

# The Varieties of Psychotropic Drugs\*

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## 1 Opium, morphine, heroin, and related synthetics

The opiates are unrivalled in their ability to relieve pain. Opium is the dried milky exudate obtained from the unripe seed pods of the poppy plant (*Papaver somniferum*), which grows naturally throughout most of Asia Minor. Of the 20 or more alkaloids found in opium, only a few are pharmacologically active. The important constituents of opium are morphine (10 percent), papaverine (1 percent), codeine (0.5 percent), and thebaine (0.2 percent). (Papaverine is pharmacologically distinct from the narcotic agents and is essentially devoid of effects on the central nervous system.) In about 1804 a young German apothecary's assistant named F.W.A. Sertürner isolated crystalline morphine as the active analgesic principle of opium. Codeine is considerably less potent ( $\frac{1}{6}$ ) and is obtained from morphine. Diacetylmorphine—or heroin—was developed from morphine by the Bayer Company of Germany in 1898 and is five to 10 times as potent as morphine itself. Opiates are not medically ideal. Tolerance is developed quite rapidly and completely in the more important members of the group, morphine and heroin, and they are highly addictive. In addition, they produce respiratory depression and frequently cause nausea and emesis. As a result, there has been a constant search for synthetic substitutes: meperidine (Demerol), first synthesized in Germany in 1939, is a significant addition to the group of analgesics, being one-tenth as potent as morphine; alphaprodine (Nisentil) is one-fifth as potent as morphine but is rapid-acting; methadone, synthesized in Germany during World War II, is comparable to morphine in potency; levorphanol (Levo-Dromoran) is an important synthetic with five times the potency of morphine. These synthetics exhibit a more favourable tolerance factor than the more potent of the opiates, but in being addictive they fall short of an ideal analgesic. Of this entire series, codeine has the least addiction potential and heroin has the greatest.

## 2 Hallucinogenic drugs

It is difficult to find a suitable generic name for a class of drugs having as many diverse effects as have been reported for “hallucinogens.” Abnormal behaviour as profound as the swings in mood, disturbances in thinking, perceptual distortions, delusions, and feelings of strangeness that sometimes occur with these drugs is usually indicative of a major mental disorder; consequently these substances are often called psychotomimetic to indicate that their effects mimic the symptoms of a naturally occurring psychosis. There are indeed points of similarity between the drug states and the natural psychoses, but there are also many dissimilarities—so many as to make the resemblance quite superficial. Such substances as the bromides, heavy metals, belladonna alkaloids, and intoxicants can, however, cause abnormal behaviour to a degree sometimes described as psychotic, and if the list is extended to include the drugs being discussed here, then the objection—that the term psychotomimetic should refer only to the mimicking of a natural psychosis—is no longer valid. Taking this point of view, some investigators prefer the term psychotogenic (“psychosis causing”). One of the most conspicuous features of this kind of drug experience is the occurrence of the distinctive change in perception called hallucination. For this reason the term hallucinogenic is sometimes

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used. Most people are aware, however, even while under the influence of the drug, that their unusual perceptions have no basis in reality; so this is not a very accurate use of the term. Strictly speaking, very few people truly hallucinate as a result of taking a hallucinogen.

All these terms are borrowed from medicine and are closely identified with pathology. In this sense, all are negative. It has been suggested that these drugs be called psychedelic (“mind manifesting”). This term shifts the emphasis to that aspect of the drug experience that involves an increased awareness of one’s surroundings and also of one’s own bodily processes—in brief, an expansion of consciousness. The term also shifts emphasis from the medical or therapeutic aspect to the educational or mystical-religious aspect of drug experience. Only certain people, however, ever have a psychedelic experience in its fullest meaning, and the question of its value to the individual is entirely subjective. The possibility of dangerous consequences, too, may be masked by such a benign term. None of these terms, then, is entirely satisfactory, and one or two are distinctly misleading. (These terms are used interchangeably henceforth with no particular intent other than to indicate membership in the LSD-type family of drugs.)

