

become victims of cannabis psychosis, serious mental illness resulting from heavy marijuana use. I have seen young people in the grip of it. Many of the victims land in psychiatric hospitals, are discharged, but never fully recover.

Take the case of one ninth-grader I knew, a good student and baseball player, a gifted artist, a really dynamic youngster who had a substantial contribution to make to the world. Some friends got him to try marijuana. He enjoyed the high it produced. Soon, he was a heavy user. He lost interest in everything else, literally stopped functioning to the extent that in the middle of his tenth-grade year he was expelled from school. He didn't care; all he wanted to do was smoke pot all the time.

When his parents objected, he left and just wandered, for months. His father finally found him and placed him in a psychiatric institution in the hope he could be straightened out. But he didn't improve. After six months, the hospital discharged him. That was ten years ago. He's still wandering. He has no contribution to make now, and nothing to look forward to.

I have seen too many kids wander

away like that, never to recover from the damage they have inflicted on themselves. It is heartbreaking.

With 16 million Americans currently using marijuana, imagine the enormity of the destruction that is taking place in this generation. Yet today no fewer than 11 states have already decriminalized marijuana and there is a drive to make the ruinous junk legal.

Of course, most people who use pot are not criminals, any more than those millions of us who violate traffic laws are criminals. But even those of us who violate traffic laws understand that we must have such laws, that to abolish them would be to descend into chaos.

We need equitable laws dealing with marijuana, not a legal market for the stuff. For if we legalize marijuana, the human suffering that will ensue will surely lead us one day to repeal such a law. And, by that time, there won't be much we can do to help the victims of our folly.

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REPRINT

Marijuana Alert

I. BRAIN AND SEX DAMAGE

All during this decade, evidence has been accumulating that smoking marijuana may be seriously injurious to health. In the past few years, striking new studies have further darkened the picture, demonstrating measurable harm to diverse body organs—above all, to the brain and reproductive functions. Today the specter of a damaged human stock haunts scientific researchers and clinicians alike.

This two-part report brings, first, an account of the new research and, second, one doctor's cry of anguish about the hundreds of pot-damaged teenagers with whom he has worked.

By Percy Mann

SCIENTISTS from around the world are sending warning signals to the millions who smoke marijuana: mounting evidence indicates that pot smokers may be unwittingly damaging their brains, and decreasing their chances of conceiving and producing completely healthy offspring.

These warnings have emerged from recent gatherings of scientists reporting on their latest research. In July 1978, at the International Symposium on Marijuana held in Reims, France, some 50 researchers from 14 countries presented new studies about marijuana's injurious effects on reproduction, lungs, cellular me-

tabolism and the brain. In March 1979, at a conference in Virginia sponsored by the National Institute on Drug Abuse, investigators revealed more evidence of marijuana's harmful effects on the reproductive system. Three months later, at a conference at New York University Medical School, scientists and psychiatrists added to the growing list of dangers caused by chronic smoking of marijuana.

Responding to the startling evidence, the House of Representatives Select Committee on Narcotics Abuse and Control began hearings on the health hazards of marijuana in July. Rep. Lester Wolff (D., N.Y.),

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 chairman of the committee, said: "The United States is the most pervasive drug-abusing nation in history. And our most pervasive illegal drug of abuse is marijuana." Citing the latest (1978) national drug-abuse survey, Wolf noted that one in nine high-school seniors was smoking pot on a daily or near-daily basis, an almost 80-percent increase in three years' time; that pot smoking is now common among junior-high students; that evidence indicates pot smoking among 8- to 12-year-olds is increasing.

"Bummed Out." Of all the effects of marijuana, its impairment of the brain and its harm to the reproductive system pose the greatest threats. Pot has an *affinity* for the brain and the sex organs. Marijuana's *60* cannabinoids, substances found exclusively in the cannabis plant, are soluble in fat. They are attracted to the body's fatty organs, where they remain, only gradually clearing from the body. As one researcher put it, "When the high is gone, the pot is not."

The principal psychoactive, or mind-altering, cannabinoid is delta-9-THC. It has been traced radioactively, and it takes five to eight days for just half the THC in a single marijuana cigarette to clear from the body.

