

Visions of the Night

Western Medicine Meets Peyote 1887-1899

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This article outlines some of what I have thus far learned from a project I began some years ago to study the history of the earliest scientific investigations of peyote and its alkaloids. I have come across a number of intriguing features in this history, including particularly the personalities of many of the principal investigators. But I will focus on two main questions here:

1) What is actually known of the *human* pharmacology and psychopharmacology of the many alkaloids in peyote *other than* the most famous and abundant alkaloid, mescaline? Could these contribute in any way to the overall effects of regular peyote consumption as practiced by members of the Native American Church?

2) How did peyote affect the first non-Indians to ingest it? I was particularly interested in finding first-hand accounts from these earliest “psychonauts” (to employ an anachronism) which might reveal significant differences in the response of non-Indians from Indians. My motives in looking for such differences and my reasons for expecting them are developed below.

Some definitions are needed. By peyote, I mean the cactus used by American Indians, particularly those in the Native American Church of the United States, as a religious sacrament. At the present time, the botanical identification of this cactus is *Lophophora williamsii* (Lemaire) Coulter. It is now known that there are two species which together comprise the total extent of this genus: *L. williamsii* and *L. diffusa* (Croizat) H. Bravo. The latter grows only in a quite small region of Mexico in the state of Querétaro, south of and separate from the much larger region of the

Chihuahuan Desert where *L. williamsii* is to be found. *L. williamsii* is by far the more abundant species and the one whose more northern ecological niche overlaps the U. S. border into Texas from Loredo to Rio Grande City. It is the sole “peyote” cactus used as an entheogenic sacrament in the Native American Church; significantly, its principle alkaloid is mescaline, with lesser amounts of some 40 others; while the alkaloid in highest concentration in *L. diffusa* is pelotone, with lesser amounts of lophophorine, anhalamine, and anhalonidine. If there is any mescaline in *L. diffusa* it occurs only in trace amounts well below the threshold of pharmacological activity (Todd, 1969; Bruhn and Holmstedt, 1974). Both species are quite similar in appearance, and although the differences are clear enough in the living cactus (chiefly the presence of well-defined ribs and furrows in *L. williamsii* versus prominent podaria in *L. diffusa*—see the photographs in Anderson, 1996, pp. 170, 172, 211, 217), it is not surprising that these differences vanish on drying. Both forms were also misnamed “mescal” by non-Indians during the late 19th and early 20th centuries, thus adding to an already abundant source of confusion.²

Unfortunately, the critical distinction between these two species of *Lophophora* went unrecognized until the mid-20th century, when a baffled and frustrated Gordon Alles (whose name will resonate to those familiar with early studies of ephedrine, amphetamines, and MDA)³ personally financed the graduate studies of botanist Edward F. Anderson. Anderson’s careful taxonomic study of the group (Anderson, 1969; 1996, p. 154) with the supporting chemical studies of Todd (1969) and of Bruhn and Holmstedt (1974) finally resolved the issue.

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² For the full story of mescal misnomenclature see Stewart (1987) or Anderson, (1996).

³ Alles was the self-experimenter who described seeing pseudohallucinatory “smoke rings” after taking MDA.

At the time of the earliest investigations of the peyote cactus, considerable controversy and confusion appears to have been caused because several shipments of the cactus sent to Germany for chemical and pharmacological analysis consisted entirely of *L. diffusa*, and these seem to usually have been designated in the taxonomy of the time as *Anhalonium williamsii*.

But the designation was probably inconsistently applied, since the taxonomic differences are subtle and almost imperceptible when the cacti were dried, as these were. Other shipments contained the true sacramental peyote, *L. williamsii*, and seem usually to have received the designation *Anhalonium lewinii* in honor of Berliner toxicologist Louis Lewin (1850-1929), the first to discover pharmacologically active alkaloidal material in peyote (Bruhn and Holmstedt, 1974, pp. 384-385).

Arthur Heffter received shipments of both (including a small sample given him by Lumholtz from cacti the latter had collected when he lived with the Huichols) and recognized there was a great difference in alkaloid content between them, but also acknowledged that he was utterly unable to detect any morphological differences between the various samples of dried cacti (Heffter, 1898). Heffter and Lewin continued to insist there were two species, one containing mescaline as its chief alkaloid, the other pelletine.

Lewin also claimed he could identify morphological differences between the two forms. However, until the work of Anderson, the judgment of botanists such as Schuhmann, Safford, and others prevailed in recognizing only one species, *L. williamsii*.

This tedious but necessary classificational excursus having run its course, we return to the two questions about which this article is centered.

Part I. Besides Mescaline:

What Is Known of the Other Peyote Alkaloids?

Has there been any study on humans of the effects, individually and in concert, of the many alkaloids other than mescaline which are found in peyote?

There are an unusually large number of alkaloids in peyote—no other cactus approaches *Lophophora williamsii* in this regard. There have been many studies of mescaline, the most abundant alkaloid in peyote. But what of the other alkaloids? These are, in order of decreasing occurrence: pelletine, anhalonidine, anhalamine, hordenine (anhaline), lophophorine, 3-demethylmescaline, anhalonine, *N*-methylmescaline, anhalidine, *N,N*-dimethyl-4-hydroxy-3-methoxyphenethylamine, anhalinine, *O*-methylanhalonidine, isopelletine, and peyophorine. There are also numerous alkaloidal amides and amino acids (Lundström, 1983;

Kapadia and Favez, 1970, 1973).

True, these other alkaloids occur in smaller amounts, but they may well be effective at doses one-tenth or even one-hundredth that of mescaline, which is one of the least potent psychoactive drugs known. And a peyote religionist who consumes some 40 to 100 peyote “buttons” in a single evening—as Native American Indians frequently did in previous generations before the cactus became scarce in the United States—would most likely be ingesting pharmacologically active doses of a number of alkaloids in addition to mescaline.

There follows what I believe to be an exhaustive account of all human studies of the non-mescaline peyote alkaloids.

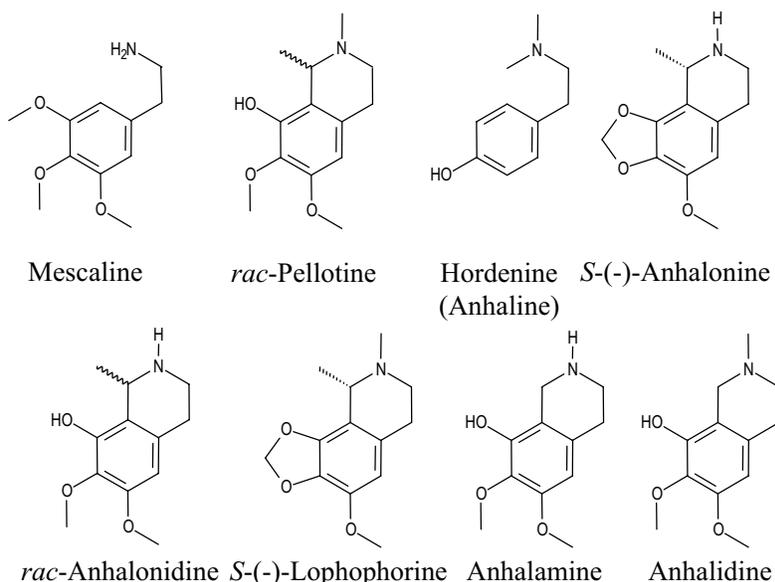
Pelletine, Anhaline (Hordenine), Anhalonine, Anhalonidine, Lophophorine

Pelletine is the alkaloid which occurs next in abundance after mescaline in *L. williamsii* and it is the chief alkaloid in *L. diffusa*. Pelletine and anhaline (hordenine) were the first *Lophophora* alkaloids to be obtained as pure crystalline substances, both reported by Heffter, the eponym of this journal (1894a).

The cacti from which Heffter isolated pelletine were most likely *L. diffusa* (he described it as *Anhalonium williamsii*) since he found no mescaline and only traces of any other alkaloid. This was Heffter’s first venture into the study of peyote, and his knowledge of the Amerindian customs surrounding peyote ingestion was at this time quite poor, and he believed that the Indians “lay unconscious and slept for 2-3 days, then woke up, singing and crying out, only to fall asleep again (1894a, p. 66).

Heffter found through several experiments on himself and unnamed others that doses of 50-60 mg had a “marked sleep-inducing effect. About two hours after taking pelletine orally, there was a pronounced feeling of sleepiness, heaviness of the eyelids, and a reluctance to make any physical or intellectual effort. As in all these experiments the usual laboratory activities continued to be carried out, these symptoms disappeared completely within 0.5-1 hour” (p. 81).

Later, when he had read the more reliable accounts given by Mooney and others concerning the “visions” attributed to peyote, he wondered if perhaps higher doses of pelletine might cause some of these effects. He therefore administered himself successively larger doses until he reached 240 mg. At this dose he still noticed no alteration of his visual field, but found it was almost impossible to stay awake. Despite a marked dizziness on retiring he awakened the next morning with no ill effects (Heffter, 1898, pp 408-409).



The Principal Peyote Alkaloids

Pellotine was manufactured and sold as a sleeping aid by Boeringer and Sons in Germany and tested as a hypnotic on a total of several hundred patients in Europe (Jolly, 1896, 1896a; Pilcz, 1896) and the United States (Hutchings, 1897).

However, the later discovery and marketing by the Bayer Company of a series of inexpensive synthetic barbiturates like Veronal (barbital) in 1904, and Luminal (phenobarbital) in 1911, two of pharmacology's all time blockbuster drugs, made the costly and tedious isolation of pellotine from *Lophophora williamsii* impractical.

In any case, pellotine was not the most consistent or reliable sleeping aid. Some patients did not respond, and its effects seemed quite short-lived. But the latter feature might be desirable for insomniacs suffering from early awakening. Hutchings reported that "the sleep produced by Pellotine was particularly calm and natural; the patient could be readily roused and would sleep again if the effects had not worn off. No unpleasant after effects, such as headache, nausea or coated tongue, were observed. The patient usually awoke refreshed and calm. When given during the morning hours, two or three hours' sleep could usually be obtained, after which the patients would be bright until bedtime when they usually slept well again" (Hutchings, 1897).

It is unlikely that pellotine acts, as do most current soporifics, at GABA receptors. It showed some curious species variations not characteristic of GABAergic drugs: Heffter (1898) reported that dogs seemed immune to it, and showed no effects whatever even when given massive doses of 50 mg/kg (corresponding to a dose of 3.5 *grams* in an adult human).

On the other hand, cats given as little as 15 mg/kg vomited and shrieked piteously; larger doses, far from sedating them, caused continual wailing and nervous spasms. In this respect pellotine seemed to resemble morphine, which also produces excitement in cats at higher doses (Merck, 1991).

Most of the patients upon whom pellotine was tested were in psychiatric wards, and usually their general daytime behavior improved on the drug.

In retrospect, expecting as we do now the 2-4 week delay in efficacy shown by all classes of antidepressants, we might suspect that pellotine is an antidepressant.

For instance, there is the following case, reported by Hutchings from New York's St. Lawrence State Hospital for the Insane, concerning a 39-year-old woman diagnosed with "agitated melancholia"—what today's more exquisite nomenclature might call Mixed Anxiety-Depressive Disorder (DSM-IV, 1994, pp. 723-725):

She had been under observation for one month and during that time was troubled with insomnia and extreme restlessness. When awake, she constantly rubbed her hands and moaned and when out of bed could rarely be persuaded to sit, but walked the floor in a rapid, nervous manner.

She was given a half grain (32.4 mg) of pellotine hypodermatically [sic] at 9:00 a.m. on January 27. At that time she was walking up and down the floor and could not stop long enough to answer questions addressed her. Within a few minutes she became more calm, exchanged her night-dress for a house dress and sat down.

She spent the afternoon reading or employing herself in several ways and talked quietly with others. The good effects continued through the night; she slept eight hours, which was better than she usually did with trional.

The medication was reduced to one-quarter grain morning and evening and was continued for three weeks with no bad effects. This amount seemed sufficient to keep her in a fairly comfortable condition; she slept from five to eight hours at night and though agitated at times during the day, had periods of calm during which she read and amused herself in various ways.

She had so far improved within three weeks that the pellotine was discontinued and nothing substituted for it (Hutchings, 1897, pp. 45-46).

Anhaline (Hordenine), isolated from a shipment of cacti described as *Anhalonium fissuratum*, was tried by Heffter at a dose of 100 mg, with no detectable effects (1894a, p. 74). Anhaline was later shown to be the same alkaloid as hordenine, which was isolated from barley germs and its structure determined by Leger in 1906.

It is a simple phenethylamine, *N,N*-dimethyltyramine (tyramine is 4-hydroxyphenethylamine), and Späth realized early in his study of cactus alkaloids that Heffter's anhaline and Leger's hordenine were probably the same. Heffter's empirical formula for anhaline was wrong ($C_{10}H_{17}NO$ instead of the correct

$C_{10}H_{15}NO$) and his melting point a bit off (115 instead of 117.5 °C), but when Späth sent Heffter a sample of hordenine Heffter found the two alkaloids to have identical melting points and the same physiological effects on frogs (Späth, 1919, p. 133).

In doses 2 to 5 times that assayed by Heffter, hordenine is a fairly powerful sympathomimetic; it is a vasoconstrictor and bronchodilator, and raises blood pressure with an activity intermediate between epinephrine and ephedrine.

Perhaps this was the activity known to the Tarahumaras, who value the cactus, "sunami" from which Heffter isolated hordenine, *Ariocarpus fissuratus* (which in Heffter's day was known as *Anhalonium fissuratum*), and consider it more potent than peyote (Anderson, 1996, p. 162). In addition to hordenine, it is reported to contain the very similar and biogenetically related *N*-methyltyramine, and perhaps *N*-methylhomoveratrylamine, which is 3,4-dimethoxy-*N*-methylphenethylamine (Lundström, 1989). Shulgin (1992, p. 614-616) and his coworkers found no activity in the *N*-demethyl analog of this compound, 3,4-dimethoxyphenethylamine, even at oral doses of half a gram. Perhaps the native shamans are confused here: another cactus, *Ariocarpus retusus* with the same alkaloidal content as *A. fissuratus* (both are also called "chautle") is known to the Huichols as "false peyote" because of its undesirable side effects (Anderson, 1996, p. 162). Evidently one must pick one's shaman as carefully as one picks one's cacti.

Anhalonine. In 1896, Prentiss and Morgan (P&M) reported what seems in fact to be *the first human trial of an isolated peyote alkaloid in pure form.* (Assuming, as seems most likely, that the pellotine which Heffter used in his self-experiment in 1894 was derived not from the genuine peyote cactus, *L. williamsii*, but from *L. diffusa*.)

In order to ascertain the action of anhalonine upon man, Dr. Morgan took the drug in progressively increasing doses daily up to 200 mg without any appreciable effect. As this amount is nearly four times the quantity of anhalonin contained in the crude drug⁴ administered in the experiments already

⁴ By "drug" P&M mean dried peyote. "Drug" and its cognates in other European languages as used at this time primarily denoted physiologically active plant material (the word originally derives from the Dutch for "dried"); it gradually came to acquire a secondary meaning of a physiologically active chemical from any source. Currently the primary and secondary meanings are reversed.

reported, it is evident that anhalonin cannot be the active principle of mescal buttons [peyote], or even a potent factor in the production of their effects (1896, p. 297).

The anhalonine with which P&M carried out their experiments at the Medical Department of Columbian University in Washington, D.C., had been isolated from peyote following Lewin's 1894 procedure by a young chemist, Ervin E. Ewell, who was employed at the U. S. Department of Agriculture in the Division of Chemistry under Dr. Harvey Wiley.

P&M state that Ewell had obtained anhalonine in a "pure state," but intriguingly note that his reported melting point was 77.5 °C. This was the melting point given by Lewin (actually 74-77.5 °C) in 1894 (p. 376). As the more than 3 degree spread suggests, this was not the melting point of the pure compound—Heffter later corrected it to 85.5 °C (1896a, p.225). A depressed melting point and a broadened range indicate that the material is less than chemically pure. One wonders—was Ewell fudging? If he really had pure material it should have melted at 85.5 °C.

At any rate, P&M's conclusion that anhalonine is pharmacologically inert is supported by Heffter's later self-experiment (1898, p. 424) in which he reports that "100 mg of the hydrochloride evoked no detectable symptoms in me other than mild sleepiness."

In an odd instance of synchronicity, P&M report a second alkaloid isolated by Ewell which he believed to be the same as the alkaloid "called by Heffter alkaloid B" (1894a), which the American group "for convenience" christens "*mescaline*," as well as a third, unnamed, alkaloid which they believed would set the record for peyote alkaloid toxicity (pp. 297-306). Later, Heffter (1896a, 1898 p. 410) was to report that the alkaloid A of his earlier report was actually the true mescaline as it is called today; while alkaloid B was probably anhalonidine, which Heffter found particularly difficult to separate from mescaline (1898, pp. 398-399). But the "*mescaline*" which Ewell gave P&M seems in their animal experiments too toxic to have been anhalonidine. It was probably a mixture of anhalonidine and lophophorine.

In a review article on the peyote cactus published by Ewell in the *Journal of the American Chemical Society* (1896), he expresses the hope that "American scientists will not leave the task of exploring this promising field entirely to workers beyond the sea, considering our proximity to much of the necessary material" (p. 642).

Alas, their hopes were to be dashed. In 1895, Wiley was able to write to James Mooney, the

Smithsonian ethnologist who had collected the peyote during field studies with the Kiowa Indians, that Ewell was making progress in separating and studying the active constituents of the drug (including the plant resins, which Wiley and Ewell erroneously believed to be responsible for the "visions"); but by 1897 Wiley seems to have thrown in the towel. He writes that "Mr. Ewell is very much interested in the subject and is anxious to perform his share of the work and will do all that he can find time to do, but we cannot promise any immediate results at present. We must regard the plant as quite thoroughly "brought out" chemically, and as much more work has been done abroad than in this country, we can claim no monopoly of the subject" (Wiley, 1897). Ewell was indeed "very much interested" in the subject; we will later see that he was shaken to his depths by a peyote experiment he conducted on himself.

Anhalonidine, in a self-experiment carried out by Heffter (1898, p. 424), produced in doses of 100-250 mg of the hydrochloride salt "a little sleepiness and a dull sensation in the head. The pulse was unchanged. There were no visions to be seen."

Lophophorine, because it occurs in such small amounts in peyote, was regarded by Heffter as a priori unlikely to be a significant contributor to its overall effects.

When he took 20 mg of lophophorine hydrochloride orally, Heffter experienced after 15 minutes a "strong, painful pressure in the back of the head along with facial warmth and flushing. There was also a slightly decreased pulse rate (from 78 to 70). All effects were gone within 40 minutes" (1898, p. 424).

Other Studies

The following studies should be mentioned for the sake of completeness because they are indeed concerned to some degree with the human pharmacology of non-mescaline peyote alkaloids.

However, in my judgment, they actually contribute little new data, either because they have less information than they claim to have, or because they have been misinterpreted to contain more than they do, or because they seem to suggest that the writers possess more information than they will admit to.

Dixon (1898)

W. E. Dixon. employed the services of Edmund White, a "pharmaceutist" [sic] at St. Thomas's Hospital, London, who used a method he "modified" from that of Heffter's to separate the constituent peyote

alkaloids. The process as briefly described in Dixon's 1899 article would be most unlikely to effect significant separation of the peyote alkaloids; rather, a mixture of all the alkaloids would result.

White gave Dixon crystalline free bases of four peyote alkaloids all very soluble in water; yet only mescaline has a water-soluble free base form. But the strongest indication that these crystals were mixtures (probably of the sulfate salts) is the fact that Dixon found that they "all . . . possess a remarkable similarity in their physiological actions," including the production of "a kaleidoscopic play of colours ever in motion and the tints constantly changing" (1898, p. 1061).

The only explanation for this effect at the dosages specified is that Dixon was actually employing a mixture of all the alkaloids, chief among them mescaline. While his observations on his own intrapsychic response are interesting as an instance of mescaline (or better "panpeyotl") intoxication, they shed no light whatever on the specific effects in man of anhalonidine, anhalonine, or lophophorine.

This is not my isolated opinion. Mogilewa—in an article studying the activity of the separate alkaloids on frog heart functioning in which his results are diametrically opposed to those found by Dixon on frogs—also notes that Dixon's results are in complete contradiction to the results of Heffter and Lewin and have to be the result of using "not pure substances, but mixtures of alkaloids" (Mogilewa, 1903, p. 140).

Rouhier

In a rather offhand observation which was probably meant as an obliging response to a bit of freewheeling speculation by Lewin in his 1888 paper that there might be a number of alkaloids in peyote with opposed pharmacology, Heffter summarizes the *animal* toxicity (mostly on frogs) of the five peyote alkaloids he has characterized (which in many cases all workers acknowledge is totally different from their human pharmacology), and proposes a sort of "periodic table of peyote alkaloids," arranging them on a spectrum between the poles of mescaline (which for the sake of this schema he describes as being a morphine-like depressant—I leave it to the informed reader to decide how accurate a characterization this is of its human psychopharmacology) and lophophorine (described as being a strychnine-like stimulant).

Having made these rather arbitrary and really quite vague analogies, Heffter then proposes that pelletine, anhalonidine, and anhalonine could be placed nicely in between (1896, p. 418).

All in all, this is an awkward forcing of very skimpy data into a Procrustean paradigm in a manner

untypical of Heffter. (Was he perhaps trying to extend a conciliating hand to Lewin? Heffter by all accounts was an amiable and modest person who preferred collegiality to controversy, and Lewin at this time was a far more famous figure who was as a matter of cold scientific achievement being thoroughly upstaged by Heffter's work on *Lewin's own cactus*. In other places, and perhaps here as well, it seems that Heffter is trying his best to soften the blow his own work must have had on Lewin's pride.)

Nonetheless, this modest proposal of Heffter's won an undeservingly extensive response.

In his doctoral dissertation of 1926, *Monographie du Peyotl*, and in the book he wrote based largely on this dissertation, *La Plante qui fait les yeux émerveillés: Le Peyotl*, Alexandre Rouhier (1975) later discusses Heffter's strychnine-morphine spectrum in a way which has led some to believe that Rouhier himself tested all five peyote alkaloids on human subjects in pure form.

But a careful reading of Rouhier's data (pp. 226-231) shows that it is nothing more than a literal translation into French of Heffter's self-experiments in every instance (something perhaps less obvious than it should be because of Rouhier's graceful avoidance of references).

Over the years, this process expanded geometrically; with everyone quoting everyone else so that by 1938, La Barre (1989, pp. 139-140) could devote two pages and cite six or more authorities (including Dixon's totally unreliable work, which in any case claimed just the opposite, that all the alkaloids were pharmacologically identical) discussing how the earliest effects of peyote intoxication were due to one alkaloid, the next due to another, and so forth. This is the sort of science Mark Twain so admired because it produced such an enriching return in speculation from such a modest investment of fact; indeed, it conforms to the description a Jesuit friend of mine has for theology, which he calls "data-free analysis."

As for Rouhier, in all the experiments he conducted on himself and others, which often resulted in astonishingly vivid imagery, he used either an oral dose of what he termed "panpeyotl basique" (p. 216), which was a mixture of all the peyote alkaloids in their free base form obtained by evaporating a chloroform extract, or a simple alcohol extract of peyote (pp. 233, 241, 248, 254). Rouhier also created a number of terms such as "peyotlinica" and "mescalonica" to distinguish peyote which contained almost exclusively pelletine (which Rouhier insists

on calling “peyotline”⁵), from peyote containing mescaline. This time, to reverse the confusion, he presented these terms in a way which could suggest they were coined and used by Heffter, which they most certainly were not.

