

## A Biochemical Bridge to the Embodied Psyche:

### LSD Research 1945-1965

Kim Hewitt



Kim Hewitt is pursuing a doctorate in American Civilization at the University of Texas at Austin. Her email address is khewitt@mail.utexas.edu. This project is supported in part by MAPS. Comments or further support would be greatly appreciated.

I AM WRITING a cultural studies dissertation that explores how psychedelics helped facilitate a shift in American ideas about mind-body interaction. It is well known that Aldous Huxley's publication of *The Doors of Perception* in 1954 sparked renewed interest in psychedelics and speculation that both religious experiences and madness could be chemically induced, forcing a reconfiguration of mind-body interaction. It is less well known that knowledge about the chemical structures and properties of psychedelics played an important role in changing psychiatric ideas about mental function. As researchers began to construct a model of mental illness that acknowledged a physiological factor, the Cartesian duality between mind and body began to crumble, as did the plausibility of Freudian psychoanalytic techniques for serious mental disorders. One of the aims of this project is to educate both the academic community and the general public about the immense cultural impact of psychedelic drug research, not only in shifting psychiatric views, but in mainstream ideas about consciousness.

The story of LSD's contribution to psychiatry is a historical strand distinct from the use of LSD as an adjunct tool for psychotherapy, which was also hotly debated during the postwar decades. Specifically, LSD research proved crucial to the development of a biochemical theory of psychosis and the link between serotonin and mental disorders. The implications of a physiological element of consciousness—that madness, and perhaps even religious experience, are inseparable from the body—have since become commonplace, with widespread repercussions in American life. More accurate discussion of these ideas by cultural critics and historians is long overdue, but has become more possible through interdisciplinary work that reconciles the humanities with research from hard sciences such as chemistry, biology and neuroscience.

CULTURAL CONTEXT influences how we interpret experiences. Prior to knowledge about the biochemical component of mental illness — and prior to knowledge about changes in perception and cognition induced by psychedelics — how would we have interpreted the following report?

*When I am melting I have no hands. I go into a doorway in order not to be trampled on.*

*Everything is flying away from me. In the doorway I can gather together the pieces of my body. It is as if something is thrown in me, bursts me asunder. Why do I divide myself in different pieces? I feel that I am without poise, that my personality is melting and that my ego disappears and that I do not exist anymore. Everything pulls me apart... The skin is the only possible means of keeping the different pieces together. There is no connection between*

*different parts of my body.*<sup>1</sup>

As recently as the late 1970s, some psychiatrists would have considered this experience of schizophrenia a result of a functional disorder — one caused by psychological maladjustment to the environment. Yet, mental disorders and psychedelic experiences have both consistently acted as catalysts to question the Cartesian duality between mind and body and explore consciousness. Much postwar research with psychedelic drugs was based on the psychomimetic properties of the drugs. Because researchers believed that the psychedelic state mimicked psychosis, they hoped to understand schizophrenic episodes by studying the “LSD psychosis.” Many psychologists and psychiatrists hoped that by taking LSD they might better understand their mentally ill patients. Researchers conducted many studies to test the perceptual and cognitive changes induced by LSD. The idea that mental illness might be chemically induced spurred re-evaluation of the etiology of mental disorders, and the workings of the human mind-body — and forced us to consider holistic mind-body interaction as a possible model of consciousness. Gradually, we have come to accept that consciousness has a physiological element, and that the human mind is inseparable from bodily functioning. By forcing us to reconsider the basis of everyday functioning, LSD research has prompted us to consider mind-body holism in relation to mental health, the concepts of identity and personality, the nature of religious experience, the possibilities for human pharmacological self-creation, and ultimately of our social construction of “reality.”

Psychiatric “realities” are in large part determined by conceptions of mind-body interaction, and my completed dissertation will include a history of ideas of mind-body in psychiatry. In the early twentieth century, Freudian psychoanalytic theories began to pose non-somatic explanations for many disorders. A prime example was hysteria, named by the Greeks for the part of the body where it supposedly originated, the uterus. Freud relocated the origin of this illness from the body to an unhealthy psyche, which then affected the woman’s behavior and body.<sup>2</sup> Although Freud’s theories admitted that the mind and body

are entwined, the foundation of his model is a psyche, formed by childhood events, reigning over the body. Although doctors never lost sight of the possibility that mental disorders could be caused by an organic lesion, in the early twentieth century Freudian theory had shifted the emphasis to psychological factors. Renewed interest in somatic theories during the 1930s was sparked—and complicated by—advances in endocrinology, biochemistry, genetics and neurology, as well as interpretations of mental illness from the fields of sociology and anthropology.<sup>3</sup>

During the 1930s institutions began administering new treatments to patients diagnosed with mental illness. A brief glimpse at these treatments illuminates the state of psychiatry before a plausible biochemical theory was developed. That doctors employed these stringent techniques in the absence of a conceptual theory for how and why they worked illustrates the crucial importance of even the slightest bit of information that could explain the etiology of mental disease. Although on rare occasion one of these treatments affected a cure, without a clear idea of what caused the condition diagnosed as schizophrenia or manic-depression, doctors could not understand how or why a treatment was efficacious.