One organ that contains a large amount of fat is the human brain. The testes and ovaries also have high fat contents. What does marijuana buildup in these organs do? One psychiatrist researching this

area is Dr. Robert C. Gilkeson of Cleveland, Ohio. In 1976, a tall, handsome teen-ager came into his office. Formerly a good student, Steven complained of poor grades and difficulties in concentration and memory. "Everything I used to like has become a drag. Even chicks. I feel bummed out all the time."

Dr. Gilkeson discovered reversed d's and b's in the young man's handwriting—a classic finding in learning disabilities. He suggested an electroencephalogram (EEG), a brain-wave test. The report came back: "Abnormal EEG. Diffuse encephalopathic process [brain impairment]. Markedly immature for age." His brain-wave readings were typical of those of a 6- to 8-year-old.

Steven had admitted being a chronic (usually defined as daily or near-daily) pot smoker. The psychiatrist advised him to give up pot for two months. Steven was so shaken that he agreed.

In eight weeks his EEG was notably better, though not yet normal. "But," said Dr. Gilkeson, "there was real improvement in Steven's grades, in his mood, memory, humor and speech patterns." Encouraged, Steven agreed to go for another two potless months—after which the EEG report read: "Within normal limits for age."

Because of his work with Steven, Dr. Gilkeson embarked on a study that is still in progress. He has thus far given EEGs to 43 "typical" teen-

agers, who had been high at least twice a week for the previous four months, but who had not smoked pot for 48 hours preceding the test. The result: all 43 EEG's, like Steven's, were "markedly immature" and indicated diffuse brain impairment.

Striking Changes. Dr. Robert Heath, chairman of the department of neurology and psychiatry at Tufts Medical School, showed the Reims symposium slides of magnified brain cells from the limbic area of Rhesus monkeys. (The limbic area—directly involved in control of sex drives, appetites, emotions—is very similar in man and Rhesus monkeys.) These monkeys had been exposed to the smoke of two to three "monkey-sized" marijuana cigarettes (one-fourth of an average human joint) a day at three-percent THC. ("Good pot" sold on the street today has three- to six-percent THC.) Said Dr. Heath, "The smoke of one monkey-sized joint produces the same blood level of THC in the monkey as a human gets in his blood after smoking a 'human-sized' joint of the same THC strength. By checking blood levels, researchers can ascertain so-called 'human equivalency doses' for monkeys and for all other animals."

Result: the monkeys' brain cells showed striking structural changes, including abnormal deposits of opaque material in—and a widening of—the synaptic cleft between neurons. "This," said Dr. Heath, "may cause a slowing down or interrup-

tion in the movement of brain messages." There was also an abnormal clumping of the small sacs in the endings of nerve cells that contain the chemical activators of the brain, plus a significant increase of foreign matter in the nerve-cell nuclei. All of these conditions are associated with brain impairment.

At an earlier conference, Dr. Heath noted the rapidity of these changes: "Clinical observation indicates that people might drink for years before serious brain damage occurs. But it would seem from the monkey studies that you have to use marijuana for only a relatively short time in moderate to heavy use before evidence of brain damage begins to develop."

One of the symptoms reported by chronic pot smokers is impairment of short-term memory. Neurologist William H. Stuart of Atlanta, Ga., reports the case of a 28-year-old building subcontractor who smoked pot daily (but took no other drugs and drank only beer). After five years, he would look at a blueprint, walk over to his workmen and forget what to tell them. "He stopped smoking pot two years ago," says Dr. Stuart. "But his short-term memory has not improved at all. He has lost his business. And now he's working for another subcontractor—hammering nails."

Clinicians who see human results like this are as concerned as the researchers. Dr. Mitchell Rosenthal, president of Phoenix House Foundation (which runs a residential-treat-

ment program for drug abusers), represents the findings of many drug therapists when he says: "Most of the time, when kids stop smoking pot, they will regain what short-term memory they have lost. But I've also seen cases of kids who were chronic users, or who combined pot with another drug, where there was no subsequent improvement."

Effects on Sex. Perhaps the most important structure in the limbic area is a small lump of tissue in the center of the brain: the hypothalamus. Hanging from this is a still smaller lump: the pituitary. As little as a billionth of a gram of THC affects the hypothalamus, which, in turn, affects the pituitary, which regulates endocrine function and the hormones controlling sex and reproduction.

