LET ME assure the reader who may have a response to a presumptuous title that what follows does not comprise any final view or comprehensive statement; in this case at least, the appearance is not the reality. Rather, my discussion proceeds from a particular point of view (or bias, if you wish)—namely, that of a psychopharmacologist over 30 years of age, who has learned from experience that subjective effects of drugs, changes in feelings and perceptions reported verbally by the subject—do not always correspond to the observable behavior manifested by the subject. When there is a discrepancy, the subject's observable behavior is the better prognosticator of consequences for his health and for the health of others in his social milieu. Consider the drunkard, or, to stray from psychopharmacology proper, consider the manic or schizophrenic with delusions of grandeur. I am tempted, at this point, to stray even further and consider the general epistemological question of the validity of "direct" or "immediate" experience, unchecked by "objective" testing of logical consequences. This would lead us too far afield at the moment, but I shall return to it later.

In accordance with this point of view, I shall have relatively little to say about the "subjective" effects of marihuana—the "highs," "kicks," "drives," "insights," "serenities," "fantasies," "transcendental experiences," etc. Of these collectively, I would say, with Heine (in another context) that they constitute

Ein Mysterium das nur
Von demjen'gen wird verstanden
Der entsprung von dem Kerker
Der Vernunft and ihren Banden.

(Disputation, Verse 28)

(a mystery that can be understood only by him who has escaped from the prison of reason and its restraints). Elsewhere) I have suggested that these terms, meaningless though they are in an operational sense, nevertheless do influence behavior in one way—namely, in facilitating repeated use of the drug through their acquisition of
secondary reinforcing properties. But as we are concerned here with clinical and social consequences of marihuana intoxication, we shall turn now to "objective" data.

These are derived from various sources. Some are anecdotal reports of marihuana-smoking in a "natural" setting, others in an "experimental" setting, with and without "quantitative" tests. Still others, entirely experimental, deal with the effects of marihuana extracts, either of a mixture of cannabinoids or of 49-tetrahydrocannabinol alone, or with the effects of synthetic analogues of natural cannabinoids. All of these are relevant to the issues at hand, since consideration of them permits us to formulate estimates not only about the effects of smoking of pot obtainable through illicit channels in the United States under present social conditions, but also about the potentialities of pot-smoking under less restrictive social conditions were such to supervene.

Perhaps the most succinct description of what might be called "the complete acute marihuana intoxication syndrome" is that given by Bromberg2 in 1934.

The chief effect of the drug in the smoked form (when inhaled) is an intoxication of transitory nature and relatively uniform symptomatology. The intoxication is initiated by a period of anxiety within 10 to 30 minutes after smoking, in which the user sometimes becomes panicky, develops fears of death and anxieties of vague nature associated with restlessness and hyperactivity. Within a few minutes he begins to feel more calm and now develops definite euphoria; he becomes talkative, feels more at ease, is elated, exhilarated and filled with a vivid sense of happiness. He begins to have a sensation of lightness in the limbs. Walking becomes effortless. The paresthesias and changes in bodily sensations help give an astounding feeling of lightness to the limbs and body. Elation continues: he laughs uncontrollably and explosively for brief periods of time without, at times; the slightest provocation: if there is a reason, it quickly fades, the point of the joke is lost immediately. Speech is rapid, flighty, the subject has the impression that his conversation is witty, brilliant, ideas flow quickly. Conclusions to questions seem to appear ready formed and surprising in their clarity. The feeling of clarity is, of course, spurious: it is merely a subjective feeling. When the user wishes to explain what he has thought, there is only confusion. The rapid flow of ideas gives the impression of brilliance of thought and observation. The flighty ideas are not deep enough to form an engram that can be recollected—hence the confusion that appears on trying to remember what was thought. The smoker is seized with the desire to impart his experiences to others: he wishes in some way to transmit the glory and the thrill. Activities are slow in passing. There is a feeling of changed reality. Sex excitement consists in the fact that sexual objects in the environment become extraordinarily desirable. At this stage (about 20 to 30 minutes after starting) he may begin to see visual hallucinations which may start as misinterpretations and illusions. Characteristically, there are, at first, flashes of light or amorphous forms of vivid color which evolve and develop into geometric figures, shapes, human faces and pictures of great complexity. The depth of color and its unusually interesting
tone strike the subject. After a longer or shorter time, lasting up to two hours, the smoker becomes drowsy, falls into a dreamless sleep and awakens with no physiologic aftereffects and with clear memory of what has happened during the intoxication.

