

Episode 28: Bicycle Day - Albert Hofmann and His Historic LSD Trip

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TRANSCRIPT

Welcome back to the Tox Lab. I'm Rebecca. I'm Rob. This week we're looking at something a little bit different. We're going to be looking at the story of the discovery of LSD, the famous Bicycle Day incident.

Rebecca, what's the strangest thing you've ever done on a bike? I knew this question was coming and I have no answer. I don't think I've done anything strange. No.

No. Ridden a bike. Yeah, ridden a bike basically. I think that's probably true for me too.

I wasn't really sure if there was anything strange you could do on a bike. Well, it turns out there is. It's possible to ride through the streets of a Swiss city whilst, can we say, tripping balls on this podcast? You can say what you like on this podcast, it's ours.

Whilst tripping balls on LSD. And we're going to look at that story today. Before we jump into today's episode, if you want to stay up to date with our content, future episodes, or if you want to get in contact with us about ideas for future episodes, then you can follow us on socials, so you can find us on Instagram at @the_tox_lab. We're also on LinkedIn.

And if you don't use socials, but still want to get in contact with us, you can email us at thetoxlab@gmail.com. I want to take us back to Switzerland, first of all, in 1938. So a chemist, Albert Hofmann, originally born in 1906, was working at a company called Sandoz.

This company still exists. This company is still a big producer of generic medication today. But he was working for this chemical company and he was researching a class of compounds called ergot alkaloids. Ergot is a fungus and it would colonize and infect crops, particularly rye and other crops like that.

And it would essentially make it inedible. It would cause what they call ergotism, which is effectively a form of food poisoning, I guess, in humans and mammals that would consume these grains. So it was quite an economically devastating fungus at times. Ergot alkaloids would mimic neurotransmitters and hormones in the body causing hallucinations.

But chronic exposure also led to gangrenous symptoms because it could cause severe vasoconstriction. Effectively, things like the tips of the fingers might die. So it was quite a severe poisoning if ergot contaminated your crops. But also it had a history of being used in medicine.

Powdered ergot was sometimes used in obstetrics and gynecology. It was sometimes used in labor to reduce blood loss and reduce the risk of hemorrhage due to these vasoconstrictive properties. The fungus actually had quite a lot of interest because of its potential economic implications but also its use in medicine up to that point. And so Hofmann really was tasked with trying to characterize and investigate some of these ergot alkaloids and also use them as starting points to synthesize novel compounds.

So one of the new classes of compounds that were being created off the back of these ergot extracts were compounds that were known as ergamides or, more familiarly, lysergamides. And they're basically amides of one of the extracted components. So in 1938, one of these compounds, LSD-25, lysergic acid diethylamide, was created in a lab. And at the time, it was just one of many compounds that were produced out of this research group.

But it wasn't until 1943 that something unexpected happened. So on the 16th of April, 1943, Hofmann was busy in his lab and was in the final stages of synthesizing LSD. And he started experiencing some unusual sensations including dizziness and restlessness and was forced to return home. He then started feeling intoxicated and was experiencing an extremely stimulated imagination and uninterrupted streams of fantastic pictures, extraordinary shapes and a kaleidoscopic play of colors.

And this lasted approximately two hours. And he wasn't really sure what was going on but assumed that somehow he'd come into contact with the LSD that he was synthesizing. And he was normally very careful with this. And so he thought he must've come into contact with a crystal that had absorbed into his skin.

And that's how he felt about it. So he actually went back to this compound really on a hunch, didn't he? It was in his mind, he thought, I just want to try that compound again. And for whatever reason, intuition really sort of took him back to that compound.

And I guess this is probably the first accidental LSD ingestion at this point, bearing in mind the compound was relatively new. So what happened next? Well, when he recovered from that small unintentional ingestion, he decided that this compound needed more research. And so now we get to what is now famously known as the Bicycle Day.

This was three days later, the 19th of April in 1943. And I want to take you back there now in your mind. We're in Basel in Switzerland, middle of the war, Switzerland famously neutral, although it was very much a border town. So it was right on the edge between the German front line.

And there was, even though Switzerland weren't actively involved in the war, I think that the feelings of war could be felt. Fuel was rationed, there wasn't much traffic on the road. There were air raid drills regularly. But also, yeah, we're in this beautiful mountain town.

So Rebecca, take us through, with some extracts of this biography, what happened? So on the 19th of April, 1943, Albert Hofmann intentionally ingested 0.25 milligrams of LSD. Soon after, he started experiencing gradual changes in his perception. And a couple of hours later, he asked his laboratory assistant to escort him home.

And because it was the war, he had to ride home on his bicycle. So that's kind of where Bicycle Day comes from. On his way home, objects in his vision became distorted as if he was viewing them through a convex mirror. He felt that he was moving quite slowly, but his assistant said that they actually made it home in pretty good time.

