

Ololiuqui: The Ancient Aztec Narcotic Remarks on the effects of *Rivea corymbosa* (Ololiuqui)^{1,2}

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Introduction

This is an account of a model psychosis (6) produced by eating the seed of a tropical American plant which is known in Mexico as ololiuqui. It is only quite recently that Schultes (16) has made order from chaos in the matter of the identity of a climbing vine called *Rivea corymbosa*. I was introduced to ololiuqui by Mr. Leslie LeCron during a visit to Los Angeles in which he showed me Taylor's (22) article where he compares it with the peyote. Mr. LeCron discovered that seeds of *Rivea corymbosa* could be obtained from Dr. I. D. Clement, Director of the Atkins Gardens and Research Laboratory of Harvard University. I am indebted to Dr. Clement for sending me a supply of the seeds which would otherwise have been very difficult to obtain. It is reassuring for the investigator to know that the substances with which he is experimenting have been collected by skilled scientists who exercise meticulous care, for medical and pharmacological investigators have very often suffered from improper or imperfect botanical determination.

It is now nearly sixty years since Weir Mitchell (8) and Havelock Ellis (2) published their classical papers on the peyote. In the last half century, many investigators have worked with peyote, and especially with mescaline, one of its eight alkaloids, whose chemical formula has been known for many years. Some attention has also been given to hashish (12), as a mixed preparation of the Indian hemp (*Cannabis indica*) is called in North Africa, but there is still much uncertainty about its active principle. In the last decade, two synthetic compounds, lysergic acid (5) and adrenochrome (4) have been discovered to have qualities which allow them to be placed with the naturally occurring hallucinogens. Lysergic acid has been extensively investigated by psychological, physiological, and pharmacological means. Similar work is being started with adrenochrome. In the meanwhile, there are still a number of unusual substances in the world which have received scant attention from investigators, although each one sounds intriguing enough to warrant at least a glance. This paper is a brief glance at one of them. [527]

Other Reputed Hallucinogens

Why should we bother with the odd properties of queer drugs from strange places? Apart from an innate curiosity which has drawn men to them since the earliest times, there are other reasons. The changes in perception, affect, thinking, and sometimes posture, which follow the ingestion of these substances, have, it has recently been observed (9) much in

common with the acute phases of schizophrenia. It is therefore possible that a wider knowledge of these hallucinogens, as they have been inelegantly termed (4), might lead to a better understanding of the massive psychosis which fills one out of every five hospital beds in the world. So grievous is the burden in suffering and expense of this illness, and so slender our understanding of it, that we cannot neglect approaching it by routes that may at first seem circuitous.

I know of at least four substances, said to be hallucinogenic, of which we have little systematic information. These are:

Harmine, which is derived from the Syrian rue. This is apparently synonymous with banisterine, and yageine, from Caapi (*Banisteriopsis* spp.). The same substance was given the intriguing name of telepathine by Fisher-Cardenas (13) in 1923. While Gunn (7) has made some important studies of its pharmacology, very little seems to be known about its psychological effects. Even less is known about ibogaine derived from the iboga bean which grows in Gaboon. Albert Schweitzer (18), in a recent publication, refers briefly to its psychological properties, but I have been unable to trace any other information so far. *Amanita muscaria*, a remarkable fungus from a deadly family, has been used extensively in Siberia and is notable for the great potency of its active principle which can survive several passages through the human body. It is excreted in the urine and some Siberian tribes have developed from this an economic, but to our taste unaesthetic, form of conviviality.

Cohoba, a narcotic snuff used in Haiti for necromancy, was described by Ramón Pané who sailed with Columbus in 1496. This snuff was later confused with tobacco. It is derived from a leguminous plant called *Piptadenia peregrina*, and its active principle is believed to be bufotenine (21). I have not discovered a modern account of its psychological effects.

Rivea Corymbosa

Schultes's (16) valuable monograph provides much information in a compact form about the history and identification of ololiuqui. The conquistadors and their inquisitorial companions were displeased when the Indians, whose countries they had ravaged, clung to some of their ancient customs in spite of rigorous persuasion to abandon them. Victors are always readier to force the vanquished to abandon old habits which are distasteful to the new order than to deal with their own shortcomings. The conquistadors were no exception to this melancholy rule. In spite of Spanish persecution, which was as cruel as it was pious, the Indians continued to revere their sacred plants. Indeed peyote, far from losing its aura of divinity, has in recent years become very closely associated with Christianity (11), and has more devotees now than it ever had in its history. Its cult has spread widely over this continent to Indians who have never used it before.