Of course, not all features of this "complete syndrome" develop in every marihuana smoker on every occasion. If, however, the dose-effect studies with chemically pure tetrahydrocannabinols of Isbell and Jasinski and Hollister et al are accepted as indicative of the potentialities of marihuana, then the variability of the effects of smoking marihuana cigarettes could readily be explained in terms of the interaction of two factors: (1) the relatively low concentrations of tetrahydrocannabinols in marihuana available at the present time in the United States, and (2) a conglomeration of "predisposing conditions," the natures of which are largely unknown, but probably include characteristics of the personality make-up and expectations of the smoker and of the environmental setting in which marihuana is smoked. Again, if Isbell's and Jasinski's and Hollister et al's studies are accepted as relevant to marihuana, then it could be expected that the postulated "predisposing conditions" would become less and less important in producing the "complete marihuana syndrome" as the concentration of active tetrahydrocannabinols in the cigarettes increases. Such dose-effect relationships are also characteristic of mescaline, lysergic acid diethylamide (LSD), and their congeners, the "complete intoxication syndromes" of which are similar in many respects to that described for marihuana.

It should be stressed that the variability in the effects of all of these drugs at low dosage levels does not mean that these drugs have no specific pharmacological actions. For example, their dose-effect patterns could not be mimicked by pentobarbital, or morphine, or chlorpromazine, or a wide variety of other psychotropic drugs. Elsewhere, I have stressed the "pattern specificities" of psycho-tropic drugs in general—meaning, that such drugs can be classified according to the effects they produce at various dose levels under various conditions in a manner that allows us to distinguish between, say, "sedative-hypnotic," "potent analgesic," "tranquilizing," "antidepressant," and "psychotomimetic" agents. Tetrahydrocannabinol could certainly be classified as "psychotomimetic." Pending more complete studies with marihuana per se, I am not sure how to classify this agent; however, the literature does contain a number of reports of "psychotic reactions" to even the relatively low-potency marihuana cigarettes available in this country.

Thus, Bromberg describes 11 patients seen at Bellevue Hospital in New York who exhibited visual and auditory hallucinations, distortion of visual perception, manic states, depression, paranoid reactions or catatonic excitement after smoking marihuana. Two such instances occurred in a study on the effects of marihuana in which I participated in the 1940's. One of the subjects (described in the report of Williams et ale), a rather unstable and secretive individual, was being tested for auditory acuity...
with an audiometer. After smoking three marihuana cigarettes, he tore the earphones off his head, yelled, "I hear! I hear!," wept and shouted accusations of persecution against the custodial supervisor, which were definitely delusional. After about an hour, he vomited, calmed down, and apologized for his unseemly behavior. Through the whole episode, he remained well-oriented toward person and place. Another subject, who subsequently dropped out of the study, became disturbed after smoking marihuana cigarettes (I do not recall how many) in the course of an electroencephalographic (EEG) investigation, conducted in an electrically shielded room which, in those days, adjoined the research shop. Jumping off the bed, he seized a heavy instrument (I believe it was a tin-shears), held it over my head, threatened to bash it in if I, or any of the shop personnel, made any move, and accused us of trying to control his mind. This proclamation was also extended to others who came running to the shop door (the only entrance and exit). Needless to say, we did not make any move, but after a few minutes (it seemed like an hour) of verbal persuasion, he allowed himself to be escorted to the disturbed psychotic ward, where he made an uneventful recovery after a day or two. Keeler7 also reported 11 cases of "adverse reaction" (delusions, paranoid ideas, hallucinations, depersonalization, fear of homosexuality) described retrospectively by marihuana smokers. Very recently, Talbott and Teague described 12 "psychotic reactions" lasting 1 to 11 days, seen during a one-year period among US soldiers in Vietnam, occurring after smoking Vietnamese marihuana cigarettes for the first time; these authors estimate that Vietnamese marihuana is twice as potent as the US variety—a possible indication of the dose-effect relationship discussed above.