## 2.1 Types of hallucinogens

Widespread interest and bitter controversy have surrounded the LSD-type drugs that produce marked aberrations of behaviour. The most important of these are (1) d-lysergic acid diethylamide, commonly known as LSD-25, which originally was derived from ergot (*Claviceps purpurea*), a fungus on rye and wheat, (2) mescaline, the active principle of the peyote cactus (*Lophophora williamsii*), which grows in the southwestern United States and Mexico, and (3) psilocybin and psilocin, which come from Mexican mushrooms (notably *Psilocybe mexicana* and *Stropharia cubensis*). Bufotenine, originally isolated from the skin of toads, is the alleged hallucinogenic agent contained in banana peels. It has also been isolated in the plant *Piptadenia peregrina* and the mushroom *Amanita muscaria* and is thought to be the active principle of the hallucinogenic snuff called cohoba and yopo and used by the Indians of Trinidad and by the Otamac Indians of the Orinoco valley. Harmine is an alkaloid found in the seed coats of a plant (*Peganum harmala*) of the Mediterranean region and the Middle East and also in a South American vine (*Banisteriopsis caapi*). There are some amides of lysergic acid contained in the seeds of two species of morning glory (*Rivea corymbosa*, also called *Turbina corymbosa*, and *Ipomoea tricolor*, also called *I. rubrocaerulea* or *I. violacea*). Synthetic compounds of interest are DMT (dimethyltryptamine) and STP (dimethoxyphenylethylamine; DOM). Cannabis (discussed separately below) is not usually included in this group of hallucinogenic drugs, but there is no particular justification for its exclusion. It is a resin obtained from the leaves and tops of the hemp plant (*Cannabis sativa*).

During the late 1970s phencyclidine (PCP), or “angel dust,” emerged as a leading street hallucinogen. Developed in 1956 as an anesthetic, PCP was discontinued for human use because of its severe and unpredictable side effects, the psychological effects sometimes persisting for as long as a month. PCP in liquid or crystal form can be injected, inhaled, or ingested; most commonly it is sprinkled on marijuana or tobacco and smoked.

## 3 Barbiturates, stimulants, and tranquillizers

There are many sanctioned uses for drugs that exert an effect on the central nervous system. Consequently, there are several classes of nonnarcotic drugs that have come into extensive use as sleeping aids, sedatives, hypnotics, energizers, mood elevators, stimulants, and tranquillizers.

Sedatives and hypnotics differ from general anesthetics only in degree. All are capable of producing central-nervous-system depression, loss of consciousness, and death.

The barbiturates, bromides, chloral hydrate, and paraldehyde are well-known drugs—with the barbiturates being of greatest interest because of the increasing number of middle and upper class individuals who have come to rely on them for immediate relaxation, mild euphoria, and an improved sense of well-being. But alcohol has been and continues to be the drug of choice for these same effects.

Of the drugs that excite the nervous system, nicotine, caffeine, the amphetamines, and the potentially addicting cocaine are well known. The use of stimulants to facilitate attention, sustain wakefulness, and mask fatigue has made the amphetamines an increasingly popular drug by students and those who engage in mental work. Originally the drug of truck drivers, amphetamine is now a common cause of arrest among teenagers and young adults who commit drug offenses. Cocaine has always been a potentially dangerous drug, and it has become especially popular among the middle and upper classes. Stimulants do not create energy, and the energy mobilized by these drugs is eventually depleted with serious consequences.

The tranquillizers are a heterogeneous group, as are the behaviours that they are employed to alter. In general, tranquillizing drugs reduce hyperactivity, agitation, and anxiety, which tend to cause a loss of behavioral control. Tranquillizing drugs do not characteristically produce general anesthesia, no matter what the dose; this attribute tends to distinguish tranquillizing drugs from the barbiturates.

All the barbiturates, stimulants, and tranquillizers are widely prescribed by physicians, and all these drugs are available through nonmedical (illegal) sources. Most of these drugs are classified as “habit-forming.” The minor tranquillizers are commonly associated with habituation and may induce physical dependence and severe withdrawal symptoms. The amphetamines and cocaine intoxicate at high dosages, and both are capable of inducing serious toxic and psychotic reactions under heavy use. The barbiturates are the leading cause of death by suicide. They are judged to be a danger to health by both the World Health Organization Expert Committee and the United Nations Commission on Narcotic Drugs, which have recommended strict control on their production, distribution, and use. The nonnarcotic drugs in widespread use among middle and upper class citizenry manifest considerable untoward consequences for the individual and for society when abused—thus placing their problem in a different perspective than that normally associated with the opiates, LSD, and marijuana.

### 3.1 Barbiturates

The barbiturates relieve tension and anxiety at low dose levels without causing drowsiness, although some tendency toward drowsiness may be an initial reaction for the first few days on the drug. These drugs exert a selective action in small amounts on higher cortical (brain) centres, particularly those centres that are involved in the inhibitory or restraining mechanisms of behaviour. As a consequence, there is an increase in uninhibitedness such as talkativeness and unrestricted social interaction following the taking of the drug. There is also an impairment of function at low dose levels. All the barbiturates are capable of inducing sleep when given in sufficient amounts. They do not affect the perception of pain as do the analgesics, but they do alter the individual’s response to pain (e.g., decreasing his anxiety) and are useful in this regard. Infrequently, the barbiturates produce undesirable reactions ranging from simple nervousness, anxiety, nausea, and diarrhea to mental confusion, euphoria, and delirium. Some tolerance is developed to these drugs, but no physical dependence occurs in the drug range (100 to 200 milligrams) normally employed clinically. Prolonged use may lead to drug habituation and psychic dependence. When the drug is used chronically in higher amounts (400 milligrams per day), physical dependence may develop. Sudden withdrawal of a barbiturate following chronic use is frequently associated with withdrawal symptoms that are more severe than those produced by the opiates. A barbiturate should never be withdrawn abruptly following long continued use. The barbiturate addict shows many of the symptoms associated with chronic alcoholism, including blackouts, irrationality, slurred speech, poor motor coordination, emotional deterioration, mood swings, and psychosis.