Hoffman-La Roche

One tantalizing report remains to be mentioned in this context. In 1964, Brossi, Schenker, and Leimgruber at Hoffman-La Roche’s Nutley, NJ research laboratories reported improved syntheses of the isoquinoline peyote alkaloids *anhalamine*, *anhalidine*, *anhalonidine*, and *pellotine*. (All had been previously synthesized in the 20s and 30s by Späth; only the last two had been previously tried by humans as we saw above.) Two years later, the same laboratory reported the results of a series of animal tests on these four alkaloids plus mescaline (Brossi, 1966, p. 407). None of the compounds showed significant activity as anticonvulsants, tranquilizers, MAO inhibitors, or hypnotics. Pellotine showed some muscle-relaxant activity, but only at very high doses (200 mg/kg). (There were, of course, no tests in those days for specific receptor binding or inhibition of neurotransmitter reuptake.) The authors conclude the article with these cryptic words: “*The presence of hallucinogenic activity cannot be ruled out (das Vorhandensein einer hallucinogenen Wirkung kann nicht ausgeschlossen werden).*” This is a strange thing to say: one would expect them to state either that they did not test for hallucinogenic activity, or that they did and found none, or that the tests conducted would not rule out such activity—which in any case was obvious enough, since all the tests were also conducted on mescaline. The study found quite low toxicity in mice for these compounds (p.o. LD₅₀, mg/kg: mescaline 800, pellotine 200, anhalonidine 700, anhalamine 960, anhalidine 750). *Did the authors perhaps sample one or more of these compounds at dosages much larger than Heffter’s or Morgan’s and find that they were indeed hallucinogenic?* If so, in light of the problems endured by Sandoz over its “problem child” LSD during the decade leading up to the publication of this article, is it any wonder that they would state their results so obliquely? A later publication by one of the authors,

referring to these two papers, is also ambiguous: “recent investigations on some tetrahydroisoquinoline alkaloids, which coexist with mescaline [in peyote], have shown that the physiological effects of these cactus extracts are mainly due to their mescaline content” (Brossi and Pecherer, 1970, p. 17).

Thus ends the entire history, I believe, of all reliable human trials using peyote alkaloids other than mescaline. Aside from pellotine, all were performed by two individuals, Morgan and Heffter, and except for pellotine and anhalonine, there was one and only one trial of each alkaloid at quite likely subclinical doses. In other words, we know very little of the effects of these alkaloids in man.

Some Unanswered Questions

Peyote vs. mescaline. Since it is a commonplace in anecdotal folklore that peyote provides a decidedly different, usually “richer,” experience than mescaline or LSD (the latter being scorned by some as “synthetic”) it would be interesting if there had been some sort of controlled comparison of the effects provided by the peyote plant—or even Rouhier’s panpeyotl—with mescaline. Ideally, a double blind study might show some influence of the other peyote alkaloids on the total experience. For example, one could extract all the alkaloids from peyote, add back just the mescaline, and make a tea from this indistinguishable in flavor from a tea made from unaltered peyote. No such study seems ever to have been made. In any case, it would probably prove inconclusive: entheogens (or the human mind!) are too much like Heraklitus’s river. The same dose, the same setting, but is it ever the same person? It is in any event never the same experience.

In point of fact, in terms of their intrapsychic component, descriptions of mescaline experiences seem indistinguishable from descriptions of peyote experiences. But there seem to be two physical differences. Heffter and most other early Ameuropean peyote users usually complained of headaches the next day. But Mooney did not, and the Amerindians do not, so perhaps these were tension headaches induced by the understandable anxiety of quite risky first-time experiences (a mild form of the Briggs syndrome described below).

⁵ Doubtless an improvement in etymology but a needless confusion in chemistry. Nor do I read Lewin (*pace* Shulgin, 1973, p. 49) as “arguing strongly” for “peyotlin.” He makes this mild (for Lewin!) suggestion once, and only once, while acknowledging Heffter’s prior discovery of the alkaloid: “die kleine Menge . . . die ich erhielt, gab die Schwefelsäure-Saltpetersäure-Reaction, die nach Heffter auch für das wirksame Princip Pellotin (richtiger Peyotlin) zutrifft” (1894, p. 389). But he never mentions the issue again. In the last edition of *Phantastica*, he continues to argue for the existence of a distinct species *A. lewinii* distinguishable from *A. williamsii*, and his principle argument, in agreement with Heffter, is the presence of “Pellotin” in *A. williamsii* (Lewin, 1927, p. 136).

Another difference stands out which may owe its effects to non-mescaline alkaloids. Persons taking peyote seem usually to report that they cannot sleep for as long as 12 to 24 hours. Mooney says several times that he took peyote only because without it he could not stay awake but with it (as much as 7-8 buttons) he easily observed the rituals through the night and was wakeful all the next day.

Carl Lumholtz, the famed Norwegian explorer who we will see shares the honor of being one of the very first whites to record the effects of peyote, writes “not only does it do away with all exhaustion, but one feels actually pushed on, as I can testify from personal experience. In this respect it resembles Peruvian coca” (Lumholtz, 1902, II, p 358). All the subjects in P&M’s study experienced insomnia. On the other hand, Kurt Beringer (1927, p. 34) says that this effect was entirely absent from his subjects, all of whom were given subcutaneous or intramuscular injections of pure mescaline (sulfate or hydrochloride). The stimulant effect might be due to hordenine, but Rouhier also comments that his subjects only experienced a mild, even pleasant, period of wakefulness lasting no more than a few hours; he contrasts this with P&M’s accounts (p. 334), and hordenine should have been present in Rouhier’s panpeyotl.

Perhaps the wakefulness attributed by Mooney to the pharmacological effects of peyote could really be an entheogenic effect. (If so, this was probably quite clear to Mooney, who is astonishingly perceptive in these matters; however, probably for political reasons, as a defense of Indian use of peyote against governmental efforts to ban it, he often seems to downplay the psychic effects of peyote on himself or others). The custom of conducting the peyote ritual as an all-night vigil stemmed from the Amerindian traditions of endurance trials, and the entheogen-engendered near-telepathic communion with the other participants may have transformed weariness and pain into positive features of communal bonding. Finally, there is always the enormous element of suggestibility inherent in the use of this class of drug: if the P&M subjects heard from Mooney that the drug caused wakefulness, they would probably experience wakefulness. Similarly, some of Beringer’s subjects felt that the mescaline which had been made via chemical synthesis provoked a “stronger alteration of consciousness” than the mescaline which the same

pharmaceutical firm, Boehringer & Söhne, extracted from peyote, which latter form was felt to produce a “much stronger euphoric” effect (Beringer, 1927, p. 34). Beringer seems to take this possibility seriously, asking future workers to be on the lookout for it; if Beringer believed it, his subjects probably would, too.

Peyote vs. alcohol. As is well known, peyote is honored by the Native American Church for its ability to suppress alcohol use, alcohol craving, and alcoholism. “Peyote and whiskey don’t mix,” is a saying as old as the use of peyote by the Indians of the U.S. Could this be an effect, not only of the profound religious experiences in the peyote church, but also an effect quite literally, as these church adherents believe and say, of the peyote itself (*pace* La Barre, 1989, p. 21)? *Is it perhaps a pharmacological effect of one or more of the alkaloids in peyote?*

We are probably all aware of the use of naltrexone (ReVia) or acamprosate (Aotal) to suppress alcohol craving. A recent double-blind study from the University of Texas, San Antonio, has revealed the capacity of *ondansetron*, a 5-HT₃ antagonist, to selectively suppress alcohol intake among patients with early-onset alcoholism, a group that is thought to carry a genetic susceptibility to alcoholism. Ondansetron presumably works, the researchers say, “by ameliorating an underlying serotonergic abnormality” (Johnson, 2000). Might not a similar, perhaps more effective drug be at work in peyote?

Peyote and long-term morbidity/mortality. And of course there is that most obvious unanswered question: *Are there any long-term effects, good or bad, from the regular use of peyote?* The medical world has been acquainted with peyote for more than a century. Yet such has been the appalling lack of concern for the marginalized Native Americans on the part of the U. S. Government and the Bureau of Indian Affairs (supposedly the compassionate guardian of their Indian “wards”) that only in the last year has there been any interest in answering this question. The study, which is in progress under the direction of physicians John Halpern and Harrison Pope, is co-funded by Harvard Medical School, by the Heffter Institute, and, somewhat incongruously, by the National Institute on Drug Abuse. (By DSM-IV criteria, Native American Church use of peyote isn’t drug abuse; besides, the U.S. Congress has told us it isn’t.)⁶

⁶ At least, that seems to be the ineluctable corollary of the American Indian Religious Freedom Act Amendments of 1994 (Public Law 103-344 [H.R. 4230]—Oct.6, 1994) which states that “notwithstanding any other provision of law, the use, possession, or transportation of peyote by an Indian for bona fide traditional ceremonial purposes in connection with the practice of a traditional Indian religion is lawful, and shall not be prohibited by the United States or any State.”

Part II. Besides the Indians

Who were the first Ameuropeans⁷ to try peyote? What was their reaction to this utterly novel alteration of consciousness? These were after all the very first exposures of Ameuropeans to the class of drugs we now know as psychedelics, hallucinogens, or entheogens. (Or at least they were the first in nearly two millenia, on the assumption that the ancient Greek rite of Eleusis employed an active psychedelic in its sacred ritual drink known as the *kykeon*, since all knowledge of its preparation seems to have been lost.) Did these utterly naive users experience panic attacks or “bad trips?” Was their response a sense of heightened religious awareness which we would now characterize as “entheogenic?” Or were the effects of peyote consumption not even perceived as altering the psyche at all but as causing only physical symptoms such as wakefulness or nausea or at most a few alterations of the visual field?

The reason that these first samplings by Ameuropeans should be looked at carefully is that when a drug or custom or behavior (and peyote consumption involves all of these) tunnels the quantum gap between two utterly different cultures, it is likely to emerge on the other side in an almost unrecognizably altered guise. And it is hard to imagine a gap greater than that between the culture of the nomadic Amerindians of the Western Plains, who lived with the migratory buffalo herds through unimaginably harsh winters and desert summers—and that of the raw, young, mercantile Yankee farmers, ranchers, and railroaders pushing west across the continent drunk on the victorious slaughter of the Civil War: two tectonic plates undergoing a grinding collision.

In other words, the mind-set and setting of the Amerindian peyotists and the first non-Indian users were poles apart. Whites trying peyote in the late 19th and early 20th century had none of the presuppositions or associations we now have with regard to psychedelic drugs. And this allows for a sort of double-blinded control that would be difficult to duplicate today.

Furthermore, our more “enlightened” culture naturally assumes that the effects of peyote on a Red Indian will be more or less the same as on a White Suburbanite, because our minds run with Pavlovian predictability down the well-worn rut of pharmacological reductionism (a methodology in any

case particularly ill-suited to the study of entheogens). But these assumptions we think of as commonplace were anything but common among either Amerindians or Ameuropeans in the last decade of the 19th century: even physicians (whose diplomas, particularly in the United States, carried far less weight in those days by way of rigorous education, social acceptance, or financial reward) easily assumed that a drug that was fearlessly consumed by a race which regularly survived the Great Plains blizzards in a crude shelter of buffalo skins might well kill White men. Or enslave them. Or addict them. If firewater killed red men, might not peyote poison palefaces?

Which brings up the other interesting fact that, as peyote made a few small inroads from red culture to white, alcohol was making enormous strides in the other direction. Either of these drugs—one a revered sacrament, the other (at least in its more benign forms) a prized social enhancement—might have been hoped a priori to temper a cultural tectonic collision into a more constructive collusion. But such was not to be the case; generally, neither drug has taken settled root in its heterochthonous setting, both being therein chiefly rejected or abused. To this day it remains a truism amongst participants in the Native American Church that “peyote and whiskey don’t mix.” And, casting a cold eye over present day usage of LSD and psilocybe mushrooms by binge-drinking college students, it would seem that social drinkers benefit as little from psychedelics as peyotists do from whiskey.

Arguing for a vast difference in intrinsic sociopsychopharmacology between peyote and alcohol (despite the continual assumption by U. S. legislators that peyote use was simply another form of drunkenness to be banned from the reservations) is the perhaps surprising fact that peyote was *no less foreign* than alcohol to the Amerindians of the United States, who only adopted and adapted the peyote ritual from their Mexican neighbors in the last half of the 19th century, some decades *after* they had become acquainted with alcohol. Both drugs arrived at a period of enormous social upheaval and desolation, when the heretofore nomadic plains Indians were being forcibly removed into reservations by a United States Government armed to the teeth at the close of the Civil War in a policy which would now be characterized unambiguously as racial cleansing.

⁷ I take the liberty of employing as a counterfoil to *Amerindian*—widely used to designate members of Native American cultures—the neologism *Ameuropean* for members (on either side of the Atlantic) of that European culture which by the end of the 19th century had already come to dominate the Americas and is now in hegemony everywhere.

Why was it that peyote seems generally to have played such a constructive role in helping this oppressed people to endure their condition, while alcohol seems to have done just the opposite? What elements in Amerindian culture allowed the peyote experience to be used to support and strengthen their humanity? And conversely, what elements in mainstream American culture have made psychedelics the one class of drugs which, without any exception, are banned—for all non-Indians at least—as taboo?⁸

This is an extremely difficult question to answer, as are all meta-cultural questions. But I think a large part of the answer lies in the contrast between the Ameuropean obliviousness to and discomfort with, in contrast to the Amerindian awareness of and even preference for, the dimension of the non-verbal, including not only what happens not to be uttered, or what usually is not uttered, but particularly what is beyond any utterance. “*Wovon man nicht sprechen kann, darüber muß man schweigen.*” are, appropriately enough, the last words⁹ of Wittgenstein’s *Tractatus logico-philosophicus*: “of that, whereof one cannot speak, one must be silent.” If we think these words are dismissive, we are like the Zen novice who stares at the tip of his master’s finger when the master points to the moon.

Thus in Ameuropean culture, we gratefully flee from that realm which can only be addressed without words, rushing to fill the frightening void with the hundred-headed media hydra and with endlessly varied electronic modes of communionless communication. We would panic in the Silence of Peyote; we must ban it. Amerindian peyotists are comfortable in mostly shared silence, as the roles of singer and drummer rotate around the group. When Huichols are asked what they have experienced in the ritual they typically remain silent or say simply “I saw my life.” Outsiders interested in the Native American Church who ask about the groups “teachings” are told “the Peyote will tell you.”

The difficulty Amerindian culture seems to have in using alcohol constructively may flow from the meretricious impression it can give at the outset that,

like peyote, it opens into the Silence; in the shared insight of Carl Jung and Bill Wilson, alcoholic *spirits* can masquerade as *Spiritus* (AA, 1984, p. 384). But instead it leads ineluctably to delirium, oblivion—and that anterograde amnesia which perversely aborts Wisdom stillborn from its harsh but natural gestation in error. On the other hand—always, of course, in moderation—how wondrously alcohol relieves the stress of the urban whirlwind where we Ameuropeans race so fast the Silence cannot catch us! And how lissomly it lubricates the weekend’s idle chatter when as windowless monads we share our loneliness together!

We now come to the record of the earliest first-hand accounts of peyote consumption by Ameuropeans. As an arbitrary but significant end-point, we will review all reports up to and inclusive of Arthur Heffter’s isolation of chemically pure mescaline from peyote and his proof by self-ingestion in 1897 that it was the substance chiefly responsible for the peyote “visions.” (In point of fact, however, mescaline was not to be readily available until Späth determined the correct structural formula in 1919, more than a decade after Heffter, in his last publication on the subject in 1905, disproved his own supposition that it was an *N*-methylbenzylamine.)

The First Psychonauts? Briggs, Lumholtz, and Mooney

There are three Ameuropeans, two Americans and a Norwegian, who each independently discovered peyote and became interested enough in the plant to sample it themselves. Chronologically, the first was a Texas physician, John Raleigh Briggs (1851-1907), who experimented with peyote in 1886. The second was Carl Lumholtz (1851-1922), a Norwegian with a passion for exploration who was the first white man to live alone with the Australian aborigines, as well as the Tarahumara and Huichol of northwest Mexico, where in 1892 he first became acquainted with and sampled *hikuli*, as these natives call peyote. The third was James Mooney, an Irish-American with a lifelong passionate interest in and sympathy for Indian history and culture, whose field trips as an ethnologist working

⁸ By congressional ukase we are commanded to accept *de fide* that cocaine, methamphetamine, morphine, and the cannabinoid dronabinol are Schedule II, having “an accepted medical use,” while all “hallucinogens,” including peyote, are Schedule I and have “no accepted medical use and a high potential for abuse.”

⁹ For the rest is Silence. *Er muß diese [und alle!] Sätze überwinden, dann sieht er die Welt richtig. . . . Es gibt allerdings Unaussprechliches. Dies zeigt sich, es ist das Mystische.* (The reader must go beyond these [and all] utterances; only then will he see the world as it is. . . . Of course the Unutterable exists; it *reveals* itself: it is the Mystical.)

for the Smithsonian allowed him in 1891 to be the first non-Indian to attend a peyote religious ceremony and report on it. He continued to attend many of these ceremonies over the course of many years, and at some point no later than the summer of 1892 he began the regular custom of eating four to eight peyote “buttons” during the ceremony.

John Raleigh Briggs seems to be the first Ameuropean to report on the experience of consuming peyote. In the *Medical Register* (1887a) he authored an article titled “‘Muscale Buttons’—Physiological Effects—Personal Experience.” Here is part of the article including the account of his own peyote experience with its original, somewhat peculiar punctuation:

From Notes.—At 10 a.m., June 20, 1886, I ate one-third of one of those “buttons,” or *prickly plants*, and with pencil and paper and watch before me, awaited results. In fifteen minutes afterward I felt a slight fullness in my carotids, and found my pulse had gone from 60 (normal) to 70. In fifteen minutes more the feeling in my head and throat was becoming very unpleasant—one of over-arterial tension—and my pulse had reached 90. My respirations had gone up to this time from 18 (normal) to 26. The unpleasant fullness of my head rapidly increased until 10:45, when my head began to ache and I felt dizzy. My pulse had then reached 120 and respirations 30. Soon after the forty-five minutes had passed a *sudden* and *alarming* jump in my pulse occurred—reaching 160. The peculiar and dazed feelings I then experienced, together with *alarm*, prevented my taking notes on respirations, and therefore don’t know the number, but they had certainly still further increased. It seemed to me my heart was simply *running away with itself*, and it was with considerable difficulty I could breathe air enough to keep me alive. I felt intoxicated, and for a short time particularly lost consciousness. Automatically I rushed to my able friend, Dr. E. J. Beall, of Fort Worth—my residence at the time. After giving him an idea, as best I could, of the trouble, he prescribed aro. spts. ammonia and whiskey, in large doses, every few minutes. This I took, if I remember right, one hour after having taken the “muscale button.” It seemed necessary for me to walk in the open air for me to breathe. In about half an hour I felt some

relief, and my pulse and respirations gradually became less until in about six or eight hours they were about normal. No bad consequences followed. I did, however, feel much depressed for about twelve hours—a feeling of malaise. The recollection of such experience is vividly impressed upon my mind. I believe if prompt aid had not been given me I should have died. . . . Whatever may be the ultimate constituents of this poison, it certainly is the most *violent* and *rapid* of all fruits, or even medicines, known to me—manifesting its first effects in less than fifteen minutes. I know of nothing like it except opium and cocaine. The most notable point is the rapidity with which it increases the heart’s action. Next, the intoxication and subsequent depression. I think it well worth the trouble to investigate the matter. One man’s experience is worth but little, and it is to be hoped some enterprising experimenter will carry out the research. As to *myself*, I must admit I feel somewhat abstemious on the subject (Briggs, 1887).

It is difficult to imagine what exactly happened to Briggs. In their study of the effects of peyote consumption in human volunteers nearly a decade later, Prentiss and Morgan (P&M) note that this report from Briggs is the only previous record of the taking of peyote for experimental purposes, and comment: “The symptoms produced in this experiment are so widely different from those which we have obtained from administration of the drug that we cannot believe that the drug taken by Briggs was the same one which we have now under consideration. (P&M, 1895, p. 584). Briggs, now located in Dallas, where he had established a successful tuberculosis sanitarium in the Oak Cliff district (Frank, 1914, pp. 1777-1778; Giles, 1951, pp. 225-226), spotted the P&M article when it was reviewed in the *Medical Record* and wrote them August of 1896, protesting that the cactus he consumed was indeed truly “mescal:”

I note with much pleasure your paper in the *Medical Record* of 22d instant on the “Mescal Buttons.” I am the “Briggs” referred to therein and until convinced otherwise I shall believe that I made the first experiments with this new therapeutic agent. . . .

One third of a large green button came near killing me--I never want to go through the experiment again. That what I had was the identical plant you refer to there can be

no question but the button I chewed and swallowed was green—at least 3 inches across and $\frac{1}{2}$ to $\frac{3}{4}$ of an inch thick--it being a sample button sent me was the largest that could be found. . . .

I made several experiments on dogs. In each instance the dog would after an hour or two drag his hind legs and the flow of urine was greatly increased. The dogs would howl and seem to be in great distress, the most I ever gave one was 3 buttons tied up in beef steak which they swallowed (Briggs, 1896).

Despite P&M's skepticism, there is surprisingly good evidence that Briggs did indeed consume a true specimen of *L. williamsii*. Shortly after the report of Briggs appeared in the *Medical Record* it was reprinted in the *Druggists' Bulletin* (Briggs, 1887b), where it caught the eye of the general manager of Parke-Davis & Co. in Detroit. They wrote to Briggs and asked for samples of his Mexican material. A cigar box of peyote was sent 8 June 1887 by Briggs, who promised larger amounts but admitted to trouble dealing with his source, a Mexican smuggler who provided peyote to Texas Indians but wanted cash in advance for a large order. Parke-Davis sent some of the Briggs peyote to Dr. Henry Rusby, Professor of Botany and Materia Medica at the College of Pharmacy in New York, who was their botanical consultant (Bender, 1968).

In the Parke-Davis laboratories, Frank Augustus Thompson reported on 5 July 1887 that the cactus material contained "a large amount of alkaloids," thereby justifying a revision of the historical record: *although unpublished, the first discovery of alkaloidal material in cacti precedes Lewin's work by one year and can be claimed by Frank Johnson of Parke-Davis*. Meanwhile, Dr. Rusby, baffled by the problem of identifying the botanical identity of the peyote material, sent samples to Sereno Watson of the Botanic Garden at Harvard in Cambridge, who suggested it was of the genus *Anhalonium*.

A sample was also sent to Berlin to Dr. Lewis Lewin, the internationally known pharmacologist, toxicologist, and authority on opium and cocaine addictions (Bender, 1968). Lewin acknowledged receipt of the material on 3 July 1887. As it happened, he was planning an extended trip to the United States for that very year. In September 1887 he visited Parke-Davis in Detroit (on his way to observe the famous opium dens of San Francisco), where he was given more of the peyote material to analyze on his return to Germany (Bruhn and Holmstedt, 1974). While there is no documentation of this, it seems more than likely that when he was given the material by Parke-Davis superintendent Wetzell, he would have been told

of the progress Thompson had made in the laboratory, specifically in discovering alkaloidal material in the cacti.

What happened to the peyote sent to Watson? It was carefully cataloged in the Gray Herbarium of Harvard University. Some seven decades later, Bruhn and Holmstedt obtained permission from Harvard to analyze this material by GC-MS. The distribution of alkaloids in this Briggs material corresponds almost exactly to that found in fresh *L. williamsii*, the true peyote cactus, including the expected preponderance of mescaline (Bruhn and Holmstedt, 1974, pp. 358, 372-373)—the only difference from fresh cacti was the loss of some of the phenolic alkaloids.

