Dr. Stanislav Grof entrevista Dr. Albert Hofmann

Esalen Institute, Big Sur, California, 1984.

Editor's note: This remarkable dialogue from 1984 has never been published. We're printing it now in part to provide historical context for a new effort, in which MAPS is participating, to restart LSD psychotherapy research in the United States. In addition, this dialogue addresses and helps clarify the idealist view of the potential value of psychedelics, when used properly, to help "engender ecological sensitivity, reverence for life, and capacity for peaceful cooperation with other people and other species," qualities that are desperately needed in these times of terrorism and war.

Grof: It is a great pleasure and an honor for me this morning to welcome and introduce Dr. Albert Hofmann, to the extent to which he needs introduction at all. As you all know, he became world famous for his discovery of a compound that is probably the most controversial substance ever developed by man, diethylamide of lysergic acid, or LSD-25. When LSD made its entry into the world of science, it became an overnight sensation because of its remarkable effects and also its unprecedented potency. It seemed to hold tremendous promise in the research of the nature and etiology of schizophrenia, as an extraordinary therapeutic agent, as a very unconventional tool for training of mental health professionals, and as a source of inspiration for artists.

Dr. Hofmann's discovery of LSD generated a powerful wave of interest in brain chemistry and, together with the development of tranquilizers, was directly responsible for what has been called the "golden age of psychopharmacology." And then his prodigious child became a "problem child". This extraordinarily promising

chapter in psychology and psychiatry was drastically interrupted by unsupervised mass self-experimentation and the ensuing repressive administrative, legislative, and political measures, as well as the chromosome scare and the abuse by the military and secret police. But I firmly believe that this chapter is far from being closed. Whether or not LSD research and therapy as such will return into modern society, the discoveries that psychedelics made possible have profound revolutionary implications for our understanding of the psyche, human nature, and the nature of reality. And these new insights are here to stay as an important part of the emerging scientific world view of the future.

Before we start this interview, I would like to add a little personal note. Dr. Hofmann's discovery of LSD and his work, in general, have had a profound impact on my own professional and personal life, for which I am immensely grateful. My first LSD session in 1956, when I was a beginning psychiatrist, was a critical landmark and turning point for me and since then my life has never been the same. So this interview gives me the opportunity to express my deep appreciation and gratitude to Dr. Hofmann for the influence he has had on my life.

What I would like to ask you first has something to do with the way people tend to qualify your discovery of the psychedelic effects of LSD. It is usually referred to as a pure accident, implying that there was nothing more involved in this entire matter than your fortuitous intoxication. But I know from you that the history was somewhat more complex than that. Can you clarify this for us?

Hofmann: Yes, it is true that my discovery of LSD was a chance discovery, but it was the outcome of planned experiments and these experiments took place in the framework of systematic pharmaceutical, chemical research. It could better be described as serendipity. That means that you look for something, you have a certain plan, and then you find something else, different, that may nevertheless be useful.

And that is exactly what happened with LSD. I had developed a method for the synthesis of lysergic acid amides in the context of a systematic study, the purpose of which was to synthesize natural ergot alkaloids. At that time, in the 1930s, a new ergot alkaloid had been discovered which is named ergometrine, or ergonovine. It is the real active principle of ergot. The presence of this alkaloid in ergot is the rea- son why it has been used in obstetrics to stop uterine bleeding and as an oxytoxic. And this sub-stance turned out to be an amide of lysergic acid. Until the late 1930s, it had not been possible to prepare such substances in the laboratory. I discovered a technical procedure that made it possible and was able to achieve partial synthesis of ergonovine; I then also used this procedure to prepare other lysergamides. First came

the modifications of ergonovine and one of these modifications, methergine, a homologue of ergonovine, is today the leading medicament in obstetrics to stop postpartum bleeding. I also used this procedure to prepare not so close derivatives of ergonovine, more different than methergine. And one of these compounds was LSD-25, lysergic acid diethylamide. The plan, the intention I had, was to prepare an analeptic, a circulatory and breathing stimulant.

Grof: Was there some indication in the early animal experiments that LSD could be an activating agent?

Hofmann: No, I made LSD because it is an analog of coramine, which is diethylamide of nicotinic acid. Be- cause of the structural relationship between LSD and the ring of the nicotinic acid, I hoped to get an analeptic. But our pharmacologist concluded that lysergic acid diethylamide did not have any clinically interesting properties and suggested that it be dropped out of research. That happened in the year 1938. But all along, I had a strange feeling that we should again test this substance on a broader scale. Then, five years later, in 1943, I finally decided to synthesize another sample of LSD. At the end of the synthesis, something very strange happened. I got into a dreamlike condition, in which all of my surround- ing was transforming. My experience of reality had changed and it was rather agreeable. In any case, I left the laboratory, went home, lay down and enjoyed a nice dreamlike state which then passed away.

Grof: Did you immediately suspect that this was an intoxication from the drug you were working with?