Ololiuqui has not received the same attention from psychiatrists as peyote, and the reason for this is clear from the data its Schultes's monograph. Until his work was published in 1941, there was an unresolved dispute among botanists [528] as to the plant from which the inconspicuous seeds, which the Indians chewed so persistently, derived. Safford (14) maintained, in the face of much evidence to the contrary, that ololiuqui was the seed of *Datura meteloides*, and such was his eminence in the ethno-botanical field that many followed him. Schultes, however, has now established that ololiuqui is the seed of *Rivea corymbosa*, a large, scandent, twining, woody vine of the *Convolvulaceae* (Morning Glory

family). It is the only species of the *Rivea* known in the New World, and is found in the West Indies, South America, Central America, and Florida, growing wild.

Substances Present

Until 1937, when the late Professor Santesson (15) of Stockholm discovered an active narcotic principle in the seeds of *Rivea corymbosa*, no intoxicating substances were known to occur in the Convolvulaceae. Santesson was unable to identify this narcotic chemically but concluded that it was an alkaloid combined with a sugar. He did not isolate this alkaloid, so that its chemical formula is unknown.

Psychological Effects of Ololiuqui

Schultes has drawn his information on the psycho-physiological effects of ololiuqui from many sources, starting with Spanish conquistadors and ending with modern investigators and reports of Indian ololiuqui users. This is the least satisfactory aspect of his fine monograph, and it is hardly fair to blame him for shortcomings which arise because his interest centred in botanical and not in psychological matters.

Schultes discusses only two experiments on human subjects, and since neither of these was in any way affected no further clues became available from their work. A Dr. Marsh of the U.S. Agricultural Service "obtained negative results when he experimented with the seeds of *Rivea corymbosa*, and Reko although he had been warned that five or six seeds would produce an intoxication, ate a handful without noticeable effect". Santesson was much puzzled by this immunity and indulged in some speculation about "Racial differences in susceptibility to intoxication" to account for it. While there are differences in susceptibility to all sorts of intoxication, and doubtless racial characteristics play some part in this, there seems to be a simpler explanation for Reko's immunity. The impetuous man had a whole handful to get down and unless I am much mistaken he swallowed them whole. The seeds are small, round and very hard skinned. It requires a determined crunching to smash them with the teeth and unless they are broken up I believe they pass unchanged through the gut. Clement (1) has suggested that the narcotic content of different plants can vary greatly.

Schultes was not able to witness a ceremony in which ololiuqui was being used, nor could he, in the field, partake of the narcotic. Nevertheless it was being used by time Mazatecs as late as 1939 for medicinal and divinatory purposes. I found that the gravest shortcoming was that I was never quite certain whether human or animal experiments were being described. Schultes refers to Santesson's description of what he calls "halbnarcose" and Reko's (16) term "hypnotisch-somnambulistisch". Schultes (17) opines that Santesson's work refers solely to frogs and mice, and tells me that Reko informed him that his account of the intoxication was based chiefly on Indian reports.

However, it seems fairly clear that the Indians, apart from the curative [529] properties which they ascribed to it, also valued it for its use in divination and magic which resembled that of peyote (even though the two drugs are not found in contiguous areas). There seems to have been one interesting difference, for while the peyotist enjoys his transcendental experience in company, the ololiuqui-taker is said to prefer to be alone. A

further difference is that most accounts seem to agree that the effects of ololiuqui last only about three hours, which is less than those of peyote. The Spaniards are full of references to witchcraft and devilry, but much of their evidence is coloured by prejudice.

Hallucinations and visions are mentioned often but without very much precise description.

Dr. Clement (1) in a personal communication tells me that he has been unable to discover any evidence that it has ever been used as a narcotic in Cuba. Like many other plants, it has a reputation as an abortifacient, though there is no information about its efficiency in this respect. There is some evidence that ololiuqui honey, which is of a very excellent quality, has a somnoric effect.

Dosage

The investigator of any new drug is always glad to have some hint about the amount needed to produce its characteristic effect; the more precise this information, the better. When investigating something whose characteristic effects are said to be psychological, and in which therefore the value of experimental animals is small, it is very hard to determine a suitable dose. The synthetic hallucinogens are easier to work with than the naturally occurring ones, because we know fairly accurately the amount of mescaline or lysergic acid required to produce a model psychosis. We also know that only one substance is responsible. With peyote, we are dealing not only with a mixture of alkaloids, but in addition, the relative concentrations of the eight alkaloids can vary. The directions for taking the comparatively well-known peyote show great differences, so that it is hardly surprising that the information about ololiuqui is likewise deficient.

