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COMMITTEES OF CORRESPONDENCE INC. Wine Makes Might

Connie & Otto Moulton
P.O. Box 232
Topsfield, MA 01983
(617) 774-2641

Drug Abuse Newsletter

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LOOK-ALIKE DRUGS

A NEW PROBLEM

Historically, abusers of illicit substances have been faced with the possibility that what they bought may contain various kinds and quantities of adulterants, contaminants, and substitutes. For example, quinine and other substances have traditionally been used to "cut" or adulterate heroin and cocaine. Oregano and catnip have been used to dilute street-level quantities of marijuana.

In recent years, however, new products (the legality of which is still to be determined) have entered the market. Their easy availability as well as their potential health dangers pose a unique and significant problem to health and enforcement agencies as well as to the users and their parents.

WHAT ARE LOOK-ALIKE DRUGS?

Look-alike drugs are pills (tablets and capsules) and powders containing non-controlled, over-the-counter ingredients whose physical appearance mimics various prescription drug products which contain popular substances of abuse and are regulated under the provisions of the Controlled Substances Act.

Look-alike drugs are available in a variety of forms: powders, various colored or speckled capsules, as well as various forms of tablets. Their users and street-level sellers give these drugs the same street names as their controlled counterparts. Look-alikes usually contain varying mixtures of caffeine (the equivalent of about two cups of coffee per pill), and two other non-prescription chemicals: ephedrine sulphate (a nasal decongestant), and phenylpropanolamine hydrochloride (an appetite suppressant). It has also been noted that on occasion the contents of a given kind of capsule has varied, indicating that some manufacturers may use whatever ingredients are available at the time of production.

There are a number of different white granular substances similar to cocaine being sold as a substitute for cocaine. Some dealers will tell the buyer that it is a substitute. However, in the case of naive buyers the substance is pawned off as the real thing and is sold at very high prices. This deception can be the cause of many problems for the users.

WHAT ARE ACT-ALIKE DRUGS?

Act-alike drugs are those not manufactured to closely resemble controlled substances, but which are promoted in the same way and contain the same ingredients as look-alike drugs.

INFORMATION FROM THE FOOD AND DRUG ADMINISTRATION (FDA)

The principle ingredients commonly found in look-alike drugs are caffeine, ephedrine sulfate and phenylpropanolamine hydrochloride. These chemicals are found in many legitimate drug preparations and are safe when used in accordance with approved labeling. In August of 1982, FDA decided that while the individual ingredients were approved for over-the-counter marketing, triple combinations of the three ingredients were not. Such combinations were then made subject to the FDA approval process, subjecting manufacturers of such combinations to much greater FDA regulation and monitoring than that to which most over-the-counter manufacturers are subjected. This enabled FDA to take various actions against violative manufacturers and their products. In November 1983, FDA took the same action with respect to double combinations. This latest action will even affect such legitimate over-the-counter products as "Dietac." It will, of course, also cut off the escape route taken by the shady manufacturers who changed their formulations from three ingredients to two in response to the earlier FDA action.

People having information on continued violations of the FDA Act and regulations should bring such information to the attention of:

The Associate Commissioner for Regulatory Affairs
Food & Drug Administration
5600 Fishers Lane
Rockville, Maryland 20857

LOOK-ALIKE DRUGS AS A MEDICAL AND SOCIAL HEALTH PROBLEM

Although the ingredients used in look-alike drugs are legitimately used as decongestants, analgesics, cold, allergy, or asthma relief medications and as appetite suppressants, these same ingredients may also produce mild stimulant or depressant side effects. When taken for their intended, legitimate medical purpose (in recommended doses and in accordance with FDA labeling), these look-alike ingredients are generally safe and produce only minor side effects. However, through deceptive advertising or because the substance is represented as a controlled substance, the user of look-alikes may be deceived into believing that the pills he or she has purchased will produce effects equal to those of the controlled substance that they imitate.

Equally serious adverse physiological reactions are possible and have occurred when look-alike drugs have been taken in large quantities. This generally occurs when the user wants a high or wants to come down from one and takes several dosage units. These reactions may range from episodes of acute nervousness and irritability, periods of sleep disorder, general drowsiness, temporary hypertensive episode, cerebral hemorrhage, stroke and even death.

A related but perhaps greater health hazard is the extreme danger that those who have become accustomed to ingesting look-alikes may one day knowingly or unknowingly ingest an apparently equal quantity of an actual controlled substance. The risk of adverse physical reactions increases greatly, especially when depressant substances are involved. An overdose can result in death.

The FDA has received reports of twelve deaths associated with injecting or sniffing these substitute white powders, many of which contain local anesthetics

such as lidocaine, procaine and tetracaine. The main dangers of these substitutes, according to the FDA, are that they can collapse blood vessels, depress heart muscle strength and cause low blood pressure.

The FDA has advised that the diversion and misuse of these cocaine substitutes is an emerging public health problem with deadly consequences. The FDA has asked "all manufacturers and distributors to help stop this diversion to these relatives of cocaine."

We are advising all parents and others involved in our battle against drug abuse to become informed about these look-alikes and to be on the lookout for their use among our teenagers. Tell everyone about the existence and dangers of these look-alike drugs.

Note: Portions of this paper are copies from a document that is a joint publication of the Air Force Office of Special Investigations (AFOSI) and the Air Force Office of Drug and Alcohol Abuse Control (AF/MPXHD).

WHAT IS BEING DONE

The Subcommittee on Alcoholism and Drug Abuse (Senator Gordon Humphrey (R-NH), Chairman) held a hearing on July 14, 1983, to hear testimony on look-alike drugs regarding Federal, state and local efforts to ban them through regulation, legislation, community programs and school policies. Witnesses described the way in which the problem is changing to include "act-alike" drugs and discussed the need for Federal legislation.