To bring a long story to its end: it can be said with as much certainty as is given in historical matters that *in June 1886 Briggs took L. williamsii, the genuine entheogenic peyote*. Why did he have so violent and intense a reaction to this small amount of peyote, a response so different from that of the Indians? One can only conclude that Briggs was *very, very* apprehensive—I feel *sure* he would approve the use of *italics, which he was fond of himself*—and managed to work himself up into an extreme *panic attack* at the *first onset, real or imaginary, of a drug effect*.

Briggs scores two for the record books: the first Ameuropean to record taking peyote and the first to have had a *bad trip*. Without his curiosity and courage, however, neither Parke-Davis nor Lewis Lewin would have known of peyote. And in explanation of the enormous apprehension he felt at eating peyote, one must realize that his notions of its effects (the "street mythology" of the day) were quite at variance with the facts. Most of the many fables he narrates about peyote use involved unconsciousness or death—none of the outcomes are positive. In one of many rambling letters to Parke-Davis he describes a war dance by peyote-consuming Kiowa Indians during which "about 30 died at once." In another letter, he confidently asserts "I am certain 2 buttons would kill a *white* man" (Bender, 1968, p. 161; Bruhn and Holmstedt, 1974, p. 358). Fear is fear, groundless or no, and it is a very powerful mind-altering (un)substance.

That the next two Ameuropeans to sample peyote had quite different experiences is doubtless due to the fact that both took the plant in the context of their friendly association with Amerindians who invited them to share the sacrament with them.

Carl Lumholtz was born in 1851 near Lillhammer, Norway. His father wanted him to become a Lutheran clergyman, so he abandoned his early interest in botany and began the study of theology. "To secure my degree," he writes, "I had to work sixteen

hours a day for several months; this strain brought on a nervous breakdown, which, however, unexpectedly turned to my benefit.

To regain the stability of my nerves I now devoted myself exclusively to the collecting of birds and animals and to a study of their modes of life. . . . Love of nature took stronger and stronger hold of me and one day it occurred to me what a misfortune it would be to die without having seen the whole earth” (Lumholtz, 1921, pp. 225-226). Impressed with his zoological aptitude, the University of Christiania and several Norwegian museums provided the funds for Lumholtz to travel to Australia and collect specimens.

Lumholtz immediately left the settled part of Australia behind, sought out the natives, and began to live with them, despite their reputation of being cannibals with a particular predilection for Ameuropean flesh. He lived with them four years, discovering a number of new animal and plant species. However, he was an instinctive anthropologist, and the most valuable thing he was to bring back to Norway were the vivid and perceptive descriptions of the way of life of the aboriginal peoples he lived with.

His curiosity soon turned to the American continent, and in 1890 he began an exploration of the northern part of Mexico’s Sierra Madre, accompanied by a large party of fellow explorers and attendants. But his interests had turned to the native peoples of the region, and like James Mooney, he realized that the only way to gain their complete trust was to live alone with them. And so, in 1892, “in order to save expense and to concentrate my efforts on ethnological research I conducted my investigations alone, following the wild (so-called *gentiles*) Indians into the distant retreats in the deep cañons for which the States of Chihuahua and Durango are famous” (1921, p. 231).

It was probably in 1892 that he first observed the use of peyote among the Tarahumares. In his third and most extensive expedition from March 1894 to March 1897, he claimed to be the first white man to visit the Huichols, whose aboriginal use of peyote (which both they and the Tarahumare call *hikuli*) incorporates an astonishingly complex ritual and mythology (Furst, 1972; Ruland, 1985).

In a retrospective essay written a year before his death in 1922, he gives the following testimony about peyote and the use of peyote by the Amerindian tribes he lived with:

Of the ethnological results gained during my travels in Mexico I consider the information which was collected about the anciently well-known *peyote* (*lophophora*) among the most important. It is a well

established fact that this little cactus when partaken of exhilarates the human system, allays all feeling of hunger and thirst, and produces color visions. In the Huichol tribe this highly interesting plant cult reached its greatest development. The Tarahumares also worship this plant. . . .

Of late years, the *hikuli* cult has, strangely enough, been adopted by certain tribes in the United States and well meaning people are trying to stop this on the ground that it is a kind of debauché. Nothing could be farther from the truth. By all manner of means prevent the Indians from getting the white man’s brandy, which ultimately and surely ruins them, but *hikuli*, or *peyote*, is an entirely different matter.

As far as my experience goes, the partaking of *peyote* is not injurious to health; besides, the cult is observed only during a limited season of the year. The effect of the plant on the nervous system is very different from that of alcohol; the balance of the body is even better than under normal conditions. There is nothing vicious about the *hikuli* cult. Abstinence from sexual intercourse is imposed on its devotees and a marked effect of the plant is temporarily to take away all sexual desire (1921, pp. 235-236).

In 1902, Lumholtz wrote *Unknown Mexico*, a two-volume work describing his explorations which has become a classic in anthropology. It contains lengthy descriptions of the customs and beliefs surrounding the use of hikuli:

To the Indians, everything in nature is alive. Plants, like human beings, have souls, otherwise they could not live and grow. Many are supposed to talk and sing and to feel joy and pain. For instance, when in winter the pine-trees are stiff with cold, they weep and pray to the sun to shine and make them warm.

High mental qualities are ascribed especially to all species of *Mammillaria* and *Echinocactus*, small cacti, for which a regular cult is instituted. . . . The Huichols use only the species and variety shown in the illustration [*Lophophora williamsii*], while the Tarahumares have several. Major J. B. Pond, of New York, informs me that in Texas, during the Civil War, the so-called Texas Rangers, when taken prisoners and deprived of all other stimulating drinks, used mescal

buttons, or “white mule,” as they called them. They soaked the plants in water and became intoxicated with the liquid.

The plant, when taken, exhilarates the human system, and allays all feeling of hunger and thirst. It also produces colour-visions. When fresh, it has a nauseating, slightly sour taste, but it is wonderfully refreshing when one has been exposed to great fatigue. Not only does it do away with all exhaustion, but one feels actually pushed on, as I can testify from personal experience. In this respect it resembles the Peruvian coca; but unlike the latter, it leaves a certain depression, as well as a headache. Although an Indian feels as if drunk after eating a quantity of hikuli, and the trees dance before his eyes, he maintains the balance of his body even better than under normal conditions, and he will walk along the edge of precipices without becoming dizzy. At their nocturnal feasts, when drinking heavily of both tesvino [a mildly alcoholic fermented beverage] and hikuli, many persons may be seen to weep and laugh alternately. Another marked effect of the plant is to take away temporarily all sexual desire. This fact, no doubt, is the reason why the Indians, by a curious aboriginal mode of reasoning, impose abstinence from sexual intercourse as a necessary part of the hikuli cult (1902, I, pp. 357-359).

He describes his own consumption of hikuli in two places. The first time was with the Tarahumare, at a ceremony utilizing an hikuli tea.

At one of the feasts [of the Tarahumare] which I witnessed I wished to taste hikuli, as it was new to me. A lively discussion arose between the shamans, and I was finally told that I might sit with them The condition was made, however, that I should take off my sombrero. It happened to be a cold and windy December night, but I obeyed and put my handkerchief over my head, to which no objection was raised. The man who carried the gourd, first danced in front of the shaman, then around the fire, and finally brought it to me. The liquid tasted somewhat bitter, but not exactly disagreeable; and while I drank, the man looked at me with astonishment, as if he had expected that hikuli would refuse to be taken by me.

I drank only a small cupful, but felt the

effect in a few minutes. First it made me wide awake, and acted as an excitant to the nerves, similar to coffee, but much more powerful. This sensation lasted for about ten minutes, when it was followed by a depression and a chill such as I have never experienced before. To get warm I almost threw myself into the fire, but not until morning was the feeling of cold conquered. Some Tarahumares told me that they are similarly affected, and for this reason they do not take it (1902, I, pp. 374-375).

Some years later, when accompanying members of the Huichol tribe in an arduous journey to a series of sacred caves, he describes how hikuli revived him when he was near total exhaustion:

My excursion proved rather fatiguing, but it gave me an opportunity to put hikuli to a practical test. Under ordinary circumstances the plant was nauseating to me; but now, when I was thirsty and tired, I could rather to my surprise, swallow the cool, slightly acid cuts without difficulty. I found them not only refreshing, quenching thirst and allaying hunger, but also capable, at least for the moment, of taking away any sense of fatigue, and I felt stimulated, as if I had had some strong drink.

I had taken my breakfast of rice and milk at sunrise on that day, and afterward I had eaten only about an ounce of chocolate and three very small wafers. But when I had gradually consumed two hikuli of medium size I did not feel any weariness to speak of, although I had been active all day, and was just convalescing from a recent attack of malaria. Now, in Te-akata, as I packed up my large camera for the fifth or sixth time, after having made some thirty exposures, there had come over me such a feeling of exhaustion that I had to sit down, completely played out. . . . It seemed to me utterly impossible to ascend to the place where I had left my mule, less than two miles away, nor could the Indians carry me up the steep rocks.

“Here I must sleep,” I said. But they would not give ear to this. It was incomprehensible to them that I was unable to walk farther. They volunteered to bring me water and to give me hikuli, after which they were sure I should be strong again. I

consented to take their medicine, hoping that the plant might help me to recuperate again. They quickly brought me a gourd of water from the river below, which, however, as the Indians use their gourds in common and as a strong epidemic of whooping-cough prevailed just then (particularly among the children), did not present a very tempting draught. However, in defiance of whooping-cough and anything else the gourd might contain, I drained it, and ate one hikuli. The effect was almost instantaneous, and I ascended the hill quite easily, resting now and then to draw a full breath of air. Yet I must confess, that when at dusk I reached my mule after an hour's walk, I felt as if I should not have been able to take another step.

I washed my face in the cool stream near by, and mounted my intelligent *mula parda*. Eager to get home, she hurried up the hills at a pace which soon left my companions behind. Anyone unaccustomed to Mexican riding might have thought it too hazardous to ascend the steep hillside on a pitch-dark night at so quick a tempo. I, too, if less tired than I was, should probably have thought it safer to get off at certain places and walk. As it was, I confided in my clever and spirited animal. Mules see much better than men at night; besides, she did not give me much time for reflection, but pushed on, as if she, too, had had hikuli, along the narrow track that with many sharp turns zigzagged upward. At the last of these dangerous places she actually jumped with me up a bank two feet high, the chances for the moment being that man and beast would roll down into the yawning abyss. But she landed me safely, and half an hour later I was in my camp.

During the night I suffered from the after effects of the drug, which, when my eyes were closed, showed themselves in colour visions consisting of beautiful purple and green flashes and zigzags. I was also nauseated, and had no appetite until noon next day, by which time I had entirely recovered (1902, II, pp. 177-179).

In both of these instances described by Lumholtz, one wonders to what extent the effects he attributes to the physiological action of hikuli were not really the result of the amplified suggestibility that is so typically caused by psychedelics. While there can be a slight

fall in body temperature on taking mescaline, LSD, and psilocybin, the extreme "depression and a chill such as I have never experienced before" which Lumholtz experienced the first time he took peyote with the Tarahumaras was probably connected with the insistence of the shaman that he take off his hat before he drank the hikuli, and Lumholtz's obvious reluctance to do this. And it is hard to believe that the stimulant effect of hikuli when he takes it among the Huichols could be "almost instantaneous"—unless perhaps one or more of the peyote alkaloids can be rapidly absorbed from the oral mucosa as the cactus is chewed.

In any case, what is more noteworthy is what does *not* happen to Lumholtz either of the times he takes hikuli. *There are no psychological or spiritual reactions whatever on his part; merely physical symptoms* (chill, renewed energy) or at most the "after effects" of closed-eyes visuals. As for this last phenomenon, the only one distinctly typical of peyote, Lumholtz seems oddly ambivalent. He "suffered" from them, and he lumps these visuals together with the negative effects of nausea and lack of appetite, and yet he describes them as "beautiful." All this stands in vivid contrast to Mooney's brief but rich description of the effects on him of peyote taken during a Kiowa Indian religious ceremony, which we will discuss below.

James Mooney. Born in Richmond, Indiana, in 1861 of immigrant parents from Meath, Ireland, James Mooney as a young boy became fascinated by the stories of the Indians who once inhabited all of the vast U.S. continent. Only a generation before Mooney's, the last straggling Eastern tribes had passed through his native Indiana, fleeing west in advance of the relentless rush of white settlement. The often futile resistance on the part of these oppressed peoples to the imposition of an alien culture and religion doubtless reminded him of similar stories told him by his parents about their native Ireland, and as early as the age of 12 he had begun creating a catalog of the names and locations of all the Indian tribes of the Americas. In his valedictory address at graduation from Richmond High School in 1878, he lectured his fellow graduates and their parents on the history of the treatment of the Indian tribes by the United States Government, and concluded that members of the Indian service would have to study tribal cultures if they were ever to develop a compassionate and understanding Indian policy. His words must have had the force of prophecy, for one year later, a government agency was founded to do just that: the Bureau of American Ethnology (BAE) at the Smithsonian Institution in Washington, D.C.

Mooney worked for a few years in his home town as a reporter and writer for the Richmond *Palladium*, but could not shake off his dreams of studying the Indians. After several letters failed to convince the BAE's chief, John Wesley Powell, that he was a suitable candidate, he traveled to Washington, found Powell in his office, and showed him his meticulous listing of Amerindian tribes. As it happened, the publication of just such a listing was one of Powell's first priorities, and he was deeply impressed. He asked Mooney to start work as a volunteer until the next fiscal appropriation, and Mooney enthusiastically agreed (Moses, 1984, pp. 1-17). Mooney was to remain at the Bureau until his death in 1921 from mitral valve insufficiency due to a childhood bout with rheumatic fever.

Many of his writings are regularly reprinted to this day, since they contain irreplaceable observations and descriptions of now vanished Amerindian languages and customs written in a limpidly clear style with a warm and generous sympathy for the people he was studying. Because of his ability to win over the confidence of the shamans and chiefs of the Indian tribes when he visited and lived with them on many long field trips, in 1885 he was the first white person to be shown an ancient Cherokee sacred ritual written in the Cherokee script. And a few years later, living with the Kiowa of Oklahoma in the summer of 1891, he was invited to participate with them in their new peyote (or "seni" as the Kiowa called it) ritual which had been taught to them by the Comanches only a few years before. He thereby became the first white person to observe the peyote ritual as practiced by the Amerindians of the United States (Colby, 457-462).

Mooney was fascinated by the ceremony and the cactus at its center, and much of the rest of his career was dedicated to the study and defense of this cult, which Mooney soon realized was uniquely able to provide a source of unity and cultural integrity to the multitude of Amerindian tribes uprooted from their native lands and thrown together on the reservations. The peyote cult is "a pan-Indian, semi-Christian, nativistic movement . . . that stresses the common bond among Indians rather than the local cultural differences . . . to preserve what are seen as distinctively Indian elements against the efforts of the dominant whites to make the Indians over into standard Americans" (Aberle and Stewart, 1957, p.1). On Mooney's return to Washington in the fall of 1891, he spoke enthusiastically about this "Kiowa Mescal Rite" before the Anthropological Association of Washington; he was eventually to play a leading role in founding the Native American Church.

Mooney found himself exhausted after

participating in his first all-night ritual, but was impressed by how alert and invigorated the Indian participants seemed to be throughout the night and the next day. Probably at a second peyote ceremony in 1891, but possibly not until a ceremony the following year, Mooney followed the advice of his Kiowa friends and ate several peyote buttons to combat his fatigue. He then found himself easily able to concentrate on observing the details of the ceremony though the night. He later said that seven or eight buttons was the most he could eat without risking nausea; in testimony before a fairly hostile congressional committee in 1918, he relates that "the Indians claim that a certain quantity of peyote produces beautiful color effects, and this is corroborated by medical testing. [He refers to the studies of Prentiss and Morgan, described below.] I have never experienced this effect up to 7 or 8 buttons—my limit—but do not doubt the statement. The effect would probably be more vivid to a white man or one unaccustomed to it. The Kiowa consider 10 the minimum" (US, 1918, p. 63).

It might seem that Mooney, in claiming he never experienced any "visions" with 7 or 8 buttons, is being somewhat disingenuous, perhaps out of an understandable desire to downplay the "intoxicating" features of the plant in order to counteract the constantly repeated testimony from various missionaries, the Women's Christian Temperance Union, and others (none with any firsthand acquaintance with peyote or its religious use) that peyote consumption was "a species of drunkenness. There can be no question about that. The lasting effect of it is the deteriorating effect upon the human system; there can be no question about that, either" (US, 1918, 135). All studies using the "mescal buttons" bartered at the time in the American Southwest indicated that eight buttons was more than sufficient to provoke "colored visions" and other characteristic entheogenic effects. Indeed, many years earlier, Mooney had described his own reaction to the combination of plant and ceremony in these words:

One seems to be lifted out of the body and floating about in the air like a freed spirit. The fire takes on glorious shapes, the sacred mescal upon the crescent mound becomes alive and moves and talks and you talk to it and it answers. You look around on your companions and they seem far away and unreal, and yet you know they are close by your side. At times the songs and the drum-beat fill the tipi like a burst of thunder, then the ear seems for a time unconscious and you hear it not, although you see the motion of

the lips and the hands. And then the sound comes up from the ground and comes out of the air and is all around you like spirit whisperings (Colby, 1978, p. 465).

What did Mooney or anyone else mean by “colored visions?” Mooney may have felt that what he describes here, which is so inextricably and synergetically bound up with the music, the fire, and the singing, was quite different from either the cold phosphorescent geometric patterns seen behind closed eyes by Ameruopeans taking peyote in a clinical setting *or* the elaborate stories of meeting and conversing with the spirits of one’s departed ancestors and discovering a new name and destiny narrated by the Indians as the fruit of their traditional “vision quests.” Nonetheless, what Mooney describes here is an enthralling, ecstatic experience that he probably saw quite clearly would rarely or never occur had he not taken peyote.

I mentioned above the contrast between Mooney’s experience described here and the experiences Lumholtz had on his two encounters with hikuli. Some of the differences may be due to Lumholtz’s taking a smaller dose; he says he took three hikuli in all in Teakata. On the other hand, these were probably entire hikuli plants, not just the slices, or “buttons” used by the Kiowas. In any case, while the effects on Lumholtz were limited to physical symptoms, the images used by Mooney to describe his experience, in part because they are *not* explicitly religious, powerfully evoke the immanent approach and presence of Otto’s *mysterium tremendum et fascinans*—that shuddering sense of awe, simultaneously terrifying and utterly enrapturing, which is at the heart of every “religious” experience (Otto, 1923).

What were Mooney’s own religious beliefs? This is something of an enigma. He never wrote of his personal life. As one of his biographers says in frustration, “some men and women have lived their lives as if constantly holding mirrors to their faces, certain that they were stellar players on history’s stage. . . . Still others, however, leave evidence that can only be teased out of their published works and official, rather than personal, correspondence. I admire people with such humility, yet selfishly wish that James Mooney . . . had possessed enough vanity to bequeath to some future historian a dust-laden, yellowed foolscap on which he had inscribed his most exclusive thoughts. He did not. . . .” (Moses, 1984, p. xi).

What indications there are as to Mooney’s religious sensibility seem contradictory. Raised a Roman Catholic, he discontinued any active affiliation with it or any other religion early in life—perhaps because like many Irish patriots he resented the Irish

Catholic clergy’s opposition to the Irish struggle for independence from Britain. (Mooney was a co-founder and the first president of the Washington Gaelic Society). In 1897, he married Ione Gaut, a woman whose family directly descended from the Duke of Norfolk and who herself was later a regent for the Daughters of the American Revolution. Although the Gauts were Methodist, out of respect for Mooney’s mother and his sister, a Franciscan nun, the couple were married in a Roman Catholic ceremony and raised the children as Catholics. One of his closest friends in Washington was a co-founder of the Gaelic Society, Bishop Thomas J. Shahan, Rector of Catholic University, and a frequent visitor to the couple’s home. Shahan was also a founder and editor of the *Catholic Encyclopedia*, and commissioned Mooney to write articles on the Irish and the Indians. Although Mooney never participated in any religious services except the christening of his children, his wife converted to Catholicism sometime around 1910. One of his daughters, Eire, determined at the age of seven to save her father’s unregenerate soul and for a year insisted he go with her to Mass every Sunday morning. Mooney lovingly walked with Eire to the church but never entered it. And yet, on December 21, 1921, as his progressively worsening mitral valve insufficiency left him gasping for breath, he summoned his friend Bishop Shahan to his bedside and received the last sacraments of the church. Just before dawn the next day, he died. His deathbed return to the fold could be seen as an empty gesture meant to console his friends and family, or a last gamble in the spirit of Pascal’s wager or the playfully cynical last words of Rabelais: *Je m’en vais chercher un grande peut-être—I go in search of the great Perhaps*. Moses surmises that “the doctrine he had questioned in life he had accepted at the moment of death—or at least he had accepted its possibility” (Moses, p. 220).

But Mooney was no cynic; all his writings reveal a person acting with simple honesty, out of firm convictions. I think the more likely explanation for this last-minute seeming volte-face was that it was Mooney’s willing expression of his resignation in the face of death using the only language and symbols available to him, those of the Catholic Church, even though he would no more have literally subscribed to its dogmas on his approaching death than he did in life. Perhaps he had learned something from the Indians and from the peyote cult he had studied so long—perhaps it could be said, as the Indians would put it, that he had learned something from Peyote, when it “becomes alive and moves and talks and you talk to it and it answers.” I think on his deathbed he accepted the forms and rituals of his Irish heritage and his

Catholic family in the same way that the Indians in their peyote ceremonies often accepted such Christian symbols as the crucifix—not in the explicitly theological way in which Ameuropeans commonly define their religious persuasions, but in a broad, open acceptance as one of innumerable equivalent manifestations of the Great Spirit (Slotkin, pp 44, 69-70).

Years before, Mooney had visited the last chief of the Comanches and their greatest peyote priest, Quanah Parker. Quanah was envied by some whites for his ability to negotiate successfully on behalf of his tribe with cattlemen wishing to lease the Indian reservation lands for grazing; many believed that Quanah was quite wealthy. Actually, after the ratification of the Jerome Agreement and the opening of the Oklahoma reservation lands to white settlers, Quanah was often near bankruptcy (Hagan, pp. 109-111).

Quanah was known to say that “the white man goes into his church house and talks *about* Jesus, but the Indian goes into his tipi and talks *to* Jesus” (Simmons, Chapter xi, p. 2). Yet Quanah did not mean the literal Jesus of Nazareth, who was rarely or never addressed in the peyote ritual, but “Jesus” as one revered symbol among many of the “Supreme Spiritual Being” (Colby, p. 464).

In the same spirit, Quanah would later say, commenting on the many conversions of his people to Christianity (his own son later became a Methodist minister) that “the Jesus road is a good road.” In Mooney’s 1918 testimony defending the Indian religion before a House of Representatives committee, he remembered his old friend, who had died in 1911, and the *wokowi* (as the Comanche called the peyote meetings)¹⁰ he had attended with him:

I have been present at this ceremony among the Comanche, at the house of Quana [sic] Parker, their noted head chief. Some of us here knew Quana. For those who did not know him I will say that he was . . . altogether the ablest man in the history of the western

tribes of Oklahoma. He led the outbreak of the five confederated tribes against the Government in 1874, and kept his men out a year or two after everybody else had surrendered. He had that kind of persistence.

After the surrender he adopted what was best in civilization, but held on to what he believed to be the best in Indian life. He spoke Comanche, English, and Spanish, had traveled extensively, was familiar with Washington, and lived in a fine house with a white man for secretary and a white woman for housekeeper. . . .