Hofmann: I had the suspicion that it was caused by something from the laboratory, but I believed that it could have been caused by the solvent I had used at that time. I had used dichlorethylene, something like chloroform, in the very final state of preparation. So, the next day in the laboratory, I tried the solvent and nothing happened. Then I considered the possibility that it might have been the substance I had prepared. But it did not make any sense. I knew I was very careful and my work was very clean. And, of course, I did not taste anything.

But I was open to the fact that, maybe, some trace of the substance had in some way passed into my body. That, maybe, a drop of the solution had come onto my fingertips and, when I rubbed my eyes, it got into the conjunctival sacs. But, if this compound was the reason for this strange experience I had, the nit had to be very, very active. That was clear from the very beginning because I had not ingested anything. I was puzzled and decided to conduct some experiments to clear up this

thing, to find out what was the reason for that extra ordinary condition I had experienced.

Being a cautious man, I started this experiment with only 0.25 milligrams (the ergot alkaloids are usually administered in milligram dosages). That is an extremely low dose and I expected it would not have any activity. I thought I would increase very cautiously the quantity of LSD in subsequent experiments to see if any of the dosages were active. It turned out that when I ingested this quarter of a milligram, I had taken a very strong, a very high dosage of a very, very active com- pound. I got into a strange state of consciousness. Every- thing in my surroundings changed – the colors, the forms, and also the feeling of my ego had changed. It was very strange! And I became very anxious that I had taken too much and I asked my assistant to accompany me home. At that time we had no car available and we went home by bicycle.

Grof: Many people who have taken LSD, particularly in such a high dose, have a lot of respect for that ride. They realize what it is to ride a bicycle in that kind of a condition.

Hofmann: During this trip home on the bicycle – it was about four kilometers – I had the feeling that I could not move from the spot. I was cycling, cycling, but the time seemed to stand still. In my report afterward, I mentioned this trip on the bicycle to show that LSD affected the experience of time, as an example of the distortion of the sense of time. Then the bicycle trip became a characteristic aspect of the LSD discovery. As we arrived home, I was in a very, very bad condition. It was such a strange reality, such a strange new universe which I had entered, that I believed I had now become insane. I asked my assistant to call the doctor. When the doctor arrived, I told him that I was dying. I had the feeling that my body had absolutely no feeling any more. He tested me and shook his head, because everything was OK.

Then, my condition became worse and worse. When I was lying on my couch, I had the feeling that I had already died. I believed, I had a sense that I was out of my body. It was a terrifying experience! The doctor did not give me anything, but I drank a lot of milk, as an unspecific detoxicant. After about six hours, the experience of the outer world started to change. I had the feeling of coming back from a very strange land, home to our everyday reality.

And it was a very, very happy feeling and a very beautiful experience. After some time, with my eyes closed, I began to enjoy this wonderful play of colors and forms, which it really was a pleasure to observe. Then I went to sleep and the next day I

was fine. I felt quite fresh, like a newborn. It was an April day and I went out into the garden. It had been raining during the night. I had the feeling that I saw the earth and the beauty of nature as it had been when it was created, at the first day of creation. It was a beautiful experience! I was reborn, seeing nature in quite a new light.

Grof: We have seen this kind of sequence, the death- rebirth process, very regularly in psychedelic sessions. Many people link this experience to the memory of their biological birth. I wanted to ask you, if during the time when it was happening, it was just an encounter with death or if you also had the feeling that you were involved in a biological birthing process?

Hofmann: No, the first phase was a very terrifying experience, because I did not know if I would recover. First, I had the feeling that I was insane and then I had the feeling I was dying. But then, when I was coming back, I had of course the feeling of rebirth.

Grof: When did you become aware that this drug could be of significance to psychiatry?

Hofmann: Immediately! I knew immediately that this drug would have importance for psychiatry! But, at that time, I would never have believed that this substance could be used in the drug scene, just for pleasure. For me it was a deep and mystical experience and not just an everyday pleasurable one. I never had the idea that it could be used as a pleasure drug. And then, soon after my experience, LSD came into the hands of psychiatrists. The son of my boss at that time, Dr. Werner Stoll, who was working at the Burghoeltzli Psychiatric Institute in Zurich, conducted the initial experiments with LSD.

First, we checked it in our laboratory, because the head of the Chemical Department, Professor Stoll, and the head of the Pharmacology Department, Professor Rothlin, said that what I was telling them was not possible. They told me: “You must have made a mistake when you measured the dosage. It is impossible that such a low dosage could have an effect.” And Professor Rothlin then made an experiment with two of his assistants. They took only one fifth of what I had taken, 50 micrograms, to check it out. And even then, they had a full-blown experience!

Grof: So, this was, in a nutshell, the story of the discovery of LSD. And then we come to the next important chapter of your psychedelic research, the isolation and identification of the active principles of the magic mushrooms of the Mazatec Indians

in Mexico. How long after the discovery of the psychedelic effects of LSD did Gordon Wasson contact you?