Senator Humphrey has introduced two bills in the 98th Congress:

S-503 - Bans the manufacture, distribution and advertisement of look-alike drugs and act-alike drugs.

S-497 - Amends the Postal Statute to make drug abuse-oriented advertisements and shipments in response to these ads non-mailable.

WHAT YOU CAN DO

Write your legislators.

Ask them to support Look-Alike Legislation Bills S-503 and S-497.

RESOURCE REFERENCES FOR ADDITIONAL INFORMATION

Publication Department
Senate Labor & Human Resources
Hart Senate Office Building
Washington, D.C. 20510

Hearing - Look-Alike Drugs July 14, 1983

Publication Department
Select Committee on
Narcotics Abuse & Control
H2-234 H.O.B. Annex 2
Washington, D.C. 20515

Hearing - Look-Alike Drugs #97-1-8 (1981)

Hearing - Further Investigation of Look-Alike Drugs #97-2-4 (1982)

MISCELLANEOUS INFORMATION

The Committees is still operating on a yearly subscription basis, renewals due in January. The National Federation of Parents for Drug-Free Youth (NFP) Newsletter, Vol. 2, #3, erroneously stated that we were not going to be a subscription operation. We will plan to do four newsletters per year on specific drug-abuse subjects and then provide additional mailings on current issues that need letter-writing action.

Cindy Cleary has joined our staff as Administrative Assistant. Office hours are Monday through Friday, 9 a.m. to 3 p.m. The answering machine is on at other times. In order to keep bookkeeping and typing at a minimum, we request that all orders for material be PREPAID. Emergency situations are different.

A new King Features syndicated column called STRIKING BACK, written by Sue Rusche, on the subject of drug and alcohol abuse and featured twice a week will begin on February 1, 1984.

Write a letter to the Managing Editor of your local newspaper stating that you would like to read this column in your newspaper and would they subscribe to have it. If you need further support or information, contact:

Jim Head, Executive Editor
King Features
235 East 45th Street
New York, NY 10017
212/682-5600

Sue Rusche
Families in Action
3845 N. Druid Hills Rd., #300
Decatur, GA 30033
404/325-5799

NEWS UPDATE ON MODEL DRUG PARAPHERNALIA LAW

The United States Supreme Court has clearly indicated that the Model Law is constitutional. The Court issued guidelines favorable to all drug paraphernalia laws. The Model Law can be enforced. It has been enforced.

Many headshop owners have been arrested and convicted, and many headshops have been seized. The first, and one of the best handled prosecutions, occurred in Webster Groves, Missouri. The prosecutor, Thomas Newmark, has agreed to provide advice to any prosecutor who has never handled a Model Act Case.

Thomas Newmark
Railway Exchange Building, Suite 1400
611 Olive Street
St. Louis, Missouri 63101
314/231-5833

The Drug Enforcement Administration is ready to help in any way that it can. If you know of any drug paraphernalia being sold in your state, send the name and location of the shop to Harry Myers and he will pass on this information to the right officials for action.

Harry Myers
Associate Chief Counsel
Drug Enforcement Administration
1405 I Street, N.W.
Washington, D.C. 20537
202/633-1340

Drug Abuse Issue of the Month

Vol. 1 No. 3

DRUG PARAPHERNALIA

Concerned parents all over the country are banding together to put a stop to the sale of drug paraphernalia -- the toys, gadgets, tools, and devices sold to enhance the use of illicit drugs. Paraphernalia is most often sold in head shops, described as "little learning centers for drug abusers" by the director of the nation's largest residential drug treatment center, Dr. Mitchell Rosenthal.

Since 1975, the number of high school seniors who smoke marijuana daily has doubled. Today, 1 in 10 seniors smokes an average of 3½ marijuana cigarettes a day; and 13% of these smoke more than 7 joints a day. Moreover, nearly one-third (31 percent) of the nation's 12 to 17 year old children have now tried pot -- up from 14 percent in 1972, the year the drug paraphernalia industry first emerged on a national scale.

During the same period of time, cocaine use among youngsters nearly quadrupled and the number of kids who tried inhalants and hallucinogens -- two additional kinds of drugs "pushed" by paraphernalia products and publications -- also increased dramatically. At paraphernalia hearings conducted by the U. S. Select Committee on Narcotics Abuse and Control last fall, Dr. Rosenthal said: "There is no question in my mind that the great increase in adolescent drug abuse can be blamed on the proliferation of head shops. And so can the nature of that abuse, the sophistication kids have about how and what to smoke or sniff or swallow."

At the same hearing Sue Rusche, President of Families in Action, (a Georgia-based parents' group whose community education efforts resulted in the nation's first statewide drug paraphernalia laws), added: "What we are seeing is the emergence of an industry that glamorizes and promotes the use of illicit drugs, an industry that, in the time-honored tradition of American free enterprise, is developing a new market of drug users -- our 12 to 17 year old children."

With products like "Star Wars" space guns and pirated "frisbee" pot pipes, "Candy Quaaludes," cocaine comic books, and "Practice Grass" kits for fifth graders, it is little wonder that children exposed to such materials come away thinking that drugs are normal. In the words of one youngster, "Marijuana isn't a drug; it's just around--like blue jeans." And children's exposure to drug paraphernalia is now virtually unavoidable in most communities. Head shops have now spread from adults-only zones to far more lucrative locations in suburban shopping malls, in record stores, and, as some community surveys show, in clusters around high schools, middle schools and even elementary schools.!

HISTORY OF THE PARAPHERNALIA INDUSTRY

The growth of the drug paraphernalia industry parallels the growth of drug use among college students of the 1960's.

As the use of drugs spread from the "counterculture" to the "mainstream" of university students and American G.I.'s in Vietnam, a sizeable market of drug users emerged. The economic power of this market steadily increased as the students of the 60's became the wage earners of the 70's.

