THE RISE, DECLINE, AND FALL OF LSD

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> *The urge to transcend self-conscious selfhood is . . . a principal appetite of the soul. When, for whatever reason, men and women fail to transcend themselves by means of worship, good works and spiritual exercises, they are apt to resort to religion's chemical surrogates.*—ALDOUS HUXLEY. [1]

On April 16, 1943, a fascinating chapter in the history of neurology, psychopharmacology, and humanity began when Albert Hofmann unwittingly discovered the incredibly potent and profound effects of d-lysergic acid diethylamide—LSD—upon the mind. What makes the history of LSD so enthralling is not simply its overwhelming psychological effects but the various responses of those who explored the strange mental terrain hidden behind the veil of ordinary perception. Discovered in an era of scientific adventurousness, LSD was closely associated with self-experimentation from the beginning. For a scientist to dose himself with an unknown, unpredictable, extremely powerful drug would be unheard of today; yet this approach was not considered unprofessional by early LSD researchers. This emphasis on subjective experience, particularly in psychiatry, led to the eventual widespread use of LSD that temporarily changed the brainscape of America during the late 1960s.

The history of LSD has been characterized by a range of high expectations for its potential applications. Within the medical world, researchers attempted to harness its powers as an agent to reveal the pathogenesis of schizophrenia, facilitate psychoanalysis, and cure alcoholism. However, it was impossible to keep a mental probe of such magnitude solely within the realm of science. The CIA, in conjunction with many psychia-

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trists, explored its possibilities as a chemical weapon for mental and behavioral control. As LSD drifted from private circles into the public domain, it became a means to transcend conventional customs of thought and to provide an instant, enlightening spiritual experience. This stage culminated with LSD being banned in 1965, at which time a counterculture based on ritual use of LSD had developed amid horror stories of LSD-induced chromosomal damage and "trips" gone awry resulting in LSD psychosis. However, to understand how Hofmann's strange discovery could have led to such an impact on our society, we must start at the beginning.

Pre-LSD Psychedelics

Different cultures have used a variety of naturally occurring psychoactive agents since the dawn of civilization, most often as an integral part of their religious practices. The earliest mention was recorded by the Aryans of ancient India in the Rig-Veda, a 3,500-year-old collection of hymns praising soma. Soma has the distinction of being the only drug to be venerated as a deity and has been convincingly proposed by Wasson to be *Amanita muscaria* (fly agaric) [2], a mushroom containing the psychoactive muscimol. More recently, the Aztecs were known to have incorporated a variety of hallucinogenic substances into their religion and society. These included the psilocybin-containing teonanacatl or "flesh of the gods" (mushrooms of the genus *Psilocybe*), ololiuqui (morning-glory seeds, which have a number of psychotropic ergot alkaloids), and the drug which indirectly begat the psychedelic revolution: peyote [3]. However, Western civilization was largely unaware of these activities until science turned its attention to the peculiar chemical properties of these plants and fungi and the field of pharmacology was born.

The modern-day study of pharmacology began in 1855 with the publication of *Die Narkotischen Genusmitteel unde der Mensch* [4]. In this volume, Von Bibra identified a number of different mind-altering plants and encouraged others to examine this overlooked branch of botany. In 1886 toxicologist Louis Lewin carried on this line of exploration with an in-depth study of peyote. Lewin collected different cactus specimens and isolated four different peyote alkaloids. Unwilling to self-experiment, he persuaded a colleague named Arthur Hefter to isolate the psychoactive constituent, which he called mezcal [5].

Ten years later, neurologist (and founder of the American Neurological Association) Weir Mitchell tried peyote and described his experience in rich detail in the *British Medical Journal,* closing with the prophetic warning:

I predict a perilous reign of the mescal habit when this agent becomes attainable. The temptation to call again the enchanting magic of my experience will, I am sure, be too much for some men to resist after they have once set foot in this land of fairy colors where there seems so much to charm and so little to excite horror or disgust. [6]

Inspired by Mitchell's dramatic imagery, English physician Havelock Ellis decided to try peyote himself and reported his experiences in an unrestrained flowing description entitled "Mezcal: A New Artificial Paradise." His assertion, "for a healthy person to once or twice be admitted to the rites of mescal is not only an unforgettable delight but an educational influence of no mean value," [7] drew a public reprimand from the editors of the *British Medical Journal* for tempting the public with drugs possessing no medical benefits, whose only purpose was to provide a temporary escape from reality. However, the public became aware of the visions attainable through the ingestion of peyote, and its use spread to subcultures in major metropolitan areas where the intellectually elite gathered (such as Greenwich Village in New York City), forerunners of the counterculture that was to blossom during the 1960s.