Hofmann: For the first ten years, LSD was my “wonder child”, we had a positive reaction from everywhere in the world. Around two thousand publications about it appeared in scientific journals and everything was fine. Then, at the beginning of the 1960s, here in the United States, LSD became a drug of abuse. In a short time, this wave of popular use swept the country and it became “drug number one”. It was then used without caution and people were not prepared and informed about its deep effects. And then all kinds of things happened, which caused LSD to become an infamous drug. It was a troublesome time! Telephones, panic, and alarm! This had happened, that had happened.... it was a breakdown. Instead of a “wonder child”, LSD suddenly became my “problem child”.

I saw in the newspaper a notice that an American amateur mycologist and ethnologist, Gordon Wasson, and his wife had discovered mushrooms which were used in a ritual way by the Indians. These mushrooms seemed to contain a hallucinogen that produced an LSD-like effect. Of course, I did not know who these ethnologists were, but I certainly was interested in investigating these mush- rooms. Then, I got a letter from Professor Heim, a French mycologist from the Sorbonne in Paris. Mr. Wasson and his wife, who had discovered this very old Mexican mushroom cult and had published information about the ritual use of these mushrooms, had sent him some samples. They had asked him if he could examine the mushrooms and make a precise botanical investigation.

Professor Heim tried to isolate the active principle from the mushrooms, but did not succeed. Gordon Wasson had also initiated chemical studies of the mush- rooms in the United States, at the University of Dela- ware, but this work had not brought any positive results either. And so Professor Heim, who knew about the work we had done with LSD in Basel, asked me in his letter if I would be interested in taking on this research. So, in this way, LSD attracted the mushrooms to come into my laboratory.

At first, we had only 200 or 300 grams of these mushrooms. We tested them in animals, since we had some experience with LSD and we knew what kind of pharmacological activity could be expected from such psychoactive principles. We did not find anything and our pharmacologist suggested that the mushrooms probably were not active at all, that they were the wrong mushrooms, or that they had lost their activity when they had been dried in Paris. In any case, to clear the problem, I decided to make a self-experiment. I took a dosage that was mentioned in the

prescriptions in the old chronicles – 2.4 grams of dried mushrooms – and I had a full-blown LSD experience.

And it was very strange. I took it in the laboratory and I had to go home, because I had again taken a dosage that was rather high. At home, everything looked Mexican – the rooms and surroundings – although I had never been in Mexico before. I thought that I must have imagined all that, because I knew that the mushrooms had come from Mexico. For example, I had a colleague, a doctor who supervised me for this experiment. When he checked my blood pressure, I saw him as an Aztec. He had a German face, but for me he became an Aztec priest and I had the feeling he would open my chest and take out my heart. It was really an absolutely Mexican experience!

After a few hours, I came back from the Mexican landscape and I knew that we had not used the right tests. The work with animals would not have taken us any- where; we had to test the activity (of the various amounts) in humans. And from then on, my colleagues and I tested personally all the extracts we made from the mushrooms. We extracted them with different solvents and used fractionating procedures to isolate the active principles.

Grof: How many steps did it take you from the beginning to the end to identify chemically the active principles?

Hofmann: We had about five or six steps. Finally, we ended up with a very small quantity, several milligrams of concentrated material that was still amorphous. And we could use it to make a paper chromatogram. It turned out that the substance was concentrated in four phases. We cut the paper chromatogram and four of my colleagues and I ate these fractions. When one turned out to be active, then we could make some tests with this fraction, crystallize it, get the color reaction specific for it, and so on. Finally, we were able to isolate the active principles and it turned out to be two substances, which I named psilocybin and psilocin because they had been isolated from Psilocybe mexicana. Most of these magic mushrooms used by the Indians belong to the genus Psilocybe.

Then, when we had these substances, we sent them for pharmacological testing. It turned out that they were about a hundred times less active than LSD, but still very active. It means that about 5 to 10 milligrams is the active dose. Later I received a letter from Professor Moore in Delaware, who congratulated us for solving the problem of the mushrooms. He and his team had worked for more than a year trying to isolate the active principles from these mushrooms and were not able to do it.

They had tested all their extracts in animals, all kinds of animals, even fish, but were not able to find a lead. The reason for our success was that we used our own team for testing the fractions and did not rely on animal experiments. Professor Moore then sent me the rest of these mushrooms; after all this work, he still had about 12 kilograms left.

Grof: What was the overall time that it took you to identify the active alkaloids?

Hofmann: About half a year. Having chemically identified these substances, we were then able to synthesize them in the laboratory. We were able to use the basic materials we had on hand from the LSD research, namely derivatives of tryptamine which could now be used for the synthesis of psilocybin, and psilocin. Gordon Wasson, who was a banker by profession and an amateur mycologist, was very impressed by the results. He did not know what active principles meant; for him it was the mushrooms that were the active agent. He came to Basel to visit us and I showed him these active principles in a pure crystalline form. It turned out that only about 0.5% of the mushrooms represents the active principles. In- stead of 5 grams of the mushrooms you can take 25 milligrams of psilocybin. Gordon was quite fascinated to see these crystals and then he said: "Oh, by the way, there is another magic drug the Indians use which has not yet been studied scientifically. It is called ololiuqui.

Grof: And so began another important chapter of your research.

