what happens in the brain while on psychedelics. Below are some of our key findings:

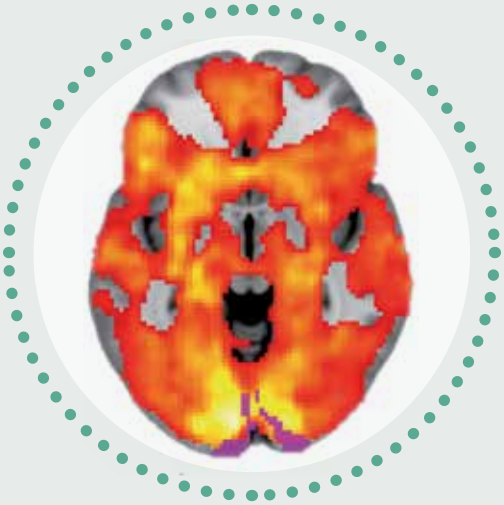
- Ego-dissolution appears to arise from a decrease in activity within the *default-mode network* (DMN), a collection of widespread brain areas that work together to control consciousness. Like the conductor in an orchestra, the DMN controls the amount of sensory information that enters our sphere of awareness, and has been described as the neural correlate of the 'ego'. Yet the DMN disintegrates under LSD, allowing for a dramatic increase in communication between brain networks that are normally highly segregated;
- For instance, with LSD, the visual cortex extends its connectivity to over twenty extra brain regions, including those involved in memory and emotional processing, which makes a richer sensory and emotional experience, and can also be associated with participants reporting 'seeing' more complex visual imagery with their eyes closed;
- The 'peak' psychedelic state, a qualitatively richer state of consciousness, seems to be brought about by more complex, less predictable, and more 'entropic' neural activity. These shifts in activity may predict subsequent personality changes, as well as allowing the overcoming of rigid, maladaptive thoughts patterns which underlie psychological illnesses such as depression;
- Perceptions shift radically, in part due to changes in how the external environment is processed. While what we experience is usually significantly influenced by predictive models and expectations, psychedelics allow us to rely more on direct experience.

REBOOTING THE BRAIN

Remarkably, many of the changes observed under psychedelics appear to mimic the way infants' brains work. This more fluid, 'plastic' state allows for changes to take place, repressed memories to be accessed, and maladaptive conditionings, such as addictive behaviours to be 'unlearned'.

PSYCHEDELICS CAN POSITIVELY CHANGE PEOPLE IN THE LONG TERM

Psychedelics appear to hit a 'reset button', allowing people to shift the trajectory of their life. The acute psychedelic experience can have a lasting effect on personality, particularly by increasing openness, optimism, mindfulness and nature-relatedness.



PSYCHEDELIC–ASSISTED THERAPY

Much of the work of the Beckley Foundation is driven by a desire to clarify how psychedelics can ease psychological distress of all kinds. Our collaborations have been leading the way in this regard. We were the first to show that psilocybin may alleviate stubborn, treatment-resistant depression and that it shows remarkable results in the treatment of nicotine addiction. It has also been shown that LSD-assisted psychotherapy can quell anxiety and depression in those who have been diagnosed with a terminal illness, and that regular use of ayahuasca can lead to personality changes that are linked to improved mental health and increased mindfulness. Our research is also providing unique insights into the way psychedelics exert their therapeutic potential.

THE QUALITY OF ACUTE EXPERIENCE PREDICTS THERAPEUTIC OUTCOME

Our research has demonstrated that patients who have stronger mystical experiences (or ego-dissolution) show greater improvement in long term recovery. This observation has major implications for psychedelic-assisted psychotherapy, indicating ways in which the compound enables patients to break free from the hyperactivity of rigid, maladaptive thought patterns that underlie hard-to-treat conditions such as depression, anxiety, and addiction.

THE IMPORTANT SYNERGISTIC ROLE OF MUSIC

Music and psychedelics, when used together, evoke powerful emotions, allowing traumatic memories to be revisited, a process which, in an appropriate therapeutic setting, can carry great healing potential. Our *Beckley/Imperial* study looked at the way music and psilocybin interact with each other during psychedelic-assisted psychotherapy for depression. The findings indicate that positive therapeutic outcomes can stem from a synergistic interaction between psychedelics and music.