Public attention shifted to more immediate concerns with the outbreak of World War I, and after the war most research in this area was limited to Germany. Ernest Spath synthesized the psychoactive alkaloid of peyote—mescaline—in 1919 [8]; and in 1924 Lewin published his magnum opus *Phantastica,* which categorized the world's known psychotropic plants into five categories. Nevertheless, it was not until Hofmann's serendipitous discovery of LSD that widespread scientific attention was given to the consciousness-altering properties of psychoactive drugs and the door was opened to a new era of neurobiochemistry. Although its psychological effects are very similar to those of mescaline, LSD is effective at 1/5,000th the dose.

The ability to induce profound mental effects in minuscule doses made LSD the subject of intense study in the medical profession—especially in neurology and psychiatry. From a purely scientific perspective, the antagonistic effects of LSD contributed a great deal to our understanding of brain chemistry, shedding new light on the location and function of various neurotransmitters such as serotonin, adrenaline, and dopamine. However, the story of LSD is primarily concerned with people—the interesting cast of characters whose lives were deeply shaken by their LSD experiences, and their differing beliefs about how the drug should be used (or not used) for the benefit of mankind. This article will trace the rise, decline, and fall of LSD in terms of three overlapping periods: (1) LSD as a psychotomimetic, (2) LSD as a psychotherapeutic adjunct; and (3) LSD as a psychedelic.

LSD as a Psychotomimetic

THE DEVELOPMENT OF LSD

The discovery of LSD was the result of research with ergot alkaloids at Sandoz Laboratories in Basel. Ergot is a sugary excretion of the lower fungus *Claviceps purpurea,* which is parasitic on grains—particularly rye. The fungus grows in a curved sclerotia that manufactures a variety of ergot alkaloids and has been the cause of epidemic outbreaks of ergotism throughout history from human consumption of contaminated grain [9]. Ergotism was common in the Middle Ages and killed up to 40,000 people in A.D. 944. The most recent epidemic of ergotism occurred in 1927 in Russia.

Two types of ergotism have been recognized: gangrenous and convulsive [3]. The former is characterized by dry gangrene of the extremities and is often accompanied by vivid visual hallucinations. Visions of devils and flame experienced by early victims led to the diagnosis of "St. Anthony's fire" and "holy fire." Symptoms of convulsive ergotism include distorted sensory perception, delirium, psychosis, hallucination, and painful muscular contractions that lead to convulsions. There is evidence suggesting that this disorder was responsible for the mental delusions and convulsive fits typically exhibited by the "possessed" at the Salem witch trials [10].

Despite problems associated with ergot poisoning, ergot's beneficial effects of inducing uterine contractions were noted as early as the sixteenth century. Ergot became a medicine in European midwifery for aiding childbirth and inducing abortions. The oxytocic properties of ergot were introduced to North America by John Stearns in 1808 [11] with his publication of "Account of the Pulvis Parturiens, a Remedy for Quickening Childbirth." However, danger to the newborn posed by uterine spasms subsequently restricted ergot's use to controlling postnatal hemorrhage.

The late nineteenth and early twentieth centuries witnessed the foundation of modern work with ergot alkaloids. In 1875, Tanret isolated an impure crystalline substance from extract of ergot and named it ergotinine. In 1906, Dale prepared an ergotoxine and observed oxytocic effects, inhibition of the autonomic nervous sytem, and antagonism to adrenaline. Ergotamine, the first pure crystalline extract from ergot, was isolated by W. A. Stoll in 1981, and this substance is still used today for treatment of migraine headaches. Finally, Jacobs and Craig isolated lysergic acid—the nucleus structure common to all ergot alkaloids—from ergotinine in 1934 [11]. However, the events leading directly to the discovery of LSD did not begin until the next year, when Hofmann began his work with ergot alkaloids.

Hofmann, a co-worker of Stoll at the pharmaceutical research labs of

Sandoz in Basel, began his studies by isolating lysergic acid from ergot and combining this with an assortment of different amines in peptide linkage. In this manner he produced ergobasine (a.k.a. ergometrine, ergonovine), the first partly synthetic ergot alkaloid. Through variation of the amino alcohol constituent, he attempted to improve the pharmacological properties of ergobasine and obtained Methergine®—a compound with tremendous uterotonic and hemostatic qualities, used worldwide to stop hemorrhage after childbirth.