The natural unwillingness of the Indians to disclose their religious secrets to strangers has been greatly increased by the zeal of generations of Spanish busybodies. Serna (19) gives us a vivid description of the reticence of the Indians and the attitude of the Spaniards. "These seeds ... are held in great veneration...They place offerings to the seeds ... in secret places so that the offerings cannot be found if a search be made. They also place these seeds among the idols of their ancestors . . . The natives do these things with so much respect that when some transgressor of the law who has the seeds in his possession is arrested and is asked for the paraphernalia which are used in taking ololiuqui ... or for the seeds themselves, he denies vehemently that he knows anything about the practices. The natives do this not so much because of fear of the law as because of the veneration in which they hold the seed ololiuqui. They do not wish to offend ololiuqui with demonstrations before the judges of the use of the seeds and with public destruction of the seed by burning."

According to Schultes it seems that at least three groups of Indians told investigators that they commonly took thirteen seeds. One of these groups claimed that their reason for doing this is because thirteen was the sacred number that represents Jesus Christ and his apostles at the Last Supper. The seeds are taken in water or with an alcoholic drink such as pulque, mescal (a drink not to be confused with the alkaloid of the peyote), aguardiente, or tepache. [530] I therefore expected that, if anything happened, thirteen seeds would be enough to produce in a short time dizziness or giddiness followed by lassitude, increasing drowsiness and finally a stuporous state in which visual hallucinations would occur, and I would be only dimly aware of what was going on around me. The

evidence suggested that this would last about three hours, but I was not at all clear how I might expect to feel after the stage which has been so oddly termed "somnambulistic narcosis" had worn off.

I had a little information from Mr. L. LeCron and Mr. Aldous Huxley, who took six seeds in February, 1954, without any very clear effect. I later discovered that Mrs. Huxley, on a similar dose, had some delightful visions depicting some new adventure in the life of Wu-Cheng-Ens' (23) heroic and archetypal ape, Monkey. I did not however know of this until after I had taken ololiuqui myself.

The Experimenter, His Surrounding and the Seeds

I weigh about 170 pounds and am 5 feet 9 ½ inches. I am aged 36 and enjoy good health. I have never suffered from jaundice (4). I am experienced in the model psychoses, having taken mescaline on one occasion and watched others take it. I have taken part in many lysergic acid experiments, although I have not yet ingested it myself. I have taken adrenochrome on three occasions. I can therefore claim some degree of sophistication in these matters. This has the advantage that such a trained observer may be alert to subtle changes which others might ignore and the disadvantage that he might be suggestible and report small changes attributable simply to heightened expectation. There is no easy way out of this dilemma, but in a preliminary trial it is not very important, although in a larger experiment it would have to be guarded against. A full evaluation of a new hallucinogen is, as I have pointed out elsewhere (10), a major enterprise calling for the co-operation and co-ordination of many disciplines. Stefaniuk (20) has shown how complex are the experiential and behavioural changes with which we have to be prepared to deal. I know of no satisfactory study of such an evaluation, or even any discussion of the methods that would be most helpful.

The seeds of *Rivea corymbosa* are about the size, hardness, and colour of a small sweet pea. Technically they are described thus, "being bacchate, dry and indehiscent with only one seed". They are hard enough to need grinding with the molar teeth. Those with dentures should use a hammer or a pestle and mortar. With the help of Mr. D. Sheldon and Mr. Doisey, of the Saskatchewan Hospital, Weyburn, I have devised a tubular steel pestle and mortar with a detachable base which reduces the effort required to smash the seeds and eliminates danger to teeth and dentures. I would be glad to describe it to other experimenters.

The seeds have a bitter taste like lupin or wild bean seed. My sample was not in the least peppery and could not possibly be described in Hernandez's (3) words of 1651 as having "a sharp taste and is very hot". It does not in the least resemble the burning taste of chili, with which, as a curry eater, I am familiar, although Reko states that its Mixtec name *yucu-yaha*, meaning chili plant, refers to its hot taste. Chewing large numbers of seeds is tedious and they leave a slightly nauseating after-taste in the mouth.