**B**EGINNING in the 1930s, a patient institutionalized for depression might be subjected to insulin injections, each one of which would induce a temporary coma, or a series of electroshock treatments, during which electrical current would be conducted through the patient’s head, jolting the patient into convulsions and unconsciousness. Although these treatments often stabilized the individual, they were not pleasant experiences. As Sylvia Plath described in lines of poetry that were likely inspired by her electroshock therapy, “By the roots of my hair some god got hold of me, I sizzled in his blue volts like a desert prophet.”<sup>4</sup> Side effects could entail spinal fractures or other broken bones suffered during the electrically induced convulsions.

For intractable cases of severe mental illness, the last resort was a procedure developed by two Portuguese doctors in 1936. This “psychosurgery” was called

lobotomy because it destroyed the cortex of the frontal lobe of the brain. By 1947, doctors in the United States had performed 2,000 lobotomies.<sup>5</sup> However, Drs. Walter Freeman and James Watts, pioneers of lobotomy in the United States, pointed out in *The American Journal of Psychiatry*, that lobotomy was definitely not a cure. Rather, it was a “decidedly practical” effort to help the patient adjust to his environment. Freeman and Watts admitted the limited benefits of lobotomy by emphasizing “above all we do not speak of recovery.” Rather, a fair result would be the ability of the patient to live outside the hospital, while a good result would enable the patient to “earn a living or manage a household.” Individuals who suffered from schizophrenia benefited least from prefrontal lobotomy, and the majority of these patients were never capable of leaving the hospital, even after psychosurgery. However, the doctors noted that the surgery made the patients more docile on the hospital ward.

**A**LTHOUGH psychosurgery did not usually reduce hallucinations or other symptoms of psychosis, it certainly reduced the extremities of emotion and behavior for some patients. Their violent outbursts diminished and were replaced by apathy and inertia.<sup>6</sup> This may have improved the tenor of life for these patients, or at least for those surrounding them. Whether or not quality of life improved is debatable. At the time, doctors, or at least Freedman and Watts, did not dwell on the tragic price paid to remove the most extreme antisocial behaviors associated with mental illness. The usefulness of lobotomy lay in the reorientation of the patient, who turned away “from the self to the environment. The patient takes his cue from those around him. He is cheerful when they are cheerful, playful when they are playful, sympathetic when they arouse his sympathy, apologetic when they show him how he has transgressed.” In short, the lobotomy quelled behaviors society could not tolerate, and created a pliable individual, no longer absorbed in the suffering of his illness, but responsive to the needs of the environment. “He is unconcerned about himself and unworried about the future. If he is no longer able to paint pictures, write

poetry or compose music, he is, on the other hand, no longer ashamed to fetch and carry, to wait on table or make beds or empty cans. If he has suffered some reduction in his personal dignity and vanity, he has gained in social adaptability.”<sup>7</sup>

Thus were the hopes for otherwise intelligent and talented individuals who suffered from severe mental illness in 1945. Today, mental disorders still cause abysmal suffering, while treatments remain experimental and problematic. Even the best drug therapies often incur side effects, some of which can be devastatingly disruptive. Many cases of manic-depression, schizophrenia, and other chronic illnesses still remain unresponsive to any treatment. The unfortunate reality remains that today the exact causes of mental illness remain a mystery. However, the biochemical theories postulated in the 1950s began to steer doctors and therapists — as well as the general public — away from theories that blamed childhood trauma, the schizogenic mother or dysfunctional family, social maladjustment or social deviance.

In *The Doors of Perception*, Huxley revealed that he felt strongly that his mescaline state bordered at moments on madness, although he noted “most takers of mescaline experience only the heavenly parts of schizophrenia.”<sup>8</sup> Huxley sketched out Humphry Osmond’s adrenochrome theory. Osmond, then working at a psychiatric hospital in Saskatchewan, Canada, had noted the similarity between the chemical compositions of mescaline and adrenaline. Since the mescaline molecule could produce a state similar to psychosis, Osmond wondered if psychosis was a result of a malfunction of adrenaline production in the human body. Perhaps a toxic biochemical was produced as nor-adrenaline changed into adrenaline. Osmond called this unknown biochemical “substance M,” and theorized that it was a cause of psychosis.<sup>9</sup> Although this theory was never proven, it was among the first specific biochemical theories of mental illness. At the Rockefeller Institute for Medical Research in New York, chemists were following a similar train of thought as they pondered the similarity between the molecular structures of LSD and serotonin. The theories they produced have proven fruitful for psychiatric research.