Hofmann began synthesizing new lysergic acid derivatives from which he expected new and interesting pharmacological attributes based on their structures. The twenty-fifth substance in this series was d-lysergic acid diethylamide (hence the name LSD-25), and its synthesis was planned with the hope of producing a circulatory and respiratory stimulant, because of structural similarities with nicotinic acid diethylamide, a known analeptic. Synthesized in 1938, LSD-25 was found to have strong uterotonic effects (about 70 percent that of ergobasine) and was also known to cause restlessness in laboratory animals. However, no obvious benefits were noted, and it was temporarily shelved.

After a 5-year hiatus, a "peculiar presentiment" [11] that LSD held pharmacological properties not obvious in the initial investigations led Hofmann to repeat its synthesis. In the final stages—purification and crystallization in the form of a tartrate—he was interrupted by unusual sensations and had to leave the laboratory. He describes his experience as follows:

> Last Friday, April 16, 1943, I was forced to stop my work in the laboratory in the middle of the afternoon and to go home, as I was seized by a peculiar restlessness associated with a sensation of mild dizziness. On arriving home, I lay down and sank into a kind of drunkenness, which was not unpleasant and which was characterized by extreme activity of the imagination. As I lay in a dazed condition with my eyes closed, (I experienced daylight as disagreeably bright) there surged upon me an uninterrupted stream of fantastic images of extraordinary plasticity and vividness and accompanied by an intense, kaleidoscope-like play of colors. This condition gradually passed off after 2 hours. [12]

Hoffman realized that his strange experience could be attributed only to accidental ingestion of the lysergic acid diethylamide with which he had been working. He decided to repeat the experiment on himself, and 3 days later ingested 250 micrograms—a dosage he believed to be extremely low, on the basis of the known toxicity of the ergot alkaloids. His attempt to record the experience begins:

> April 19, 1943: Preparation of an 0.5% aqueous solution of d-lysergic acid diethylamide tartrate.
> 4:20 p.m.: 0.5 cc (0.25 mg LSD) ingested orally.
> The solution is tasteless.

4:50 p.m.: No trace of any effect
5:00 p.m.: Slight dizziness, unrest, difficulty in concentration, visual disturbances, marked desire to laugh. . . . [12]

However, 40 minutes after ingestion, Hoffman perceived the effects to be much stronger than previously and was unable to continue his notes. He managed to cycle home with his assistant, despite his tremendously distorted vision and feelings of making no forward progress. On arrival he called for a doctor and lay down. He felt as if everything around him was spinning and saw peoples' faces transformed into "grotesque masks." Worse than the "demonic transformations" of the outer world were his frightening inner psychological changes—feelings of being possessed, of going insane, and out-of-body experiences. The doctor arrived after the worst of the mental crisis had passed and recorded no abnormalities besides extremely dilated pupils. At this point the feelings of horror began to dissipate and were replaced by feelings of gratitude that his sanity was returning. He began to enjoy the colorful images dancing behind closed eyes and marveled at is experiences of synesthesia (where one sensory perception is transformed into another). Finally, he was able to sleep and woke with a clear head and a sensation of "well-being and renewed life," remembering his experience in every detail [11].

Hofmann realized that no other known substance could elicit such amazing psychic effects in minute dosage and believed that LSD would have much potential use in pharmacology, neurology, and psychiatry. He relayed his experiences to Professors Stoll and Rothlin (director of the Pharmacology Department at Sandoz), and both were astonished, particularly at the low dosage. Rothlin and a colleague immediately repeated the experiment on themselves with much lower doses, confirming Hofmann's reports.

In 1947 Sandoz began marketing LSD under the trademark Delysid®, suggesting both experimental and analytical applications for research in the accompanying literature. Experimentally, Sandoz recommended self-administration of the drug by psychiatrists so that they could gain an understanding of the subjective experiences of the schizophrenic. Sandoz also advocated the induction of model psychoses in normal subjects in hopes of revealing the organic causes of mental disease. Analytically, they suggested that LSD could release repressed thoughts and feelings in anxious and neurotic patients [4]. However, Sandoz appeared to have a better grasp of the potential of LSD than most American psychiatrists so these ideas did not gain immediate acceptance in the research community until numerous studies were completed.