The first and second experiments were done in my own home, alone except for my little daughter who was going to bed when the seeds were taken. My excuse for this slovenly procedure was a scepticism about the potency of [531] ololiuqui fostered by reading Dr. Marsh's experiment. My wife, who has done a good deal of work in this field, and my sister, who is a registered nurse, were present during the third experiment. I had no verbal

means of recording for two of the first three experiments, and when I had a dictaphone, for reasons that are not clear, I did not use it. I did however take notes with a greater or lesser degree of assiduity.

In the fourth experiment, which was again conducted in my home, my psychologist colleague Mr. Ben Stefaniuk was present. He took down most of our conversation on tape, and also made a series of notes such as he has used in our lysergic acid experiments, indicating changes in behaviour and the time at which these occurred. The number of seeds taken were 14, 26, 60 and 100 in that order. For the first three experiments, they were chewed and washed down with iced water. In the fourth they were smashed with a hammer and then ground to a fine flour in a glass pestle and mortar. This fine flour was placed on the tongue with a teaspoon and swallowed with iced water.

The Experiments

One

At 6.15 p.m. on Friday, 20 February, 1954, I chewed up fourteen of the seeds. I felt that this number was less of a challenge to the fates than the thirteen favoured by the Indians. I noted "I am alone with little H. A definitely unexperimental atmosphere-am strongly of the opinion that nothing will happen."

6.30 p.m. One of those curious things that might be suggestion: an extraordinary clarity of objects. "The tennis ball, white and furry on the tomato coloured carpet and a little cluster of glass marbles some eighteen inches away from it. All seem to be related to one another and each seems to have special significance"... "Irritability is noticeable especially when disturbed"... "My gaze is caught by the polish on the willow shoots, the greenness of a leaf, the furriness of a cactus. This could be heightened awareness due to heightened expectation."

6.45 p.m. I ate a fair supper although not keen to do so. Nothing more happened. I read quietly all evening. I did not record another note although I had meant to do so.

Two

Exactly a week later I took 26 seeds in similar circumstances and had a very similar experience. Although I had a dictaphone with me and had brought it a considerable distance for this express purpose, I failed to record or keep notes of any sort. This could be ascribed either to incompetence or to the effects of ololiuqui. I prefer the latter explanation, because I am quite aware of the requirements of this sort of research and am usually a fluent writer.

Three

7 March, 1954. At 12.30 p.m. I chewed sixty seeds and washed them down with water. I took notes most of the time. At 1.0 p.m. I had lunch, which was tasteless, though I ate some of the same food later with enjoyment. At 1.30 p.m. I noted this-"A slight headache, vague, unlocalized. A great effort to write, easier just to sit. People irritate; things fascinate: the texture of wood: the almost metallic gold centre of an African violet. Mildly nauseated. The little warm dog on my lap the only contact." [532]

2.0 p.m. "Very indolent and irritable, curious sense of distance-noise uncomfortable-pup

consolingly real. Children coming in a very real threat. H. (my 4 year old daughter) wants to come close to me and the dog. Find this most disturbing, say 'Go away, go away.'" "Lethargic, irritable, scarcely bother to write."

2.10 p.m. "On closing my eyes hypnagogic phenomena, much vividder than usual at this time of day." (Normally on eye closing I do not have hypnagogic phenomena unless very tired.) "I have no wish to explain or communicate. The little dog alone remains in contact, demanding nothing, not even understanding."

2.20 p.m. "Eyes closed. Curious patterns. First blackness so deep that my hair stood on end. Then a beige-grey ceramic design, with silver stippled patterns, an abstract design of an ibex. Do I mean ibex-a horned deer-yes ibex, not ibis the bird."

2.40 p.m. "A very difficult state to describe. Every action seems discreet and uncertain. Very difficult to make up one's mind to do anything." J. my wife read my notes, "J. is reading this and I am conscious of this in an entirely detached way, as if she were reading my diaries post-mortem. Also feel rather silly as I write this down, though I know it will worry her and she is worried." "Objects seemed to have an extraordinary solidity and dimensionality." "That scarlet piece of wood on the brown carpet, it is so intensely bright that the colour seems to sink into the carpet." "A curious idea that I am writing and wasn't getting any forrader or anything down-a sort of nightmare self erasing writing." "One is bewildered by the wonder of each single object."