### 3.2 Cocaine

Cocaine is an alkaloid derived from the leaves of the coca plant (*Erythroxylon coca*), a bush that is natural to Bolivia, Chile, and Peru along the western slopes of the Andes Mountains. Cocaine has a pronounced excitant action on the central nervous system and, in small doses, produces a pleasurable state of well-being associated with relief from fatigue, increased mental alertness, physical strength, and a reduction of hunger. In greater amounts, cocaine is an intoxicant that produces excitement, mental confusion, and convulsions. The Incas were acquainted with the ability of cocaine to produce euphoria, hyperexcitability,

and hallucinations; the practice of chewing the coca leaf as part of religious ceremonials was an established custom at the time of the Spanish conquest in the 16th century. The natives who now work the mines high in the Andes chew coca leaves for increased strength and endurance. Coca plants are under cultivation in Sri Lanka (formerly Ceylon), India, and Java. The alkaloid, tropacocaine, is chemically related to cocaine and is obtained from the Java coca plant.

Cocaine is habit forming and may also be physically addicting in some individuals, but not to the extent of the opiates. Only certain persons display abstinence symptoms on withdrawal. Significant physiological tolerance does not develop. Chronic use is associated with severe personality disturbances, inability to sleep, loss of appetite, emaciation, an increased tendency to violence, and antisocial acts. When a toxic psychosis develops, it is characteristically accompanied by paranoid delusions. Hallucinations are prominent with continued use of cocaine, particularly the tactile hallucinations that give the impression that bugs are under the skin. The drug is a white crystalline powder in pure form and the practice of “snuffing” cocaine was common in Europe at the turn of the 20th century. It is less potent when taken by mouth. When injected by vein, a favourite method in the United States, the effects are rapid in onset, intense, but of short duration. This is followed by a correspondingly deep depression that prompts the user to repeat the dose to restore the sense of well-being. Cocaine is sometimes mixed with heroin to dampen any extreme excitability produced by the cocaine. The great number of undesired effects that come on continued use frequently prompts the cocaine user to turn to other drugs.

### 3.3 Amphetamines

These stimulants are of three types having closely related actions on the nervous system: amphetamine proper (Benzedrine), one of its isomers (Dexedrine), and methamphetamine (Methedrine). The amphetamines have been used to alleviate depression, fatigue, the hyperkinetic behaviour disturbances of children, postencephalitic Parkinsonism, enuresis, nausea of pregnancy, and obesity. More recently, the amphetamines have been used in combination with one of the barbiturates, such as amobarbital or phenobarbital, to produce mood elevating effects. It is the effects of the amphetamines on mood that have led to their widespread abuse. A toxic psychosis with hallucinations and paranoid delusions may be produced by a single dose as low as 50 milligrams if no drug tolerance is present. Although the normal lethal dose for adult humans is estimated to be around 900 milligrams, habitual use may increase adult tolerance up to 1,000 milligrams per day.

The ability of amphetamine to produce a psychosis having paranoid features was first reported in 1938, shortly after its introduction as a central stimulant. Sporadic reports of psychosis followed, and in 1958, a monograph on the subject of amphetamine psychosis included these statements:

Psychosis associated with amphetamine usage is much more frequent than would be expected from the reports in the literature. . . .The clinical picture is primarily a paranoid psychosis with ideas of reference, delusions of persecution, auditory and visual hallucinations in a setting of clear consciousness. . . .The mental picture may be indistinguishable from acute or chronic paranoid schizophrenia. . . .Patients with amphetamine psychosis recover within a week unless there is demonstrable cause for continuance of symptoms; e.g., continued excretion of the drug or hysterical prolongation of symptoms.

There have been subsequent attempts to distinguish between amphetamine psychosis and paranoid schizophrenia. Whatever the outcome, amphetamine induces a psychosis that comes closer to mimicking schizophrenia than any of the other drugs of abuse, including LSD. Some behavioral symptoms such as loss of initiative, apathy, and emotional blunting may persist long after the patient stops taking the drug. Methamphetamine was used extensively by the Japanese during World War II, and by 1953 the habitual users of the drug in Japan numbered about 500,000 persons. This large-scale usage created such a serious social problem that the amphetamines were placed under governmental control in Japan in 1954. This Japanese experience has provided the opportunity for systematic studies on chronic methamphetamine intoxication. One group of 492 addicts who had been institutionalized showed a 14 percent rate of chronic

psychosis with evidence of permanent organic brain damage. In the language of the street, “Meth is death.” The amphetamines produce habituation, drug dependency, physiological tolerance, and toxic effects, but no physical addiction.