Hofmann: Yes. I went with Gordon Wasson to Mexico to study the other magic plant materials, ololiuqui (morning glory seeds) and Salvia divinorum, a new Salvia species that the Indians also used like the mushrooms. We visited Maria Sabina, the curandera or the shaman woman who had given the mushrooms to the Wassons. They were probably the first white people who ever ingested the mushrooms during the sacred ceremony. It was already late summer or beginning of fall and there were no more mushrooms. We explained to Maria Sabina that we had isolated the spirit of the mushrooms and that it was now in these little pills. She was facinated and agreed to make a ceremony for us. To participate in the ceremony, you always have to have a reason. The mushroom ceremony is a consultation, like going to a doctor or a psychiatrist if you have some problems. Gordon told Maria Sabina: "I left New York three weeks ago and my daughter had to go to the hospital to have a child. I don't know what happened with her. Can the mushroom tell me what happened with my daughter?" So that was the reason they made a ceremony for us. It involved Maria Sabina, her daughters, and other shaman colleagues and it was a beautiful ceremony.

Grof: I understand that, on this occasion, Maria Sabina gave you the official "seal of approval," that after having taken the pills, she actually confirmed that their effects were identical to those of the magic mushrooms. Hofmann: Yes. I gave her for the ceremony tablets of the synthetic psilocybin. I knew that she used a certain number of mushrooms and I assessed the corresponding quantity of tablets. We used them and it was really a full blown wonderful ceremony which lasted until the morning. When we left, Maria Sabina told us that these tablets really contained the spirit of the mushrooms. I gave her a bottle of them and she said: "I can now also perform the ceremonies during the times when we have no more mushrooms."

Grof: How did you now move from your mushroom research to the work with ololiuqui?

Hofmann: I got the supply of ololiuqui, seeds of a certain morning glory family, from Gordon Wasson. Gordon got them from a Zapotec Indian who had collected them for him. These seeds, like the mushrooms, were used in ceremonies for a kind of magic healing and for divination. We were able to isolate the active principles responsible for the effect of these seeds and I was quite astonished to find out that these seeds contained as the active principles monoamid and hydroxyethylamid of lysergic acid and a bit of ergonovine. These were derivatives of lysergic acid which I had on my shelf through my studies with LSD. I initially could not believe that this was possible, because the lysergic acid derivatives I had worked with before were produced by a fungus.

Grof: And the morning glory seeds come from flowering plants that belong botanically to an entirely different category.

Hofmann: Yes, these plants belong to two very different stages of evolution in the plant kingdom, which are quite remote from each other. And it is absolutely unusual to find the same chemical products in quite different stages of plant evolution.

Grof: I have heard that, at the beginning, your colleagues actually accused you, saying that you must have contaminated your samples from the ololiuqui research with the products of your LSD work that you kept in your laboratory. Knowing how meticulous your work is, that was quite an outrageous accusation!

Hofmann: That is true. I gave the first report on this work in 1960, at the International Conference on Natural Products in Sydney. When I presented my results, my colleagues shook their heads and said: "It is impossible that you find the same active

principles in a quite different section of the plant kingdom. You are working with all kinds of lysergic acid derivatives; you must have mixed up something and that is the reason." But finally, of course, they checked it and confirmed our results.

That was the closing of a kind of magic circle. I started with the lysergic acid amidesmethergine and LSD – and LSD attracted the mushrooms. The mushrooms then brought the ololiuqui and the work with ololiuqui took me back to lysergic acid amides. My magic circle!

Grof: Have you actually tried the ololiuqui yourself?

Hofmann: Yes, I did. But, of course, it is about ten times less active; to get a good effect, you need one to two milligrams.

Grof: And what was that experience like?

Hofmann: The experience had some strong narcotic effect, but at the same time there was a very strange sense of voidness. In this Void, everything loses its meaning. It is a very mystical experience.

Grof: Usually, when you read the psychedelic literature there is a distinction being made between the so-called natural psychedelics, such as psilocybin, psilocin, mescaline, harmaline, or ibogaine, which are produced by various plants (and this applies even more to psychedelic plants themselves) and synthetic psychedelics that are artificially produced in the laboratory. And LSD, which is semi-synthetic and thus a substance that was produced in the laboratory, is usually included among the latter. I understand that you have a very different feeling about it.

Hofmann: Yes. When I discovered lysergic acid amides in ololiuqui, I realized that LSD is really just a small chemical modification of a very old sacred drug of Mexico. LSD belongs, therefore, by its chemical structure and by its activity, in the group of the magic plants of Mesoamerica. It does not occur in nature as such, but it represents just a small chemical variation of natural material. Therefore, it belongs to this group as a chemical and also, of course, because of its effect and its spiritual potential. The use of LSD in the drug scene can thus be seen as a profanation of a sacred substance.

And this profanation is the reason that LSD has not had beneficial effects in the drug scene. In many in- stances, it actually produced terrifying and deleterious effects instead of beneficial effects, because of misuse, because it was a profanation. It should have been subjected to the same taboos and the same reverence the Indians

had toward these substances. If that approach had been transferred to LSD, LSD would never have had such a bad reputation.