RECONNECTING WITH ONE'S EMOTIONS

We found that psilocybin allowed depressed patients to reconnect with their emotions, by increasing emotional responsiveness to emotional stimuli.

ENHANCING CONNECTEDNESS

An increased sense of connection and connectedness was reported by the participants in our psilocybin for depression study as one of the major mediating factors of recovery. This sense of connectedness lasted for several weeks or months for many patients.

PREDICTING WHO WILL BENEFIT MOST FROM PSYCHEDELIC THERAPY

Using an algorithm able to identify certain emotional patterns in people's speech, we were able to predict with an impressive 85% of accuracy, which patients would be the most likely to respond to psilocybin therapy, based only on an initial interview. This technique, which basically relies on the ability of a computer to understand human language, offers a "highly cost-effective facility for screening individuals for treatment suitability and sensitivity."

POLICY PROGRAMME

The 'War on Drugs' continues to cause worldwide devastation. Prohibition costs taxpayers billions each year, yet policies have failed to eliminate drugs, instead increasing the risks and harms associated with their use. Unregulated and mired in criminality, the illicit drugs trade is now worth over $350 billion a year, and is associated with escalating violence, corruption, incarceration and suffering.

Over the last 20 years, the Beckley Foundation has been at the forefront of global drug policy reform, pioneering a scientific evidence base on which to build balanced alternatives to the prohibitionist approach. We bring together international scientists, politicians and other experts to explore key issues at influential seminars and produce seminal books, reports and papers, with the aim of minimising the harms incurred by current policies, proposing rational alternatives, and opening doors to further research into the potential medical and social benefits of certain psychoactive substances and a change of approach.

A SELECTION OF KEY ACHIEVEMENTS

Society & Drugs: A Rational Perspective (2002 - 2011). This series of 11 highly influential seminars held at the Houses of Lords, brought together for the first time eminent politicians, scientists, policy-makers, and other experts to discuss key policy issues at the national and global levels. Out of these discussions came a series of policy reports and books, that laid the foundations for global drug policy reforms which are currently taking place.

The seminars also paved the way for our ongoing policy programme which has included the following initiatives:

The founding of two leading organisations: the *International Drug Policy Consortium (IDPC)* and the *International Society for the Study of Drug Policy (ISSDP)*. These were both founded by Amanda Feilding and Mike Trace as part of the *Beckley Foundation Policy Programme* and launched at the Beckley Foundation Seminar of 2004. Since then they have become independent and flourished.

The Beckley Foundation Global Cannabis Commission was initiated by Amanda in 2006, and launched in 2008 with the report *Cannabis Policy: Moving Beyond Stalemate*. This report was the first of its kind and has been extremely influential in the regulation of cannabis at UN and national levels. It was later co-published with Oxford University Press.

The Global Initiative for Drug Policy Reform was launched in 2011 at a Beckley Foundation seminar at the House of Lords. The *All Party Parliamentary Group for Drug Policy Reform* was set up to support this initiative. The seminar was attended by high level governmental representatives from 14 countries interested in reform. Former Brazilian President Fernando Cardoso attended leading the representation of the Global Commission on Drug Policy.

The Beckley Foundation's Public Letter (2011) was signed by 9 Presidents, 13 Nobel Laureates, and a host of other international luminaries. It is considered a key milestone in the history of drug policy reform.

The Beckley Foundation's International Advisory Work. Amanda was invited by both the Guatemalan and Jamaican governments to advise them on drug policy reform. This included writing two reports for *Guatemala,* one entitled the *Paths to Reform*, which the President used at UN and other international meetings. In Jamaica, Amanda worked closely with the Minister of Justice and the Government in the implementation of a regulated cannabis industry.

The foundation has also been involved in advisory work in Mexico and Colombia among other countries.

POLICY PUBLICATIONS

The **Foundation has produced over 40 books, reports, and briefing papers on global drug policy issues**, which have had a strong role in influencing the UN and various governments and States in their moves towards reform. Our publications present a thorough review of the impact of current prohibitionist policies and shed light on many previously obscured areas of this complex issue, while opening up the avenues for alternative policies.