In November 1978, Drs. Joan Bauman and Robert Kolodny of the Masters & Johnson Institute in St. Louis reported on their study of 26 women, ages 18 to 30, who smoked pot three times a week or daily for at least six months prior to the study. Thirty-one percent of the menstrual cycles of the pot-smoking women showed a shortened luteal phase, compared with 9.7 percent of the cycles of the non-pot-smoking women. A shortened luteal phase could mean that a growing embryo might not be properly nourished. The women also had decreased prolactin, a hormone important in milk production.

Another survey by Dr. Kolodny, of 500 men, ages 18 to 30, who had

smoked pot for six or seven years, showed statistically significant lower rates of sexual activity and fewer orgasms. Dr. John Hall, chairman of the department of medicine at Kingston Hospital in Jamaica, reports that 20 percent of his male patients who have smoked for five or more years complain of impotence.

Research studies on animals seem to indicate that cannabinoids result in lowered sperm count and in a greater number of abnormally shaped sperm. These findings were replicated in humans using high marijuana dosages by Dr. Wylie Hembree of Columbia University College of Physicians and Surgeons. Dr. Hembree also found a statistically significant decrease in sperm mobility.

"Genetic Roulette." Since men constantly produce millions of sperm, the formation of sperm probably returns to normal when pot smoking is stopped. But the effect on women could be lasting. Dr. Akira Morishima of Columbia University says: "A human female is born with about 400,000 eggs. If they are injured, there's no way to repair that damage. And it has been proven, by radioactively tagging the THC, that it accumulates in the ovaries, as well as in other organs."

Dr. Morishima gave 150 "teen-aged" mice very high doses of THC daily. "All the mice were mated, and were sacrificed when the fertilized eggs had multiplied into four cells. In the control group, very few of the fertilized eggs were abnormal. But in

the THC group, about half the eggs were dying or had died. Of those that had lived, 20 to 30 percent looked unhealthy."

At the California Primate Research Center of the University of California at Davis, Rhesus monkeys, whose reproductive systems closely resemble those of human females, were given raisin cookies spiked with milligram amounts of THC—the monkey equivalent of a human smoking one to two joints. The monkeys received this dose every day for three years. Result: 44 percent of the pregnant "THC mothers" produced dead or dying offspring, compared to 12 percent, a normal birth loss, in the control group. Although all of the dead babies of the THC-drugged monkeys looked normal, a pathologist did microscopic evaluations of tissues and organs from each. He found subtle developmental abnormalities in various tissues and organ systems of the THC-exposed offspring, which were not present in the dead offspring of the undrugged mothers.

Says Dr. Ethel Sassenrath, who conducted the study: "The THC-exposed babies that survived acted differently from the others. They didn't seem to have normal 'brakes' on behavior. They showed deficits in attention. This kind of subtle behavioral difference is characteristic of marginal brain damage in early development."

An agent capable of affecting sex function, sex cells (sperm and egg) and fetus must be regarded as a

source of possible congenital damage in those offspring that do survive. In 1974, Dr. Gabriel Nahas of Columbia University College of Physicians and Surgeons, a pioneer in marijuana research, discovered that THC exposure diminished the capacity of individual cells to orchestrate life according to the genetic plan built into cellular molecules. THC inhibits formation of DNA (the genetic material essential for proper cell functioning and division) in cells, resulting in cellular death and abnormality. Dr. Nahas's finding has since been replicated by other scientists from 12 research groups here and abroad. Dr. Nahas warns: "Today's pot smoker may not only be damaging his own mind and body, but may be playing genetic roulette and casting a shadow across children and grandchildren yet unborn."

Warning Signals. Some pot smokers discount findings about marijuana's possible genetic effects with the comment: "Pot smokers have perfectly healthy babies." However, as pointed out by Dr. Robert Peterson of the National Institute on Drug Abuse: "Despite thousands of years of alcohol consumption, not until recently did doctors discover that not very large quantities of alcohol can cause the fetal alcohol syndrome which results in abnormal babies. Therefore, pregnant marijuana smokers would be wise to heed the present warning signals before all the definitive findings are in."