The "complete acute marihuana intoxication syndrome" has also been described after administration of extracts of marihuana" and of "synhexyl" (or "pyrahexyl compound")—a synthetic analogue of tetrahydrocannabinol.6 It may be remarked here that the Mayor's Committee report,9 often cited as proving marihuana "harmless," con-thins descriptions of nine individuals (among 72 subjects) who displayed "psychotic reactions" after administration of cannabis extract or marihuana.

In contrast to the descriptive reports of the "complete acute marihuana intoxication syndrome" (including "adverse reactions") which have been cited, as well as others in the same vein," most "objective" tests of intellectual and psychomotor performance have yielded only little or no evidence of impairment after smoking marihuana cigarettes 9.12 Running through most of the descriptive accounts, however, are references to "forgetting what has just been said," inability to form an "engram that can be recollected," "fragmentation of thought processes," "gaps in the stream of thought," and similar references to a disturbance of immediate recall that becomes apparent when the observer listens attentively to what the marihuana smoker is saying, or trying to say while intoxicated. If I may be permitted some poetic licence, I may put it this way:

The drunkard staggers only when he walks,
While the pot-head forgets only when he talks

This profound truth was rediscovered recently by Well and Zinberg as they asked subjects to speak about a "dramatic incident" in their lives into a tape recorder before and after smoking marihuana. Data are given only for chronic users who were tested on "high-dose" marihuana cigarettes. Ratings of predrug and postdrug speech samples on a 7-point (+3 to −3) bipolar scale for narrative quality, coherence, unity, awareness of a listener, thought completion, time orientation, free associative quality, degree of intimacy, and nature of imagery, made by five independent judges who did not know the purpose of the scoring, indicated marked impairment in all categories. "Overall, the following patterns were noted: marihuana tended to cause greater and more vivid imagery, shift of time orientation from past or future to present, increased free associative quality and intimacy, decreased awareness of a listener." Commenting on the basis of "careful listening," Weil and Zinberg think the problem is this: a high individual appears to expend more effort than when not intoxicated to remember from moment to moment the logical thread of what he is saying. . . . This speech difficulty has two principal manifestations: simple forgetting of what one is going to say next and a strong tendency to go off on irrelevant tangents because the line of thought is lost." Judging from my own data on the effects of LSD, mescaline, etc, and the data of others, I suspect this effect of marihuana on the immediate recall required for speech is unique, and as such may furnish a clue to its mode of action in the central nervous system.

Probably, the sites of action of marihuana in the brain are not entirely the same as those of LSD, since there is no cross-tolerance between tetrahydrocannabinol and LSD. Nor is it likely that marihuana and central anticholinergic agents, like atropine or scopolamine, share the same loci of actions, as the "anmesias" they produce are very different clinically.