Grof: Let me move to another subject. Can you tell us something about the attempts to isolate the active alkaloids from Salvia divinorum?

Hofmann: Yes. When I was in Mexico, we also encountered another plant that the Indians used ritually, like ololiuqui or like the mushrooms. It was a member of the Salvia species which had not been botanically identified. After a long trip into Sierra Mazateca, we finally found a curandera who conducted a ceremony with this plant and we had the opportunity to have an experience with it. Gordon Wasson, my wife, and myself ingested the juice of fresh leaves and experienced some effects, but it was very mild. It was a clear-cut effect, but different from the mushrooms.

Grof: Have you attempted the isolation and chemical identification of the active principle from Salvia divinorum?

Hofmann: I took the leaves and made extracts from them by pressing out the juice. I took this extract to Basel to my laboratory and wanted to chemically analyze it, but it was no longer active. It seems that the active principle is very easily destroyed and the problem of chemical analysis is not yet solved. But we were able to establish the botanical identity of this plant. It was determined at the Botanical Department at Harvard that it was a new species of Salvia and it got the name Salvia divinorum. It is a wrong name, bad Latin; it should be actually Salvia divinatorum. They do not know very good Latin, these botanists. I was not very happy with the name because Salvia divinorum means “Salvia of the ghosts”, whereas Salvia divinatorum, the correct name, means “Salvia of the priests”, But it is now in the botanical literature under the name Salvia divinorum.

Grof: Was it Dr. Richard Schultes at Harvard who identified the plant?

Hofmann: No, it was done in the same Institute, but by two other botanists; they were the ones who gave it the name.

Grof: Was this the end of your research of psychedelic sub- stances? Have you been interested since then in any other psychedelic plants? And have you made any more attempts at identifying some of their active principles?

Hofmann: No. No more.

Grof: Was this work interrupted because of the political and administrative problems at Sandoz caused by the unsupervised use? Do you think you would have other- wise continued in this work? And would you have liked to carry on?

Hofmann: Yes, I have already said that the abuse and misuse in the drug scene brought many troubles to our company. Then came the legal restrictions from the health authorities in nearly all countries and, of course, management of our company was no longer interested in pursuing this avenue of research.

Grof: I would like to ask you now about another project, your work with Gordon Wasson concerning the Mysteries of Eleusis. In your book The Road to Eleusis, you suggest the possibility that it was a psychedelic cult that actually existed and practiced for almost 2000 years, from 1400 BC to 400 AD. And even then people did not just lose interest in it, but it was terminated by an edict of the Christian emperor Theodosius who prohibited and sup- pressed all pagan ceremonies.

Hofmann: In professional circles of Greek scholars, it is absolutely clear that the ancient Greeks used some psychoactive substance in their cult. There exist many references to a sacred beverage, kykeon, that was administered to the initiates after preparations which took one week. After the adepts got this potion, they had, all together, powerful mystic experiences that they were not allowed to talk about and describe exactly. I had worked about twenty years ago with the Greek scholar, Professor Kerenyi, on this problem.

The interesting question is: what were really the ingredients of this kykeon, this sacred potion? We had studied many plants that Professor Kerenyi had suggested as possible candidates, but they were not at all psychedelic. Then came Gordon Wasson with his hypothesis; naturally, it involved mushrooms, because he saw mushrooms everywhere! He asked me, if the men in Greek antiquity had the possibility to prepare a psychedelic potion from ergot. He came to this idea, because the Mysteries of Eleusis were founded by the Goddess Demeter and Demeter is the goddess of grain and ergot (Mutterkorn). That gave him the idea that ergot could be involved in the preparation of kykeon.

I had all the materials at hand because, as part of our studies of ergot, we had collected all the literature and also many samples of ergot from all around the world. This included the ergot that was growing in the Mediterranean basin, in Greece, and so on. One or two of these wild ergots growing on grasses can also be found in rye fields or in barley fields. Rye did not exist in antiquity, but barley did, and in barley fields you can find certain wild ergots.

We had found and analyzed all this ergot before Gordon asked me his question and in one species growing on wild grass (Paspalum) we had found exactly the same components as in ololiuqui. Its main components were lysergic acid amide, lysergic acid hydroxyethylamide, and also lysergic acid propanolamide (ergonovine). Therefore, I had no difficulty answering Gordon's question: Man in antiquity had the possibility to prepare a psychedelic potion from ergot. He had to just collect the ergot, grind it, and put it into the kykeon.

Gordon, pursuing the problem of kykeon, addressed not only me, as a chemist, but also a Greek scholar Professor Carl Ruck at Harvard, who was a specialist on the role of medicinal plants in Greek mythology and Greek history. Professor Ruck was able to direct Gordon to some allusions in the Hymn to Demeter that provided support for his hypothesis. These passages mentioned that, indeed, there was some kind of ergot which was used to make this kykeon psychedelic. And the three of us then co-authored a book, which explored this evidence.

Grof: That was the book The Road to Eleusis?

Hofmann: Yes, that was The Road to Eleusis, which was published here in the United States and also came out in some other languages, such as Spanish and German.