We present alternatives to prohibition that:

- **Promote public health and human rights**
- **Reduce drug-related crime, violence and corruption**
- **Enable governments to gain control of, and profit from, one of the world's largest economies**
- **Dismantle the barriers to scientific and medical research**

KEY PUBLICATIONS

***Cannabis Policy: Moving Beyond Stalemate* (2008)** is a pioneering report produced by the **Beckley Foundation's Global Cannabis Commission.** Since it was set up in 2006, it has demonstrated how draconian drug policies do not curb use. The book laid out for the first time alternative routes towards minimising the harms associated with cannabis: by decriminalisation and the establishment of a legally regulated market.

***Roadmaps to Reforming the UN Drug Conventions* (2012)** explains in detail how the UN Drug Conventions could be amended to give countries the freedom to tailor their drug policies to their individual needs i.e. full decriminalisation and regulation where appropriate.

***Licensing and Regulation of the Cannabis Market in England and Wales: Towards a Cost-Benefit Analysis* (2013)** was the first report to quantify the fiscal and social benefits of a regulated and taxed cannabis market. The report demonstrated that the government could gain £1.25 billion in tax revenue.

ONGOING AND UPCOMING POLICY WORK

2018 WILL SEE THE RELEASE OF TWO NEW SEMINAL REPORTS:

Evidence is mounting for the failure of prohibition to curb or eliminate drug use, despite the billions spent on enforcement. Leaders from countries most affected by the drug war, such as Guatemala and Colombia, are demanding a review of ineffective policies, and an enquiry into possible alternatives. Countries such as Uruguay, Portugal, Czechia, and certain States in the US have taken the lead by either legalising cannabis use or decriminalising all drug consumption.

In response to the call for alternative drug policies, we are launching two new policy reports assessing the harms and benefits associated with the use of specific drugs, the collateral damage brought about by punitive policies, and the way forward in terms of alternative policies focused on public health, community safety, cost effectiveness, economic development and human rights.

Change will occur on a drug-by-drug basis, responding to specific issues in specific contexts. Our reports are the first to focus on individual drugs, the ways in which they are produced, distributed and consumed, and the potential routes forward to reduce harms and maximise benefits associated with their use.

Roadmaps to Regulation: Cannabis, Psychedelics, MDMA, and New Psychoactive Substances (2018) presents four stand-alone reports that explore regulatory models for the medical, therapeutic and recreational use of each of these substances. We demonstrate that most of the risks associated with the use of these drugs are direct consequences of prohibition, and that strict legal regulation at both the production and supply levels will help resolve many of the harms caused by both the drugs themselves and the unintended consequences of prohibition. The report also highlights the need for reform in order to remove the obstructions currently inhibiting research into their therapeutic potential.

Image: Carol Conzelman

The Cocaine Papers (2018) The illicit cocaine trade is a major destabilising force in many parts of the world, particularly Latin America, the Caribbean, and West Africa. The cocaine trade and the drug war waged to suppress it are responsible for deaths, violence, corruption, economic damage, and environmental destruction, among many other harms to individuals and society. It is difficult, if not impossible, to envisage an end to these problems without addressing the complex issues surrounding both the illicit cocaine market and the prohibitionist approach to controlling it.

Following a series of meetings with the former Guatemalan president, Otto Perez Molina, the first courageous world leader to advocate drug policy reform, Amanda Feilding proposed the first report to explore the regulation of coca, cocaine and its derivatives. Molina endorsed the project and the Cocaine Papers was conceived. This report brings together over 25 international experts from multiple disciplines to make the case for the legal regulation of coca and cocaine, in order to tackle the illicit market and reduce the devastating violence, corruption and political instability it has caused. around the world.

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Associate Professor of Pharmacology at the Universitat Autònoma de Barcelona (UAB), Associate Researcher at the Drug Research Center of the Sant Pau Hospital in Barcelona.