The notion that mental disorders are of chemical origin dates back to the beginning of pharmacology. In his *Treatise on the Chemical Constitution of the Brain* (1884), Johann Thudicum wrote "many forms of insanity are unquestionably the external manifestations of the effects upon the brain substance of poisons fermented within the body." [13]. With the advent of LSD, researchers believed they might have discovered a biochemical tool to explore the organic causes of mental disease, although this idea took a couple of years to develop.

The first clinical study on the effects of LSD was published by Stoll in 1947. He administered the drug to both normal subjects and schizophrenics, producing the original description of symptoms reported by Hoffman in doses as small as 20 micrograms. However, Stoll believed the intoxication was of the "acute exogenous" type, affecting the diancephalon and not like naturally occurring psychosis. He also noted that schizophrenics and normal controls appeared to respond the same to LSD [14].

Two years later, Condreau reported that psychotic patients were more resistant to LSD than controls and questioned whether their psychosis could be the result of an internally produced agent similar to LSD [15]. Contributing to the overall concept from a slightly different angle were the first North American studies [16–18], which noted the similarity between symptoms of LSD intoxication and schizophrenia. These studies prepared the groundwork for the concept of constructing a model psychosis by utilizing LSD.

Researchers used two different methods in working with model psychoses to reveal the biochemical factors responsible for schizophrenia. One was to look for a substance produced internally by schizophrenics that chemically resembled LSD or other psychoactive drugs. The other approach was more direct: determine the mechanism by which LSD exerted its effects and examine whether the same pathways were affected in schizophrenics. Of course, this procedure relied on the controversial assumption that the symptoms of LSD and schizophrenia were essentially the same.

In 1952 Humphrey Osmond and John Smythies presented a novel approach to the situation that focused on the metabolism of catecholamines [18]. After noticing a strong resemblance between the chemical structures of mescaline and adrenaline, they postulated that dopamine (a precursor of adrenaline) could be converted to 3,4-dimethoxyphenyl ethylamine (DMPEA)—a compound reported to produce catatonic states in animals—if the methylating enzyme pathways were altered. They treated schizophrenics with a methyl acceptor and reported promising results, but this treatment was later proved ineffective. Interest-

ingly, a decade later it was reported that 65 percent of acute schizophrenics and 8 percent of normal controls excreted a compound tentatively identified as DMPEA [19]. However, this agent was shown to have no psychoactivity in humans when given in doses comparable to doses of mescaline [20].

The next endogenous toxic hypothesis was an alternative possibility of Osmond and Synthies's work and concentrated on the roles of adrenochrome and adrenolutin. Adrenochrome is a natural by-product of adrenaline degradation that can be transformed into adrenolutin and other products. This hypothesis had two assumptions to demonstrate: (1) that adrenochrome and adrenolutin were psychoactive, and (2) that schizophrenics produced chemicals that inhibited the conversion of adrenochrome into nonpsychoactive compounds, thereby increasing the concentration of adrenochrome and adrenolutin. Osmond and Hoffer also suggested that LSD inhibited the same reaction.

Osmond dosed himself with adrenochrome and personally reported confirmation of its psychotomimetic effects. This group also found that LSD increased adrenochrome levels, and that phosphate excretion was altered by both adrenolutin and LSD in a manner that resembled phosphate excretion in schizophrenics [21].

These findings were consistent with those of Hoaglund et al., who found that phosphate excretion in schizophrenics and in LSD-treated normal humans was decreased to half that of normal controls but would be greatly increased by the injection of ACTH. They postulated that schizophrenics may produce an abnormal agent that acts like LSD in producing psychotic behavior, affecting phosphate metabolism and adrenal responsiveness [22]. Osmond and Hoffer appeared to have discovered this agent.

These results led to increased testing along with refined measurement techniques in hopes of confirming the adrenochrome theory. However, it was soon determined that adrenochrome was not present in the blood of schizophrenics, and later reports claimed that adrenochrome had no psychological activity [23].

Other researchers were taking an alternate route, attempting to discover LSD's biochemical course of action. Two researchers had independently observed that LSD antagonized the effects of serotonin in smooth muscle and in strips of rat uterus. Wooley and Shaw reported the role of serotonin in the maintenance of normal mental functioning and suggested that LSD elicited its mental changes by interfering with serotonin the brain [24]. It was later shown that LSD caused an increase in brain serotonin levels [25] accompanied by a fall in the concentration of 5-hydroxyindoleacetic acid [26], the primary metabolite of serotonin. Although these later experiments were able to verify the presence of serotonin in the raphe nucleus of the brain and demonstrate its impor-

tance as a neurotransmitter, it was soon shown that LSD did not exert its effects simply by inhibition of serotonin. Brominated LSD (BOL-148) has an even greater antagonistic effect on serotonin than LSD—but absolutely no psychoactivity [27].