While I was stopping at his house he arranged a peyote ceremony among the Comanche, and he told me: “In order to convince you that it does not kill us prematurely or break down our health, as has been alleged, I have invited to lead the ceremony to-night the old man who first brought it to us about 50 years ago.”

I did not know that until he told me, after they were all gathered together. He introduced me to the old man, who, I should judge, must have been far past 70 years. His voice was weak at first, but when his turn came he said the prayer and sang the songs.

On this occasion [Quanah] sang a song of his own composition and made the midnight prayer in his own language, and then, for my benefit, in English. It was a prayer for long life and health for himself and his family and prosperity and good crops for his people.

I still have the ceremonial wand which he carried on that occasion and which he gave me before parting, because, he said, “You are the only white man who knows our religion” (US, 1918, p. 67.)

Mooney tells of the same events in somewhat different words on pp. 71-72.

¹⁰ According to Colby (p. 470-471), Mooney’s field notes do not mention his attendance at this peyote ceremony, led by Buiwat, the old man who had first brought peyote use to the Comanches. Colby has Mooney’s extensive interview with Buiwat take place before the ceremony, but Mooney’s 1918 testimony says (twice) that it was the next morning. Colby concludes that Quanah did not permit Mooney to attend the ceremony, but the detailed recollections of Mooney in 1918 directly contradict this. I believe the reason Mooney did not describe the *wokowi* in his field notes is because he did not attend it as an observer but as a committed participant—or that his original intention to attend as an observer was transformed in and by the event. In typical fashion, Mooney does not write about his personal experiences. Again, if Quanah had not allowed Mooney to attend the meeting, would he have allowed him to purchase a large quantity of peyote from the Comanches the next day to bring back with him to Washington? Mooney’s silence about the *wokowi* is louder than words.

“The only white man who knows our religion.”

It seems to me very unlikely that Quanah, admired by whites and Indians alike for his keen ability to read human motivation and for his utter honesty, would make this statement to Mooney—while entrusting him with the sacred staff used in leading the *wokowi*—intending only to acknowledge Mooney’s academic study of “our” religion.

Doubtless that is the way the members of Congress and the other whites at the hearings in 1918 took these words, and doubtless that is why Mooney recalls them—to make it clear that none of the numerous detractors of the peyote religion had as much knowledge of what they wanted to condemn as Mooney did. But there can really be only one meaning to Quanah’s words. It was a meaning the Indian peyotists present at the hearings easily understood, even as they knew the words had been meant for Mooney alone.

From Hell to Heaven: A Chemist’s Conversion

In the autumn of 1894 (Prentiss, Morgan, 1895, p. 577; Ewell, 1896, p. 629; Colby, p. 471) Mooney came back to Washington with a large quantity of peyote which he had purchased from the Comanches during his week-long visit with Quanah.¹¹ Mooney’s superior, Powell, gave about half of the peyote to Washington physicians Daniel W. Prentiss and F. P. Morgan (P&M); about an equal amount¹² to Dr. Harvey Wiley at the U.S. Department of Agriculture’s Bureau of Chemistry; a few buttons were also sent on to Dr. Weir Mitchell of Philadelphia, one of the most prominent physicians of the day.

We will encounter the well-known story of Mitchell’s wondrously colorful visions using this peyote a little later. First we tarry at the Department of Agriculture, where Dr. Harvey Washington Wiley, then head of the Bureau of Chemistry, was at the midpoint of a long and often controversial career. Born in 1844, he graduated with an MD from the Indiana Medical College in 1871. However, he never practiced medicine but soon turned to chemistry, becoming the first professor of chemistry at the fledgling Purdue University from 1874-83, then chief chemist of the

Bureau of Chemistry at the USDA in 1883. There he was soon known as the “Crusading Chemist” because of his campaign for federal legislation against food adulteration. After 1906, when President Theodore Roosevelt signed the legislation Wiley had long espoused, he was hailed as the “Father of the Pure Food and Drugs Act.” He was also instrumental in reorganizing a group of disjointed local societies into a national American Chemical Society, and served as its president from 1893-1894.

Harvey’s USDA Bureau of Chemistry was later to evolve into the present-day FDA, but this was not to happen on Harvey’s watch. So heated were the controversies and the political skirmishing surrounding Wiley’s zealous enforcement tactics (sometimes based on scant or erroneous data), that he quit the Bureau in 1912 and accepted a 200% salary increase to become the Director of the Bureau of Foods, Sanitation, and Health for Randolph Hearst’s *Good Housekeeping*, a bully pulpit he held until his death in 1930, inveighing with invariable wit but inconsistent wisdom against alcohol, coca-cola, and the use of preservatives such as sodium benzoate in pickles or sulfur dioxide in dried fruit (Anderson, 1958; Wiley, LC).

Wiley was one of the authorities asked to give testimony with Mooney in 1918 before the House committee considering a bill to prohibit peyote. Buried in the testimony of these two men are two different versions of an episode both recalled from nearly a quarter century before. Both versions agree on the substance of the story, but both are doubtless contaminated, like the four Gospels, by some of the retrospective falsification inevitable after 25 years. I incline to give greater credence to the details of Mooney’s version when they differ since, with President Theodore Roosevelt, I feel that “the trouble with Dr. Wiley is, that . . . he has been guilty of such grave errors of judgment in matters of such great importance as to make it quite impossible to accept his say-so” (Young, p. 504). In the case of Wiley’s testimony about peyote, Roosevelt’s misgivings are borne out: in 1918, Wiley is still delivering pronouncements on peyote chemistry that had been

¹¹ In his 1918 testimony, Mooney first says this happened in 1891 (US p. 60), the year in which he first attended a peyote ceremony. Perhaps he brought a smaller amount back in 1891, and has conflated this with the “large quantity of this peyote for official investigation” which he later says he brought back in 1894 (US p. 72). Colby (p. 471) says Mooney’s field notes show he purchased \$25 worth of the peyote. In 1918, Mooney recalls that it was 50 pounds (US p. 61).

¹² According to Dr. Lyman F. Kebler, Wiley’s successor at the Bureau, “we had about 25 pounds in the department, but they disappeared somewhere. I do not know whether Indians were around there and got them, but somebody got them, and no doubt they have been used” (US, p. 57).

thoroughly discredited by Heffter in 1896—for example, that the characteristic “visions” of peyote are “due to the resin” and not the alkaloids (US, p. 52).¹³ It is also suspicious that most of the points of Wiley’s version which differ from Mooney’s tend to cast Wiley in a flattering light.

Sometime in the fall of 1894 Wiley assigned the task of analyzing the peyote buttons which he had received from Powell to a bright young chemist named Erwin Ewell. Ewell had many other responsibilities and could only spend a limited amount of his time on the peyote project, but he became quite interested in the entire subject. He was soon familiar with Lewin’s work of 1888 and probably both Lewin’s and Heffter’s reports, which had been published in early 1894. He was able to isolate alkaloidal material from the cacti but—probably because of the null results obtained in the self-experiments of Dr. Morgan using anhalonine described above—soon became convinced that the active principle of the cactus lay in the resinous material, not in the alkaloids. At this point, for reasons unknown, perhaps as a benchmark for evaluating the effects of any further alkaloids he might isolate, he determined to try peyote himself. Wiley’s testimony, which preceded Mooney’s on 21 February 1918, is as follows:

I rather discouraged him, saying that Drs. Prentiss and Morgan were turning to that part of it. But as he was a man very anxious for complete investigation he wished to try it on himself, and finally I consented. I assigned one of his laboratory mates to be with him in this work. . . . So he took the buttons home with him and he chewed them in the manner described by Mr. Mooney as being practiced by the Indians; he chewed them until they formed a bolus, and then swallowing the bolus. . . . About 2 o’clock on Sunday morning the condition of Mr. Ewell became so alarming to his roommate

that he came with Mr. Ewell to my residence and awakened me, the laboratory mate feeling he could not take the responsibility any longer. . . . It was 48 hours before he could sleep after he had taken these beans and after the excitement had gradually passed away. He was constantly talking and saying, “Oh, how beautiful; oh, how splendid; how magnificent.” I was particularly struck with this expression. I knew something of his views and that he was a great admirer of Robert G. Ingersoll.¹⁴ One of the things he said was, “Oh, I wish I could talk with Ingersoll just for a minute; I could convince him that there is a heaven. I see it. I see the angels in the streets of gold.” Of course, the heaven which he saw was the heaven that had been described to him (US, p. 52-53).

This religious conversion on the part of Ewell was only further reason for Wiley to conclude that peyote produced nothing but delusions. For despite what one might think of as Wiley’s conservative views on such subjects as 2% beer, he had himself long ago abandoned his early biblical fundamentalism to become a follower of the Darwinian agnostic Thomas Huxley and the positivist philosopher Auguste Comte. In his youth he once wrote a rather klutzy poem, “The Agnostic’s Creed” (Anderson, 1958, pp. 84-85), which includes such inept stanzas as these:

*There is no death, only atomic changing,
When life from one form to another passes,
And new life comes but from the rearranging
Of the old parts in new atomic masses.*

*And what is called the soul, the spark eternal,
Is nought but apt molecular conjunction,
The regal intellect, the genius supernal,
Is of the brain and nerves a simple function.*

¹³ For a truly ludicrous theory of alcohol inebriation spawned from the (sober!) brain of Wiley in support of continuing US prohibition, read his testimony before the New Jersey legislature (Wiley, 1920) in which he argues that one glass of beer is as toxic as a hundred because you cannot drink a hundred without drinking the first one—thus reversing a toxico-pharmacological insight as ancient as Paracelsus and probably inspiring the W. C. Fields film, *The Fatal Glass of Beer*.

¹⁴ Ingersoll was a celebrated freethinker whose speeches and writings eloquently ridiculed the contradictions and absurdities arising from a literal reading of the Bible. He was also a humane man of genuine compassion, espousing non-violence, emancipation, and women’s suffrage. His “infidel” views were in some ways more tolerated then than now; he was a close friend of President Garfield, often dining at the White House. Walt Whitman, Thomas Edison, Mark Twain, and others publicly subscribed to Ingersoll’s views. (Note that this is *not* clergyman George Goldthwait Ingersoll in whose honor the Harvard Divinity School’s annual prize lecture on the ‘Immortality of Man’ is given, recipients of which include William James in 1897 and Walter Pahnke in 1968.)

Wiley briefly expatiated in this vein as to the simple-mindedness of Ewell's and the Indians' notions of heaven, adding that Ewell was unable to sleep for 48 hours and that afterwards "he could not recall from memory these visions; they seemed to have escaped entirely from his memory and his mental vision." Mooney testified shortly after Wiley, and gives the following version of the events, some features of which seem clearly offered in quiet but obvious contradiction to Wiley's account:

Mr. Ewell on one occasion, without consulting others and without knowing anything of the Indian method of using the plant, tried it upon himself, the crude drug, I think. He told me about it when I saw him, I think, the next afternoon. He was then lying upon a lounge in his office, and when I came in he said to me, "I have been in heaven and I do not care whether I recover or not." Then he told me of his experiences. He lived on the upper portion of Fourteenth Street. It was November and cold weather for that season. He told me that without saying anything to outsiders—he may have told one or two, but in a general way it was not known that he was going to try it—he ate two that night. The Kiowa Indians who are accustomed to these things say you feel no effect until you have taken 10, but, of course, that depends somewhat upon the individual. I have frequently taken seven or eight, and that is about my limit, because then there comes a feeling of nausea. He took two. He may of taken a small fraction of another, but I think not, and instead of having his mind at ease and his body at ease also, as most people do when they take medicines, he lay down in bed for a little while; then he got up again about midnight and wrote out his will and then dressed himself, either before or after, I do not remember which, and went out upon the street to find a drug store and stay there, so that he might be safe in case anything happened. I forget who found him, but I think he met a policeman, who learned from him where his office was and brought him over there, as he did not wish to go to his home. Anyhow, instead of going to bed quietly or

even staying quietly in his room and trying to keep his mind at ease, he got all ready to die, if things happened that way, wrote out his will before going out upon the street . . . and was found there walking about by somebody else. It took a day or so for him to get over it at the Department of Agriculture. I saw and talked with him the same afternoon, within 24 hours of his taking it, and although he was rather excited, he knew what he was doing and could talk in a very interesting fashion of what had happened to him (US, p. 62).

Prentiss and Morgan's Clinical Studies

The planned clinical studies of peyote intoxication were finally carried out in Washington, D.C., under the supervision of physicians Daniel W. Prentiss and F. P. Morgan (P&M). The authors of this landmark work, which was the first to observe in a clinical setting the effects of whole peyote (or any hallucinogen whatever) on man, were respectively Professor of (P) and Assistant to the Chair of (M) *Materia Medica and Therapeutics*, at the Medical Department of Washington D.C.'s Columbian University (a school originally of Baptist affiliation which would be renamed George Washington University in 1904). The experiments used dried peyote buttons and usually took place at night, presumably in replication of the circumstances of the Amerindian religious ceremonies. The subjects were young male volunteers from the Washington, D.C. area. In their published report, Prentiss and Morgan (1895) record in some detail the results of six experiments (two of them on the same person) with doses ranging from 3.5 to 7 buttons.¹⁵

"It will be noticed," say P&M (pp 579-80), "in the following experiments that only three to seven of the buttons were necessary to produce a marked effect, whereas the Indians take ten or twelve at one ceremony. This difference in susceptibility is undoubtedly due to the tolerance for the drug which has arisen in the Indian as a result both of his own habitual use and of the hereditary influence received by him from his progenitors."

What is perhaps the most salient feature of this work is that the most profound experience is that of the first volunteer, it being the only one to approximate the lyrical description Mooney gave of how peyote affected him in an Amerindian religious ceremony. (Since this is a "chemist" taking peyote alone at his

¹⁵ They later (1896, p. 292) state that they conducted 8 such experiments, but only reported the results of six. Ewell's experiment may be one of the unreported ones.

home, one wonders if it was not Ewell getting back up on the horse which had thrown him.) As always, context and intent plays an enormous role. It is probably no coincidence that the first experiment was carried out *alone* with P&M not present. P&M apologize for this, commenting that “this experiment is of value only as showing the remarkable effect of the drug upon the brain, especially the centres of vision. No record of the effect upon the bodily functions was taken” (p. 580). But the constant physical interventions by P&M, trying to monitor pulse rate, pupillary dilatation, respiration, body temperature, and the like, may have significantly diminished the level of response on the part of the others. Only the most interesting features of these experiments are given here.

Experiment 1

(Chemist, 27 years old, 123 lbs, 5 ft 5 in tall)

The dose was a total of 4 and a half peyote buttons weighing in total about 14.5 g. The first three buttons were slowly chewed and swallowed between 9 and 11 p.m.

At 11 o'clock I retired to my room to prepare for bed. Before doing so, however, I noticed that on closing my eyes I could see all sorts of designs in brilliant and ever-changing colors. These visions were so pleasing that I at once decided to continue the experiment, and I placed the fourth and part of the fifth button in my mouth. Then followed a train of delightful visions such as no human being ever enjoyed under normal conditions. My mind was perfectly clear and active; the power to concentrate my thoughts upon any desired subject was only slightly lessened; seated at my desk, I could write of my sensations and experiences; stretched out upon the bed, with closed eyes, an ever-changing panorama of infinite beauty and grandeur, of infinite variety of color and form, hurried before me. By concentrating my thoughts upon various subjects successively, the nature of the visions could be determined and considerable control exercised over the time that they remained in view. Perhaps the most pleasing of all the visions of the night were brought to view by my voluntarily thinking intently of the production of Kiralfy's "America" as given two years ago. Indeed, during the passage of this and many other visions before my enraptured mental gaze, my pleasure so far passed the more ordinary realms of delight as to bring me to that high ecstatic state in which our exclamations of

enjoyment become involuntary. I truly thought that I had experienced great pleasure upon many previous occasions, but the experience of this night was one quite unique in this regard in the history of a lifetime. The tendency of every feature of the experience to prove a source of pleasure was quite remarkable. Efforts to fix the attention upon some subject which should give rise to unpleasant visions resulted in the appearance of myriads of horrible crawling monsters and seas of grewsome [sic] forms of human face and body which would cause the ordinarily sensitive human being to shudder. But under the influence of the mescal it merely added another item to the list of the inexpressible delights of my remarkable night's experience.

There was also a marked loss of conception of time and space. By about 4 a.m. the effects began to fade and had disappeared by evening the next day. There was some mild depression during the day and inability to sleep until 9 p.m.

Experiment 2

(Reporter, 24 years old, 158 lbs, 5 ft 11 in tall)

A total of 7 peyote buttons were consumed by this subject between 11:30 p.m. and 2:30 a.m., the buttons having been ground to a powder and taken in wafer-paper to minimize nausea. There was a "sedative effect on the muscular system . . . the subject feeling decidedly lazy and perfectly contented."

From 3 a.m. to 7 a.m. the subject reclined in his chair with no exhilaration but a tendency to reverie; there was a fine tremor in the extremities and a rumbling in the ears. He lost conception of time, the intervals between his words and sentences seeming inordinately long. His narration follows:

The first sensations that followed my taking the drug came upon thoughtlessly closing my eyes. Instantly there sprang into the field of view a host of little tubes of shining light, down which green and red balls the size of peas were constantly rolling. The tubes of light bent themselves into the shape of letters, but they would spell nothing, and, slowly curving themselves into grotesque shapes, began to revolve rapidly, the green and red balls going in the opposite direction and with even greater velocity. All the field of view between these silent wheels was filled in with a shifting mass of green. The colors were wonderful. They were the colors of the

spectrum intensified as though bathed in the fiercest sunlight. No words can give an idea of their intensity or of their ceaseless, persistent motion. The figures constantly changed in form and color, but always remained a series of fantastic curves, revolving rapidly back and forth upon their own axis. The forms changed through rich arabesques, Syrian carpet patterns, and plain geometric figures, and with each new form came a new flush of color, every shade appearing, from pure white to deepest purple. When the eyes opened and the light was turned up, the visions faded like stars going out in daylight, and the room, tables, chairs, and all surroundings came back into real existence and within reach of the hands.

The subject experienced these visions during intermittent periods during which he seemed at a loss for words and “seemed to have a double personality,—to be outside of himself looking at himself.” During these times he felt “great distrust and resentment . . . towards those who were making the experiment with him. He realized his ‘mental inferiority,’ and firmly believed that we were secretly laughing at his condition. He believed that we intended to kill him, and for this reason he refused to take the eighth button at 3:30 a.m.” Between these periods he had no such paranoid feelings and even apologized for having felt them. By 7 a.m. the symptoms began to diminish, being completely gone by 7 p.m. the next day. During the day there was some problem with vision, headache, a sense of dual personality, and some recurrence of the visions but he managed to do a day’s work.

Experiment 3

The same subject repeated the experiment with only 3.5 buttons and had a very diminished experience with faint visions, no paranoid ideation, and an ability to work the next day with “extraordinary facility,” to the extent that he described it as a “remarkable brain stimulant.” (M&P do not state how long an interval took place between these two experiments on the same subject; in light of later knowledge of the effects of mescaline, it is possible that a significant tolerance from the first experiment was still in place.)

The next two experiments were conducted simultaneously, giving the same amount of peyote to each volunteer at the same time; P&M note how different the effects of this drug can be in different subjects, even when given at the same dosage under identical circumstances.

Experiment 4

(Student, 26 years old, 6 ft. 2.5 in 158 lbs.)

Between 6 and 10:30 p.m. 3.5 buttons were slowly chewed and swallowed.

The pupil became dilated after the third button and remained so until evening of the following day. A fine tremor of the extremities was noted at 11 p.m. A feeling of perfect comfort and satisfaction appeared after the second button at 9 p.m. This feeling accompanied by disinclination to make any muscular effort, and the effect deepened into a most marked depression of the muscular system at about 11 p.m., which became the most prominent feature of the experiment. He became unable to walk without assistance, and could with difficulty maintain himself in the sitting posture. All of his voluntary muscles took part in this depression, and were limp and flaccid. He did not move his lips in talking, and at times was unable to speak above a whisper. Like the subject of Experiment II, he “lapsed away” into paroxysms, at which times the depression was greater and the visions and all other symptoms more intense. In the intervals between them he was more nearly himself. These paroxysms could be precipitated at any time by turning the light low.

Loss of conception of time was a marked feature of the experiment. All objects also seemed small and removed to a great distance, so that he needed assistance to bring a glass of water to his lips.

Visions appeared upon closing his eyes at about the time of commencement of the depression, and lasted until about 3 a.m., when they began to diminish in intensity, and finally disappeared at 1 p.m. on the following day. The visions were not brilliant displays of color, but the appearance in rapid succession of variously colored familiar objects, like barrels, pumps, etc., and he expressed no admiration for them. The visions were subject to suggestion. Upon being asked if he did not see this or that object, it immediately appeared before his imagination. Thus, having suggested a Sunday-school, he described accurately the scholars, the movements of the leader, the song they were singing, and even sang the song with them before us. He fully realized that the vision was an effect of the drug and not a reality.

His intellect was fairly clear, there being only slight slowness and confusion of thought at times. He had a sense of mental inferiority, and also felt that he was sinking all the time, and that his life was leaving him, and expressed anxiety as to his condition.

The subject of Experiment 4 was unable to sleep during the day following and experienced headache and weariness that lasted for three days, being on the second day so severe he was unable to attend to his work.

Experiment 5

(Clerk, 21 years old, 5 ft. 10 in., 148 lbs.)

Between 6 and 10:30 p.m. he took 3.5 buttons, each being slowly chewed and swallowed:

After the second button, the subject reclined lazily in his chair, perfectly contented, and unwilling to make any muscular effort. The effect upon the brain showed itself in this case not in the production of visions,—only a few visions of color being seen,—but in a remarkable mental exhilaration and stimulation, which lasted until 9 a.m. He was perfectly happy and experienced a sense of superiority and well-being. He wrote continuously an account of his sensations, but experienced difficulty in writing down his thoughts, so fast did they follow one another. He lost all conception of time. . . . Sleep was found impossible the next day.

Experiment 6

(Chemist, 29 years old, 5 ft. 10 in., 155 lbs.)

Between 10 a.m. and 1 p.m. four buttons were taken, weighing, in all, 11.52 g.

Visions appeared upon closing the eyes at 1:30 p.m. in the form of tapestry designs in black and white. From this time until 3 a.m. on the following morning, whenever the eyes were closed, a panorama of beautifully colored objects, designs, scenes, dances, marches, etc., passed continually before his imagination. The visions were at times under the control of the will. The effect of music upon them was noted, and it was found to have no effect, except so far as the regular marking of the time was concerned. He preferred drumming to regular time upon a table to the music of a piano. The effect of this was to make the men, women, and objects dance, or otherwise keep perfect time to the drumming, and greatly intensified the pleasant

effect of the drug. It will be remembered that a constant beating upon drums is a regular part of the taking of the mescal buttons by the Indians. His reason and will were absolutely unaffected.

Drs. Mitchell and Eshner

Dr. S. Weir Mitchell (1828-1914) was among the preeminent physicians of his day, the recipient of numerous honors and awards. A trustee of the University of Pennsylvania and the Carnegie Institution of Washington, he became the first president of the Congress of American Physicians and Surgeons, and was reelected to this position many times. He was considered by such famous physicians as Sir William Osler, William Keen, and Harvey Cushing as something close to genius for his unusual ability to conduct exacting scientific research on such topics as snake-venoms and the neurological consequences of gunshot wounds while also writing numerous novels and poems which were widely respected by first-rank critics such as George Meredith and William Dean Howells (Earnest, 1950).