The first paraphernalia product evolved from cigarette rolling papers. The U.S. Tobacco Company's Zig Zag Papers, for example, is one of many brands which had been sold for years in drug stores and tobacco shops. By the mid-1960's, however, rolling papers found their way into "hippie" boutiques which offered counterculture clothing, wood-carved pipes, and cigarette papers for "rolling your own" marijuana. In 1972 Burt Rubin of Robert Burton Associates, capitalized on h bservation that pot smokers often stuck two papers tog er to accomodate enough marijuana to make a good-sized joint. He developed double-wide paper ("E-Z Wider") which revolutionized the rolling paper industry. Rubin's company parlayed an initial investment of $6,000 into a $9,000,000 conglomerate with an annual advertising budget of half a million dollars in just six years. Other paper manufacturers followed suit, developing variations of the double-wide concept and enjoying corresponding sales increases. Not only has the number of brands mushroomed, but also the distribution of rolling papers designed specifically for marijuana has expanded out of boutiques and into 24-hour convenience stores, most major drug store chains, supermarkets, and even cigarette vending machines. When confronted with attempts to regulate rolling papers, manufacturers insist the papers are for tobacco. Advertisements they place in drug magazines, however, make clear that the reverse is true. "Careful not to offend any constituency, Rubin calls his wrappers cigarette papers' to the business establishment while winking at potheads who turn them into joints."
(Circus Weekly, 12/19/78).

The phenomenal success of rolling papers adapted for marijuana led both new and established companies like Rubin's to diversify, inventing other products to enhance drug use. One such diversification centered around a "bong," a verticle bamboo device brought back from Vietnam by U.S. veterans. A hole in the bong enables cold air to be drawn in on top of hot smoke, pressing a volume of concentrated marijuana smoke into the lungs and producing a quicker, more intense high. A variety of bongs soon

Continued from page 1

entered the market, as well as other products to facilitate marijuana use. As cocaine became available in this country and as its use became more frequent, the paraphernalia industry developed and sold cocaine accessories as well -- from measuring scales and cocaine testing kits to "cute" cocaine spoons, earrings and necklaces displayed in many posh boutiques and department stores.

By 1974, organized distribution of paraphernalia remained a problem for manufacturers -- and this fact had a great deal to do with the birth of **High Times**, the first of the drug magazines. **High Times**, according to Andrew Kowal, the magazine's original publisher, came about because, as he pointed out, although a lot of people were smoking and getting high, and rolling papers and pipes were being sold, -- there was still no way for this paraphernalia industry to **market** its products to the public.(emphasis added) **(Hustler, 12/77. High Times** did not have an easy start. Many printers refused to print it and no distributor would touch it, forcing **High Times** to develop it own distribution network. This began, according to Kowal, by offering the first issue "to marijuana dealers who bought hundreds and distributed it to clients. **(The Journal,** Addiction Research Foundation of Ontario, 2/1/77). **High Times** currently claims 4,000,000 readers. Like the paraphernalia industry, **High Times** has also diversified and presently publishes a line of drug pamphlets, the **High Times Encyclopedia Recreational Drugs**, a magazine index, and the "High Times Newsflash," a monthly summary of the magazine's contents which is distributed as a "wire service" to college newspapers and AM/FM radio stations throughout the nation.

Soon after the publication of **High Times** in 1974, other drug magazines appeared on the market including **Head, Flash,** and **Rush.** In 1977, the publishers of **High Times** brought out a second magazine oriented to the trade called **Dealer** and in January, 1979, two more mass audience drug magazines appeared: **Hi Life** and **Stone Age.** By connecting paraphernalia manufacturers, distributors, and retailers with consumers, these magazines have greatly stimulated the industry. This can be seen in the proliferation of head shops in major cities over the past few years (estimates range as high as 30,000), their shift in location from urban commercial districts to suburban shopping centers, and the sale of paraphernalia in other retail outlets such as record stores, supermarkets, 24-hour convenience stores, book stores and gift shops. Furthermore, the success of the drug magazines has stimulated the publication of a number of drug books and pamphlets. **The Whole Drug Manufacturers Catalogue, The Anarchist Cookbook,** and **The Cocaine Consumer's Handbook** are a few examples.

INDUSTRY TRENDS

1. MORE DRUGS

Several disturoing trends in the drug paraphernalia industry can be identified. First is the expansion of the concept of "recreational drugs." Initially, the industry focused on marijuana and cocaine. As paraphernalia sales escalated, however, so did the number of drugs the industry deemed acceptable enough to design products around and to promote in the drug magazines. These fall into general categories such as "legal" drugs (isobutyl nitrite, nitrous oxide, psilocybin mushroom spores, and others); prescription drugs (Valium, Quaaludes); and "kiddie practice drugs" such as lettuce opium; practice grass (alphalfa, etc.); "Candy Quaaludes" and "Hash" Oil, a fake product sold to kids as the real thing.

2. FALSE INFORMATION

A second trend is to falsely "debunk" medical research that indicates harmful effects from drug use. **High Times,** for example, replied to a letter from a reader worried about pot damaging his lungs that "seriously, you don't have to worry about tars in grass. top doctors at the National Institute on Drug Abuse and the American Cancer Society have **privately** assured us." (Emphasis added.) The directors of both agencies sent letters to the editor strenously objecting to such false statements and the blatant misuse of their agencies' names, but **High Times** ignored their letters.