To my knowledge, only Williams et al have reported on the effects of chronic cannabis intoxication. In six subjects taking 60 to 2,400 mg of "pyrahexyl compound" orally (one to eight doses per day ad libitum) for 26 to 31 days; the initial effects were drowsiness, euphoria, dryness of the mouth, injected sclerae, increased appetite, swollen eyelids, spontaneous laughter, garrulity, dilatation of the pupils, slowness of reaction, and difficulty in expressing thoughts. (Pupillary dilatation was not observed as an effect of marihuana by Weil et al or of tetrahydrocannabinol by Isbell and Jasinski.) After two to three days, there was loss of interest in their surroundings and decreased ability to concentrate. After four to six days, all subjects increased their dosage, with reappearance of the initial effects to some degree. Again, tolerance developed to these effects and henceforth only progressive lethargy and irritability were observed. No abstinence phenomena developed during the first two days after abrupt withdrawal of the drug, but on the third day most became restless, slept poorly, had poor
appetites and hot flashes, and perspired. One subject had a "panic reaction"—agitated, fearful, cried, disoriented—which subsided over three days. Another had a hypomanic reaction on the fourth withdrawal day—overactive, euphoric, drowsy, bowing to others. These two reactions are suggestive of withdrawal psychoses, but systematic studies on the effects of replacement on "pyrahexyl compound" were not made.

Physiological changes during long-term pyrahexyl intoxication included lowering of rectal temperature, initial acceleration and later slowing of pulse rate, depression of respiration, initial increase and later decrease in caloric intake, increase in body weight, increased time spent in bed, and progressive decrease in motor activity. EEG changes consisted mainly of slight decrease in alpha frequency and alpha percentage with appearance of slow (theta-delta) activity in two of the subjects.

Six subjects (including three who had participated in the "pyrahexyl compound" study) smoked marihuana ad libitum for 39 days. During the first few days, they exhibited euphoria, bursts of spontaneous laughter, silly behavior, and difficulty in concentrating. Later, they showed loss of interest in work, decreased activity, indolence, non-productivity, and neglect of personal hygiene. All subjects reported subjective "jitteriness" on withdrawal of marihuana, but none showed abstinence signs. During longterm marihuana intoxication, injection of the sclerae, increased pulse rate, dilatation of the pupils, increased appetite (especially for sweets), and increased blood pressure were noted initially. Later these changes declined. Interestingly, no changes in scores on the Seashore test for Musical Talents were found, but the subjects uniformly reported that their performance was better on marihuana.

The social aspects of marihuana intoxication can, perhaps, best be discussed in two frames of reference: (1) public health and (2) ideology. From the public health standpoint, it should be pointed out, first of all, that there is, at present, no medical indication for prescribing marihuana. Stockings,5 and others, writing in the 1940's and 1950's, suggested that, as a "euphoriant," marihuana or other cannabis preparations might be used in the treatment of depressions. Whether or not substitution of "fragmentation of thoughts," "losing the memory of what has just been said," and other features of the "marihuana high" for depression is good medical practice, I leave for you to decide. In any case, the proponents of this so-called treatment seem to have overlooked the fact that depressions serious enough to require treatment last weeks or months, and that the "euphoriant" actions of marihuana give way to apathy and irritability during long-term intoxication. Furthermore, we do have psychopharmacological agents today that, with proper medical control, can be used in the treatment of depressions without producing loss of immediate recall, etc.
Is marihuana dangerous to health, personal or public? Certainly the "adverse reactions" cited would answer that question in the affirmative on both counts. The fact that such "adverse reactions" to US marihuana cigarettes are sporadic does not militate against this answer for at least two reasons: (1) the "predisposing conditions" are not precisely defined and, hence, no one can know who, in what circumstances, will be affected in such a manner; and (2) the potency of pot varies greatly and, as pot-pushers do not usually furnish reliable information on the potency of their merchandise, no one can know whether he is smoking a "low" or a "high" dose of cannabinoids. Apart from the possibility of "adverse reactions," I, personally, would not care to be a passenger in a car chauffeured by a driver who could not remember whether or not he had just placed his foot on the brake—or was it the accelerator?