They were cycling pretty quickly. He started becoming increasingly anxious. And when he arrived home, the feelings had increased. And he felt that he was going insane.

He also believed that his neighbor was a malevolent witch out to get him. And he felt that LSD had somewhat poisoned him. So he used a generic poisoning treatment and started drinking a load of milk as a way of trying to combat his poisoning symptoms. There's a few little nuggets of extracts here in this biography that I really like.

The lady next door whom I scarcely recognized brought me the milk. In the course of the evening, I drank more than two liters. She was no longer Mrs. R, but rather a malevolent, insidious witch with a colored mask.

Incredibly vivid descriptions. So a little while later, a doctor was called to assess him, but could only find a pair of very widely dilated pupils. He couldn't find anything else on a physical exam. And this doctor was jotting him immensely for self-experimenting with LSD.

So his pulse, blood pressure, breathing, all normal. No reason to prescribe any medication. Instead, he conveyed me to my bed, stood over me. Slowly, I came back for a weird, unfamiliar world to reassuring everyday reality.

So eventually the terror began to fade and he began to enjoy his experience. He described kaleidoscopic images that were opening and closing in circles and spirals with exploding colored fountains. Sounds became transformed into optical perceptions. Each vividly changing image had its own consistent form and color.

Later in that evening, his wife returned. Somebody had phoned her to say he had suffered a mysterious breakdown. By the time she got home, actually, he was sufficiently recovered to tell her what had happened. So the following morning, he woke up and experienced a sensation of wellbeing and renewed life.

Breakfast apparently tasted amazing. And he described his sense as being heightened for the remainder of the following day. And what he found quite interesting was that he could remember every experience of his LSD trip in amazing detail and didn't experience any sort of hangover effects after this experience that you might associate with being on drugs. If anything, the opposite, right?

It was sort of a more vibrant feeling the next day. Yeah, he had like extreme mental clarity and things like that. So let's look a little bit at what actually happened and what we know and drill into a bit of this. So firstly, he actually took a fairly sizable dose, didn't he?

He thought that there was no way that a quarter of a milligram could be a big dose. And actually turns out in LSD terms, that's quite a dose. So he didn't just self experiment. He actually self experimented with fairly sizable concentration of LSD.

And we've talked a bit about psychedelics before, haven't we? And clearly this isn't the first psychedelic experience because there's plenty of natural psychedelics in mushrooms, in plants in South America, things like that, that have been around since effectively the dawn of history and have been used by cultures throughout time. But this was the first recorded case of a synthetic or semi-synthetic, I suppose, based on its original ergot structure, psychedelic. And the pharmacology of these compounds is quite interesting.

LSD has a very, very similar shape to serotonin and it acts on serotonin receptors. Unlike serotonin, it only acts on certain subtypes. So it mostly acts through what we call 5-HT_{2A}. And this tends to then only affect certain parts of the brain.

And it's this action we think that leads to these hallucinations and perception changes, changes in self-awareness. So what happened after LSD's discovery and self-experimentation? Well, Sandoz actually marketed LSD. They started using it as a medication for psychiatry.

And it saw some really early use to aid talking therapies, uses to try and help with addiction, depression. And then in the 1960s, we saw this huge cultural shift. Lot actually going on. In terms of sort of Western culture at the time, we were in this post-war era.

There was the Vietnam situation going on. And so there was a big rise in this sort of counterculture movement. And LSD really became quite a big part of that, didn't it? Suddenly LSD went from being a drug that was marketed and used for therapeutic reasons.

It became a drug of artists and musicians. People were using it more in a recreational context than they were pharmaceutically. And tinfoil hat moment again, Rebecca, we've mentioned this before. The CIA did do some mind control experiments using LSD.

We might have to do an episode on that one, don't we? I think we might. But effectively this rise in counterculture movement actually meant that it was scheduled under various drug laws. And suddenly it wasn't used in psychiatry anymore.

There was a real crackdown on LSD. LSD did go on a bit of a journey, didn't it? From Swiss labs to universities, to CIA interrogation rooms, to Grateful Dead concerts. And eventually it was then banned.

So going back to Hofmann's biography, he does go and chat a bit about the non-medical use of LSD. He says it was obvious that a substance with such fantastic effects on mental perception and on the experience of the outer and inner world would arouse interest outside of medical science. But I had not expected that LSD, with its unfathomable, uncanny, profound effects, so unlike the character of a recreational drug, would ever find worldwide use as an inebriant. And he very much mourned the loss of LSD from the psychiatric sphere into the more general drug use sphere.

And there was then at this point in society, just before the ban, really a huge rise in LSD experiments that were perhaps a little bit less ethical, a little bit less scientific. Yeah, so we talk about some of these in episode 10, Elephant in the Room, if you want to go check that out. The infamous Tusko the elephant experiments that were carried out at about this point in history. The other interesting snippet from Hofmann's biography is actually where he talks about the dangers of non-medical LSD experiments.