3. PRODUCTS FOR KIDS

A third trend is the sale of products specifically designed for children. These include bongs "for Tots who Toke", "Baby Toker T-Shirts" in infant and toddler sizes, and fake I.D. Cards, all advertised in **High Times.** There are also Christmas stockings decribed by their designer, Jeff Kaplan of Adams Apple, as containing a "pipe, **Everything You Always Wanted to Know About Marijuana,** a rolling machine, papers, clips, incense, screens, and Zots candy, so you know, if somebody's parents should see it, they'll say, 'Oh, it's a candy-filled stocking'". **(Rolling Stones, 1/27/77)**

4. GLAMORIZING DRUG DEALING AND SMUGGLING

A fourth trend is the industry's attempt to equate the "right" to use drugs with constitutionally guaranteed rights and its insistence that the government therefore has no right to regulate or control the use of **any** drug. This leads, logically enough, to a tendency to ridicule drug laws and law enforcement efforts. Illustrations of this trend range from **High Times'** full page feature **Trans-High Market Quotations,** (monthly listings of the current cost of illicit drugs from nations around the world) to advertisements for "Night Vision Goggles, ideal for driving vehicles, piloting airplanes helicopters and boats without lights." Ad carried in both **High Times** and **Hi-Life Magazines.**

One of the many magazines and books published for drug users, dealers and promoters. Every type of ad can be found including the above source for fake I.D.s. More examples of ads and features can be found on page 7.

Above left: A small sampling of the hundreds of paraphernalia products available. Clockwise: Power Hitter which glows in the dark; Fan Can containing a motorized fan; Razor Gun, all of these items are used to force more smoke into the lung. Also shown, a child's toy as a smoking device and a mask to intensify the high associated with pot-smoking.

Above right: A tee shirt popular with pot smokers (also made in childrens and infant sizes) and a Christmas stocking filled with an assortment of paraphernalia.

THE PARAPHERNALIA LAWS

Georgia parents were among the first to recognize the motivational impact of drug paraphernalia upon children and the first to insist that something be done to put a stop to such nonsense. The Georgia paraphernalia laws were passed in early 1977 and were initially upheld (they are currently under appeal) by Federal courts in response to constitutional challenges brought by the paraphernalia industry. Because Georgia's laws resulted in the closing of some 30 head shops in metropolitan Atlanta, they became the model for similar legislation in communities across the country.

As other communities and states adapted Georgia's laws to suit their own needs, a body of legislation accumulated which resulted in a decision by the U.S. Department of Justice, prompted by the White House, to draft a uniform drug paraphernalia act. The task to research and draft such a law fell to the U. S. Drug Enforcement Administration (D.E.A.) which created the Model Drug Paraphernalia Law. D.E.A.'s Model Law has since been passed by hundreds of towns and cities as well as several states. **By November, 1980 eight Federal District Courts had upheld the Model Law as constitutional.** Moreover, five additional District Courts have struck down other paraphernalia laws, and four of these have recommended the Model Law as more appropriate -- and constitutional -- legislation. In at least one important case, the paraphernalia industry appealed a District Court decision which found the Model Law constitutional -- but has since **withdrawn** its appeal, presumably because they felt they did not have a good enough case to win an appeal.

The drug paraphernalia industry's response to the Model Law includes offering its own "model law" which, in a thinly-veiled effort to keep doing business, prohibits sales of its own products to children. Even if such a law could be enforced, the message still remains: Legal drug paraphernalia implies that drugs themselves must be O.K.; moreover, paraphernalia would still be available to kids through mail order ads in drug magazines, or through head shop purchases made by older friends.

Publicly, the paraphernalia industry insists its products have many other uses and therefore cannot be banned from sale. Privately, industry representatives caution manufacturers to avoid **labeling** their products as "drug paraphernalia". The proposed technique.

As Andy Kowl advised in **Accessories Digest (1/80)**, a paraphernalia trade publication, "Anybody who is smart will not be affected by laws banning drug paraphernalia -- just don't sell it, (Meaning anything labeled paraphernalia). You can still sell bongs and clips and all sorts of other novelties and accessories, of course, just no drug paraphernalia". His advice to head shop owners continues, "Pull back now; lay low; and we will weather the storm. It may be peaking now, or soon, and when it blows over, be proud that you did your part to protect the guaranteed rights of Americans."

The industry's legal counsel Michael Pritzker, writing in **Accessories Digest (6/79)** strongly advises paraphernalia manufacturers to disassociate any **mention** of illicit drug use in connection with their products. Such an approach attempts to absolve the paraphernalia industry of any responsibilities for its product.

In spite of the well-financed defense being mounted by the multimillion dollar drug paraphernalia industry, it is encouraging to note that ordinary moms and dads, pooling "grocery money", have already had a sizeable impact in curtailing paraphernalia sales in their communities. It is generally felt that the D.E.A. Model Law is the best one to pass because it is most likely to withstand constitutional challenges. It is a law which has been and is being passed in local communities as well as cities and states throughout the nation. And it is a law which has been "sponsored" by parents.

WHAT YOU CAN DO

A step by step procedure which has been used successfully by individuals and groups throughout the country:

1. Visit a head shop in your community. Ask questions. Buy some samples, particulary "Kiddie Paraphernalia". Educate yourself about drug paraphernalia. Read a copy of **High Times Magazine.**

2. Organize your community. Educate other parents and concerned adults. (See below for publications list to help you get started.)

3. Take your "Bong Show" (your paraphernalia items), plus the **High Times** paraphernalia ads, **plus** the Model Paraphernalia Law to a sympathetic **State Legislator.** Ask him or her to sponsor this law in your state.

Note: This can be just as easy and far more effective, than trying to get the law through at the local level. The community-level law can prove to be wasted energy if, with the same energy and effort, the Model Paraphernalia Law can be passed to cover all communities in your state.

Also send a request to your governor to ask him for his backing for this Model Law. This may be easier than you think. For example, in January 1980 a reporter who regularly covers the Maryland State Legislature said, "In all my 20 years of covering the legislature, I have never seen such enthusiastic support for any bill." (The Maryland State Senate passed this Model Law 47-0. It was signed into law in May 1980.)