His reputation in both fields is considerably less lustrous now than it was in his lifetime. In particular, he has become a *bête noire* among feminist scholars because of the “Weir Mitchell Rest Cure,” a treatment recommended for such syndromes then diagnosed as neurasthenia, melancholy, or hysteria. We would nowadays probably describe most of the patients given the Rest Cure as suffering from mild to clinical depression with suicidal ideation; however, some of those treated were floridly psychotic with frank hallucinations. The Cure was based on Mitchell’s theory that nervous disorders were often caused by anemia, and he therefore required the patient to eat large meals of bland fattening food and whole milk while avoiding any mental excitement by remaining isolated for weeks or months in a darkened room attended only by a nurse and the physician. The Cure was outlined in his book, *Fat and Blood: An Essay on the Treatment of Certain Forms of Neurasthenia and Hysteria*. Strange as it may seem, the procedure was honored throughout the United States and Europe, and advocated by such luminaries as Sigmund Freud in Austria and Jean Charcot in France.

Most of the patients given the Rest Cure were women, and this was consistent with Mitchell’s compassionate but condescending view of the sex so typical of most physicians of his day. In addressing Radcliffe’s student body in 1890, he expressed his view that women in general often collapsed under the strain that higher education imposed on their physical and emotional state: “I no more want [women] to be

preachers, lawyers, or platform orators, than I want men to be seamstresses or nurses of children.” Mitchell believed that women attempting arduous intellectual efforts were risking nervous breakdown or insanity, and talented intellectuals like Charlotte Perkins Gilman and Virginia Woolf naturally reacted to imposed Rest Cures with anger and loathing (Banks, 1998).

However, despite these blemishes, Mitchell must be given his due as a courageous investigator of psychotropic drugs—courageous because his studies went beyond observation to include experiments on himself. He acknowledged a brief period during which he developed a fascination with self-injected morphine because it produced “an endless succession of visions, which he did not forget, as one does common dreams.” He wrote to Brander Matthews, a professor of drama at Columbia University, who had become acquainted with hashish use among the literati of France, and asked him for “a good lot of the hasheesh they smoke and that they eat . . . also a pipe” (Earnest, pp. 154-155).

As noted above, Powell and Mooney sent Mitchell some peyote in late 1894 or early 1895. Apparently Mitchell did nothing with it until he read the September 1895 issue of the *Therapeutic Gazette* describing the dramatic visual alterations experienced by Prentiss and Morgan’s subjects after taking 3.5-7 peyote buttons. Sometime after this he made an alcoholic extract of the buttons such that each fluid dram (or *drachm* = 1/8 oz.) corresponded to one peyote button, and on May 24, 1896, while engaged in his ordinary medical rounds, he took a number of doses of the extract. In December of the same year the *British Medical Journal* published Mitchell’s astonishingly vivid depiction of the effects he experienced from taking what eventually was a total of slightly more than 6.5 drams of the extract:

At 12 noon of a busy morning I took fully 1½ drachm of an extract of which each drachm represented one mescal button. I had in a half-hour a sense of great gastric discomfort, and later of distension. At 1 p.m. I took a little over a drachm. Between 2 and 3 p.m. I noted my face as flushed; the pupils were dilated midway, the pulse 80 and strong. I had a light sense of exhilaration, a tendency to talk, and now and then I misplaced a word. The knee-jerk and station were normal. Between 2 and 4 o’clock I had outside of my house two consultations, and saw several patients. I observed that with a pleasing sense of languor there was an unusual amount of physical endurance. I went rather quietly, taking two stairs at a time

and without pause, to the fourth storey of an hotel, and did not feel oppressed or short of breath. This is akin to the experience, as I learn, of the mescal-eating Indians, and to that of many white men.

Meanwhile my stomach was more uncomfortable, and I saw the first evidence of any change in my colour records. On closing my eyes (while in my carriage), I held longer than usual any bright object just seen. As to this, however, I am not as sure as I am concerning the later phenomena. About 4:10 p.m. I drove home, and after taking half an ounce of extract [0.5 oz = 4 drachms] in three doses I lay on a lounge and read, becoming steadily more conscious, at first of a left frontal pain (not severe) and soon after of a dull occipital ache felt on both sides and at or about the occipital bosses. Yawning at times, sleepy, deliciously at languid ease, I was clearly in “the land where it is always afternoon.” At 4:30 p.m., rising to make notes, I became aware that a transparent, violet haze was about my pen point, a tint so delicate as at times to seem doubtfully existent.

At this stage of the mescal intoxication I had a certain sense of the things about me as having a more positive existence than usual. It is not easy to define what I mean, and at the time I searched my vocabulary for phrase or word which should fitly state my feeling. It was in vain.

At this time, also, I had a decisive impression that I was more competent in mind than in my everyday moods. I seemed to be sure of victoriously dealing with problems. This state of mind may be easily matched in the condition of some men when pretty far gone in alcohol intoxication. My own mood was gently flattering—a mere consciousness of power, with meanwhile absolute control of every faculty. I wrote a long letter of advice dealing with a rather doubtful diagnosis, and on reading it over was able to see that it was neither better nor worse than my average letter. Yet the sense of increased ability was so notable that, liking to test it, and with common-sense disbelief in its flattery, I took up a certain paper on psychology, which a week before I had laid down in despair. I grieve to say that it was less to be comprehended than ever. My ignorance would have remained bliss

had I not made the experiment. I next tried to do a complicated sum, but soon discovered that my ordinary inefficiency as to figures was not really increased.

A mood is like a climate and cannot be reasoned with. I continued to have for some two hours this elated sense of superiority. I was for this while in that condition in which some people permanently abide.

The further test of writing a few lines of verse was tried. I found there was much effort needed. I lay down again about 5:20, observing that the outer space field seemed to be smoky. Just at this time, my eyes being closed, I began to see tiny points of light, like stars or fire flies, which came and went in a moment. My palms were now tingling, my face a little flushed. About 5:40 the star points became many, and then I began to observe something like fragments of stained glass windows. The glass was not very brilliant, but the setting, which was irregular in form, seemed to be made of incessantly flowing sparkles of pale silver now going here, now there, to and fro, like, as I thought, the inexplicable rush and stay and reflux of the circulation seen through a lens. These window patterns were like fragments coming into view and fading.

Hoping for still better things in the way of colour, I went upstairs lay down in a darkened room and waited. In a few minutes the silver stars were seen again, and later I found that these always preceded any other more remarkable visions.

The display which for an enchanted two hours followed was such as I find it hopeless to describe in language which shall convey to others the beauty and splendour of what I saw. I shall limit myself to a statement of a certain number of the more definite visions thus projected on the screen of consciousness.

During these two hours I was generally wide awake. I was comfortable, save as to certain gastric conditions, which were not so severe as to distract attention. Time passed with little sense for me of its passage. I was critically attentive, watchful, interested, and curious, making all the time mental notes for future use.

Especially at the close of my experience I must, I think, have been for a while in the peculiar interval between the waking state

and that of sleep—the “*praedormitum*”—the time when we are apt to dream half-controlled stories; but as to this I am not very sure. As a rule, I was on guard with every power of observation and reflection in full activity.

My first vivid show of mescal colour effects came quickly. I saw the stars, and then, of a sudden, here and there delicate floating films of colour—usually delightful neutral purples and pinks. These came and went—now here, now there. Then an abrupt rush of countless points of white light swept across the field of view, as if the unseen millions of the Milky Way were to flow a sparkling river before the eye. In a minute this was over and the field was dark. Then I began to see zigzag lines of very bright colours, like those seen in some megrims. I tried to fix the place and relation of these tints, but the changes were such as to baffle me. One was an arch of angled lines of red and green, but of what else I could not determine. It was in rapid, what I may call minute, motion.

The tints of intense green and red shifted and altered, and soon were seen no more. Here, again, was the wonderful loveliness of swelling clouds of more vivid colours gone before I could name them, and, sometimes rising from the lower field, and very swiftly altering in colour tones from pale purples and rose to greys, with now and then a bar of level green or orange intense as lightning and as momentary.

When I opened my eyes all was gone at once. Closing them I began after a long interval to see for the first time definite objects associated with colours. The stars sparkled, and passed away. A white spear of grey stone grew up to huge height, and became a tall, richly finished Gothic tower of very elaborate and definite design, with many rather worn statues standing in the doorways or on stone brackets. As I gazed every projecting angle, cornice, and even the face of the stones at their joinings were by degrees covered or hung with clusters of what seemed to be huge precious stones, but uncut, some being more like masses of transparent fruit. These were green, purple, red, and orange; never clear yellow and never blue. All seemed to possess an interior light, and, to give the faintest idea of the

perfectly satisfying intensity and purity of these gorgeous colour-fruits is quite beyond my power. All the colours I have ever beheld are dull as compared to these.

As I looked, and it lasted long, the tower became of a fine mouse hue, a everywhere the vast pendant masses of emerald green, ruby reds, and orange began to drip a slow rain of colours. All this while nothing was at rest a moment. The balls of colour moved tremulously. The tints became dull, and then, at once, past belief vivid; the architectural lines were all active with shifting tints. The figures moving shook the long hanging lines of living light, and then, in an instant, all was dark.

After an endless display of less beautiful marvels I saw that which deeply impressed me. An edge of a huge cliff seem [sic] to project over a gulf of unseen depth. My viewless enchanter set on the brink a huge bird claw of stone. Above, from the stem or leg, hung a fragment of some stuff. This began to unroll and float out to a distance which seemed to me to represent Time as well as immensity of Space. Here were miles of rippled purples, half transparent, and of ineffable beauty. Now and then soft golden clouds floated from these folds, or a great shimmer went over the whole of the rolling purples, and things, like green birds, fell from it, fluttering down into the gulf below. Next, I saw clusters of stones hanging in masses from the claw toes, as it seemed to me miles of them, down far below into the underworld of the black gulf.

This was the most distinct of my visions. Incautiously I opened my eyes and it was gone. A little later I saw interlaced and numberless hoops in the air all spinning swiftly and all loaded with threaded jewels or with masses of colour in long ropes of clustered balls. I began to wonder why I saw no opals, and some minutes after each of these circles, which looked like a boy's hoop, became huge opals; if I should say fluid opals it would best describe what was however like nothing earthly.

I set myself later to seeing if I could conjure figures, for so far I had seen nothing human in form, nor any which seemed alive. I had no luck at this, but a long while after I saw what seemed a shop with apothecaries' bottles, but of such splendour [of?] green,

red, purple, as are not outside of the pharmacies of fairy land.

On the left wall was pinned by the tail a brown worm of perhaps a hundred feet long. It was slowly rotating, like a catherine wheel [pinwheel], nor did it seem loathly. As it turned, long green and red tentacles fell this way and that. On a bench near by two little dwarfs, made, it seemed, of leather, were blowing through long glass pipes of green tint, which seemed to me to be alive, so intensely, vitally green were they. But it were vain to find in words what will describe these colours. Either they seemed strangely solid, or to possess vitality. They still linger visibly in my memory, and left the feeling that I had seen among them colours unknown to my experience.

Their variety and strange juxtapositions were indeed fascinating for one to whom colour is more than it is to most men; nor is it possible to describe the hundredth of what I saw. I was at last conscious of the fact that at moments I was almost asleep, and then wide awake. In one of these magic moments I saw my last vision and the strangest. I heard what appeared to be approaching rhythmical sounds, and then saw a beach, which, I knew to be that of Newport. On this, with a great noise, which lasted but a moment, rolled in out of darkness wave on wave. These as they came, were liquid splendours huge and threatening, of wonderfully pure green, or red or deep purple, once only deep orange and with no trace of foam. These water hills of colour broke on the beach with myriads of lights of the same tint as the wave. This lasted some time, and while, it did so I got back to more distinct consciousness, and wished the beautiful terror of these huge mounds of colour would continue.

A knock at my door caused me to open my eyes, and I lost whatever of wonder might have come after. After dinner I ceased to be able to see any further display of interest. Now and then a purple or pink fragment appeared, but that was all. For a day after I noted the fact that my visions could be easily recalled by a memorial effort, but with less and less sharpness.

These shows are expensive. For two days I had headache and for one day a smart attack of gastric distress. This came after the first dose, and was most uncomfortable. The

experience, however, was worth one such headache and indigestion, but was not worth a second.

Dr. Prentiss and others describe mescal as causing insomnia. My first experience with the tincture was made early in the morning. I became deeply flushed by noon, but had no visions. I felt drowsy and slept very well the following night. The extract used, as stated, did make me sleepless up to 4 a.m., but neither restless nor uneasy. . . .

For the psychologist this agent should have value. To be able with a whole mind to experiment mentally upon such phenomena as I have described is an unusual privilege. Here is unlocked a storehouse of glorified memorial treasures of one kind. There may be a drug which shall so release a mob of verbal memories, or of musical records, or, in fact, of tastes and odours. I naturally speak of things seen under mescal influence as glorified memories—certainly nothing soon in these visions was altogether outside of my known experiences—but everything was expressive—forms were gigantic—colours marvellously intermingled. In fact, nothing was simply the vision of a thing remembered and recognised except the familiar Newport Beach.

I see no obvious therapeutic uses for mescal in massive doses. It is yet to be tested by continuous employment in moderate amounts, and may be of value.

I sought so to limit the influence of mescal as to remain in full possession of all my faculties. The larger doses secure, as Dr. Prentiss has shown, more remarkable results, but may lessen the power to observe and to comment. I should dread a little lest excessive amounts might leave too permanent effects. In fact, I constantly carried for days a quite vivid image of one of these jewel clusters, seeing it mentally whenever my mind was turned upon the subject of my visions.

Mitchell makes as well some interesting comparisons of his peyote visions with the intense visual auras and even full-formed eyes-open pseudohallucinations experienced by a former patient of his who suffered from severe migraine headaches. He concludes the story of his own experiences with a warning and some suggestions for further experimentation:

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

Were I to take mescal again I should dictate to a stenographer all that I saw and in due order. No one can hope to remember for later record so wild a sequence of colour and of forms.

But since to talk does not disturb these visions, a perfect account might easily be given. No one has told us what visions come to the Red man. I should like to know if those of the navy [laborer] would be like those of the artist, and above all, what those born blind could relate; and, too, such as are born colour blind. (Mitchell, 1896).

The First “Bicycle-Day”—May 30, 1896

Finally, Mitchell appends a report from one of his colleagues, a Dr. Eshner of the staff of Washington’s Infirmary for Nervous Disease. Eshner describes what he experienced when he took a total of 3.66 fluid drachms (equal to 3.66 peyote buttons) on Memorial Day of 1896, just a few days after Mitchell’s experiment:

I found I could not keep at serious work; I felt some distraction, and lacked my usual mental concentration. I soon began to feel badly, lapsing into a condition of general *malaise*, with not a little prostration, and had to give up any attempt at work, however small. I found some comfort in lying down, and when my eyes closed I became conscious of a series of visual impressions, in most of which colour sensations were present. The pictures were characteristically kaleidoscopic, particularly as regards uniformity of arrangement. They changed frequently at times, like lantern pictures on a screen. The designs were Various; some were Oriental, with stars and crescents, and points of light interspersed; others were mosaic in arrangement; some were screen-like; some, fern-like; some showed chased figures. Neither the images nor the light were very vivid, although as a rule quite distinct. The intensity at times appeared related to the vigour with which the eyes were closed.

At about 6.30 p.m. I arose and attempted to eat a little, but failed. Nausea was quite pronounced, and there was total loss of appetite. At no time did vomiting occur.

I then lay down for half or three-quarters of an hour, and the visions were repeated. I had intended going out in the evening, and, in the hope of gaining relief, I equipped myself for a bicycle ride, and started off, despite my langour and general depression. I made my way to the Park without the slightest difficulty, and at Girard Bridge met and spoke to an acquaintance, stopped under the bridge to view the Memorial Day illumination, and went on.

I rode in all about eight miles, going down a fairly steep declivity with ease, and descending a longer and perhaps steeper declivity with almost equal ease. I perspired en route, not unduly, but perceptibly. I felt that my pupils must be dilated from the brilliancy of the light, with prismatic radiations and the large amount that entered my eyes. I think ocular accommodation may also have been affected, although the visual langour may have been only a part of the general langour. Vision seemed not alert. I was in a state of placid indifference, free from enthusiasm, free from aspiration, without spontaneity. I imagine there was a little dryness of the secretions of the mouth and throat, because my voice appeared a little deeper and fuller than usual.

I was scarcely conscious of ordinary movement, and felt as though I could scarcely make any extraordinary movement, although I was conscious of the necessity of making the effort, and of the increased exertion necessary in mounting the hill of which I have spoken. In general, however, I seemed to go on by virtue of my own momentum. In a figurative way, I felt as if I were of the same density as the medium in which I floated, so that I would yield to slight external physical impulses. The feeling is one that I can best describe as muscular or motor anaesthesia. I was a little indifferent as to how I rode, yet not careless nor without a sense of responsibility, but I made little effort to avoid the rougher places, and appreciated very little jolting. I sustained my equilibrium perfectly, and was not compelled to dismount other than intentionally.

I rode slowly down Broad Street by the side of a four-in-hand and listened with enjoyment to the strains of the trumpeter. I met a little messenger boy on a bicycle who made a ludicrous impression on me, and whom at his request I

helped to a match without dismounting.

I reached home about half-past nine, and called at the house of Dr. S. Weir Mitchell, and in his absence left a note for him. I was more fortunate in finding Dr. J. K. Mitchell at home, who noticed the deepening in my voice, dilatation of the pupils, some injection of the eyes, a little flushing of the face, increased knee-jerks and active muscle-jerks, a heart beat of 72, and, as he thought, some evident effort in speech.

My own feeling was one of partial release of inhibition, of relaxation of restraint and of repression. The state was not a pleasurable, but rather a helpless one. I could write freely and with ease about what I had passed through and was passing through, and experienced a certain freedom and fluency of expression.

I sat up and read from about ten until half-past twelve, the visions returning whenever I closed my eyes. Now I was again able to see all sorts of new designs, fresco work, porcelain decorations, tapestry figures, intricate laces, parquetry, diagrams, various kinds of scroll work, etc.

I endeavoured to picture an American flag but only partially succeeded after I had retired, and then my flag was furled. I saw coats of arms and shields and the like. All colours were represented. I looked especially for blue, as Dr. Mitchell had told me that he had seen all colours but blue, and I was successful. At one time I saw various shadows of green, and at another especially purples, violets, lilacs, etc. In none of the images were people or animals or other objects than designs represented.

As I read I was easily pleased. At this time I experienced a sense of nausea, with a suggestion of burning and weight in the umbilical region; but this was gone by the following morning.

Before going to bed I partook of a sandwich and some milk. I found the sense of taste benumbed. I was not able to fall asleep for some time. My sense of hearing seemed to be more receptive, but less acute. The condition might be described as an impairment of the auditory accommodation comparable to the corresponding ocular state. My breathing failed specially to attract my attention, but seemed shallow. I was conscious of pain on being pinched.

The night was a restless one, with some snatches of sleep of varying length, but I arose with ease at the usual hour, feeling not much the worse for my late experiences, and not at all sleepy. There remained a sense of fulness in

the head, but no other reminder. I partook of my usual breakfast with ordinary relish. The preparation had a disagreeable nauseous taste, with suggestion of pungency (Mitchell, 1896).

Although he had predicted “a perilous reign of the mescal habit,” seven years later, in a series of letters to written to Mooney in 1903, Mitchell reacted with dismay to the news of efforts to ban peyote in Oklahoma and elsewhere:

I write now principally to thank you and to express my amazement at the action of the Legislative Association of Oklahoma. I can see how it may open the way to much cruelty and injustice. . . .

As far as I remember, I took the substance of nine buttons, and had an afternoon and evening in fairyland. . . . I wish you would tell me where I can find the law forbidding its use in the United States under penalties. It is really a rather harmless drug as compared with most of the others which men use, and I think such a law quite ridiculous.

Shortly after his visit to “fairyland” in 1896, Mitchell sent some of the peyote buttons to William James at Harvard, whom he deeply admired and with whom he had an on-again off-again friendship of many years—frequently marred by such incidents as Mitchell’s impatiently declaring to James after a spiritualist seance they had attended together that it was nothing but “inconceivable twaddle” (Earnest, p. 155).

James promptly sampled the buttons while alone on June 8th at the family’s Chocorua cottage. Perhaps the buttons had begun to rot or were contaminated with some bacteria—in any case, the results were entirely different from those produced by Mitchell’s extract. On 11 June 1896, William wrote to his brother Henry (addressed jovially as “Dear Heinrich”) in Europe: “I took one bud 3 days ago, vomited and spattered for 24 hours and had no other symptom whatever except that and the Katzenjammer the following day. I will take the visions on trust” (James 1993, p. 403).

This must sadly rank as one of the greatest lost opportunities in entheogenic history. For as is well known, William James wrote extensively of his response to nitrous oxide, at one time saying that an “intense metaphysical illumination . . . [and] immense emotional sense of *reconciliation* . . . a thousand-fold enhanced, was the direct effect upon me of the gas.” He says he tried nitrous oxide a number of times, always with the same result, after reading (at no stated

date) a pamphlet called *The Anaesthetic Revelation and the Gist of Philosophy* by Benjamin Blood. The first time James wrote of his nitrous oxide experiences seems to be in a footnote appended to an 1897 reprint of *The Will to Believe*. A lengthy discussion showing James took these experiences very seriously occurs in his most famous work, *The Varieties of Religious Experience* (James, 1990, pp. 349-354), which James wrote in 1902 after giving the Gifford Lectures the year before. James’s abortive trial of peyote probably occurred after his experiences with nitrous oxide, and it is tempting to speculate that he would have given peyote a second chance were it not for his somewhat diminished opinion of Mitchell and the fact that the effects of peyote were described by Mitchell as being essentially limited to the visual rather than any more profound psychological sphere.

One Painter, Two Poets, and a Sexologist

Henry Havelock Ellis (1859-1939) was a personality somewhat like Weir Mitchell in that he displayed a passionate talent and commitment to both literature and science. While he earned a nominal M.D. in 1889 from Britain’s second-rank Society of Apothecaries, he never practiced medicine. During the eight long years he spent in the somewhat lukewarm pursuit of this degree, he created the *Mermaid* series—unexpurgated scholarly reprints of the best plays by Shakespeare’s contemporaries, many of whom had been hitherto unknown or inaccessible. By dint of his energy, enthusiasm, and obvious talent, he was able to enlist as editors for this series some of the best literary critics of the day. A little later, he inaugurated a similar series, *Contemporary Science*, in which first-rank scientists explained their fields to the audience of intelligent laypersons.

But his real life’s work resulted from his determination to candidly investigate in an objective scientific manner that great arena of Victorian taboo, sex. This resulted in a series of six volumes, *Studies in the Psychology of Sex*, which appeared from 1897—the year of Ellis’s peyote experiment—to 1910. Fearing the likelihood of censorship in Britain, Ellis published the first volume of the series, *Sexual Inversion* (written in part in collaboration with the homosexual poet John Symonds) in Germany, in translation.

As Goldberg states, “the sober, scientific reception of the book by the German authorities provides an amusing contrast with the violent hubbub created by the late-Victorian Puritans of Ellis’s native land” (Goldberg, 1926, p. 195). The remaining volumes were published in America and received a warm reception. Of course copies made their way back to England, and promptly brought on a lawsuit in 1898 by the Crown

against a London anarchist bookseller, Bedborough, who dared to stock it. Bedborough pled guilty and went to prison while Ellis briefly fled the country. A large number of scholars and writers rallied to Ellis's cause, and he was soon able to return. On completing the last volume, Ellis wrote in his diary "The work that I was born to do is done."