The new ideas about the etiology of mental disorder hinged on the discovery of serotonin in the late 1940s. Maurice M. Rapport and his coworkers Arda Alden Green and Irvine H. Page had isolated serotonin from beef serum in 1948, and demonstrated its ability to contract the smooth muscles lining the walls of blood vessels in rabbit ear tissue. This vasoconstriction narrowed blood vessels, raising blood pressure. As Rapport and his fellow researchers tested the newly isolated vasoconstrictor, they noted that its chemical and biological activity resembled that of epinephrine — also called adrenaline — although its vasoconstrictor action was twice as powerful.<sup>10</sup> In 1949, Rapport confirmed the chemical formula for serotonin and called it 5-hydroxytryptamine.<sup>11</sup>

**S**EVERAL CHEMISTS at the Rockefeller Institute based their research on Rapport's findings. In an attempt to find a treatment for high blood pressure, D.W. Woolley and E. Shaw searched for serotonin antagonists, agents that would block the vasoconstrictor action of the serotonin molecule. The most likely candidates were serotonin metabolites — chemicals with molecular structure similar to serotonin, which would take the place of the serotonin molecule in living tissues.<sup>12</sup> Among the metabolites Woolley and Shaw isolated as possible treatments for hypertension were the ergot alkaloids, including LSD, which has a chemical structure similar to serotonin.<sup>13</sup> Although another chemist in London was simultaneously proving that LSD antagonized serotonin, his results were published somewhat later than Woolley's.<sup>14</sup>

In 1954, after determining that several hallucinogenic drugs, including the ergot alkaloids, the harmala alkaloids, and yohimbine, were also serotonin antagonists; Woolley and Shaw formulated a theory of the etiology of mental disorders. Published as an article in *Science* in 1954, and as a book in 1962, Woolley and Shaw's theory proposed that serotonin mediated mental processes, and that psychosis was caused by a disturbance in serotonin in the brain.<sup>15</sup> Woolley was unsure whether over or underproduction of serotonin was the culprit, but showed evidence that serotonin was vital to mental functioning. This serendipitous biochemical discovery of the

physiology of "mind" and mental disorder resulted from scientific experimentation with LSD as one of a number of serotonin antagonists.

In 1957, the March issue of the *Annals of the New York Academy of Science* was dedicated to research with hallucinogens. Articles by Humphry Osmond, Woolley and Shaw, and others discussed research methodology, findings, implications, ethics, and future directions. Hudson Hoagland pointed out the role psychomimetic drugs played in reawakening interest in biochemical psychiatric research. Without dismissing environmental factors, Hoagland put forth a new paradigm for "mental" functioning that considered neurochemical factors, even as he recognized the limits of a strictly physiological model for behavior.

"(A)ll behavior... is a result of the organized activities of the brain functioning in its internal environment in which the cellular dynamics determined by enzyme constellations and a host of chemical determinants are basic to the nature of behavior. The personal developmental history of an individual in relation to his environment, can by conditioning, modify within limits various aspects of the brain, but why some persons develop schizophrenia in the face of life's stresses and others do not is the prime unanswered question."<sup>16</sup>

Hoagland spent the major part of his article addressing the biochemical findings of LSD research and their importance for a new model of mental function and dysfunction. He clearly laid a groundwork for the larger implications of these findings for understanding human behavior and human nature, as he stated, "a behaving disembodied psyche is a meaningless concept."

Likewise, the psyche eviscerated from its cultural milieu is incomprehensible. Interdisciplinary cultural studies are seeking new methods with which to understand individual and mass human behavior and its contexts. Postwar research with psychedelic drugs, in science labs and among intellectuals and others, provided an inchoate methodology that includes embodied biochemical functioning. Today, when seeking to understand mental disorder, one can no longer avoid the physiological element. In *Listening to Prozac*,

psychiatrist Peter Kramer has characterized this trend as the "medicalization of personality,"<sup>17</sup> but the philosophical implications extend even further. The psychedelic research that narrowed the gap between mind and body may provide a paradigm for interdisciplinary study as it seeks to encompass the embodied human into cultural studies. •

#### References

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