Also, it has been proven that the State Senator who introduced this bill received very positive attention in the Press and from the public for doing so. The Senator who introduced the bill in Maryland, for example, said, "I received so much positive attention from sponsoring this bill that if I'd done this when I was a younger, struggling politician, I wouldn't have needed a campaign committee for re-election. This bill received the most enthusiastic public response I've ever had." You can get help from the Drug Enforcement Administration, including a free packet of supplemental materials (briefs prepared to defend the Model Law and various Federal court opinions handed down to date). Be sure to give copies **at once** to the attorney who will be defending the law case. Write or call:

William Lenck, Chief Counsel (202-633-1276) or
Harry Myers, Attorney (202-633-1404)
Drug Enforcement Administration
1405 Eye Street NW
Washington DC 20537

4. In addition, write for materials. Several parent groups have published what they did to fight drug paraphernalia sales in their town, cities and states. These include:

A. How to Form A Families In Action Group In Your Community. 164 page manual tells how to organize your community to do something about paraphernalia, kids, and drugs. Includes copies of Georgia's laws. $10 single copies, $9 each for 2 to 5 copies, $8 each for 6 or more copies. Send check or money order to Families in Action, P.O. Box 15053, Atlanta, GA 30333. Also available at the same address: Quarterly Newsletter, $3 for four issues.

B. Stop the Drug Epidemic In Your Community with Effective Practical Action.
Pamphlet tells how to organize to fight paraphernalia. $3 each. Send check or money order to Interstate Movement Against Dangerous Drugs, P.O. Box 6272, Silver Spring, MD 20906

C. Paraphernalia Information Packet. $1.00
Send check or money order to Millburn Conference of Parents and Teachers, 23 Audubon Court, Short Hills, NJ 07078

D. Anne Arundel Drug & Alcohol Program
Brochure & Newsletter Free. Write to Ann Arundel Drug & Alcohol Program, 4112 Arundel Center, Annapolis, MD 21401.

The National Federation of Parents for Drug-Free Youth (N.F.P.), a coalition of some 600 parents groups throughout the nation, was formed last Spring. Additional information about children and drugs, and what **you** can do to reduce drug use by children, can be found in N.F.P.'s publication list.

You might also want to contact Gerri Silverman, N.F.P.'s Drug Paraphernalia Committee Chairman, and N.F.P.'s attorney, Jill Gerstenfield, for additional information and a copy of an Amicus Curiae brief filed in behalf of the Federation in a Federal Court test of Maryland's drug paraphernalia law. Write to the National Federation of Parents, P.O. Box 57217, Pennsylvania Ave., Washington, D.C. 20037

5. At least two United States Congressional Committees have held hearings on drug paraphernalia. These are:

The U.S. Select Committee on Narcotics Abuse and Control
(November 1979)
Room 3287
House Office Building Annex 2
Washington DC 20515
Write for a free copy of the transcript.

The U.S. Senate Criminal Justice Subcommittee
Committee on the Judiciary
Washington DC 20510
Write to Senator Charles Mathias, Chairman of the Committee, for a free copy of the transcript.

6. By November 1980 nine states passed the Model Law: Connecticut, Delaware, Indiana, Louisiana, Maryland, Nebraska, New Jersey, New York, Florida. **Note:** If your state has passed the Model Law, this does not mean that drug paraphernalia is not being sold in your community. Because paraphernalia is such a profitable business, the paraphernalia merchants have a large legal fund, and all anti-drug paraphernalia laws are routinely challenged in Federal Court to delay their implementation. Thus far, only Delaware has completed it's court proceedings under the Model Law. (Georgia is also closing down head shops under a law which predates the Model Law.)

If you are in one of the remaining eight states where the law has passed both houses and has been signed by the Governor: (a) Phone the State Attorney General's office and find out the "progression" of the law suit. Frequent calls and numerous letters will encourage the State Attorney General to aggressively defend the legislation in court. For example,

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MODEL DRUG PARAPHERNALIA LAW

The Uniform Controlled Substances Act, drafted by the National Conference of Commissioners on Uniform State Laws, has been enacted by all but a handful of states. The Uniform Act does not control the manufacture, advertisement, sale or use of so-called "drug paraphernalia." Other state laws aimed at controlling drug paraphernalia are often too vaguely worded and too limited in coverage to withstand constitutional attack or to be very effective. As a result, the availability of drug paraphernalia has reached epidemic levels. An entire industry has developed which promotes, even glamorizes, the illegal use of drugs by adults and children alike. Sales of drug paraphernalia are reported to be more than a billion dollars a year. What was a small phenomenon at the time the Uniform Act was drafted has now mushroomed into an industry so well entrenched that it has its own trade magazines and associations.

This Model Act was drafted, at the request of state authorities, to enable states and local jurisdictions to cope with the paraphernalia problem. The act takes the form of suggested amendments to the Uniform Controlled Substances Act. The Uniform Act is extremely well organized. It contains a definitional section, an offenses and penalties section, a civil forfeiture section, as well as miscellaneous sections on administration and enforcement. Instead of creating separate, independent paraphernalia laws, it seems desirable to control drug paraphernalia by amending existing sections of the Uniform Controlled Substances Act.

Article I provides a comprehensive definition of the term "drug paraphernalia" and includes particular descriptions of the most common forms of paraphernalia. Article I also outlines the more relevant factors a court or other authority should consider in determining whether an object comes within the definition.

Article II sets out four criminal offenses intended to prohibit the manufacture, advertisement, delivery or use of drug paraphernalia. The delivery of paraphernalia to a minor is made a special offense. Article II clearly defines what conduct is prohibited, and it specifies what criminal state of mind must accompany such conduct.