Unlike his contemporary, Sigmund Freud, Ellis himself had anything but a typical bourgeois marriage. By mutual consent, Ellis and his wife, Edith Lees, established from the outset what we might nowadays describe as an "open" relationship. Lees was an avowed lesbian who had a number of lengthy relationships with other women; on the other hand, throughout their apparently happy and loving marriage, Ellis maintained a simultaneous and passionate love for a well-known woman writer of the day, Olive Schreiner. His autobiography, written after his wife's death, discusses all of this with simple and quiet candor (Ellis, 1939).

In early 1897, Ellis came across Mitchell's report in the *British Medical Journal* and was intrigued by the dramatic visual experiences the Philadelphia doctor and poet so vividly reported. Doubtless Ellis was more interested than most readers because of his long familiarity with the use of hashish and opium as a stimulant to the imagination, customs he had learned of from many of the French literati he had visited in Paris as well as from his London friends in the literary avant-garde (widely described as the "decadent" movement), especially the members of the Cabbalistic group which called itself the Hermetic Order of the Golden Dawn (later the Rhymers' Club) and included Earnest Dowson, William Butler Yeats, Aleister Crowley, Allan Bennett, Arthur Symons and John Symonds. Ellis found he could purchase "mescal" buttons at a London apothecary, Potter and Clarke (Ellis 1897b), and decided to spend Good Friday alone in his rooms observing its effects.

Ellis described his peyote experiences in four publications. The first was a brief article in *The Lancet* in June of 1897; it focused primarily on the physiological effects of peyote and only briefly summarized the visual and psychological effects (Ellis, 1897a). However, this article was read by Heffter in Germany and formed part of the basis of his own estimation of how much peyote/mescaline he should attempt in his own famous self-experiments reported the following year. A second publication by Ellis in

the January 1898 issue of London's *Contemporary Review* left out the physiological effects and presented an extensive description of the "visions." This second article was reprinted the same year with minor spelling changes in the *Annual Report* of the Smithsonian Institution. A third account in the May 1902 issue of *Popular Science Monthly* is the most extensive of all, and contains a verbatim transcript of the exact notes Ellis made during his first peyote experiment accompanied by an account of the effects of a large dose of peyote on an unnamed Scottish art student under the guidance of one of Ellis's friends. The following account of Ellis's original exploration is taken from the Smithsonian version:

On Good Friday [16 April 1897] I found myself entirely alone in the quiet rooms in the Temple which I occupy when in London, and judged the occasion a fitting one for a personal experiment. I made a decoction (a different method from that adopted in America)¹⁶ of three buttons, the full physiological dose, and drank this at intervals between. 2.30 and 4.30 p.m.

The first symptom observed during the afternoon was a certain consciousness of energy and intellectual power. This passed off, and about an hour after the final dose I felt faint and unsteady; the pulse, was low, and I found it pleasanter to lie down. I was still able to read, and I noticed that a pale violet shadow floated over the page around the point at which my eyes were fixed.

I had already noticed that objects not in the direct line of vision, such as my hands holding the book, showed a tendency to look obtrusive, heightened in color, almost monstrous, while, on closing my eyes, afterimages were vivid and prolonged. The appearance of visions with closed eyes was very gradual. At first there was merely a vague play of light and shade which suggested pictures, but never made them.

Then the pictures became more definite, but too confused and crowded to be described, beyond saying that they were of the same character as the images of the

¹⁶ Ellis says "I first cut up the buttons into small fragments and I poured on boiling water twice; a single infusion, as I have since found in the case of other persons, is inactive" (1897a, p. 1541). Such a procedure would produce a tea which would certainly contain mescaline, hordenine, anhalamine, anhalonidine, and probably pelotone, which are all reasonably soluble in cold water. The other alkaloids would probably be present also as a colloidal dispersion.

kaleidoscope, symmetrical groupings of spiked objects. Then, in the course of the evening, they became distinct, but still indescribable—mostly a vast field of golden jewels, studded with red and green stones, ever changing.

This moment was, perhaps, the most delightful of the experience, for at the same time the air around me seemed to be flushed with vague perfume—producing with the visions a delicious effect—and all discomfort had vanished, except a slight faintness and tremor of the hands, which, later on, made it almost impossible to guide a pen as I made notes of the experiment; it was, however, with an effort, always possible to write with a pencil. The visions never resembled familiar objects; they were extremely definite, but yet always novel; they were constantly approaching, and yet constantly eluding, the semblance of known things.

I would see thick, glorious fields of jewels, solitary or clustered, sometimes brilliant and sparkling, sometimes with a dull rich glow. Then they would spring up into flowerlike shapes beneath my gaze, and then seem to turn into gorgeous butterfly forms or endless folds of glistening, iridescent, fibrous wings of wonderful insects; while sometimes I seemed to be gazing into a vast hollow revolving vessel, on whose polished concave mother-of-pearl surface the hues were swiftly changing. I was surprised, not only by the enormous profusion of the imagery presented to my gaze, but still more by its variety.

Perpetually some totally new kind of effect would appear in the field of vision; sometimes there was swift movement, sometimes dull, somber richness of color, sometimes glitter and sparkle, once a startling rain of gold, which seemed to approach me.

Most usually there was a combination of rich, sober color, with jewel-like points of brilliant hue. Every color and tone conceivable to me appeared at some time or another. Sometimes all the different varieties of one color, as of red, with scarlets, crimsons, pinks, would spring up together, or in quick succession. But in spite of this immense profusion, there was always a certain parsimony and aesthetic value in the colors presented.

They were usually associated with form, and never appeared in large masses, or if so,

the tone was very delicate. I was further impressed, not only by the brilliance, delicacy, and variety of the colors, but even more by their lovely and various textures—fibrous, woven, polished, glowing, dull, veined, semitransparent—the glowing effects, as of jewels, and the fibrous, as of insects' wings, being perhaps the most prevalent. Although the effects were novel, it frequently happened, as I have already mentioned, that they vaguely recalled known objects.

Thus, once the objects presented to me seemed to be made of exquisite porcelain, again they were like elaborate sweetmeats, again of a somewhat Maori style of architecture; and the background of the pictures frequently recalled, both in form and tone, the delicate architectural effects as of lace carved in wood, which we associate with the mouchrabieh work of Cairo. But always the visions grew and changed without any reference to the characteristics of those real objects of which they vaguely reminded me, and when I tried to influence their course it was with very little success.

On the whole, I should say that the images were most usually what might be called living arabesques. There was often a certain incomplete tendency to symmetry, as though the underlying mechanism was associated with a large number of polished facets. The same image was in this way frequently repeated over a large part of the field; but this refers more to form than to color, in respect to which there would still be all sorts of delightful varieties, so that if, with a certain uniformity, jewel-like flowers were springing up and expanding all over the field of vision, they would still show every variety of delicate tone and tint.

Weir Mitchell found that he could only see the visions with closed eyes and in a perfectly dark room. I could see them in the dark with almost equal facility, though they were not of equal brilliancy, when my eyes were wide open. I saw them best, however, when my eyes were closed, in a room lighted only by flickering firelight. This evidently accords with the experience of the Indians, who keep a fire burning brightly throughout their mescal rites.

The visions continued with undiminished brilliance for many hours, and as I felt somewhat faint and muscularly weak, I went

to bed, as I undressed being greatly impressed by the red, scaly, bronzed, and pigmented appearance of my limbs whenever I was not directly gazing at them.

I had not the faintest desire for sleep; there was a general hyperaesthesia of all the senses as well as muscular irritability, and every slightest sound seemed magnified to startling dimensions. I may also have been kept awake by a vague alarm at the novelty of my condition, and the possibility of further developments.

After watching the visions in the dark for some hours I became a little tired of them and turned on the gas. Then I found that I was able to study a new series of visual phenomena, to which previous observers had made no reference. The gas jet (an ordinary flickering burner) seemed to burn with great brilliance, sending out waves of light, which expanded and contracted in an enormously exaggerated manner.

I was even more impressed by the shadows, which were in all directions heightened by flushes of red, green, and especially violet. The whole room, with its white-washed but not very white ceiling, thus became vivid and beautiful.

The difference between the room as I saw it then and the appearance it usually presents to me was the difference one may often observe between the picture of a room and the actual room. The shadows I saw were the shadows which the artist puts in, but which are not visible in the actual scene under normal conditions of casual inspection. I was reminded of the paintings of Claude Monet, and as I gazed at the scene it occurred to me that mescal perhaps produces exactly the same conditions of visual hyperaesthesia, or rather exhaustion, as may be produced on the artist by the influence of prolonged visual attention.

I wished to ascertain how the subdued and steady electric light would influence vision, and passed into the next room; but here the shadows were little marked, although walls and floor seemed tremulous and insubstantial and the texture of everything was heightened and enriched. About 3:30 a.m. I felt that the phenomena were distinctly diminishing—though the visions, now chiefly of human figures, fantastic and Chinese in character, still continued—and I was able to

settle myself to sleep, which proved peaceful and dreamless.

I awoke at the usual hour and experienced no sense of fatigue nor other unpleasant reminiscence of the experience I had undergone. Only my eyes seemed unusually sensitive to color, especially to blue and violet; I can, indeed, say that ever since this experience I have been more esthetically sensitive than I was before to the more delicate phenomena of light and shade and color.

Impressed with the extraordinary color sensitivity he had experienced, Ellis thought it would be interesting to see the effects of peyote on an artist acquaintance of his. He first gave the painter three buttons, but he misunderstood Ellis's directions and failed to make the extract correctly.

Wary of what Jonathan Ott calls the "dreaded underdose," Ellis, "to make sure of success" repeated the experiment with four buttons, "which proved to be an excessive and unpleasant dose. There were paroxysmal attacks of pain at the heart and a sense of imminent death." The symptoms came on very suddenly, and when Ellis arrived they were already at their height. As the experiences of this subject were in many respects very unlike his own, Ellis gives them in the man's own words. Note the unusual synesthesia of tasting colors: "green . . . was sweetish and somewhat metallic; blue [had] . . . a taste that seemed to recall phosphorus."

I noticed first that as I happened to turn my eyes away from a blue enamel kettle at which I had been unconsciously looking, and which was standing in the fender of the fireplace, with no fire in it, it seemed to me that I saw a spot of the same blue in the black coals of the grate, and that this spot appeared again, farther off, a little brighter in hue. But I was in doubt whether I had not imagined these blue spots. When, however, I lifted my eyes to the mantelpiece, on which were scattered all sorts of odds and ends, all doubt was over. I saw an intensely vivid blue light begin to play around every object. A square cigarette box, violet in color, shone like an amethyst.

I turned my eyes away and beheld this time, on the back of a polished chair, a bar of color glowing like a ruby. Although I was expecting some such manifestation as one of the first systems of the intoxication, I was

nevertheless somewhat alarmed when this phenomenon took place. Such a silent and sudden illumination of all things around, where a moment before I had seen nothing uncommon, seemed like a kind of madness beginning from outside me, and its strangeness affected me more than its beauty. A desire to escape from it led me to the door, and the act of moving had, I noticed, the effect of dispelling the colors.

But a sudden difficulty in breathing and a sensation of numbness at the heart brought me back to the arm-chair from which I had risen. From this moment I had a series of attacks or paroxysms, which I can only describe by saying that I felt as though I were dying. It was impossible to move, and it seemed almost impossible to breathe. My speedy dissolution, I half imagined, was about to take place, and the power of making any resistance to the violent sensations that were arising within was going, I felt, with every second.

The first paroxysms were the most violent. They would come on with tinglings in the lower limbs, and with the sensation of a nauseous and suffocating gas mounting up into my head. Two or three times this was accompanied by a color vision of the gas bursting into flame as it passed up my throat. But I seldom had visions during the paroxysms; these would appear in the intervals. They began with a spurting up of colors; once, of a flood of brightly illuminated green water covering the field of vision, and effervescing in parts, just as when fresh water with all the air bubbles is pumped into a swimming bath. At another time my eye seemed to be turning into a vast drop of dirty water in which millions of minute creatures resembling tadpoles were in motion. But the early visions consisted mostly of a furious succession of colored arabesques, arising and descending or sliding at every possible angle into the field of view. It would be as difficult as to give a description of the whirl of water at the bottom of a waterfall as to describe the chaos of color and design which marked this period.

Now also began another series of extraordinary sensations. They set in with bewildering suddenness and followed one another in rapid succession. These I now

record as they occur to my mind at haphazard:

(1) My right leg became suddenly heavy and solid; it seemed, indeed, as if the entire weight of my body had shifted into one part, about the thigh and knee, and that the rest of my body had lost all substantiality.

(2) With the suddenness of a neuralgic pang, the back of my head seemed to open and emit streams of bright color; this was immediately followed by the feeling as of a draft blowing like a gale through the hair in the same region.

(3) At one moment the color green, acquired a taste in my mouth; it was sweetish and somewhat metallic; blue again would have a taste that seemed to recall phosphorus; these are the only colors that seemed to be connected with taste.

(4) A feeling of delightful relief and preternatural lightness about my forehead, succeeded by a growing sensation of contraction.

(5) Singing in one of my ears.

(6) A sensation of burning heat in the palm of my left hand.

(7) Heat about both eyes. The last continued throughout the whole period, except for a moment when I had a sensation of cold upon the eyelids, accompanied with a color vision of the wrinkled lid, of the skin disappearing from the brow, of dead flesh, and finally of a skull.

Throughout these sensations and visions my mind remained not only perfectly clear, but enjoyed, I believe, an unusual lucidity. Certainly I was conscious of an odd contrast in hearing myself talk rationally with H. E., who had entered the room a short time before, and experiencing at the same moment the wild and extraordinary pranks that were taking place in my body. My reason appeared to be the sole survivor of my being. At times I felt that this, too, would go, but the sound of my own voice would establish again the communication with the outer world of reality.

Tremors were more or less constant in my lower limbs. Persistent, also, was the feeling of nausea. This, when attended by a feeling of suffocation and a pain at the heart, was relieved by taking brandy, coffee, or biscuit. For muscular exertion I felt neither the wish nor the power. My hands, however,

retained their full strength.

It was painful for me to keep my eyes open above a few seconds; the light of day seemed to fill the room with a blinding glare. Yet every object, in the brief glimpse I caught, appeared normal in color and shape. With my eyes closed, most of the visions, after the first chaotic display, represented parts of the whole of my body undergoing a variety of marvelous changes, of metamorphoses or illumination.

They were more often than not comic and grotesque in character, though often beautiful in color. At one time I saw my right leg filling up with a delicate heliotrope; at another, the sleeve of my coat changed into a dark green material, in which was worked a pattern in red braid, and the whole bordered at the cuff with sable. Scarcely had my new sleeve taken shape than I found myself attired in a complete costume of the same fashion, mediaeval in character, but I could not say to what precise period it belonged. I noted that a chance movement—of my hand, for instance—would immediately call up a color vision of the part exerted, and that this again would pass, by a seemingly natural transition, into another wholly dissimilar.

Thus, pressing my fingers accidentally against my temples, the fingertips became elongated, and then grew into the ribs of a vaulting or of a dome-shaped roof. But most of the visions were of a more personal nature. I happened once to lift a spoonful of coffee to my lips, and as I was in the act of raising my arm for that purpose a vision flashed before my closed (or nearly closed) eyes, in all the hues of the rainbow, of my arm separated from my body, and serving me with coffee from out of dark and indefinite space.

On another occasion, as I was seeking to relieve slight nausea by taking a piece of biscuit passed to me by H. E., it suddenly streamed out into blue flame. For an instant I held the biscuit close to my leg. Immediately my trousers caught alight, and then the whole of the right side of my body, from the foot to the shoulder, was enveloped in waving blue flame. It was a sight of wonderful beauty. But this was not all. As I placed the biscuit in my mouth it burst out again into the same colored fire and

illuminated the interior of my mouth, casting a blue reflection on the roof. The light in the Blue Grotto at Capri, I am able to affirm, is not nearly as blue as seemed for a short Space of time the interior of my mouth.

There were many visions of which I could not trace the origin. There were spirals and arabesques and flowers, and sometimes objects more trivial and prosaic in character. In one vision I saw a row of small white flowers, one against the other like pearls of a necklace, begin to revolve in the form of a spiral. Every flower, I observed, had the texture of porcelain. It was at a moment when I had the sensation of my cheeks growing hot and feverish that I experienced the strangest of all the color visions. It began with feeling that the skin of my face was becoming quite thin and of no stouter consistency than tissue paper, and the feeling was suddenly enhanced by a vision of my face, paper-like and semitransparent and somewhat reddish in color.

To my amazement I saw myself as though I were inside a Chinese lantern, looking out through my cheek into the room. Not long after this I became conscious of a change in the visions. Their tempo was more moderate, they were less frequent and they were losing somewhat in distinctness. At the same time the feeling of nausea and of numbness was departing. A short period followed in which I had no visions at all, and experienced merely a sensation of heaviness and torpor. I found that I was able to open my eyes again and keep them fixed on any object in the room without observing the faintest blue halo or prism, or bar of glowing color, and that, moreover, no visions appeared on closing them.

It was now twilight, but beyond the fact of not seeing light or color either without or within, I had a distinct feeling that the action of the drug was at an end and that my body had become sober suddenly. I had no more visions, though I was not wholly free from abnormal sensations, and I retired to rest.

I lay awake till the morning, and with the exception of the following night I scarcely slept for the next three days, but I can not say that I felt any signs of fatigue, unless, perhaps, on one of the days when my eyes, I noticed, became very susceptible to any indications of blue in an object. Of

color visions, or of any approach to color visions, there was no further trace; but all sorts of odd and grotesque images passed in succession through my mind during part of the first night. They might have been the dreams of a Baudelaire or of an Aubrey Beardsley. I would see figures with prodigious limbs, or strangely dwarfed and curtailed, or impossible combinations such as five or six fish, the color of canaries, floating about in air in a gold wire cage. But these were purely mental images, like the visions seen in a dream by a distempered brain.

“He wishes for the cloths of heaven”

Ellis then “made experiments on two poets, whose names are both well known.” Ellis never gives the names of the painter whose experiences have just been reported or of either of the poets, but it has been generally assumed that one of them was the greatest poet of the 20th century, William Butler Yeats (Goldberg, p. 193)—the other has been variously said to be “the strange, dissolute writer Ernest Dowson” (Haining, I, p. 189) or Arthur Symons (Grosskurth, 1980, p.166).¹⁷

One is interested in mystical matters, an excellent subject for visions, and very familiar with various vision-producing drugs and processes. His heart, however, is not very strong.

While he obtained the visions, he found the effects of mescal on his breathing somewhat unpleasant; he much prefers haschisch, though recognising that its effects are much more difficult to obtain. The other enjoys admirable health, and under the influence of mescal he experienced scarcely the slightest unpleasant reaction, but, on the contrary, a very marked state of well being and beatitude.

He took somewhat less than three buttons, so that the results were rather less marked than in my case, but they were perfectly definite.

He writes: “I have never seen a succession of absolutely pictorial visions with such precision and such

unaccountability. It seemed as if a series of dissolving views were carried swiftly before me, all going from right to left, none corresponding with any seen reality. For instance, I saw the most delightful dragons, puffing out their breath straight in front of them like rigid lines of steam, and balancing white balls at the end of their breath! When I tried to fix my mind on real things, I could generally call them up, but always with some inexplicable change.

Thus, I called up a particular monument in Westminster Abbey, but in front of it, to the left, knelt a figure in Florentine costume, like someone out of a picture of Botticelli; and I could not see the tomb without also seeing this figure. Late in the evening I went out on the Embankment and was absolutely fascinated by an advertisement of ‘Bovril,’ which went and came in letters of light on the other side of the river. I can not tell you the intense pleasure this moving light gave me and how dazzling it seemed to me. Two girls and a man passed me, laughing loudly, and lolling about as they walked I realized, intellectually, their coarseness, but visually I saw them, as they came under a tree, fall into the lines of a delicate picture; it might have been an Albert Moore.

After coming in I played the piano with closed eyes and got waves and lines of pure color, almost always without form, though I saw one or two appearances which might have been shields or breastplates—pure gold, studded with small jewels in intricate patterns. All the time I had no unpleasant feelings whatever, except a very slight headache, which came and went. I slept soundly and without dreams.”

Most writers have assumed that the vivid description given above of the delightful dragons balancing balls on their breath was given by Yeats (Haining, *ibid.*; Stafford, 1992, p. 144; Perrine, 1996, p. 297). However, closer investigation shows this is not the case; the charming images flow from the pen of Symons, as the recent and authoritative biography of Yeats by R. F. Foster makes clear (1997, p. 570, n.

¹⁷ One might expect that Ellis’s own biography might settle the issue, but surprisingly he never mentions the peyote experiment anywhere but in a passing reference to a childhood ability to visualize scenes behind closed eyes, which he says were “somewhat of the same kind, though less vivid, as those I have since learnt to see on the curtain of the eyelids under the influence of mescal buttons” (Ellis, 1939, p. 67).

58; see also White and Jeffares, p. 466, n. 3 to letter 22). The key is the description of the poet who found the effects of peyote disagreeable because “his heart is not very strong.” This is undoubtedly Yeats, who had been diagnosed with a heart ailment in 1890—probably misdiagnosed, the underlying problem being the repeated bouts of depression that plagued him at the time (Foster, p. 96), since Yeats lived on to a crusty, lusty old age, dying at 74 with no indication of cardiac weakness. Both Yeats and Symons, a longtime friend of Ellis, were sharing lodgings rented from Ellis in the Temple at this time; both were already familiar with the “dreams” induced by hashish and opium.

Unfortunately, Yeats seems to have been spooked by the shallow respiration induced by peyote and never explored it further. The only mention I could find of peyote in his copious writings is in the story of a hashish party he once attended in Paris written in 1902 and titled “Discoveries,” which ends with this obscure sentence: “Alas that the hangman’s rope [hemp] should be own brother to that Indian happiness [hashish] that keeps alone, were it not for some stray cactus, mother of as many dreams, immemorial impartiality” (Yeats, 1961, p. 283).¹⁸

Yeats’ disappointing experiment with peyote can be placed next to William James’s in the entheogenic annals of lost opportunities. It is fascinating to imagine the effects of a large dose of peyote on someone like Yeats.

Then again, it probably would prove unnecessary. Yeats, who won the Nobel Prize for Literature in 1923, is widely considered the greatest lyric poet that Ireland has produced. But as early as 1887 he had come under the influence of the theosophists and Mme. Blavatsky; and he had a lifelong fascination with mysticism, the occult, and spiritualism.

So apprehensive was he on attending his first seance as a young man that he fainted dead away on entering the room. He was convinced that his wife’s automatic writing provided explicit guidance from departed spirits. He believed in ghosts, leprechauns, elves, and fairies. In the opinion of Ezra Pound and probably many others, Yeats’ beliefs were “very very very bughouse” (Lee, 1999).

Yet he was an effective member of the Irish Senate (1822-28), and his poetry was admired and read by cultured and common folk alike. Ellis says only that

Yeats “obtained the visions” in 1897—maybe they lingered in his memory and inspired some of the imagery in this famous poem published two years later:

*Had I the heavens’ embroidered cloths,
Enwrought with golden and silver light,
The blue and the dim and the dark cloths
Of night and light and the half-light,
I would spread the cloths under your feet:
But I, being poor, have only my dreams;
I have spread my dreams under your feet;
Tread softly because you tread on my dreams.*

From Peyote to Mescaline:

Arthur Heffter’s Self-Experiments of 1897

The most critical contribution to the understanding of peyote’s unique properties was without doubt the series of meticulously systematic experiments which Heffter performed on himself in 1897, and which led to the identification of mescaline as the first single chemical entity known to be an entheo-hallucinogen.