Should marihuana and other cannabis products be controlled—ie, should the importation, manufacture, and sale of these products be prohibited? The answer to this question depends on whether or not the person who asks it accepts the responsibility of the government to protect public health, and agrees that prohibition of importation, manufacture, and sale of a noxious product is an effective way of discharging such responsibility. If the questioner accepts both premises, then my answer would be "yes." To those who reject the second premise only (effectiveness of prohibition), my answer would be another question, "So you tell me how." Those who reject the first premise (responsibility of the government) are referred to the discussion on "ideology" below.

Is not marihuana the same as alcohol—both can produce "highs" and "euphoria," can they not? I have already expressed my opinion of the information conveyed by these terms (namely, nothing more than that the user likes whatever he is using) so let us look at the "complete intoxication syndromes" of these two drugs—they are very different; hence, the answer to this question is "no."

Is marihuana any more dangerous than alcohol? The answer to this question depends on whether one is referring, in the case of alcohol, to the drink before dinner or to alcoholic inebriation. I do not know whether one can achieve the same state as that produced by the drink before dinner by inhaling only a limited amount of cannabinoids or their pyretic products, but I assume that when one seeks to get "high" on marihuana one smokes enough to produce the specific effects of this drug, not those of alcohol. From what has been said about these specific effects, I would say that both acute marihuana intoxication and acute alcoholic inebriation are bad from the health standpoint, though for very different reasons. As for long-term cannabinism and long-term alcoholism, we have plenty of evidence that the latter is very, very bad while such meager data as exist suggest that the former is, at least, bad. I do not think it is profitable to quibble about the relative merits of "very, very bad" and "just bad."

Is it not hypocritical to tolerate (and advertise) alcohol and prohibit marihuana? Yes, but it
would be even more hypocritical for a government responsible for public health to tolerate both. The fact is that prohibition of alcohol was tried and failed because of public hypocrisy. The cure for hypocrisy is not more of it, but restoration of honesty, in this case by eschewing alcoholic inebriation as well as cannabis intoxication. Unfortunately, Western cultures have looked at alcoholic inebriation as a symbol of masculinity, thereby foredooming efforts at control.

As yet, no such cultural values have been placed on cannabis in the West, so control of this drug is not likely to meet with overwhelming public resistance.

This brings us to the "ideological" frame of reference. In dialogues with students and their professors in a number of conferences,

I have encountered some who categorically reject the "objective" data on drug effects that I am fond of presenting, as the products of "scientism," irrelevant to the "only valid reality," namely, that of personal, subjective, "immediate" (nonverbalized) experience. Asked how they would test whether or not such "immediate experiences" are delusional or hallucinatory, they cite this question as another example of "scientism" promulgated by the "Establishment" to control and manipulate its victims. Though usually couched in Marxian language, their imprecations against the "Establishment" and the utopian society they would substitute for it have a distinctly "idealistic" ring-in fact, they remind one rather of the kind of thinking that preceded "positivism" in philosophy. To me, at least, this kind of thinking has a mystical, antinomian flavor, not unlike that of certain Eastern religions, despite the absence of a deity. As such, these premises and conclusions cannot be contested by appeal to "objective evidence," and the problem is complicated further by the undeniable fact that many scientists hold and promulgate views that they refuse to submit to objective scrutiny and are as mystical as those of antiscientists themselves. All one can say is that if it is accepted that most human beings would, most of the time, vote for long life, then societies must be formed to ensure the production and equitable distribution of material goods and protection of public health from under-nutrition, disease, and dangerous drugs, even at the sacrifice of some personal "freedoms" and that "scientism" has provided such facilitators of long life though, regrettably, some scientists have not divested themselves of the mystical dogmas they have inherited from ages past which now threaten to destroy life by perversion of the products of scientific technology. At the risk of being banal, I would say, "Do not throw out the baby with the bath water, especially since you are likely to fill the bathtub again, not with just dirty water, but with the same witch's brew that revealed to Goethe's Faust not the Truth Beyond, but the Illusion Within."
References