After much experimentation in attempting to produce a model psychosis, researchers remained divided about the potential application of the mental changes produced by LSD. Part of the difficulty was undoubtedly the expectations held by investigators of LSD as a psychotomimetic. As Hoffer and Osmond stated, "A model is not a reproduction of an original . . . a model is required to clarify certain aspects of an original. This the psychotomimetic substances do reasonably well" [21]. In addition, the complexities involved in accurately describing the schizophrenic clinical syndrome made it difficult to establish a set of conditions necessary for a psychotomimetic to meet in order to acceptably describe the many forms of schizophrenia.

Although a few researchers concluded that symptoms of LSD intoxication and schizophrenia were fundamentally indistinguishable, by the mid-1950s the belief that LSD produced a reasonable model psychosis was fast declining. The consensus of this period was stated well by Bleuler, who argued that only the combination of symptoms (such as abnormal thought processes, depersonalization, and hallucinations) progressing gradually to render the individual incapable of controlling his or her life was characteristic of schizophrenia. He stated that psychotomimetic drugs have contributed to our understanding of organic psychoses—not schizophrenia [28]. The adverse opinion from such a renowned psychiatrist caused the era of LSD as a psychotomimetic to end.

LSD AND THE CIA

During the period that most LSD researchers were using the drug to elicit a temporary state of madness in laboratory subjects, the CIA entered the scene with a different set of goals in mind. In order to understand the objectives of the CIA it is necessary to recall the political context of the early 1950s—a time when the Red Scare, fueled by Senator Joe McCarthy's anti-Communist hysterics, led to the blacklisting of anyone even remotely suspected of having Communist leanings. In effect, the CIA was searching for a truth drug for interrogating suspected Communists and a chemical warfare agent to impose mental control on and manipulate behavior of those who posed a threat to democracy. Naturally, they had a great deal of interest in LSD, and in 1953 the CIA approved MK-ULTRA as a project to explore the potential employment of LSD in this area [29].

In order to perform the necessary experiments, the CIA recruited

many of the psychotomimeticists, such as Max Rinkel and Harold Abramson, and provided them with grants to carry out this morally questionable research. As an example of what the CIA was interested in, one protocol from this time requested the researcher to create "operationally pertinent materials along the following lines: a. Disturbance of memory; b. Discrediting by Aberrant Behavior; c. Alteration of Sex Patterns; d. Eliciting of Information; e. Suggestibility; f. Creation of Dependence" [29]. In another series of experiments, prostitutes were used to acquire the LSD subjects. Unsuspecting businessmen were brought to the laboratory, disguised as a bordello, where they were secretly dosed with LSD and their behavior observed behind two-way mirrors [29].

Meanwhile, in the spirit of self-experimentation that characterized the chronicle of LSD, the overseers of MK-ULTRA were ingesting the drug regularly. In late 1953, members of the Army Chemical Corps were invited to party at MK-ULTRA headquarters, where they were not forewarned that the punch was generously dosed. Two days later, believing he had gone insane, one of the army doctors killed himself.

This unfortunate incident was kept secret from the public, as were the aforementioned investigations. Apparently, LSD's potential as a mind control agent failed to live up to the high expectations held by the CIA since these covert operations ended around 1958 [29]. Nevertheless, a close eye was kept on contemporary research using LSD as a different sort of behavior-changing device in the field of psychoanalysis.

LSD as a Psychotherapeutic Adjunct

As the hope that LSD would reveal the biochemical basis of schizophrenia dwindled, researchers turned their attention to the analytical possibilities. In actuality, limited research of this sort had been going on since the late 1940s, but work in this field was overshadowed by the psychotomimeticists. There were two main methods of working with LSD in psychotherapy: as a psycholytic and as a psychedelic [3]. Psycholytic therapy used small doses to facilitate therapy and gradually increased to higher doses. Psychedelic therapy administered large doses (of 200 micrograms or more) once or a few times, and emphasis was given to the resulting experience of altered consciousness.