(TEAR OFF AT PERFORATION)

Article I

(Definitions)

SECTION (insert designation of definitional section) of the Controlled Substances Act of this State is amended by adding the following after paragraph (insert designation of last definition in section):

"( ) The term 'drug paraphernalia' means all equipment, products and materials of any kind which are used, intended for use, or designed for use, in planting, propagating, cultivating, growing, harvesting, manufacturing, compounding, converting, producing, processing, preparing, testing, analyzing, packaging, repackaging, storing, containing, concealing, injecting, ingesting, inhaling, or otherwise introducing into the human body a controlled substance in violation of this Act (meaning the Controlled Substances Act of this State). It includes, but is not limited to:

(1) Kits used, intended for use, or designed for use in planting, propagating, cultivating, growing or harvesting of any species of plant which is a controlled substance or from which a controlled substance can be derived;

(2) Kits used, intended for use, or designed for use in manufacturing, compounding, converting, producing, processing, or preparing controlled substances;

(3) Isomerization devices used, intended for use, or designed for use in increasing the potency of any species of plant which is a controlled substance;

(4) Testing equipment used, intended for use, or designed for use in identifying or in analyzing the strength, effectiveness or purity of controlled substances;

(5) Scales and balances used, intended for use, or designed for use in weighing or measuring controlled substances;

(6) Diluents and adulterants, such as quinine hydrochloride, mannitol, mannite, dextrose and lactose, used, intended for use, or designed for use in cutting controlled substances;

(7) Separation gins and sifters used, intended for use, or designed for use in removing twigs and seeds from, or in otherwise cleaning or refining marijuana

(8) Blenders, bowls, containers, spoons and mixing devices used, intended for use, or designed for use in compounding controlled substances;

(9) Capsules, balloons, envelopes and other containers used, intended for use, or designed for use in packaging small quantities of controlled substances;

(10) Containers and other objects used, intended for use, or designed for use in storing or concealing controlled substances;

(11) Hypodermic syringes, needles and other objects used, intended for use, or designed for use in parenterally injected controlled substances into the human body;

(12) Objects used, intended for use, or designed for use in ingesting, inhaling, or otherwise introducing marijuana, cocaine, hashish, or hashish oil into the human body, such as:

(a) Metal, wooden, acrylic, glass, stone, plastic, or ceramic pipes with or without screens, permanent screens, hashish heads, or punctured metal bowls;
(b) Water pipes;
(c) Carburetion tubes and devices;
(d) Smoking and carburetion masks;
(e) Roach clips: meaning objects used to hold burning material, such as a marijuana cigarette, that has become too small or too short to be held in the hand;
(f) Miniature cocaine spoons and cocaine vials;
(g) Chamber pipes;
(h) Carburetor pipes;
(i) Electric pipes;
(j) Air-driven pipes;
(k) Chillums;
(l) Bongs;
(m) Ice pipes or chillers;

In determining whether an object is drug paraphernalia, a court or other authority should consider, in addition to all other logically relevant factors, the following:

(1) Statements by an owner or by anyone in control of the object concerning its use;
(2) Prior convictions, if any, of an owner, or of anyone in control of the object, under any State or Federal law relating to any controlled substance;

Continued from page 5

(3) The proximity of the object, in time and space, to a direct violation of this Act;
(4) The proximity of the object to controlled substances;
(5) The existence of any residue of controlled substances on the object;
(6) Direct or circumstantial evidence of the intent of an owner, or of anyone in control of the object, to deliver it to persons who he knows, or should reasonably know, intend to use the object to facilitate a violation of this Act; the innocence of an owner, or of anyone in control of the object, as to a direct violation of this Act should not prevent a finding that the object is intended for use, or designed for use as drug paraphernalia;
(7) Instructions, oral or written, provided with the object concerning its use;
(8) Descriptive materials accompanying the object which explain or depict its use;
(9) National and local advertising concerning its use;
(10) The manner in which the object is displayed for sale;
(11) Whether the owner, or anyone in control of the object, is a legitimate supplier of like or related items to the community, such as a licensed distributor or dealer of tobacco products;
(12) Direct or circumstantial evidence of the ratio of sales of the object(s) to the total sales of the business enterprise;
(13) The existence and scope of legitimate uses for the object in the community;
(14) Expert testimony concerning its use."

Article II
(Offenses and Penalties)

SECTION (designation of offenses and penalties section) of the Controlled Substances Act of this State is amended by adding the following after (designation of last substantive offense):

"SECTION (A) (Possession of Drug Paraphernalia)

It is unlawful for any person to use, or to possess with intent to use, drug paraphernalia to plant, propagate, cultivate, grow, harvest, manufacture, compound, convert, produce, process, prepare, test, analyze, pack, repack, store, contain conceal, inject, ingest, inhale or otherwise introduce into the human body a controlled substance in violation of this Act. Any person who violates this section is guilty of a crime and upon conviction may be imprisoned for not more than ( ), fined not more than ( ), or both."

"SECTION (B) (Manufacture or Delivery of Drug Paraphernalia)

It is unlawful for any person to deliver, possess with intent to deliver, or manufacture with intent to deliver, drug paraphernalia, knowing, or under circumstances where one reasonably should know, that it will be used to plant, propagate, cultivate, grow, harvest, manufacture, compound, convert, produce, process, prepare, test, analyze, pack, repack, store, contain, conceal, inject, ingest, inhale, or otherwise introduce into the human body a controlled substance in violation of this Act. Any person who violates this section is guilty of a crime and upon conviction may be imprisoned for not more than ( ), fined not more than ( ), or both."

"SECTION (C) (Delivery of Drug Paraphernalia to a Minor)

Any person 18 years of age or over who violates Section (B) by delivering drug paraphernalia to a person under 18 years of age who is at least 3 years his junior is guilty of a special offense and upon conviction may be imprisoned for not more than ( ), fined not more than ( ), or both."

"SECTION (D) (Advertisement of Drug Paraphernalia)

It is unlawful for any person to place in any newspaper, magazine, handbill, or other publication any advertisement, knowing, or under circumstances where one reasonably should know, that the purpose of the advertisment, in whole or in part, is to promote the sale of objects designed or intended for use as drug paraphernalia. Any person who violates this section is guilty of a crime and upon conviction may be imprisoned for not more than ( ), fined not more than ( ), or both."