Grof: You describe in this book that you actually did a self-experiment with one of the natural ergot alkaloids to test this hypothesis, to see if it was psychedelic. Was it ergonovine?

Hofmann: Yes, we had found active principles in this ergot which grows in Greece. It contained lysergic acid amide and hydroxyethylamide, about which it was al- ready known that they were psychedelic. But it was not known if ergonovine had some psychedelic effects and I was interested to find out. Ergonovine had been used already for many decades in obstetrics without any reports that it had been psychedelic. But the dosage which is injected to women in childbirth, is only 0.5 mg and 0.25 mg. I tested it up to 2 mg and, in that dosage, it had clearly psychedelic effects. It had not been discovered earlier, because when it is administered, women are just at the end of the process of delivery. They are thus in a state in which they are not very good observers and, in addition, the dosage is too low to produce psychedelic effects. Methergine and ergonovine also produce psychedelic effects but in higher doses.

Grof: It is a very interesting hypothesis, because it gives a plausible answer to the intriguing question: What was it that was being offered at Eleusis? What could possibly have been so powerful and interesting that it kept the attention of the ancient world for almost two thou- sand years without interruption? And that it attracted so many exceptional and illustrious people? Also the fact that it was such a strongly guarded secret – the punishment for revealing the secret of the mysteries was death – suggests that something quite extraordinary, something extremely important was happening there.

Hofmann: It was a very important spiritual center for nearly 2000 years. All we have to do is to look at all the famous people, who for thousands of years in the world of antiquity, in the Roman and Greek world, were introduced to the Mysteries of Eleusis. For us it was a very interesting problem to find out what the initiates really ingested. There were two families in Eleusis who knew the secret of the kykeon, two generations of families who conserved the secret.

Grof: One often hears that the use of psychedelic materials is alien to the Western culture, that it is something that is practiced in pre-literate human groups, in "primitive" societies. The enormous effect that the death/rebirth mysteries of various kinds must have had on the Greek culture, which is generally considered the cradle of Euro- pean civilization, must be the best kept secret in human history. Many of the great figures of antiquity, such as philosophers Plato, Aristotle, and Epictetus, the play- wright Euripides, military leader Alkibiades, Roman statesman and lawyer Cicero, and others were initiates of these mysteries, whether it was the Eleusinian variety or some other forms – the Dionysian rites, the mysteries of Attis and Adonis, Mithraic or Korybantic mysteries, and the Orphic cult.

Hofmann: It shows again that in old times, and also in our time among the Indian tribes, psychedelic substances were considered sacred and they were used with the right attitude and in a ritual and spiritual context. What a difference if we compare it with the careless and irresponsible use of LSD in the streets and in the discotheques of New York City and everywhere in the West. It is a tragic misunderstanding of the nature and the meaning of these kinds of substances.

Grof: I would now like to move away from these cultural and historical explorations and go back to chemistry. Although pharmacology is not your primary interest, I would like to ask you a question about the mechanism of the action of LSD. There does not seem to be unanimity as to why LSD is psychoactive and there are several competing hypotheses about it. Do you have any ideas in this regard?

Hofmann: We have done some research that is related to this question. We labeled LSD with radioactive carbon, C14. That makes it possible to follow its metabolic fate in the organism. Strangely enough, we found, of course in animals, that 90% of the LSD is excreted very quickly and only 10% of it goes into the brain. And in the brain it goes into the hypothalamus and that is where the emotional functions are located. This corresponds also to the fact that it is primarily the emotional sphere that is stimulated by LSD. The rational spheres are rather inhibited.

And, of course, it is not LSD that produces these deep psychic changes. The action of LSD can be understood only in terms of its interaction with the chemical pro- cesses in the brain which underlie the psychic functions. Since LSD is a substance, its action can be described only in terms of interaction with other substances and with the structures in the brain, the receptors, and so on.

One of the popular hypotheses was, for example, the 'serotonin hypothesis' of the British researchers Woolley and Shaw. It was found that LSD is a very specific and strong inhibitor of serotonin in some biological systems. And since serotonin plays a very important role in the chemistry of neurophysiological functions in the brain, this was seen as the mechanism underlying its psychological effects.

Since this antagonism between LSD and serotonin was very strong and specific, our pharmacologist was very interested to find out, if there are serotonin antagonists without hallucinogenic effect. This was not only an interesting theoretical question, but a matter of some practical interest, because serotonin is involved in the mechanism of migraine headaches and in certain information processes. A serotonin antagonist without psychedelic effects could be used as a medicament.

Grof: This was the reason why 2-brominated LSD, a strong serotonin antagonist without psychedelic effects, was so important?

Hofmann: We made all kinds of LSD derivatives. Also among them was the 2-brominated LSD, which turned out to have strong anti-serotonin effect, but without any psychedelic effects. After that finding, the 'serotonin hypothesis' could not be sustained any more. Another problem was that the serotonin antagonism is not studied in the brain, but on peripheral biological preparations.