3.30 p.m. "Irritable apathy is the keynote. Too apathetic to call out. Too irritable to dare to do so. On and on and on." "Eyeball pressure does change the hypnagogic images temporarily but they return when the pressure is released. How bright the light-how shadowy people, even H. Even their voices seem dull and meaningless. The little dog is deliciously alive. N.B. shouldn't psychotic people have pets? Wouldn't they be more helpful than humans? Probably. Why? Because they are not self conscious, hardly selves at all. Maybe this is why we can't help each other because we are literally selfish. Self gets in the way, even with H. but not with the little dog. A cat too is so completely cattish, that no self, no human self intervenes. Animals are alive but undemanding."³ "Bodily sensations less than mescaline, some epigastric burning, some tingling in face and hands, slight headache, not much else." "This is a waking dream.⁴ So little changed, but enough. The cat might be artificial, a mechanical cat, but little Mesca (dog) is clearly alive." "Looking at oneself in the mirror. How can I be sure that it is me; perhaps it isn't." "Once I start writing I keep going automatically, my attention is fixed on the writing. It is the same with every[533]thing. I stick in a groove. If I got angry would I stick in it? I don't know, I'd better not try."

6.0 p.m. "This is very curious stuff. I have been lying on my bed asleep, but not really asleep for the last 2 ½ hours. I have slept a bit and have been profoundly tired, yet acutely aware of everything that was-going on. A sort of paralysis of the will; it is an immense effort to do anything yet when I do it, I can." ... "Although not keen to be near people I feel it when they go away." ... "In this dose this is not a hallucinogen to any great extent. In larger doses it may be so. It produces stupefaction without disorientation or the motor effects of alcohol. One is irritable, stuporous, apathetic, but not very uninhibited."

7.0 p.m. Within an hour of eating a sugary meal and drinking tea I noted, "Now very much more normal, very alert, and very aware of what is going on. It looks as if this stuff acts

on different centres at different times."

8.0 p.m. I eat a hearty meal. "It seems to have worn off leaving elation and clarity without tension. It is the reverse way round from Benzedrine."

That night I went to bed about midnight and slept fairly well, though I had sumac hypnagogic phenomena before falling off to sleep. When I awoke next day I was slightly tense and had a mild frontal headache-nothing like a hangover-my tongue was clean and moist.

Four

This experiment was again conducted in my home on the 21 March, 1954. It was fully recorded on tape and where I quote it is from a transcript of this record or from the few notes which I made. My colleague Mr. Ben Stefaniuk was present as an observer. At 12.10 p.m. I took 100 seeds reduced to a powder as I have already described. The symptoms, which started within twenty minutes of swallowing the powder, followed the same general pattern as the third experiment, and consisted of apathy, anergia, withdrawal, some sharpening of visual perception, and an increase in hypnagogic visions when the eyes were closed.

The apathy extended to the experiment, showing itself in a lack of interest. For instance when I was pressed to talk more I said, "Yes this is an experiment but I don't attach much importance to it." My interest in people lessened. "It is difficult to be interested in them, they shift around so much." I had feelings of weakness and doubted whether I could hold the microphone, but this weakness was not accompanied by clumsiness as in alcoholic excess. "I feel extremely steady but very weak."

At 1.34 p.m. a curious thing happened. I raised my hand above my head and couldn't get it down. No urging or verbal pressure by my colleague made any difference, neither did voluntary effort on my part. "I can't. It's stuck. That is strange, an unpleasant feeling." Eventually I pulled it down with the other hand.

I had no slurring of speech and at about 2.30 p.m. repeated "Popocatepetl" several times and very clearly. It was not easy to judge time and I had to work it out. "I'm not disorientated in time but it is extremely difficult to tell where in time I am." I referred frequently to my tiredness. Towards 3.30 p.m. I began to feel hungry, having had no inclination for food before that, but I was too lethargic to do anything about it. "It is quite strange how I fluctuate from feeling full of energy to feeling completely done in." About this time my companion asked "What about the seriousness of the experiment?" I replied, "It is there intellectually but I don't feel about it-intellectually I am well aware [534] that this is an interesting thing, but the fact is I don't feel interested in it. I really don't feel that I have the energy to be interested you know. And this doesn't quite fit into anything. It's not derealization or depersonalization. Those are almost meaningless words for certain states certain people believe they have observed in other people. But these things are not exactly applicable to me. It's something you can apply to someone else but not to yourself. This is not the feeling of being an 'it' at all. It is simply a feeling of complete detachment from the situation and being an observer; not being a thing."