Article III
(Civil Forfeiture)

SECTION (insert designation of civil forfeiture section) of the Controlled Substances Act of this State is amended to provide for the civil seizure and forfeiture of drug paraphernalia by adding the following after paragraph (insert designation of last category of forfeitable property):

"( ) all drug paraphernalia as defined by Section ( ) of this Act."

Article IV
(Severability)

If any provision of this Act or the application thereof to any person or circumstance is held invalid, the invalidity does not affect other provisions or applications of the Act which can be given effect without the invalid provision or application, and to this end the provisions of this Act are severable.

This reprint of **The Model Drug Paraphernalia Law** has been sponsored by The Committees of Correspondence which is a national group of citizens concerned about drug abuse.

COMMITTEES OF CORRESPONDENCE
P.O. Box 1590
Cathedral Station
New York, N.Y. 10025

In the days of our nation's youth, the Committees of Correspondence was formed to exchange information and ideas and to build Colonial unity. Today, the health and strength of our nation's youth are being threatened by the pervasive drug abuse pandemic. And the Committees of Correspondence has been revived to help effect a turnaround.

Growth of Drug Paraphernalia Industry And Growth of Illicit Drug Use

LIFETIME PREVALENCE -- THOSE WHO HAVE EVER USED:	YOUTH ‡ Age 12 to 17		HIGH SCHOOL SENIORS ‡ Age 17 and 18		YOUNG ADULTS ‡ Age 18 to 25	
	1972	1979	1975*	1979	1972	1979
MARIJUANA	14%	30.9%	47.3%	60.4%	47.9%	68.2%
COCAINE	1.5%	5.4%	9%	15.4%	9.1%	27.5%
INHALANTS	6.4%	9.8%	-	18.7%	-	16.5%
HALLUCINOGENS	4.8%	7.1%	16.3%	18.6%	-	25.1%
TRANQUILIZERS	3%	4.1%	17%	16.3%	7%	15.8%
SEDATIVES	3%	3.2%	18.2%	14.6%	10%	17%
STIMULANTS	4%	3.4%	22.3%	24.2%	12%	18.2%
HEROIN	6%	.5%	2.2%	1.1%	4.6%	3.5%

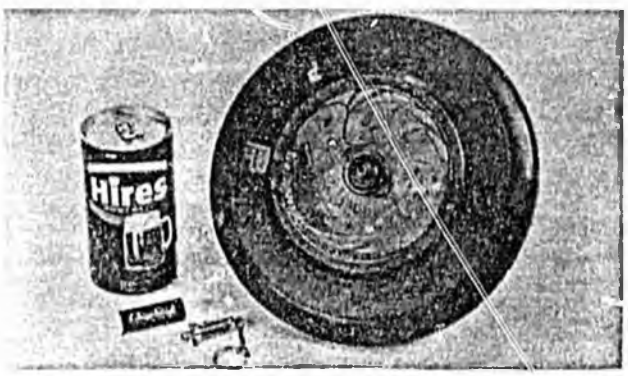
Categories of drugs are listed in descending order **in relationship to the number of paraphernalia products designed for specific drugs.** For example, the largest number of drug paraphernalia products are designed to augment marijuana use, the second largest number of products for cocaine use, etc. At the other end of the spectrum, devices to assist heroin use are infrequent among industry products.

The beginning of the drug paraphernalia industry can be traced to the invention of "E-Z Wider" Rolling Papers, the first rolling paper to be specifically designed for marijuana. A $6,000 investment by "E-Z Wider's" inventor in 1972 grew to a $9,000,000 conglomerate in just six years. Two years later, **High Times Magazine** began publication and advertised paraphernalia products to a mass audience of consumers.

‡ From **A Drug Retrospective: 1962 to 1980** and **Drugs and the Nation's High School Students, 1979 Highlights,** both published by the National Institute on Drug Abuse, (U.S. Department of Health and Human Services), 5600 Fishers Lane, Rockville, MD 20857

- Not tabulated

• First year high school senior survey began



Above Pictured are some ordinary products that could be found anywhere. None of which would arouse the least suspicion.

Right Those same products, modified, show how they are used to conceal illicit drugs.

Clockwise from top left: a soft drink can with a removable top, a product to look like a "Frisbee" called a Buzz Bee used as a smoking device, a roach clip concealed in a knife case, a tube of lip balm with a removable cap to conceal a glass vial.

MORE ADS continued from page 2

Top: Regular monthly feature Trans High and, left, a feature article on the use of short-wave radio to avoid detection by Law Enforcement Authorities.

Subscription Form

The Committees of Correspondence is a national organization of citizens concerned about drug abuse. For a one-year (10 issues) subscription to the Drug Abuse Issue of the Month, send $5.00 (cash, check or money order) to: Committees of Correspondence, P.O. Box 1590, Cathedral Station, New York, N.Y. 10025

Name _____
(please print)

Address _____
(please print)

City _____ State _____ Zip _____

Continued from page 4

in Maryland, the Attorney General assigned three top lawyers to the case; one a specialist in research and writing; one a specialist in gathering evidence and organizing the litigation; the third an experienced "trial lawyer". A few other Attorney Generals have given the litigation "less than their best possible support". **Your expression of interest can make the difference.**

When you learn the status of the bill in your state, take this memo to your local newspaper. Ask them to do an editorial or story. (Some papers seem to have a pro-paraphernalia viewpoint. If yours falls into this category and the reporting is slanted or incorrect, write to the newspaper, encouraging them to print the facts from this newsletter in order to set the record straight. The more letters which come in, the more likely it is that one of them will be printed.)

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There's been a lot of confusion about marijuana. Many years ago, exaggerated stories of the drug's bizarre effects, including tales of violence, amnesia, and sexual frenzy, began to circulate widely. When scientists found no evidence to confirm these rumors, many people began to reject reports of any bad effects of marijuana —and what was considered the "devil's weed" gained a reputation for being a "safe" drug.