Grof: Then there is, of course, the complex question of the blood/brain barrier; which of the substances that show peripheral antagonism are actually allowed to enter the brain?

Hofmann: Yes. LSD also has effects on other transmitters, such as dopamine and adrenaline and it is very complicated. For this reason, LSD was a very useful and influential tool in brain research and has remained that until this very day.

Grof: I am very interested in one particular hypothesis concerning the effects of LSD. It was formulated by Dr. Harold Abramson and his team in New York City. On the basis of some animal experiments, particularly with the Siamese fighting fish (Betta splendens), they came to the conclusion that the most relevant aspect of the LSD effect involves the enzymatic transfer of oxygen on the subcellular level. For me this was interesting, because it could account for the similarity between the LSD effects and the experiences associated with the process of dying. And there might also be connections to the effects of the holotropic breathwork that my wife Christina and I have developed. Unfortunately, it seems that this research remained limited to that one paper; I have not seen any additional supportive evidence for this hypothesis.

Hofmann: There was another hypothesis, where the emphasis was, I believe, on the effect of LSD on the degradation of adrenaline and noradrenaline leading to abnormal oxidation products (Hoffer and Osmond's adrenochrome and adrenolutine hypothesis). But none of this has been confirmed and the question of the effective mechanisms of LSD is still open. In addition, it is important to realize that there is an enormous leap from chemistry to psychological experience. There are limits to what this basic chemical background can tell us about consciousness.

Grof: If I understand you correctly, you feel, very much like I do myself, that even if we could explain all the biochemical and neurophysiological changes in the neurons, we are still confronted with this quantum leap from biochemical and electrical processes to conscious- ness that seems unbridgeable.

Hofmann: Yes, it is the basic problem of reality. We can study various psychic functions and also the more primitive sensory functions, such as seeing, hearing, and so on, which constitute our image of our everyday world. They have a material side and the psychic side. And that is a gap which you cannot explain. We can follow the metabolism in the brain, we can measure the biochemical and neurophysiological changes, electric potentials, and so on. These are material and energetic processes. But matter and electric current are quite a different thing, quite a different level, than the psychic experience. Even our seeing and other sensory functions already involve the same problem. We must realize that there is a gap which probably can never be overcome or be explained. We can study material processes and various processes at the energetic level, that is what we can do as natural scientists. And

then there comes something quite different, the psychic experience, which remains a mystery.

Grof: There seem to be two radically different approaches to the problem of brain/consciousness relationship as it manifests in psychedelic sessions. The first one is the traditional scientific approach that explains the spectrum of the LSD experience as a release of information that is stored in the repositories of our brain. It suggests that the entire process is contained inside of our cranium and the experiences are created by combinations and interactions of engrams that have accumulated in our memory banks in this lifetime.

A radical alternative to this monistic materialistic view was suggested by Aldous Huxley. After some personal experiences with LSD and mescaline, he started seeing the brain more like a "reducing valve," that normally protects us against a vast cosmic input of information, which would otherwise flood and overload our everyday consciousness. In this view, the function of the brain is to reduce all the available information and lock us into a limited experience of the world. In this view, LSD frees us from this restriction and opens us to a much larger experience.

Hofmann: I agree with this model of Huxley's that in psychedelic sessions the function of the brain is opened. In general, we have limited capacity to transform all the stimuli which we receive from the outer world in the form of optical, acoustic, and tactile stimuli, and so on. We have a limited capacity to transfer this information so that it can come into consciousness. Under the influence of psychedelic substances, the valve is opened and an enormous input of outer stimuli can now come in and stimulate our brain. This then gives rise to this overwhelming experience.

Grof: Have you actually personally met Aldous Huxley?

Hofmann: Yes, I have met him two times and we had very good, very important discussions. He gave me his book Island, which had come out just before he died. In it he describes an old culture on an island, which is trying to make a synthesis between its own spiritual tradition and modern technology brought in by an American. This culture used ritually something called moksha medicine and moksha was a mushroom that brought enlightenment. Moksha was given only three times in the lifetime of each individual. The first time it was during the initiation in a puberty rite, the second time in the middle of life, and the third time at death, in the final stage of life. And when Aldous gave me his book, he wrote: "To Dr. Albert Hofmann,

the original discoverer of the moksha medicine." I am very proud to have this book, Island; it is a beautiful book.

Grof: It is interest- ing that Aldous Huxley actually used LSD to ease his transition at the time of his death.

Hofmann: Yes, after he had died, his widow sent me a copy of a paper. When he was in the process of dying (he was unable to talk because of his cancer of the tongue), he wrote on it: "0.1 milligrams of LSD, subcutaneously." So his wife gave him the injection of the moksha medicine.

Grof: There is a beautiful description of this situation in her book which is called This Timeless Moment.

Hofmann: Yes, This Timeless Moment, by Laura Huxley.

Grof: I would like to ask you now something very personal. You must have been asked this question a number of times before, I am sure. You have had during your lifetime quite a few psychedelic experiences, some of which you described to us today. It began with the LSD experiences associated with the discovery of LSD, then the experiences during the work on the isolation of the active principles from the magic mushrooms and ololiuqui, the experience in the mushroom ritual with Maria Sabina, the sessions you described in LSD, My Problem Child, and some others. What influence have all these experiences had on you, on your way of being in the world, on your values, on your personal philosophy, and on your scientific world view?