IN MEMORIAM

DR ALBERT HOFMANN, PhD

Discoverer of LSD and founding member of the Beckley Foundation's Scientific Advisory Board until he passed away in April 2008 at the age of 102.

DR ALEXANDER SHULGIN, PhD

Pharmacologist, chemist, and psychoactive drug researcher. Author of PiHKAL, TiHKAL, and The Shulgin Index.

DR RONALD SANDISON, MD

British psychiatrist, psychotherapist and pioneer for the clinical use of LSD in psychiatry.

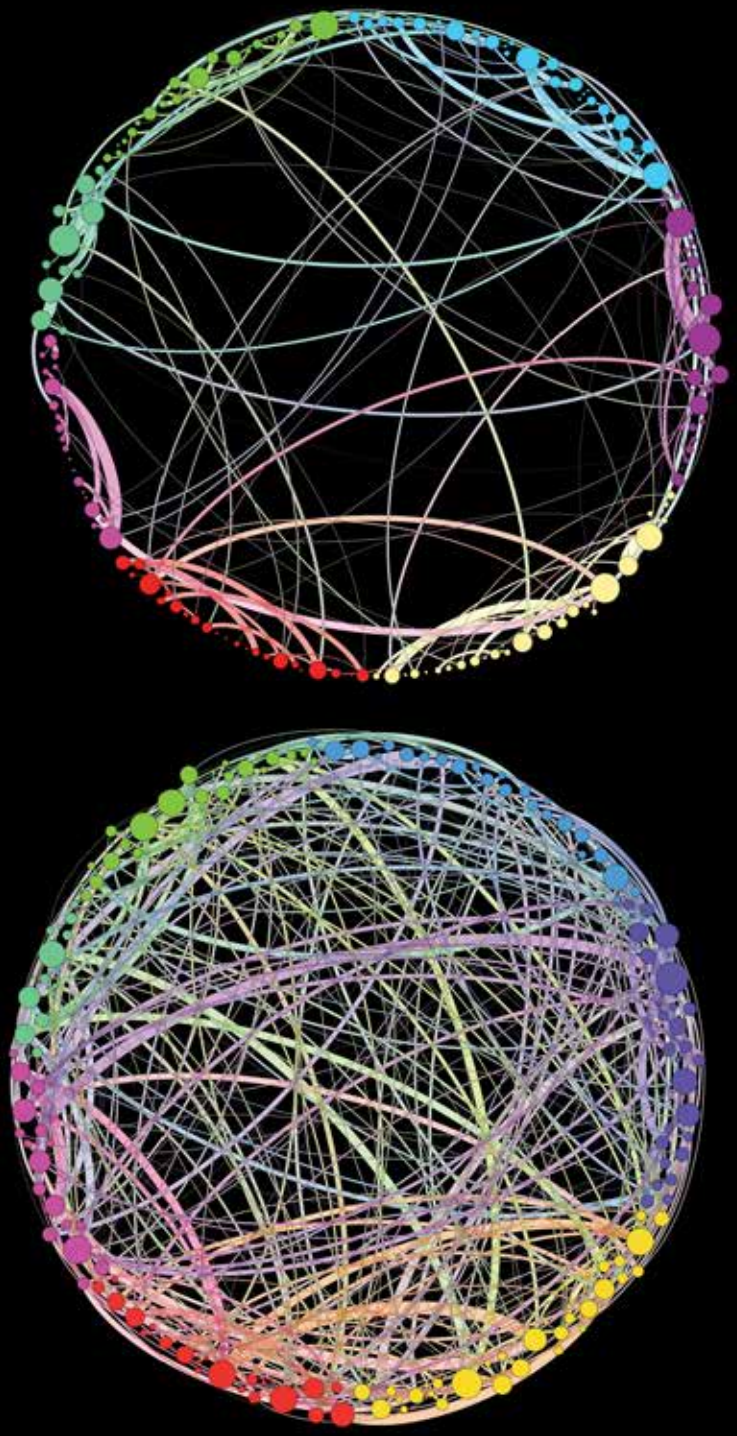

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Image on the back cover: Brain communication patterns on placebo (top) and psilocybin (bottom) - Image from Petri *et al.* (2014)