The foundation for using LSD in psycholytic therapy had been laid by 1954, primarily by European psychiatrists. Frederking mentions that drug-induced dreamlike states had been used to promote release of childhood memories and present important life events in archaic symbols in an attempt to shorten the course of psychoanalysis. He found that LSD and mescaline were effective methods of producing these states and helped patients to break down memory and emotional blocks,

and that the experience almost always ended in the patient experiencing an enormous feeling of liberation [30]. Busch and Johnson also found their patients were able to discuss their problems more easily under LSD and concluded that LSD was a viable method of communicating with chronically withdrawn patients and possibly shortening psychotherapy [31].

Psychedelic therapy was essentially designed to cure by causing an immediate change in behavior and primarily applied in treatment of alcoholics and the major personality disorders. Many reports for treatment of alcoholics showed dramatic changes. Abramson reported at least 25 percent of LSD-treated alcoholics remained abstinent for at least 6 months following treatment [32]. Smith reported that alcoholics were most susceptible to therapy after they had "hit bottom" and believed that a large dose of LSD induced this event artificially, thus rendering the patient more treatable with psychotherapy. In this study he used 24 alcoholics for whom other forms of treatment had no effect. After an average followup 1 year after their LSD session, he found six much improved (abstinent or very limited usage), six improved, and 12 unchanged [33]. In all cases, special mention was made that the drugs were only part of the treatment program and considered valueless without psychotherapy and subsequent rehabilitation.

The reported effectiveness of LSD in opening up chronically withdrawn patients gave rise to the idea that it could also break down the psychological barriers in autism. Freedman et al. gave moderate doses of LSD to 12 autistic children and observed the most obvious psychic changes of mood—swings from euphoria to depression. Although an increase in the quantity of sounds and laughter was noted, none showed any qualitative difference in speech patterns [34].

The future of LSD as a psychotherapeutic appeared promising but was soon overshadowed by the actions of those who ingested the drug for different purposes. Growing among many psychiatrists was the belief that it was essential for therapists to take LSD in order to have a personal understanding of its psychic effects. Many psychiatrists found that their trips propelled them to a temporary state of spiritual awakening and saw great potential for the use of LSD outside the world of medicine.

LSD as a Psychedelic

In 1957, Humphrey Osmond keynoted a conference entitled "The Pharmacology of Psychotomimetic and Psychoactive Drugs." His speech marked the beginning of LSD as a psychedelic. Osmond claimed that LSD and similar drugs did much more than simply mimic some symptoms of mental illness, observing that many LSD volunteers had in-

sightful and pleasurable experiences that enabled them to better understand themselves and their relationships with the world. He advocated the potential employment of this type of experience to aid psychotherapy, educate psychiatrists and psychologists in comprehending the strange ways the mind can operate, and explore the social, religious, and philosophical applications of these drugs. Realizing that these potentials would never be realized unless LSD and similar agents were newly categorized, Osmond presented his selection of nomenclature. His choice was psychedelic, meaning "mind-manifesting"—a name that implies "concepts of enriching the mind and enlarging the vision" [35].

Some of Osmond's remarks increased the polarization of those involved in research with psychoactive drugs into two different schools of thought. First was the statement that there was one key to be applied when working with model psychoses—"One must start with oneself" [35]. Osmond proclaimed that without so doing the investigator could not completely understand the state of mind experienced by the subject, and thereby would lessen the value of the study. In addition, the enthusiastic claims that "psychedelics have a part to play in our survival as a species," that they "help us to explore and fathom our own nature," [35] could have acted only as a catalyst for the actions of those who shared the attitudes of Timothy Leary and embraced LSD with the fervor of converts to a religious cult.

By 1960 there was a growing controversy in psychiatry. One group was exemplified by Osmond and his associates; and another faction was against self-experimentation and the use of LSD outside of the medical profession. The two opposing groups also differed in their experimental approach. Researchers concerned with the spiritual enlightenment aspect were generally letting the patient control the course of his or her LSD trip, acting only as guides to steer the patient through any rough areas. They were also increasingly performing their own self-experiments, gathering in the privacy of their own homes for group LSD sessions where they pondered the philosophical ramifications of the mystical states awakened in them by the drug [36]. Meanwhile, the more conservative psychiatrists were administering LSD under carefully controlled conditions and employing a variety of diagnostic tests and questionnaires to obtain their information about psychedelic experience [37]. At this time, the general public was largely unfamiliar with the powerful mental effects of psychedelic drugs, but this was soon to change.