### 3.4 Tranquillizers

Serendipity has played a major role in the discovery of tranquillizers (as it has in all facets of medicine). Tranquillizers were unknown to medical science until the middle of the 20th century when the therapeutic value of reserpine and chlorpromazine in psychiatry was discovered by chance. Reserpine was originally derived in the 1930s from *Rauwolfia serpentina*, a woody plant that grows in the tropical areas of the world, but it has since been synthesized. Because this drug has many undesirable side effects such as low blood pressure, ulcers, weakness, nightmares, nasal congestion, and depression, however, it has been largely replaced in psychiatric practice by chlorpromazine (Thorazine) and a number of other phenothiazine derivatives synthesized in the 1950s. These phenothiazines are inexpensive, easily available, produce little immediate pleasurable effects, can usually be taken in large amounts without harm, and are not physically addicting. They are used extensively in the treatment of various hyperactive and agitated states, and as antipsychotic agents. These drugs, however, may produce jaundice, dermatitis, or, infrequently, convulsive seizures, and they do not combine well with the drinking of alcohol. Chlorpromazine is effective in reversing “bad trips” such as an LSD-induced panic reaction, but it tends to strengthen rather than reverse the powerful hallucinogenic effects of STP (DOM). There is a second group of drugs, inappropriately termed minor tranquillizers, which have achieved popularity in the management of milder psychiatric conditions, particularly anxiety and tension. The major form is meprobamate (Miltown, Equanil). Although these minor tranquillizers are considered to be entirely safe in terms of side effects, they do produce serious complications, for they are commonly associated with habituation and psychic dependence. Heavy, prolonged use may result in physical dependence and severe withdrawal symptoms including insomnia, tremors, hallucinations, and convulsions.

### 3.5 Cannabis

Cannabis is the general term applied internationally to the Indian hemp plant, *Cannabis sativa*, when the plant is used for its pleasure-giving effects. The plant may grow to a height of 16 feet, but the strains used for drug-producing effects are typically short stemmed and extremely branched. The resinous exudate is the most valued part of the plant because it contains the highest concentration of tetrahydrocannabinol (THC), an active hallucinogenic principle associated with the plant’s potency. The term cannabis also encompasses the use of the flowering tops, fruit, seeds, leaves, stems, and bark of the hemp plant even though the potency of these plant parts is considerably less than that of the pure resin itself. Hemp grows freely throughout the temperate zones of the world, but the content of the resin in the plant differs appreciably according to the geographic origin of the plant and the climate of the region in which the plant is grown. A hot, dry, upland climate is considered most favourable in terms of the potency of the plant. Careful cultivation is also considered to be an important factor in resin production. The prevention of pollination and the trimming of top leaves to produce dwarfing enhances the content of resin at plant maturity.

### 3.6 Types of cannabis preparations

Marijuana, hashish, charas, ghanja, bhang, keif, and dagga are names that have been applied to various varieties and preparations of the hemp plant. Hashish, named after the Persian founder of the Assassins of the 11th century (Hasan-e Sabbah), is the most potent of the cannabis preparations, being about eight times as strong as the marijuana used in the United States. Very few geographic areas are capable of producing a plant rich enough in resins to produce hashish. Unless sifted and powdered, hashish appears in a hardened, brownish form with the degree of darkness indicating strength. The North African either eats it in a confection or smokes it, the water pipe often being used to cool the smoke. The effects are more difficult

to regulate when hashish is either ingested as a confection or drunk. In India, this resinous preparation of cannabis is called charas.

Ghanja is a less active form of cannabis. Whereas hashish and charas are made from the pure resin, ghanja is prepared from the flowering tops, stems, leaves, and twigs, which have less resin and thus less potency. Ghanja is nevertheless one of the more potent forms of cannabis. It is prepared from specially cultivated plants in India, and the flowering tops have a relatively generous resinous exudate. Ghanja is consumed much in the manner of charas.

Bhang is the least potent of the cannabis preparations used in India. It does not contain the flowering tops found in ghanja. As a result, bhang contains only a small amount of resin (5 percent). It is either drunk or smoked. When drunk, the leaves are reduced to a fine powder, brewed, and then filtered for use. Bhang is also drunk in Hindu religious ceremonials.

Marijuana is the variety of cannabis grown in the Western Hemisphere. Considered mild in comparison to other forms of cannabis, it is similar in potency to the bhang used in India. Typically, it is smoked, but occasionally it is brewed as a tea or baked into cakes. Marijuana varies considerably in potency.