Pressed to explain myself by Mr. Stefaniuk I continued: "I was feeling that I really hadn't the energy either intellectual or physical to discuss what was happening, and though there

were these perceptual changes which were not unlike the early stages of mescal or adrenochrome, the main thing was this extraordinary lack of energy⁵ - an extreme unwillingness to do anything at all." This apathy and anergia could, most of the time, be overcome by an intense effort, but at the height of the experience voluntary effort made little difference.

From 4.0-4.30 p.m. I found that it was increasingly possible to exert sufficient effort to dispel the lethargy. "You can overcome apathy if it lasts a short time, but if it lasts a long time you just can't do anything." About 5.0 p.m. I went for a drive and was interested to discover that I had none of the time and distance disturbances that I had had with adrenochrome. I ate a substantial meal.

By 6.0 p.m. I felt recovered and was active, interested and continued in this state for many hours. I noted, "Apathy, lack of energy, seems to be the keynote with only a little disturbance of perception ... Apathy (no mood) is clearly differentiated from depression (low mood) ... The lack of angst differentiates this from LSD or mescal."

11.15 p.m. after driving my friend home-"Still a depth and brightness in things such as they have on a May morning when you are twenty-one. A newness freshness as if everything had had a spring shower"..."Silence seems deeper, noises seem crisper. Oddly this was present in the apathy and is still present in this pleasant alertness without tension and without foreboding. It is very different from the touch-me-not feeling after mescaline or the bruised blunting after alcohol."

I went to bed about midnight but did not go to sleep immediately but lay relaxed and wakeful, letting associations come and making notes in the dark which weeks later are legible and seem quite sensible. At about 1.0 a.m. our little daughter awoke with a cough. Normally I would have found this irritating and would have been disgruntled. I noted, "I was cheerful, relaxed and alert. The lack of the caffeine or benzedrine tension is remarkable."

Next day I awoke at 7.0 a.m. I had a slight dryness of the mouth-no hangover. I was, it seemed, hypo-irritable yet hyper-alert. Doors banging, etc. did not in the least disturb me even though it was Monday morning. During the day's work, I think that I was more active and less touchy than I would expect after such exertion and a poor night's sleep.

Psychologist's Comments

Mr. Ben Stefaniuk was kind enough to make the following comments on the fourth experiment:

"The most apparent and constant element in the experiment was that Dr. Osmond, who usually is a very energetic and talkative person, became extremely [535] lethargic and uncommunicative. I tried to interest him in the importance of the experiment at various intervals, but, very much to my surprise, he claimed that it wasn't too important and the recording of the experiment could wait. This is an amazing reaction because, from previous discussion, I knew him to be extremely interested in the outcome of this experiment. There was nothing bizarre in either his behaviour or his verbal productions; it was not similar to most LSD reactions. His type of uncommunicativeness was displayed in

many qualifying instances by one of my female volunteers for LSD. The main changes, I feel, were lethargy, alternating with periods of restlessness, a similar type of loss in interests and the extreme slowing down of verbalization."

Discussion

I believe that this is the first series of experiments with ololiuqui, said by Safford (14) to be "the chief narcotic of the Aztecs", conducted solely for the purpose of psychological investigation. Previously, apart from Marsh and Reko (16), who heroically swallowed a "handful" of the seeds, all accounts of the effect of ololiuqui seem to have been obtained from the Indians. The descriptions recorded by the conquistadors and their descendants were distorted by the hatred which they felt for the defeated. Later enquiries by scientists were impeded by lack of psychological knowledge which would have enabled them to make the most of their informants, who were no doubt becoming increasingly wary of divulging their secrets. In support of tiny contention that neither Marsh nor Reko chewed the seeds which they swallowed is the fact that Reko, in 1934, still repeats Hernandez's (13) assertions of 1651 that ololiuqui 'has a sharp taste and is very hot'. Reko states that the Mixtecs give it the same name as the chili plant, yuca-yaha. My sample of ololiuqui had only a slightly bitter taste, and bore not the slightest resemblance to chili, whose pungency could not possibly be overlooked when placed in powdered form on the tongue. Can it be that a reputation for such pepperiness would discourage the curious? Or could it be that the seeds were gathered unripe or less ripe in one case than the other?