Heffter’s first experiment took place on June 5, 1897. At this time he had read the articles by Prentiss and Morgan (1895), by Mooney (1896), and by Mitchell (1896) describing human consumption of peyote; he had not yet seen the article by Ellis in the *British Medical Journal*—which, by coincidence, was published on the very same day, June 5, as Heffter’s first experiment. However he probably read it before his next self-experiment a month later, and certainly by the time of his last one in November, since he cites Ellis’s article in the report of his experiments published the next year (Heffter, 1898).

Heffter conducts his first experiment in order to acquaint himself with the effects of peyote so that he will be able to compare the effect of the whole plant with the effects of the separate isolated components of the cactus. Eventually, he hopes to show that the activity lies either in the resin (he cites P&M as holding this view; P&M of course are only restating the theory of Wiley and Ewell) or in the alkaloid fraction. If the activity is due to the alkaloid fraction, he hopes to show whether one or more of the four alkaloids he has isolated from peyote—mescaline, anhalonidine, anhalonine, or lophophorine—is chiefly responsible for the peyote syndrome.

¹⁸ The brackets are my effort to clarify this murky sentence. White and Jeffares (p. 466) say Yeats also mentions mescal in his *Visions Notebook* of 1898, but I have not yet been able to find this. They also cite a fragment of the *Discoveries* passage above in an alternate form which makes a little more sense: “some stray cactus” conveying “immortal impartiality and simpleness.”

Heffter's First Self-Experiment
5 June 1897

Rather than eating dried peyote buttons as the subjects of P&M's experiments did, Heffter followed Mitchell's procedure and made an alcoholic extract of 16.6 g of dried cactus, which he says corresponded to about 5 buttons. (An alcoholic *extract* [Latin *extractum*] is the residue made by exhaustively percolating the dried material with 95% alcohol, then evaporating the alcohol under vacuum to dryness.) To make this more palatable, Heffter pressed the extract tightly into a number of wafer-papers.¹⁹ He then consumed all of this material between 10:15 and 10:45 on the morning of 5 June 1887.

At the beginning of the experiment, my pulse was 76; over the course of 2 hours it dropped to 56, then rose to normal. Nausea, occipital headache, intense dizziness, and clumsiness in moving began about half an hour after the last dose. Soon after that (12:18 p.m.) my vision became blurred, with the pupils moderately dilated. Nausea increased; by lunch there was a complete lack of appetite.

At 1:30 p.m. the first color visions were perceived with my eyes closed: dark blue streaks, then an arbor with red and yellow flowers. When reading, which I could do only with some effort because of the pupillary dilatation, there appeared on the paper—but as though behind the letters—pale violet and green patches, like a delicate patterned wallpaper.

At 1:50 p.m., I lay down in a darkened room and closed my eyes. Despite the darkness, I could still see afterimages which were strikingly sharp and long lasting. A

series of richly colorful pictures then appeared, often following on the afterimages, which consisted partly of tapestry patterns and mosaics, and partly of winding colored ribbons moving with the rapidity of lightning.

Then very bright colored rays shot in arcs across a dark visual field, somewhat like fireworks but more rapidly.

All the colors were represented. There followed a series of beautiful landscapes, outstanding for their wondrous color effects. For example, I saw the beach promenade at Nervi,²⁰ where trees of an amazingly deep red color hung over the wall.

However, this was the only recognizable picture which I saw. Despite every effort of my will, I was unable to exert any influence on the objects which appeared; in the same way, I could focus my thoughts on any topic whatever, however irrelevant, and the visions continued to change as fast as lightning.

Rhythmic sounds or music did affect the scenes; they would begin to move in time with the rhythm. Occasionally I had the impression that great masses of people, soldiers or the like, were marching by me, without my being able to distinguish any individual.

Several times I saw thick purple intertwined roots and fibers on a dark, glossy background. They looked like veins filled to bursting, and frequently they transformed themselves into a network of high gothic vaults of varying colors.

Many times I found myself gazing at

¹⁹ "Ein alkoholisches Extr[actum] spissum in Oblaten" (1898, p. 420). *Spissum* is Latin for "densely compacted." *Oblaten* [fem. plural] is German for thin sheets of unleavened bread like that traditionally used for the wafers or hosts of the Christian Eucharist (*Oblate* is derived from the Latin *oblata* (*hostia*), meaning "offering"). Such "wafer-paper" was used at this time to encapsulate disagreeable medicines: "*Wafer capsules*, known also as *cachets*. . . are prepared from wafer sheet made by pouring a mixture of flour and water upon hot greased cylinders. They occur in saucer or spoon-shaped discs into which powder medicines may be placed, then covered with an identical disc whose edge has been moistened with water, and the two halves sealed by pressure"(USD, p. 258). Note that in P&M's study, the subjects of experiments 2 and 3 used powdered peyote wrapped in "wafer-paper" (P&M, 1895, pp. 580-581. It is an ironic coincidence that the "substance" or essence of the Amerindian "sacrament" was wrapped for American and European consumption in the "accidents" of the Ameuropean one, in a manner oddly corresponding to the Catholic doctrine of eucharistic "transubstantiation" or the Lutheran "consubstantiation."

²⁰ There is a famous promenade in Nervi, a suburb of Genoa on the Italian riviera. It is odd that the only familiar scene observed by Heffter is the beach at Nervi; has he been influenced by Mitchell's vision of the beach at Newport, Rhode Island (see above)?

the interior of a richly decorated banquet hall, where the friezes, walls, and chandeliers were ornamented with jewels, opals, and pearls. But the peculiar thing was that the ceiling of this hall now and then seemed to turn upside down or vertical, which made me extremely dizzy and only intensified my nausea.

The architectural visions seemed three-dimensional, while the landscapes usually gave the impression of being projected on a flat screen stretched out of course fibers.

As soon as my eyelids were opened, the visions disappeared. But the queasiness, dizziness, headache, and an oppressive heaviness in my chest remained.

And yet, despite this, I felt cheerful and excited and was occasionally inclined to laugh. I felt as though I were speaking very loudly; my auditory perception was lowered and all voices sounded as though they came from a distance. My consciousness was clear throughout the entire experiment, and my intellectual comprehension was unimpaired.

A striking symptom was the loss of the sense of time: I estimated a few minutes as lasting ½ hour. The 10-minute-long walk from my house to the laboratory seemed endlessly long.

The ability to see visions on closing my eyes remained until about 5:45 p.m., or about 4 hours. At the end, the colors appeared quite pale, and I saw only weakly distinguishable colored patches. The unpleasant side effects diminished to a mild dizziness and dilatation of the pupils. My appetite returned, and my sleep that night was peaceful and unbroken (Heffter, 1898, pp. 420-421).

Heffter concludes that his symptoms are in all essentials the same as those of previous workers, namely the occurrence of colored visions with slowing of the pulse rate, pupillary dilatation, loss of the sense of time, nausea, dizziness, and headache; he feels prepared to go on to the next step, determining whether the resinous material or, as he suspects, one of the alkaloids he has isolated is the active principle of the peyote cactus. The most likely candidate is mescaline, since it is the most abundant alkaloid in peyote.

Heffter's Second Self-Experiment

21 July 1897

Heffter took the alcoholic extract from 50 g peyote buttons, made a slurry of this with ammonia water and exhaustively extracted this with chloroform. The syrup which remained after evaporation of the chloroform contained all the alkaloids and the resin. On treatment with warm water and dilute sulfuric acid, the alkaloids dissolved leaving the resin (450 mg) behind. After evaporation of the aqueous solution, Heffter obtained 3.0 g of a dense crystalline mass corresponding to the total alkaloidal fraction as their sulfate salts.

On the 21st of July, at 11:17 a.m. he took one third of the total resinous material (150 mg), the amount corresponding to 16.67 g of peyote (as in his first experiment of 5 June). As before, he wrapped the resin in wafer paper. After about an hour his pulse had dropped from 78/min to 68 and he felt some weariness, weakness in his extremities, and a slight headache. But all symptoms had cleared by the second hour, and he concludes that the resin cannot be the active principal in peyote—what symptoms the material caused are due to a small amount of alkaloidal material adsorbed by the resin (p. 422).

Heffter's Third Self-Experiment

23 July 1897

Two days later, Heffter takes 1.0 g of the combined alkaloid sulfates, equivalent to 16.67 g of peyote, dissolves them in water, and drinks the solution at 12:09 p.m. At 12:33 he notes an occipital headache and heaviness in his extremities. By 1:15 he feels nauseated and his pulse has dropped from 76 to 68. He notes the first visual effects:

On reading, green and violet patches appear on the paper, and I also see them when I look up at the clear sky. On closing my eyes the visions appear, at first still pale but gradually becoming sharper and brighter. This time they consist not so much of landscapes but mostly of kaleidoscopic figures, tapestry and woven patterns, splendid articles of clothing, and architectural pictures.

There is little blue present; mostly the colors are orange, red, green, and occasionally yellow. In a completely darkened room (a photographic darkroom) I could see these this time with my eyes open, but they were not as lively and clear as when my eyes were shut. The ability to perceive them lasted an extraordinarily long time in this experiment—even on the morning of the following day green and violet spots appeared on closing my eyes.

All the other symptoms recurred that I experienced on 6 July²¹(pupillary dilatation, dizziness, extremely unpleasant nausea which lasted this time until 8 o'clock, loss of the time-perception, muffled hearing, a feeling of exhaustion in my extremities).

They gradually faded in the course of the evening, and the next morning there was only a slight dilation of the pupils. As before, there was no dulling of consciousness, but I needed to make an effort to focus my thoughts when making arithmetic calculations or when speaking. My speech was somewhat slow and difficult from the beginning (p. 422-423).

Heffter concludes that the alkaloids cause the peyote syndrome, and probably that the unique effect on the visual system is most probably caused by a single alkaloid. Earlier in the same article, Heffter described the results of administering mescaline hydrochloride to mammals, with no clear results. Doses of 100 to 250 mg/kg caused no evident effects on rabbits. A large cat, when given 100 mg, vomited and appeared somnolent. But when 200 mg was administered subcutaneously to a dog weighing 6.1 kg (thus 33 mg/kg or the equivalent of a dose of 2.3 g [!] of mescaline given an adult human), it showed no signs of somnolence or nausea.

"The only remarkable thing was that after about 1 hour it began to whine and bark—not while looking at the observer, but at the opposite side of its cage. When called, it turned around and wagged its tail. It continued to display the same unusual behavior for quite some time" (p. 411).

At some undisclosed date, Heffter now samples pure mescaline in doses of from 20 to 80 mg and finds that the typical slowing of the pulse, headache, etc. occur and last one or more hours depending on the dose. He then samples 100 mg mescaline hydrochloride, and finds that after 3 hours his pulse has dropped from 82 to 64; he also experiences headache, heaviness in his extremities, and a slight feeling of queasiness and fullness in his stomach. At the same time he believes, but is not entirely sure, that he can see visions when he closes his eyes. "A further experiment was therefore conducted with a still higher dose" (p. 423).

Heffter's Fourth Self-Experiment 23 November 1897

At 11:45 a.m., Heffter consumed 150 mg mescaline hydrochloride. Within one hour, his pulse fell from 78 to 66; at 12:06 p.m. he experienced photophobia and dizziness; at 1:00 he felt some nausea but nonetheless had sufficient appetite to eat; at 2:00 he began to see the by now familiar green and violet spots on the paper while reading. When he closed his eyes the visions began:

At first indistinct violet and green specks, then tapestry patterns, ribbed vaulting, etc. Now and then single points of the brightest colors float across the visual field. In general the phenomena are not as sharp as in the previous two experiments.

Later however I perceived landscapes, halls, and architectural forms (for example pillars decorated with flowers). The visions could be seen until about 5:30. Nausea was occasionally quite severe, as was dizziness. Judgment of time was slowed in the early afternoon hours.

By evening I felt perfectly well, with a good appetite and no insomnia (pp. 423-424).

At some unspecified later dates, Heffter also tried anhalonidin, anhalonin, and lophophorin in doses of 125, 100, and 20 mg respectively, as we have discussed in the previous section. None of these alkaloids produced anything resembling the visual alterations provided by peyote and mescaline.

Heffter concludes that it is mescaline alone which produces the symptoms of peyote intoxication. He explains the diminished intensity of his fourth experiment using mescaline alone as being the result most probably of too small a dose, and suggests that a higher dose—perhaps 175 mg of the hydrochloride or 200 mg of the sulfate—would produce visions as beautiful as those provided by peyote itself. It is possible, he feels, that the other alkaloids play a role producing the peyote syndrome, but argues that this is unlikely in view of the negative effects he experienced from taking anhalonidine, anhalonine, and lophophorine and from the very small overall concentration of the alkaloids other than mescaline in the peyote plant.

²¹ Heffter writes "6 Juli" yet according to his notes the previous experiment took place on 5 June. Perhaps Heffter is literally transcribing an error he made while writing notes under the influence of the drug, or possibly his own handwriting made "6 Juli" and "5 Juni" indistinguishable. In any case, 5 June is presumably correct.

Heffter is probably right in judging the other alkaloids in peyote to have no great effect in inducing the typical hallucinogenic/entheogenic syndrome. However, it is possible that the powerful and quite rapid tolerance induced by mescaline consumption—a phenomenon of which Heffter was unaware—might have blocked an effect from one of the other alkaloids if he tested them within two or three days. Basically we do not know, because Heffter's laborious, exacting, and time-consuming experiments have never been repeated.

The “Anhalonium Kontroverse”

Lewin vs. Heffter

In 1888, when Lewin published his first study of peyote, he was 38 years old and already enjoyed an international reputation through the publication of three books. *Die Nebenwirkungen der Arzneimittel*, (Berlin, 1881) was the first effort to classify the side effects of commonly used pharmaceuticals. Its usefulness was recognized at once and it was promptly translated into English—twice!—by Alexander (*The Incidental Effects of Drugs*, New York, 1882) and by Mulheron (*The Untoward Effects of Drugs*, Detroit, 1883); a Russian translation appeared in St. Petersburg in 1885. A second book was a sort of PDR of the day: *Die Arzneimittel und ihre Dosierung. Zum Gebrauch für Vorlesungen und die ärztliche Praxis bearbeitet* (Berlin, 1884) was an encyclopedic listing of all known drugs with their recommended dosages—all conveniently organized for use either for lectures at a university or as a resource book for the busy practitioner. Yet a third book, a textbook of pharmacology (*Lehrbuch der Toxikologie*, Vienna, 1885) went through two further editions by 1899, appeared in French as *Traité de Toxikologie* in 1903, and was reissued in German in 1962. (Not until 1924 was Lewin to write the book for which he is most widely remembered today, *Phantastica*, the English translation

of which was reissued once again in 1998.)

Some of the motivation for Lewin's perhaps overachieving drive—and some of the bitterness he may have felt towards Heffter—doubtless stemmed from his being denied a professorship at any of the state universities because of his refusal to be baptized, a condition for all state employment in Germany at the time with its established Lutheran church. Nothing more than an utterly *pro forma* fulfillment of this condition was expected; numerous university professors, Jew and Gentile, were openly atheistic or worshiped in non-Christian or non-Lutheran denominations.

No one seemed to consider this *modus vivendi* particularly hypocritical or cynical.²² No one but Louis Lewin, who in a rare expression of his feelings in the matter wrote in 1890 to his former high-school teacher, lifelong friend (and declared anti-Semite!), Paul de Lagarde: “Do you like traitors? Would you greet someone with respect who you knew had, for the price of more than 30 silver pieces (in the currency of an order or a title), betrayed that flag which his forbears had defended as a part of their very being through the grimmest days of want and suffering?”²³

And so Lewin conducted lectures (always standing-room only) for the medical students of Berlin from his own private quarters, and carried out his experiments in his cramped home laboratory, using his own money for materials and equipment.

Lewin was justifiably proud that Hennings had named what was thought to be a new cactus species after him. He naturally felt a certain sense of proprietary rights over this species and attempted to stake out his claim by asserting, in his first article on *Anhalonium lewinii* that “it will take some time for the full completion of this research, and until then I expressly reserve to myself further investigations in this area” (1888a, p. 406).

²² Compare the entirely different though equally sincere attitude of the family of Victor Klemperer (cousin of conductor Otto Klemperer): at the Berlin Reform Congregation, where his father was a Rabbi, services were conducted in German *on Sundays*, with heads uncovered; instead of a bar mitzvah, boys and girls were confirmed together *on Easter Sunday*. In early adulthood, Victor and his brothers were both baptized as Protestants with little or no objection on the part of their father (Klemperer, 1999, p. viii). All this seems not an expression of craven conformity but of a philosophical interpretation of all religions in the tradition of the German Enlightenment; many liberal Protestants held similar views regarding Christianity.

²³ “Mögen Sie Renegaten? Grüßen Sie jemand von dem Sie wissen, daß er für mehr also 30 Silberlinge in bar Orden oder Titel, der Fahne utreu geworden, die seine Vorfahren in schlimmen Tagen wie ein Stück von sich in Not und Elend verteidigt haben?” Cited in Hoppe (1985, p. 3); the original is in a collection of Lewin materials in the possession of Bo Holmstedt at the Karolinska Institute in Stockholm.

This statement, which rings a bit odd to modern ears, was more common in the earlier days of scientific research.²⁴ (It is noticeably absent in the English translation of this work which Lewin published in America the same year (1888b)—but this may be simply because there was no real possibility that an American scientist in those days could mount any realistic competition to Lewin).

In any case, Dr. Peter Schneck of the Institute for the History of Medicine at the Humboldt University of Berlin tells me that he feels this statement of Lewin's meant little more than an announcement further work would be forthcoming, and any attempt to reserve a field of study to oneself was as much ignored then as now.²⁵ And, indeed, Lewin never explicitly complains about the intrusion of Heffter into his presumed research preserve.

Lewin's article did excite a good deal of interest, as he anticipated. And when six years had passed and no further work on the cactus came from Lewin's laboratory, potential competitors might reasonably assume that he had given up on the subject. Nonetheless, Heffter's first foray in cactus chemistry is diplomatically centered on two other species of cacti, *Anhalonium fissuratum* and *Anhalonium williamsii*. Then, at the end of the paper, he admits he has done some work with *A. lewinii*, and has found two alkaloids in this species, but that he lacked sufficient material to obtain them in pure form.

Heffter's work could not have been published at a more inopportune time; his article must have arrived at the editorial desk of the *Archive für experimentelle und pathologische Pharmakologie* only a few weeks or a month before Lewin's second article on "his" cactus arrived there. Heffter's article appeared on page 65 and Lewin's on page 374 of the journal; Lewin had to awkwardly rewrite some of his material and expressly acknowledge that an alkaloid he was going to report on (although not fully characterized) was the "pellotine" Heffter had reported 300 pages earlier. But it would be "more correct," he sniffs, if Heffter had named it "peyotline."

Heffter was still a relative unknown compared to Lewin at this time. However, he had considerably more training than Lewin in chemistry (while both held an M.D., Heffter had a Ph.D. in chemistry as well) and Heffter enjoyed the funding, staffing, and equipment

of the laboratories at the Pharmacological Institute of the University of Leipzig, where at the age of 29 he was an Assistant Professor at the beginning of his career.

By all accounts, Heffter was a mild, generous person who took no pleasure in the malicious arts of academic one-upmanship. In fact, there seem to me to be indications Heffter went out of his way not to give offense to Lewin. But later, when both scientists were located in Berlin, students believed there was an intense antagonism between them (Bruhn and Holmstedt, p. 365). However, those of us who teach are aware that students imagine many things about their professors, and in the Berlin of the early 20th century, students lived at a much greater remove from the professorial class than now.

There is only one documented show of spite between the two of them, and that was when Heffter rightly complained in a letter that his contributions to cactus chemistry had been overlooked in a brief review by the botanist Schumann (Schumann, 1895) which had appeared in the Berlin *Pharmaceutische Zeitung*. In an effort to clarify the significance of his own researches, he pointed out the very real weaknesses—weaknesses perhaps particularly evident to a chemist—absence of a molecular formula or crystalline material with sharp melting points in Lewin's first 1888 report on *Anhalonium lewinii* (Heffter, 1895).

A month later an injured Lewin replied with his own brief letter pouting that Heffter had downplayed *his* contributions (Lewin, 1895). Thus the tempest in a teapot referred to as the "Anhalonium Kontroverse" (Hoppe, 1985, pp. 48-50; Bruhn and Holmstedt, 1974, 362).

Both men were arguably right: simply showing, as Lewin did for the first time, that there was alkaloidal material with potent physiological properties in a cactus *was* quite significant. (But as we have seen above, this was probably first achieved in the unpublished work of Frank Johnson of Parke-Davis.)

On the other hand, most of the rigorous chemical separation and purification—particularly the determination by self-experiment that it was mescaline which was the critical alkaloid—would later be achieved by Heffter. But that would not happen for a few years; in 1895 the contributions of both men were approximately equal.

²⁴ Almost the exact phrase ends Moses Gomberg's article disclosing his path-breaking discovery of the triphenylmethyl free radical: *J. Am. Chem. Soc.*, **1900**, **22**, p. 757.

²⁵ Personal communication, 2 February 2000.

A little later, in the Berlin *Apotheker-Zeitung* of 1896, Heffter published a review of all that was then known about the cactus alkaloids, neither exaggerating nor minimizing either his own work or that of Lewin (Heffter, 1896c).

As one of his students, Georg Joachimoglu, wrote on the 100th anniversary of Heffter's death, he was a mild-mannered person whose judgments were instinctively chivalrous ("ein ritterlich denkender, guter Mensch"), and when it came to matters of science, personalities were to him of little importance in comparison to the facts themselves: "Die Person war Nebensache, immer ging bei Heffter die Sache voran" (Joachimoglu, 1959, p. 392; 1960, p. 7).

Without any doubt, Heffter's famous article of 1898 in which he describes the careful series of self-experiments he had conducted the year before which led to the inescapable conclusion that the single alkaloid mescaline, taken by Heffter as a pure compound in known dosage, was responsible for the most striking and characteristic effects of peyote, the colored pseudohallucinatory "visions," is deservedly regarded as a classic in psychopharmacology.

As noted above, the key part of this article describing most of the self-experiments is available in English translation thanks to the indefatigable Bo Holmstedt (1963, pp 205-209), whose labors over the years to honor the memory of the first explorers of psychedelic substances, as well as his own invaluable studies of the chemistry of peyote, should guarantee him a place of honor among every entheogenist's household gods.

But I would gently differ with Holmstedt in one respect: his commentary leaves the impression that Arthur Heffter was taking considerable risk in being the first human being to ingest pure crystalline mescaline hydrochloride—first at a dose of 20-80 mg, then at 150 mg.

Holmstedt admiringly describes these experiments as "heroic." Yes and no. Heffter was an extremely careful, rigorously scientific worker, and the series of experiments he performed on himself using first an (alcoholic) fluid extract of whole mescal buttons, then the resinous material from the cactus, then the combined alkaloidal fraction, then finally testing each individual alkaloid—mescaline, anhalonidine, anhalonine, and lophophorine—proved conclusively that mescaline alone produced a psychic syndrome which was nearly indistinguishable from that produced by the peyote plant.

However, the carefully weighed amounts used by Heffter in all these self-experiments corresponded as he clearly stated to the separate ingredients (whether the total alkaloid fraction, the resin, or the individual

alkaloids) found in 16.6 g dried peyote or 5 "buttons" (minus of course the inevitable losses, possibly as much as 10%, due to the extraction procedure).

It is clear from Heffter's ample references to previous workers that he has chosen this amount because it will be a reasonable, safe dose which should nonetheless produce the characteristic effects of "peyote poisoning" (Mescalvergiftung).

Heffter expressly notes that the subjects in Prentiss and Morgan's experiments took as many as 7 buttons, that Weir Mitchell took 6½; Eshner 3; Ellis 3 (Heffter, 1898, pp. 419-20).