Dr. Robert DuPont, former direc-

tor of the National Institute on Drug Abuse, puts it this way: "In all of history, no young people have ever before used marijuana regularly on a mass scale. Therefore, our young-

sters are, in effect, making themselves guinea pigs in a tragic national experiment. Thus far, our research clearly suggests that we will see horrendous results."

II. ENEMY OF YOUTH

By WALTER X. LEHMANN, M.D.

ANYONE who says "pot" is harmless will get an argument from me. It hasn't been for any of the nearly 3000 young people I've worked with as a specialist in adolescent medicine. Virtually all who became addicted to hard drugs started with marijuana, which distorted their judgment and put them into the drug scene. But I've learned that marijuana by itself is bad enough—its effects too often subtle and insidious, with long-range damage difficult to calculate.

One morning the police referred to me a 15-year-old youth who, after smoking marijuana, had used the family car to tear up some neighborhood lawns. The boy was brought in by his serious, well-groomed older brother, an outstanding student and athlete. It turned out that the younger boy had never used pot before, and had been so frightened by his experience that he never wanted to use it again; he was no problem.

The problem was his older brother, though it would not be apparent for some time. Dynamic, self-pos-

sessed, he confided to me that he himself had been smoking pot, cautiously but regularly two to five times a week, enjoyed getting moderately high and had suffered no untoward effects. He felt fine, his grades remained well above average, he was captain of the soccer team and had been accepted at an Ivy League college.

How often we hear of such over-achieving easy riders among our middle-class friends nowadays. I tried to warn him about the gradual, long-term changes I had seen in other outstanding young people, but nothing would dissuade him from continuing his "moderate" marijuana use. I saw him again late that summer, just before he left for college. He was slowly, unkempt, apathetic, slow. He admitted that he had been smoking pot heavily during summer vacation. I pleaded with him to get off it, but he ignored my advice.

He was home by December, having been asked to leave college. By then, he was a typical heavy user. He

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didn't care about anything except getting high every day. His parents brought him to me. Eventually he began to perceive what marijuana had done to him and decided he had to kick the habit.

It wasn't easy—it rarely is. I used to think that marijuana created only a psychological dependence, without physical addiction. But now I am persuaded otherwise. I have seen too many youngsters suffer the terrible anxiety, the sleeplessness, the sweating, the lack of appetite, the nausea and the general malaise of withdrawal. Fortunately, my patient had enough fortitude left in him to do it.

He's back in college now, doing okay. His academic performance is acceptable, if mediocre—it's the best he can do, but it isn't close to the promise he once showed. He has not regained that sharp edge, that quality of drive, spirit and capability that once made him a standout. I am not optimistic that he will ever regain it. From what I have seen, there is no question that marijuana wreaks a havoc in the body, brain and psyche that can't be entirely undone.

I know a lot of young people who have broken the pot habit and seem to be doing well, but who are not likely ever to realize the rich potential that once was theirs. For example, another outstanding student-athlete became my patient after marijuana had all but ruined his relationship with his parents and caused him to be dropped from sports participation. He graduated from high school only by the skin of his teeth. He felt

terrible, physically and emotionally, but was determined to recover. He got off the stuff and began doing a really good job of pulling his life together.

He then decided, however, that he could handle marijuana. He would smoke it only at parties and on special occasions; it would never get out of hand again. His attitude was not untypical; recovering youngsters often develop this sense of confidence and it's hard to convince them that they haven't a chance against this stuff. I argued and pleaded to no avail. He stopped coming in. Then, in the fall, he came back. He was smoking pot regularly again, and feeling bad. He agreed that he couldn't control it, wanted to get straight again. We're working on it.

Right now, millions of our young people are marijuana users who are performing well and are very sure that they are in firm control of themselves. But as they continue using pot, a gradual deterioration will set in for many of them—in all phases of their lives. Grades will slip, athletic prowess will diminish and there will be trouble at home, all of this compounded by an increasing, wireless apathy.

For each young pot user who goes straight, there will be many who won't. They won't know where or how to find help, and most won't want help. They will drop out, from school and life. They will simply lose themselves in that frightful marijuana-induced lethargy.

The most unfortunate ones will