Nevertheless, apart from this and the number of seeds needed, the information gathered from the Indians seems to have been accurate, although incomplete. Thirteen seeds, in spite of their sacred significance, had very little effect on me. There may be more subtle explanations, but I suggest that red men, from bitter experience, have found it prudent to mislead white men, lest they once more prohibit the sacred seed and persecute its devotees.

This preliminary exploration suggests that ololiuqui differs from mescaline, lysergic acid and adrenochrome. In doses of 60-100 seeds it produces marked anergia and irritable apathy, combined with alert thought processes and increased hypnagogic phenomena. This is odd; even odder is the rapid onset, short duration, and lack of hangover, followed by alert wakefulness without tension. This alert wakefulness is noteworthy for an unusual placidity combined with a capacity for constructive action when required. I could drive a car so that a critical passenger was not disturbed.

The "paralysis of time will", which occurred with the apathy and anergia, is not unlike the complaints of some people who are labelled schizophrenic. These unlucky folk complain about their lack of energy and are looked upon as being "bizarrely hypochondriacal". They get very little understanding or attention, usually. When they are forced to overcome their anergia, they often become irritable and sometimes their behaviour seems to be impulsive. I know [536] that in one experiment I made what was intended to be a gentle push at my little daughter to fend her away and knocked her flat. The effort once made resulted in action that did not seem to be fully controlled. At the height of the experience so much effort was needed to do even the smallest thing that there was a temptation to remain totally immobile. Even in this immobility I was alert and aware what was going on most of the time. Most psychiatrists have seen patients who could be described in this

way.

Most writers agree that the Indians reverence *ololiuqui* for its use in magic, divination, and as a vision maker. Taylor (22), quoting an old authority writes: "They consult it as an oracle in order to learn many things . . . especially those things which are beyond the power of the mind to penetrate." May it not be that the Indians take it as much for the astonishing, detached, serene well-being and mental clarity combined with a capacity for action without anxiety which follows the apathy, as for the visions, etc.? Surely this remarkable state would be an excellent jumping-off place for starting that "active contemplation" so much sought by explorers of the soul, and so hard to achieve?

Like most writers whose special province is not psychology, Schultes is vague about "hallucinations". I did not experience any, though I had some heightening of visual perception with the eyes open and sonic increase of hypnagogic visions when they were closed.

My response to *ololiuqui* is almost the reverse of that to amphetamine, which causes me to have a short period of tense elation and over-activity, followed by black depression. If other experimenters also find this happens, there would be a very strong case for isolating the active principle and comparing its spatial formula and effect on cerebral enzyme systems with amphetamine.

The comfort which I derived from the close presence of the little dog requires some thought. While we have made a cult of pet animals in the West, there seem to have been few studies of the relationships which develop between animals and humans. This is often dismissed as being a substitute for another relationship—a human one. In my view this is superficial and misleading. The relationship between man and dog has developed over tens of thousands of years and seems to be based on a deeper level of understanding than words. Perhaps then, when words fail us, this is why dogs can be so comforting.

A few experiments on one subject can tell us very little, but this seems to be another instrument which may allow us to ask questions which will help us towards a greater understanding of ourselves.

Many questions spring to mind. What is the active principle of the elusive *ololiuqui*? How and where does it act? In what other ways will people respond to it? But future investigators would be glad if a few quite mundane questions were answered first. What exactly are the local anaesthetic properties that Schultes mentions? A full pharmacological investigation would be very welcome.

Summary

I have reported four experiments with *ololiuqui* (*Rivea corymbosa*), a narcotic used by the Aztecs. This is the first time, to my knowledge, that the psychological effects of the seeds of this plant have been discussed in a medical journal. The active substance or substances present are not known. I found that I required about six times the thirteen seeds which Schultes reported as the dose commonly used by the Indians, though he emphasizes that dosage seems to vary. The accounts gleaned from the Indians give only a partial description of the experience produced by *ololiuqui*. This consists of apathy and anergia

combined with some degree of heightened visual perception and an increase in hypnagogic phenomena. There is no confusion, indeed one is very acutely aware, though time perception is altered. [537] After about four hours this is replaced by a period of alert, calm, relaxed well-being lasting many hours. A condition which I have not seen described before and which is very pleasant.

I think ololiuqui requires further and fuller study, and I hope that this small reconnaissance will arouse enough interest to encourage larger and better equipped expeditions into this strange territory.