Interestingly, by this time Osmond had already played a key role in introducing psychedelics to the masses. In 1953, invited by Aldous Huxley, Osmond guided the esteemed novelist-philosopher through his first mescaline session [38]. Since his early 20s Huxley had been on a quest to achieve a higher level of cosmic consciousness, an experience of intel-

lectual and spiritual enlightenment that he felt was programmed deep within the circuits of the brain and could be reached through the induction of mystical states. Discontent with the Darwinian idea that evolution was a random product of natural selection, Huxley believed that mankind had the capability to direct its development toward the ideal—an omega point where art, science, and religion were synthesized into one vision. Part of his philosophy incorporated the idea of the brain as a "reducing valve" that functioned to screen out all of the extraneous sensory data and therefore allowed mankind to focus on the necessary information for survival. While the valve had its obvious benefits, Huxley felt that it had become deleterious to the evolutionary course. In essence, Huxley was searching for a method to bypass the reducing valve and tap into the unlimited potential of the brain. Although throughout the years he had studied under gurus and practiced meditation (all to no avail), he had realized that the means he was looking for might lie within the field of pharmacology after reading Lewin's *Phantastica*.

Huxley took mescaline under Osmond's guidance and later wrote that he had seen "what Adam had seen on the morning of his creation—the miracle . . . of naked existence" [1]. After years of searching, he believed he had finally found the key to higher consciousness. He transformed his revelatory experience into the psychedelic classic *The Doors of Perception,* which confused reviewers but was read by many with extreme interest.

Huxley soon tried LSD, deemed it a much more profound experience than mescaline (which tended to evoke more visions and colors but less enlightenment), and soon became part of the informal association of self-experimenters in Los Angeles [36]. He envisioned LSD as a drug that could change the shape of mankind's self-knowledge, an agent to accelerate evolution to produce a more intelligent, loving, and spiritual race of people. He theorized this would happen by turning on the elites, the best and the brightest, and the rest of society would naturally follow. However, all revolutions must necessarily have a leader, a unifying figure, and this one was no exception. Most of the enthusiastic scientists were unwilling to risk their careers, and Huxley himself was old and in fragile health. The revolution was poised on the edge, waiting to be set in motion, when Timothy Leary entered the picture.

While Osmond and Huxley discovered LSD along the mescaline route, Leary used the alternative psychedelic stepping-stone of psilocybin mushrooms. In the summer of 1960 the Harvard psychology professor first used these mushrooms and experienced a profound religious ecstasy, a "vitalizing transaction" [39] that he believed would revolutionize psychology. He returned to Harvard for the fall semester with big plans, plans that were greatly aided when he discovered Albert Hof-

mann had recently identified psilocybin as the active component of the mushrooms and the drug was being manufactured by Sandoz.

In late 1960, Leary began performing studies with psilocybin at the Center for Research in Personality, with the emphasis on changing behavior. A few months later he shifted the focus of his experiments to the inmates at the Massachusetts Correctional Institution. In this unconventional therapy program, Leary and other psychologists took psilocybin together with the inmates, who were then allowed to explore their deep-rooted feelings, with the researchers acting as guides of the inner conscious. Before the study ended, 22 of the participants were released from prison. Of these, only 32 percent returned to prison for parole violations or convictions for new crimes—a remarkable figure when compared to the national average of 67 percent [40].

Around the same time, Leary had consulted and taken psilocybin with Huxley, who shared his vision of expanding the consciousness of mankind through psychedelic drugs. Huxley advised Tim to use the Harvard prestige to its full advantage by staying within scientific constraints and giving psilocybin only to the socially and intellectually elite. In this manner the transformation they were seeking would gradually take place [41]. Leary initially agreed with this approach. However, his whole perspective changed when poet Allen Ginsberg dropped by Leary's house (on a recommendation from Osmond) to try psilocybin. Expecting a quiet contemplative afternoon, Leary was surprised when Ginsberg entered his study completely naked and announced he was going to walk in the streets and teach people to "stop hating" [41]. He also introduced Leary to the concept of the "fifth freedom": the right of all individuals to alter their consciousness as they saw fit [41]. Influenced by Ginsberg, Leary adopted an egalitarian approach to psychedelic drugs: he was going to make the public aware of the untapped potential within their minds by introducing as many people as possible to psilocybin. Leary recruited colleague Richard Alpert for his experiments, and they began conducting their own investigations outside of Harvard. Eventually they gave approximately 3,500 doses of psilocybin to around 400 volunteers, reporting that 73 percent of them had very pleasant experiences and 95 percent said that their lives were changed for the better afterward [42].