Hofmann: They have changed my life, insofar as they provided me with a new concept about what reality is. Reality became for me a problem after my experience with LSD. Before, I had believed there was only one reality, the reality of everyday life.

Just one true reality and the rest was imagination and was not real. But under the influence of LSD, I entered into realities which were as real and even more real than the one of everyday. And I thought about the nature of reality and I got some deeper insights.

I analyzed the mechanisms involved in the production of the normal world view that we call the "everyday reality." What are the factors that constitute it? What is inside and what is outside? What comes from the outside in and what is just inside? I use for this process the metaphor of the sender and the receiver. The productive sender

is the outer world, the external reality including our own body. The receiver is our deep self, the conscious ego, which then transforms the outer stimuli into a psychological experience.

It was very helpful for me to see what is really, objectively, outside; something that you cannot change, something that is the same for everybody. And what is produced by me, homemade, what is myself, that which I can change. What is my spiritual inside that can be changed. This possibility to change reality, which exists in everyone, represents the real freedom of every human individual. He has an enormous possibility to change his world view. It helped me enormously in my life to realize what really exists on the outside and what is homemade by me.

Grof: You have a tremendous awareness and sensitivity in regard to ecological issues, for example, the industrial pollution of water and air, the destruction of nature, the dying of the European forests, and so on. Would you attribute this to your psychedelic sessions, in which you experienced oneness with nature and the interconnectedness of creation? Do you think that these experiences somehow opened you to this greater ecological awareness, to a sharper sense of what we are doing to nature?

Hofmann: Yes, through my LSD experience and my new picture of reality, I became aware of the wonder of creation, the magnificence of nature and of the animal and plant kingdom. I became very sensitive to what will happen to all this and all of us. I have published and lectured about the main environmental problems we have in Europe and at home in this regard.

Grof: The discovery of LSD has been such an important part of your life and you have also personally experienced what a positive impact this substance can have on us if it is properly used. I would like to ask you: what was your reaction to what happened in the 1960s in the United States?

Hofmann: Well, I was very sorry, really sorry. As I said, I would have never suspected LSD could be misused in such a way. Now I have the feeling that the situation has improved, because you never read in the newspapers about accidents with LSD any more, as it happened in the 1960s practically every day. People who use LSD today know how to use it. Therefore, I hope that the health authorities will get the insight that LSD, if it is used properly, is not a dangerous drug. We actually should not refer to it as drug; this word has a very bad connotation. We should use another name. Psychedelic substances, if they are used in proper ways, are very helpful for mankind.

Grof: You wrote a book entitled LSD, My Problem Child. I heard you say, at the conference, that you hope you might see the day when your problem child will become a desired child again.

Hofmann: I myself will not probably see this day, but it will definitely happen sometime in the future, I am sure. The truth will finally come out and the truth is: If LSD is used in the right way, it is a very important and very useful agent. LSD is no longer playing a bad role in the drug scene and psychiatrists are again trying to submit their proposals for research with this substance to the health authorities. I hope that LSD will again become available in the normal way, for the medical profession. Then it could play the role it really should, a beneficial role.

Grof: Do you have a vision for the future concerning this, an idea of how you would like LSD to be used?

Hofmann: We have a kind of model for it in Eleusis and also in the so-called primitive societies where psychedelic substances are used. LSD should be treated as a sacred drug and receive corresponding preparation, preparation of quite a different kind than other psychotropic agents. It is one kind of thing if you have a pain-relieving substance or some euphoriant and (another to) have an agent that engages the very essence of human beings, their consciousness. Our very essence is Absolute Consciousness; without an I, without the consciousness of every individual, nothing really exists. And this very center, this core of the human being is influenced by these kinds of substances. Therefore, excuse me for repeating myself, these are sacred substances. Because, what is sacred if not the consciousness of the human being, and something which activates it must be handled with reverence and with extreme caution.

Grof: Many of us who have experienced psychedelics feel very much, like you do, that they are sacred tools and that, if they are properly used, they open spiritual awareness. They also engender ecological sensitivity, reverence for life, and capacity for peaceful cooperation with other people and other species. I think, in the kind of world we have today, transformation of humanity in this direction might well be our only real hope for survival. I believe that it is essential for our planetary future to develop tools that can change the consciousness which has created the crisis that we are in.

Hofmann: That certainly would be a major step in the right direction. We need a new concept of reality and a new set of values for things to change in a positive direction. LSD could help to generate such a new concept.

Grof: I would like to thank you for giving up your time of leisure on this beautiful day and for coming here to be with us and share your life experiences. I really appreciate it very much and, I am sure, so does everyone else in this room.

Hofmann: Thank you for inviting me to Esalen. I really enjoy this very beautiful landscape. It is so wonderful to be here and to experience the atmosphere in this institute with old friends and colleagues. It has been a great experience for me. Thank you, too.