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Notes

1. The original title for this paper was 'Ololiuqui Flower-her-Mother'. Dr. R. E. Schultes forbade the use of this, writing "do not use it in your title". He pointed out that "Flower-her-Mother" is an exact translation of the Mazatec word na-so-le-na designating the seeds of *Rivea corymbosa*. It would be meaningless to attach it to ololiuqui, an Aztec word. Nevertheless so that readers who enjoy a lovely word should not be deprived of its euphony, I have begged a few lines for "Flower-her-Mother."

2. Published with the approval of The Saskatchewan Committee for Schizophrenia Research, c/o Psychiatric Services Branch, Department of Public Health, Regina, Saskatchewan, using funds promoted by the Department of National Health and Welfare, Canada.

3. As Walt Whitmann put it in Song of Myself

I think I could turn and live with animals, they are so placid and self contained.
I stand and look at them sometimes half the day long.
They do not sweat and whine about their condition,
They do not lie awake in the dark and weep for their sins,
They do not make me sick discussing their duty to God
Not one is dissatisfied, not one is demented with the mania of owning things.
Not one kneels to another, nor to his kind that lived thousands of years ago.
Not one is respectable and industrious over the whole earth
So they show their relations to me, and I accept them.
They bring me tokens of myself, they evince them plainly in their possession.

4. Sonnabulistic narcosis although a clumsy term would not be an entirely inappropriate description.

5. In an experiment with adrenochrome (4) I had the curious experience that I was a timing, not a person.

References

1. CLEMENT, I. D., Personal Communication, 1954.
2. ELLIS, HAVELOCK, " 'Mescal' A New Artificial Paradise", *Anti. Rep. Smithsonian Institute*, 1898, p. 537.
3. HERNANDEZ FRANCISCO, *Rerum Medicarum Novae Hispaniae Thesaurus.*, 5651, p. 145, Rome.
4. HOFFER, A., OSMOND, H., and SMYTHIES, J. R., "Schizophrenia: A New Approach (ii)", *J. Ment. Sci.*, 1954, 100, No. 418.
5. HOFMAN A., and STOLL, A., *Helv. Chim. Acta*, 1943, 26, 944.
6. FISCHER, ROLAND, Personal Communication, 1953.
7. GUNN, J. A., "Relations between Chemical Constitution, Pharmacological Actions and Therapeutic uses in the Harmine Group of Alkaloids", *Arch. Internat. de pharmacodyn. et de Therapie*, 1935, 50, 379-96.
8. MITCHELL, S. WEIR, "Remarks on the Effects of Anhalonium Lewinii (The Mescal Button)", *Brit. Med. J.*, 1896, 2, 1625.
9. OSMOND, H., and SMYTHIES, J. R., "Schizophrenia: A New Approach", *J. Ment. Sci.*, 1952, 98, April.
10. OSMOND, H., *The Model Psychoses*, 1955 (in preparation).
11. PETRULLO, V., *The Diabolic Root*, 1934. Philadelphia.
12. ROBERTSON, V., "Hashish", *Ciba Symposia*, 1946, 8, Nos. 5 and 6.
13. RUMPF, -, *A. Pharm.*, 1928. 266, 188.
14. SAFFORD, W. E., "An Aztec Narcotic", *J. Hered.*, 6, No. 7, July, 1915.
15. SANTESSON, C. G., "'Notiz Über Piule, Eine Mexicanische Rauschdroge", *Ethnolog. Stud.*, 1937, Vol. 4. Gottenberg. (Quoted by Schultes below.)
16. SCHULTES, R. E., *A Contribution to Our Knowledge of Rivea corymbosa*. 1941. Botanical Museum of Harvard University.
17. Idem, Personal Communication, 1954.

18. SCHWEITZER, ALBERT, "Old Black Magic Reborn", *Tomorrow*, 1952, 1, No. 1. New York.
19. SERNA, JACINTO DE LA, "Manuel de Ministros de Indios...", in *Col. Doc. Ingd., para la Hist. Esp.*, 1892, 104, 163-65. Madrid. (Quoted by Schultes above)
20. STEFANIUK, W. B., Personal Communication, 1954.
21. SFR OMBERG, V. L., "Isolation of Bufotenine from Piptadenia Peregrina", *J. Amer. Chem. Soc.*, 1954, 76, 1707.
22. TAYLOR, N., "Come and Expel the Green Pain", *Scientific Monthly*, 1944, p. 76.
23. WU-CHENG-EN (trans.: Waley, A.) *Monkey*, 6th Impression, 1953. London: George Allen and Unwin.