With this sort of enthusiasm, it was inevitable that Leary would soon try LSD, and he did so around the spring of 1961. While psilocybin had been a "love drug" that hinted at the underlying mental structure, LSD provided a much more intense trip that culminated in the death of the ego followed by a feeling of spiritual rebirth (at least with the massive doses that Leary and company were ingesting) [43]. Psilocybin studies were halted, and the focus shifted to the incredible power of LSD.

As their investigations developed, criticism arose that their studies

were being carried out irresponsibly, and in the fall of 1962 Harvard officially decided that psychedelic drugs were too dangerous for nonmedical research. Leary and Alpert were given ultimatums: stay at Harvard or work with psychedelics. They left. After leaving they formed the International Federation for Internal Freedom (IFIF), an organization whose official position that psychedelics were "basically educational instruments" and whose stated purpose was "to work to increase the individual's knowledge and control of his/her own nervous system" [42].

By this time, the activities of Leary and the IFIF had gained the attention of the media, and the nation was becoming aware of the extraordinary effects of psychedelic drugs. Leary encouraged the youth of American to take LSD as a means of transcending the conventional mode of thought and stated that psychedelic drugs were "biochemical keys which unlock experiences shatteringly new to most westerners" [42]. He and his followers had essentially formed a ritual drug cult centered around the mystical experiences associated with LSD intoxication that has been called "a direct resurrection of Dionysian worship" [44]. LSD, the core of the psychedelic movement, was ingested to produce heightened emotional experiences and increased awareness. The ultimate goal was an "exalted spiritual experience." Leary claimed that "all religions have their sacrament . . . ours is LSD. Once you have taken that sacrament you are out of your mind and have come to your senses" [44].

In the 1960s, Leary had a kind of psychedelic road show that played in rented movie theaters. One such event in a Greenwich Village theater was attended by one of the authors (B.M.P) and featured Leary dressed in a Druidic white gown chanting the now famous trochiac trimeter ("Tune in, Turn on, Drop out") while standing amid clouds of dry ice–generated carbon dioxide as the projector flashed whirling bizarre shapes and colors on the screen. The audience, silent and pensive, sat waiting for something (a vision, an insight, contact with the inner self?) but nothing happened, and most left feeling disappointed.

Spurred on by Leary's call to "Tune in, Turn on, Drop out" was the hippie culture, characterized by excessive use of psychedelic drugs, a back-to-nature philosophy, and opposition to the Establishment. Concerned that illicit use of LSD was becoming a public health problem, the federal government outlawed the use and sale of psychedelic drugs in 1965 [45]. The government strengthened its antidrug stance in 1967 with reports of LSD-induced chromosomal damage [46], and although these reports were later shown to be false [47], they had a major effect by slowing recreational use of LSD. With LSD banned by the government and embroiled in controversy, research with the drug virtually ceased [45].

Because of its powerful, and often unpredictable, mental effects,

many people (including Hofmann, its discoverer [48]) were surprised that LSD enjoyed such widespread popularity during the tumultuous 1960s. However, this should not have been completely unexpected. Throughout history, mankind has sought different means of obtaining a higher level of consciousness, a mystical state of understanding the world and his relationship to it. The search for higher meaning has taken mankind down both the religious and the chemical pathways, and these paths have often crossed. Indeed, Wasson has hypothesized that religion as a cultural development originated from ancient people's use of hallucinogenic mushrooms [49].

Therefore the use of LSD to obtain an instant, transcendent, spiritual mental condition can be partially explained by the desire to find a deeper meaning in life during a period of relative instability. Hofmann, himself suspects that the materialistic American life-style and resultant feelings of alienation from nature and lack of a meaningful philosophy of life drew people to a drug that offered insight and the chance to go beyond the mundane realities of everyday life [48]. LSD never had the kind of popularity in Europe or Asia that it had in the United States—for what reason, we cannot say.

In his final analysis, Hofmann favored the potential uses of LSD; stating that if people learned to use the drug more wisely under the proper conditions, in medicinal practice, and in association with meditation, it could become a "wonder child" [48]. We now know that will never happen. LSD was part of an era of crazy faith in better living through chemistry. Although this faith is no longer shared by the mainstream of our civilization, illicit usage of LSD and other hallucinogenic drugs unquestionably still exists today, as evidenced by the "ecstasy" craze that swept through America in the mid-1980s. In addition, new psychoactive drugs are currently being synthesized and tested by underground chemists in their desire to explore the unknown frontiers of consciousness [50]. While the era of epidemic LSD ingestion has ended, as long as people are dissatisfied or bored with their lives, the market for a "soma holiday" will be a part of society.

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