Heffter references the article in which Mooney reports taking as many as 7 buttons, and observing a 12-year-old Indian boy consume 6 with no ill effects. Heffter is *not* trying to be "heroic"—if he were, he would (with unnecessary risk) have taken the 12-20 buttons Mooney reports as being the average consumption of most Kiowa males, or the 30 buttons Mooney relates he saw "the great high priest of the rite among the Comanches ... Zuanah [Quanah Parker] ... on one occasion eating" with no ill effects whatever. Mooney says he himself experienced no "visions" but only enhanced wakefulness and energy when he consumed 7 buttons, while "the Indians say that no mental effect is produced by less than ten. . . ."

The man with the highest record among the Kiowas is said to have once eaten more than ninety at a single sitting, or nearly a pound and half" (Mooney, 1896).

Heffter was displaying the same cautious, careful minimization of risk that Albert Hofmann used many years later when, at 4:20 p.m. on 19 April 1943, he took the smallest dose of LSD he could conceive of as being active, 250 micrograms.

Concluding Unscientific Postscript— A Perspectival View

Let us briefly return to one of the original issues motivating this detailed look at these first Ameuropean experiences of an *Entheogenic Sacrament*. I use this possibly controversial term to highlight just what for the most part did *not* take place.

There is no question that peyote is for the members of the Native American Church just that—an entheogenic sacrament. But in all but two of the 20 or so Ameuropean responses to peyote we have examined (I am including a post-Heffter report of Ellis, counting Mooney only once—though he may have participated in several dozen ceremonies—and counting James and Yeats each as ½) the drug was nothing more than a (pseudo) hallucinogen.

True, this is in itself an astonishing and remarkable thing—that swallowing a dried piece of cactus or a

white powder could cause an intense, vivid, and usually quite beautiful series of brilliantly colored phantasms to burst unbidden and irresistibly into the usually inviolable inner sanctum of one's personal consciousness.

Yet none of this touches on any profound or even distinctively human dimension of consciousness. (After all, Heffter's dog seemed as entranced as Heffter, although his cat was more discriminating.) The "visions" gave some of our experimenters genuine aesthetic delight and wonder—and some of the others transient paranoia.

Astonishing and remarkable once or twice, but thereafter simply odd: Ellis and Mitchell expressly say the experience was not worth buying a second time even at the rather small price of a headache and indigestion.

In the last analysis, all but two of the Ameuropean experiences are really quite trivial. The exceptions are chemist Ervin E. Ewell and—as seems most likely in my judgment—James Mooney.

It is probably no coincidence that both of these intelligent young men had expressly rejected the religion of their childhood. To expressly examine and then firmly—and in all likelihood quite painfully—turn from something so emotionally resonant as one's childhood religious tradition often, though not always, happens because persons who do this experience the "religious" dimension in their own consciousness vividly enough to question its prevailing sociocultural interpretation.

Analyzing the Ameuropean experiences within the hackneyed but always useful triptych of sacrament, set, and setting, it is apparent that the last-named component was in all cases but Mooney's absent, while in his case it was powerfully present.

But it is also significant that while Ewell did not take peyote within a religious ceremony, neither did he take it in a clinical setting (if we give credence to Mooney's recollection of the incident rather than Wiley's)—he took it alone in his own home, and as Alfred North Whitehead says somewhere, religion is above all what one does when alone.

The overall determining factor in the case of Ewell was probably his desire—which he may not have been consciously aware of—to see if an encounter with peyote would tell him something about his own religious quest, as it seemed to do for the Indians (and perhaps, as he subliminally realized on talking with him, for Mooney).

After all, *why* did Ewell deliberately reject the opportunity open to him to take peyote in P&M's clinical research protocol?

Something more than mere scientific curiosity must have motivated him. And this reminds us of what should never be forgotten: a person's own entheological dynamism is the one necessary, even at times all-sufficient factor in "producing" a mystical experience.

As the history of every religion shows, such an internal orientation, if sufficiently intense, can carry all before it and result in a mystical experience in the most unsacramental and unlikely of settings—as with Viktor Frankl's experience in Dachau. (Indeed, the goal of much religious asceticism seems to be to create with near masochistic zeal a setting so devoid of any appeal that the naked spirit, forced to confront nothing else, will be finally annihilated in the blaze of its own all-consuming Quest.)

The other thing these stories may suggest is that "entheogens" in clinical settings such as P&M employed, or even in the well-intentioned but fundamentally only whimsically curious essays of Mitchell and Ellis, are almost always going to be nothing more than hallucinogens, perhaps even psychotogens.

However powerful a person's internal dynamism might be for a "psychedelic mystical experience" (to use the later terminology of Walter Pahnke), nothing is likely to happen other than bradycardia and pretty lights, if there is nothing in the setting that remotely supports such a dynamism.²⁶

This is, of course, what Pahnke and others learned years later and were able to exploit with astonishing success. Indeed, what transforms a drug into a sacrament is precisely the setting; and the sacrament then reacts back to totally transform the setting in a reinforcing synergism.

Setting and sacrament (whether "real" or "placebo"—for everything is placebo next to the one Reality) will never be more than catalytic. Nonetheless, as every chemist will testify, catalysts are *very* helpful. As we ascend from simple inorganic reactions through organic chemistry to biochemistry and life itself they become increasingly important and finally indispensable. Life without catalysts would be more than difficult—we could not survive our next breath without them. They provide Huxley's door in the wall—the opened path of lower energy without which

²⁶ An interesting exception is the case of a young theology student (Robertson, 1968) who was given a psychedelic in a large European psychiatric clinic but then, significantly, *left alone*.

the thermodynamic barrier would be impossibly high—which allows phenomena to occur that realistically would simply never occur otherwise.

Modifying Timothy Leary's astronomical analogy, religion without psychedelics is like chemistry without catalysts—in its simplest forms merely difficult, but in its higher reaches next to impossible.

Somewhere, surely—perhaps in the flickering fire of a peyote lodge—a smiling Ervin Ewell nods agreement.

References

- AA World Services (1984) 'Pass It On': The Story of Bill Wilson and How the A.A. Message Reached the World, Alcoholics Anonymous World Services, New York, NY.
- Aberle, D.F. and Stewart, O.C. (1957) Navaho and Ute Peyotism: A Chronological and Distributinal Study, University of Colorado Studies Series in Anthropology No. 6, University of Colorado Press, Boulder, CO.
- Anderson, E.F. (1969) The biogeography, ecology, and taxonomy of Lophophora (Cactaceae). *Brittonia*, **21**, 299-310.
- Anderson, E.F. (1996) Peyote: The Divine Cactus, 2nd ed., U. Arizona Press, Tucson, AZ.
- Anderson, O.E. (1958) The Health of a Nation: Harvey W. Wiley and the Fight for Pure Food, U. of Chicago Press, Chicago, IL.
- Banks, J.T. (1998) Mrs. Woolf in Harley Street. *The Lancet*, **351**, 1124.
- Bender, G. A. (1968) Rough and Ready Research—1887 Style. *Journal of the History of Medicine and Allied Sciences*, **23**, 159-166.
- Beringer, K. (1927) Der Meskalinrausch: Seine Geschichte und Erscheinungsweise, Springer, Berlin.
- Briggs, J.R. (1887a) 'Muscale Buttons'—Physiological Effects—Personal Experience. *The Medical Register: A Weekly Journal of Medicine and Surgery* [Philadelphia], **1**, 276-277.
- Briggs, J.R. (1887b) Muscale Buttons'—Physiological Action—A Mexican Fruit with Possible Medicinal Virtues. The Druggists' Bulletin: *A Monthly Exponent of Pharmaceutical Progress and News*, **1**, 78.
- Briggs, J.R. (1896) Letter to Drs. Prentiss & Morgan, 24 August, 1896. MS 2537, Smithsonian Institution National Anthropological Archives.
- Brossi, A., Schenker, F., and Leimgruber, W. (1964) Synthesen in der Isochinolinreihe. Neue Synthesen der Kaktusalkaloide Anhalamin, Anhalidin, rac. Anhalonidin und rac. Pelletin. *Helv. chim. Acta*, **47**, 2089-2098.
- Brossi, A., Schenker, F., Schmidt, R., Banziger, R., and Leimgruber, W. (1966) Synthesen in der Isochinolinreihe. Zur Darstellung 6,7,8-Hydroxy-dimethoxy-substituierter 1,2,3,4-Tetrahydroisochinoline aus 3-Benzoyloxy-4,5-dimethoxy-phenäthylamin und Bericht über der pharmakologischen Prüfung von Anhalamin, Anhalidin, rac. Anhalonidin und rac. Pelletin. *Helv. chim. Acta*, **49**, 403-411.
- Brossi, A., and Pecherer, B. (1970) Alkaloids containing a simple aromatic moiety. In: Chemistry of the Alkaloids, Pelletier, S. W., Ed., Van Nostrand Reinhold, New York.
- Bruhn, J.G. and Holmstedt, B. (1974) Early peyote research: An interdisciplinary study. *Economic Botany*, **28**, 353-390.
- Colby, W.M. (1978) Routes to Rainy Mountain: A Biography of James Mooney, Ethnologist. Ph.D. dissertation, University of Wisconsin.
- Dixon, W.E. (1898) A preliminary note on the pharmacology of the alkaloids derived from the mescal plant. *British Medical Journal*, **1898**, ii, 1060-1061.
- Dixon, W.E. (1899) The physiological action of the alkaloids derived from anhalonium lewinii. *Journal of Physiology*, **xxv**, 69-86.
- DSM-IV (1994) Diagnostic and Statistical Manual of Mental Disorders, 4th ed., American Psychiatric Association, Washington, DC.
- Earnest, E. (1950) S. Weir Mitchell: Novelist and Physician, U. Pennsylvania Press, Philadelphia.
- Ellis, H. (1897a) A note on the phenomena of mescal intoxication. *The Lancet*, 5 June, 1540-1542.
- Ellis, H. (1897b) Mescal intoxication. *The Lancet*, 12 June, 1636.
- Ellis, H. (1898) Mescal: a new artificial paradise. *The Contemporary Review*, **73**, 130-141.
- Ellis, H. (1898) Mescal: a new artificial paradise. [Reprint from Contemp. Review] Annual Report of the Board of Regents of the Smithsonian Institution, Government Printing Office, Washington, DC, 537-548.
- Ellis, H. (1902) Mescal: a study of a divine plant. *Popular Science Monthly*, **61**, 52-71.
- Ewell, E.E. (1896) The chemistry of the cactaceae. *JACS*, **18**, 624-643.
- Foster, R.F. (1997) W. B. Yeats: A Life, I: The Apprentice Mage, 1865-1914, Oxford U. Press, New York, NY.
- Furst, P.T. (1972) To find our life: Peyote among the Huichol Indians of Mexico. In: *Flesh of the Gods: The Ritual Use of Hallucinogens*, Furst, P.T., Ed., Waveland Press, Prospect Heights, IL., pp 136-184.
- Giles, M.L. (1951) The Early History of Medicine in Dallas, 1841-1900. M.A. thesis, U. of Texas.
- Goldberg, I. (1926) Havelock Ellis: A Biographical and Critical Survey, Simon and Schuster, New York, NY.
- Grosskurth, P. (1980) Havelock Ellis: A Biography, Knopf, New York, NY.
- Hagan, W.T. (1993) Quanah Parker, Comanche Chief. Volume 6 in *The Oklahoma Western Biographies*.

- University of Oklahoma Press: Norman, OK.
- Haining, P. (1975) *The Hashish Club: An Anthology of Drug Literature*. Vol I: The Founding of the Modern Tradition: From Coleridge to Crowley, Peter Owen, London.
- Heffter, A. (1894a) Ueber Pellote. Ein Beitrag zur pharmakologischen Kenntnis der Cacteen. (Naunyn-Schmiedeberg's) *Arch. Exp. Path. Pharm.*, **34**, 65-86.
- Heffter, A. (1894b) Ueber zwei Cacteenalkaloide. *Berichte der deutschen chemischen Gesellschaft*, **27**, 2975-2979.
- Heffter, A. (1895) Ueber Pellote. *Pharmaceutische Zeitung* (Berlin), **40**, (28), 6 April 1895, 284.
- Heffter, A. (1896a) Ueber Cacteenalkaloide. *Berichte der deutschen chemischen Gesellschaft*, **29**, 216-227.
- Heffter, A. (1896b) Ueber Pellotin. *Therapeutische Monatshefte*, **10**, 327-328.
- Heffter, A. (1896c) Beiträge zur chemischen Kenntnis der Cactaceen. *Apotheker-Zeitung*, **79**, 746.
- Heffter, A. (1898) Ueber Pellote. Beitrag zur chemischen und pharmakologischen Kenntnis der Cacteen. (Naunyn-Schmiedeberg's) *Arch. Exp. Path. Pharm.*, **40**, 385-429.
- Heffter, A., and Capellmann, R. (1905) Versuche zur Synthese des Mezcalins. *Berichte der deutschen chemischen Gesellschaft*, **38**, 3634-3640.
- Hoppe, B. (1985) Louis Lewin (1850-1929): Sein Beitrag zur Entwicklung der Ethnopharmakologie, Toxikologie, und der Arbeitsmedizin. M.D. Dissertation, Freie Universität Berlin. 385-429.
- Holmstedt, B., and Liljestrand, G. (1963) *Readings in Pharmacology*, Macmillan, New York.
- Hutchings, R.H. (1897) Report on the use of pelletine as a sedative and hypnotic. State of New York. *State Hospitals Bulletin: A Quarterly Report of Clinical and Pathological Work in the State Hospitals (for the Insane), and their Pathological Institute*. [Published by authority of the State Commission in Lunacy.] [After 1898: *Archives of Neurology and Psychopathology*], **2**, (1), 45-48.
- James, W. (1990) *The Varieties of Religious Experience: A Study in Human Nature, Being the Gifford Lectures on Natural Religion delivered at Edinburgh in 1901-1902*, Vintage Books, The Library of America, New York, NY.
- James, W. (1993) *The Correspondence of William James, Vol. 2: William and Henry, 1885-1896*, Krupskelis, I.K.; Berkeley, E.M., Eds., University Press of Virginia, Charlottesville.
- Joachimoglu, G. (1959) Gedanktage: Zum 100. Geburtstag von Arthur Heffter. *Arzneimittel-Forschung*, **9**, 6, 391-392.
- Joachimoglu, G. (1960) *Verhandlungen der deutschen Pharmakologischen Gesellschaft: fünfundzwanzigste Tagung. Eröffnungsansprachen*. (Naunyn-Schmiedeberg's) *Arch. Exp. Path. Pharm.*, **238**, 6-7.
- Johnson, B.A., Roache, J.D., Javors, M.A., DiClemente, C.C., Cloninger, C.R., Prihoda, T.J., Bordnick, P.S., Ait-Daoud, N., and Hensler, J. (2000) Ondansetron for reduction of drinking among biologically predisposed alcoholic patients. *JAMA*, **284**, 963-971.
- Johnson, F.W. (1914) *A History of Texas and Texans*, American Historical Society, Chicago, IL.
- Jolly, F. (1896) Ueber Pelletin als Schlafmittel. *Duetsche Medicinische Wochenschrift*, **22**, 375-376.
- Jolly, F. (1896a) Ueber die schlafmachende Wirkung des Pelletinum muriaticum. *Therapeutische Monatshefte*, **10**, 328-329.
- Kapadia, G.J., and Fayeze, M.B.E. (1970) Peyote constituents: chemistry, biogenesis, and biological effects. *J. Pharm Sci*, **59**, 1699-1727.
- Kapadia, G.J., and Fayeze, M.B.E. (1973) The chemistry of peyote alkaloids. *Llyodia*, **36**, 9-35. 328-329.
- Kauder, E. (1899) Ueber Alkaloide aus Anhalonium lewinii. *Archiv der Pharmazie*, **237**, 190-198.
- La Barre, W. (1989) *The Peyote Cult*, 5th ed., University of Oklahoma Press, Norman, OK.
- Lee, H. (1999) Casting a cold eye: two new biographies reinterpret the self-invention of Yeats. *New York Times Book Review*, November 21, pp. 9-10.
- Lewin, L. (1888a) Ueber Anhalonium lewinii. (Naunyn-Schmiedeberg's) *Arch. Exp. Path. Pharm.*, **24**, 401-411.
- Lewin, L. (1888b) Anhalonium Lewinii. *The Therapeutic Gazette*, [Detroit] 3rd series, **4**, 231-237 [a translation of 1888a with minor modifications].
- Lewin, L. (1894a) Ueber Anhalonium lewinii und andere Cacteen. (Naunyn-Schmiedeberg's) *Arch. Exp. Path. Pharm.*, **34**, 374-391.
- Lewin, L. (1894b) Ueber Anhalonium lewinii und andere giftige Cacteen. *Berichte der Deutschen Botanischen Gesellschaft*, **12**, 283-290.
- Lewin, L. (1895) Ueber Anhalonium lewinii. *Pharmaceutische Zeitung* (Berlin), **40**, 22 May 1895, 343. 328-329.
- Lewin, L. (1927) *Phantastica, die betäubenden und erregenden Genussmittel. Für Ärzte und Nichtärzte*. 2nd ed. Georg Stilke. Berlin.
- Lumholtz, C. (1902) *Unknown Mexico: A record of five year's exploration among the tribes of the western Sierra Madre; in the tierra caliente of Tepic and Jalisco; and among the Tarascos of Michoacan*, Scribners, New York.
- Lumholtz, C. (1921) *My Life of Exploration*. *Natural History*, **21**, 225-243.
- Lundström, J. (1983) Simple isoquinoline alkaloids. In: *The Alkaloids*, Vol. XXI. New York, Academic Press, pp. 255-327. (Listing taken from Table III, p 270.)

- Lundström, J. (1989) β -Phenethylamines and ephedrines of plant origin. In: *The Alkaloids*, Vol. XXXV. New York, Academic Press, pp. 77-154.
- Merck (1991), *The Merck Veterinary Manual: A Handbook of Diagnosis, Therapy, and Disease Prevention and Control for the Veterinarian*, Fraser, C.M. et al., Eds., Merck & Co., Rahway, NJ.
- Mitchell, S.W. (1896) Remarks on the effects of Anhelonium [sic] lewinii (the mescal button). *British Medical Journal*, 1625-1629.
- Mogilewa, A. (1903), Ueber die Wirkung einiger Kakteenalkaloide auf das Froschherz. (Naunyn-Schmiedeberg's) *Arch. Exp. Path. Pharm.*, **49**, 137-156.
- Mooney, J. (1896) The mescal plant and ceremony. *The Therapeutic Gazette*, [Detroit] 3rd series, **12**, [Whole Series vol xx], 7-11.
- Moses, L.G. (1984) *The Indian Man: A Biography of James Mooney*, University of Illinois Press, Urbana, IL.
- Otto, R. (1923) *The Idea of the Holy: An Inquiry into the Non-Rational Factor in the Idea of the Divine and its Relation to the Rational*, Harvey, J.W., trans., Oxford U. Press, London.
- Perrine, D. (1996) *The Chemistry of Mind-Altering Drugs: History, Pharmacology, and Cultural Context*, American Chemistry Society/Oxford University Press, New York, NY.
- Pilcz, A. (1896) Ueber Pellotin. *Wiener Klinische Wochenschrift*, **9**, 1121-1122.
- Prentiss, D.W., and Morgan, F.P. (1895) Anhalonium lewinii (mescal buttons): A study of the drug, with especial reference to its physiological action upon man, with report of experiments. *The Therapeutic Gazette*, [Detroit] 3rd series, **11**, (9) [Whole Series vol xix], 16 September 1895, 577-585.
- Prentiss, D.W., and Morgan, F.P. (1896) Mescal Buttons. Anhalonium lewinii-Hennings. (Lophophora williamsii-lewinii-Coulter, *Transactions of the Association of American Physicians*, **11**, 289-309.
- Robertson, J. (1968) Uncontainable Joy. In: *The Ecstatic Adventure*, Metzner, R., Ed., Macmillan, New York, NY, pp. 84-91.
- Rouhier, A. (1926) *Monographie du Peyotl: Echinocactus Williamsii Lem.: Thèse pour l'obtention du diplôme de Docteur de l'Université de Paris (Pharmacie)*, Lucien Declume, Lons-le-Saunier.
- Rouhier, A. (1975) *La Plante qui fait les yeux émerveillés: Le Peyotl*, [1927 edition with minor corrections by the author], Trédaniel, Paris.
- Ruland, V. (1985) Primal hunt. In: *Eight Sacred Horizons*, Macmillan, NY, pp. 1-23.
- Schumann, K. (1895) Ueber giftige Kakteen. *Pharmaceutische Zeitung (Berlin)*, **40**, 13 March 1895, 175.577-585.
- Shulgin, A. (1973) Mescaline: The chemistry and pharmacology of its analogs. *Lloydia*, **36**, 46-58.
- Shulgin, A., and Shulgin A. (1992) *PIHKAL: A Chemical Love Story*, Transform Press, Berkeley, CA.
- Simmons, C.S. (N.D.) *The Peyote Road: An Exegesis of the Religious and Mystic Rites of the North American Indians by C. S. Simmons, One Who Has Traveled That Road*, Unpublished manuscript in MS 2537, Smithsonian Institution National Anthropological Archives.
- Slotkin, J.S. (1975) *The Peyote Religion: A Study in Indian-White Relations*, Octagon (Farrar, Straus, Giroux), New York.
- Späth, E. (1919) Über die Anhalonium-Alkaloide. I. Anhalin und Mezcalin. *Monatshefte für Chemie u. verwandte Teile anderer Wissenschaften*, **40**, 129-154.
- Stafford, P. (1992) *Psychedelics Encyclopedia*, 3rd ed., Ronin Publishing, Berkeley, CA.
- Stewart, O.C. (1987) *Peyote Religion*, University of Oklahoma Press, Norman, OK.
- Todd, J.S. (1969) Thin-layer chromatography analysis of Mexican populations of Lophophora (Cactaceae). *Lloydia*, **32**, 395-398.
- US (1918) *Peyote. Hearings on House Resolution 2614*, pt. 1, Feb 21-25 [pp. 1-168]; pt. 2, March 23 [pp. 169-193]. 67th Cong. 2nd session. US Gov. Printing Office.
- USD (1943) *The Dispensatory of the United States of America*, 23rd ed., Wood, H. C. and Osol, A., Eds., J. B. Lippincott, Philadelphia.
- White, A.M., Jeffares, A.N., Eds., (1992) *The Gonno-Yeats Letters 1893-1938: Always Your Friend*, Hutchinson, London.
- Wiley, H.W. (1895) Letter [to W.J. McGee?] 14 March 1895. MS 2537, Smithsonian Institution National Anthropological Archives.
- Wiley, H.W. (1897) Letter to Wm. J. McGee, Acting Director, bureau of American Ethnology, 26 June 1897. MS 2537, Smithsonian Institution National Anthropological Archives.
- Wiley, H.W. (1920) *Dr. Harvey W. Wiley on 2.75 Per Cent Beer: Basic Facts for Busy People*. American Issue Publishing Co., Westerville, OH [Eisenhower Library Historical Manuscripts, Johns Hopkins University].
- Wiley, H.W. (LC). *Papers of Harvey Washington Wiley*, ca. 1854-1944. MM 79045690, Library of Congress Manuscript Division, Washington DC.
- Yeats, W.B. (1961) *Essays and Introductions*, Collier Books, New York, NY.
- Young, J.H. (1996) *Harvey Washington Wiley and Pure Food Reform*. In: *American Reform and Reformers: A Biographical Dictionary*, Miller, R.M.; Cimbala, P.A., Eds., Greenwood Press, Westport, CT.