Whilst professional use of LSD in psychiatry entails hardly any risk, the ingestion of the substance outside of medical practice without medical supervision is subject to multifarious dangers. He goes on to say that the advocates of uncontrolled free use of LSD and other hallucinogens base their attitude on two claims, that this type of drug produces no addiction. And two, there is no danger to health from moderate use of hallucinations has been demonstrated. And we've talked a bit about this on the podcast before, haven't we?

We looked at the prevalence of psychedelic drugs in post-mortem cases. And the evidence does seem to suggest there is a generally low acute toxicity, but one of the risks actually is of death occurring through other means whilst under the influence of such potent substances.

And I know in his biography he talks about, because he was on such a high during the experience, those sorts of really anxious thoughts and the terrors and the feelings that things were out to get him, he was worried about LSD being used in high doses as a recreational drug because of those sorts of negative effects you get before you reach that classic sort of hallucinogenic state that he describes, all the colors and shapes and things. Yeah, so he does go on and say that actually he talks about psychotic reactions and in manic people, the feeling of omnipotence or invulnerability can lead to serious casualties.

And indeed he talks about accidents that have occurred in that way. He really does have a very balanced view actually of LSD. Yeah, he does. So what happened after this?

So LSD was banned and not only was it banned and cracked down upon on the street, but actually research using this compound pretty much dried up overnight, as did research with a lot of, if not all, psychedelic compounds. And actually only really recently in the last 10, 15 years or so has there been a bit of a resurgence in that research. And we're actually seeing some positive results in very controlled settings of psychedelic compounds being used to treat things like depression. And so really in some respects, the legacy of LSD probably has set us back a little bit in terms of scientific research.

So since this is a toxicology podcast, let's talk a little bit about LSD toxicology. We've mentioned it's got fairly low acute toxicity. It's also a bit of a nightmare to detect, isn't it? Yeah, there's a very short detection when it clears really quickly.

So we very rarely see it. I think I've only seen it in maybe one case. Yeah, I think I've only seen it in one post-mortem case. I might've seen it in a patient who was literally in A&E tripping balls as they produced their urine sample.

Yeah. But it's not something we see very often at all. It's also at very low concentration, isn't it? As we saw, Hofmann took a quarter of a milligram and had a truly incredible experience cycling his bike through Swiss streets.

And that was a high dose relative. So I do think it's a really, really interesting compound. And I do think that it should really be continued to be researched in the psychiatric setting. I do think that there is real potential use for something like this.

But as always, it needs to be done in a way that is safe and controlled. It's interesting looking at Hofmann's biography. I do highly recommend people go and have a read. We've really just scratched the surface of some of his insights with this episode today.

The title of his biography is LSD, My Problem Child. Not that it's a bad child, just that it's a misunderstood child. And I think that really does summarise it really quite well. Interesting point about Hofmann, he lived to 102.

Nice. So he did live a very long life after this discovery and self experimentation. So Rebecca, in general terms, self experimentation, before or against? I think it has its place because without it, we would be so much further in the dark with a lot of things.

Obviously, it's not without risk, but if you're willing to put that on yourself and you've briskly assessed it, then I think it does have its use. I have a lot of respect for scientists that do self experiment and then publish it. We do see it occasionally, don't we, in modern literature. It does feel like this was very much a practice of yesteryear in general terms.

As you say, it's not without risk. I mean, we were fortunate that LSD really has fairly low acute toxicity because he got his dosing well wrong, really. So wrong, yeah. And had this been an opioid or something like that, it could have been tragic.

Mm, for sure. On the other hand, had he not done it, we may not be in the world we live in today. Mm. And likewise, if LSD hadn't have been cracked down upon as much as it was, I'd be interested to see how much further along the road we would be in terms of using it to treat treatment resistant depression, for example, or PTSD and conditions such as that and its use in talking therapies and overcoming trauma.

Yeah, that's very true. And also just how it's shaped our understanding of how the brain works as well by learning how different compounds interact with different receptors and therefore trigger various parts of the brain to do various things. Yeah. It's not just psychiatric research that this has assisted but also in sort of understanding core neuroscience and things like that.

So I think we're gonna wrap this one up here. I hope you've enjoyed listening this week. Do give us a like, a follow, or a share on social media. That would be really appreciated.

You can find us on Instagram at @the_tox_lab. As I said at the beginning, we also have a LinkedIn page and if you want to contact us but don't use social media, you can email us at thetoxlab@gmail.com. I'll also be linking Albert Hofmann's biography in the description below. If any of you want to check it out, it's a really good read and we have only scratched the surface.

So it will be there if you want it. Hope you all have an amazing week and we'll see you next time. Bye.