This section examines the myths and facts about marijuana. Some of the information may surprise both you and your children. We still do not know everything we would like to know about this controversial drug. But as you will see, our present evidence clearly indicates that it is not a "safe" substance.

Marijuana: What It Is and What It Does

What Exactly Is Marijuana?

Marijuana (also called pot, grass, reefer, or weed) comes from a plant, with the botanical name of *Cannabis sativa*, that grows wild and is cultivated in many parts of the world. Containing over 400 chemicals, this plant has the ability to intoxicate its users, primarily because of the psychoactive or mind-altering ingredient called delta-9-tetrahydrocannabinol, or THC. It is the THC content, found at various concentrations in different parts of the plant, which determines the potency. And the THC content is controlled by plant strain, climate, soil conditions, and harvesting.

Typically, the marijuana used in cigarettes (joints) is made from dried particles of the whole plant except the main stem and roots. In 1975, the average confiscated sample of marijuana contained 0.4 percent THC; in 1979, the average THC content was about 4 percent—a tenfold increase. Sinsemilla, a cultivated form of marijuana which is becoming more frequently available in this country, may contain as much as 7 percent THC.

Hashish (hash) is a green, dark brown, or black resin extracted from the *Cannabis sativa* plant and smoked to produce a high. In the past, hashish, which averages about 2 percent THC, contained more THC than marijuana. However, with the increased potency of marijuana on the streets, it now frequently is stronger than hashish.

Hash oil is an extract of the *Cannabis sativa* plant. It may contain up to 30 percent THC, many times the amount found in marijuana. Hash oil is a tarlike substance usually smoked in small amounts on tobacco or marijuana cigarettes or in small glass pipes.

How Do People Feel When They Smoke Marijuana?

Feelings of euphoria and relaxation are commonly reported as the result of smoking moderate amounts of marijuana. Physically, users experience an increase in heart and pulse rate, a reddening of the eyes, a dryness in the mouth and throat, a mild decrease in body temperature, and, on occasion, a sudden appetite. High doses may result in image distortions and hallucinations.

Many users claim that marijuana enhances their hearing, vision, and skin sensitivity, but these reports have not been confirmed by researchers. Studies of marijuana's mental effects have shown that the drug temporarily impairs short-term memory, alters the sense of time, and reduces the ability to perform tasks requiring concentration, swift reactions, and coordination.

Do People Ever React Badly to Marijuana?

Yes. The most common adverse reaction to marijuana is a state of anxiety, sometimes accompanied by paranoid thoughts; these can range from general suspicion to a fear of losing control and going crazy. Acute anxiety reactions are usually experienced by novice users, and the symptoms generally disappear in a few hours as the drug's effects wear off. While anxiety reactions can usually be quieted by simple reassurance, some marijuana users may need professional help. Over 11,000 emergency room visits relating to marijuana use were reported in 1979.

Can Marijuana Cause Mental or Psychological Problems?

Marijuana does not directly cause mental problems, but like many other drugs, it appears to bring to the surface emotional problems and can even trigger more severe disorders, particularly schizophrenia. People suffering from depression or other emotional disturbances who use marijuana to treat their symptoms often cause a worsening of the problem. An estimated 5,000 people seek professional treatment every month for problems related to marijuana.

How Can Marijuana Affect Your Child?

In addition to the physical effects described later, a very real danger in marijuana use is its possible interference with growing up. As research shows, the effects of marijuana can interfere with learning by impairing thinking, reading comprehension, and verbal and arithmetic skills.

Scientists also believe that the drug may interfere with the development of adequate social skills and may encourage a kind of psychological escapism. Young people need to learn how to make decisions, to handle success, to cope with failure, and to form their own beliefs and values. By providing an escape from "growing pains," drugs can prevent young people from learning to become mature, independent, and responsible.

How Much Is Heavy Marijuana Use?

For the purposes of this booklet, heavy use is defined as smoking at least once a day. However, many young

people when asked to define heavy use say that it means smoking three or more times a day.

What Is Marijuana "Burn Out"?

"Burn out" is a term first used by marijuana smokers themselves to describe the effect of prolonged use. Young people who smoke marijuana heavily over long periods of time can become dull, slow moving, and inattentive. These burned-out users, also referred to as "vegged out" or "space cadets," are sometimes so unaware of their surroundings that they do not respond when friends speak to them. Such youngsters, however, do not consider themselves to be burned out. Scientists believe that burn out may be a sign of drug-related mental impairment that may not be completely reversible, or is reversible only after months of abstinence.

Can Marijuana Cause Addiction?

While increasing numbers of people are reporting problems associated with their marijuana use, and many are having problems stopping after heavy or long-term use, there is little evidence that the drug is physically addicting. Animal studies have shown, however, that a tolerance to THC can develop. This means more and more marijuana must be used over time to achieve the high once experienced by using smaller amounts.

Does Marijuana Lead to the Use of Other Drugs?

There is nothing in marijuana itself that causes people to use other drugs. While studies have shown that the use of tobacco and alcohol often precedes marijuana use, the overwhelming majority of marijuana smokers do not go on to use other drugs. But some do; surveys show that the earlier marijuana use begins, the more likely it is that the use will be heavy. Early use also increases the likelihood of subsequent experimentation with other drugs such as hashish, hallucinogens, cocaine, amphetamines, and occasionally barbiturates and heroin.

How Are People Introduced to Marijuana?

Most people are introduced to marijuana by their peers—that is, by people their own age, usually acquaintances or friends. Pushers are rarely involved when a person first smokes marijuana.

How Many People Smoke Marijuana?

Over 50 million Americans have tried marijuana at least once. Approximately 22 million were considered current users at the time of the last national survey in 1979—"current" because they reported smoking marijuana during the month preceding the survey.

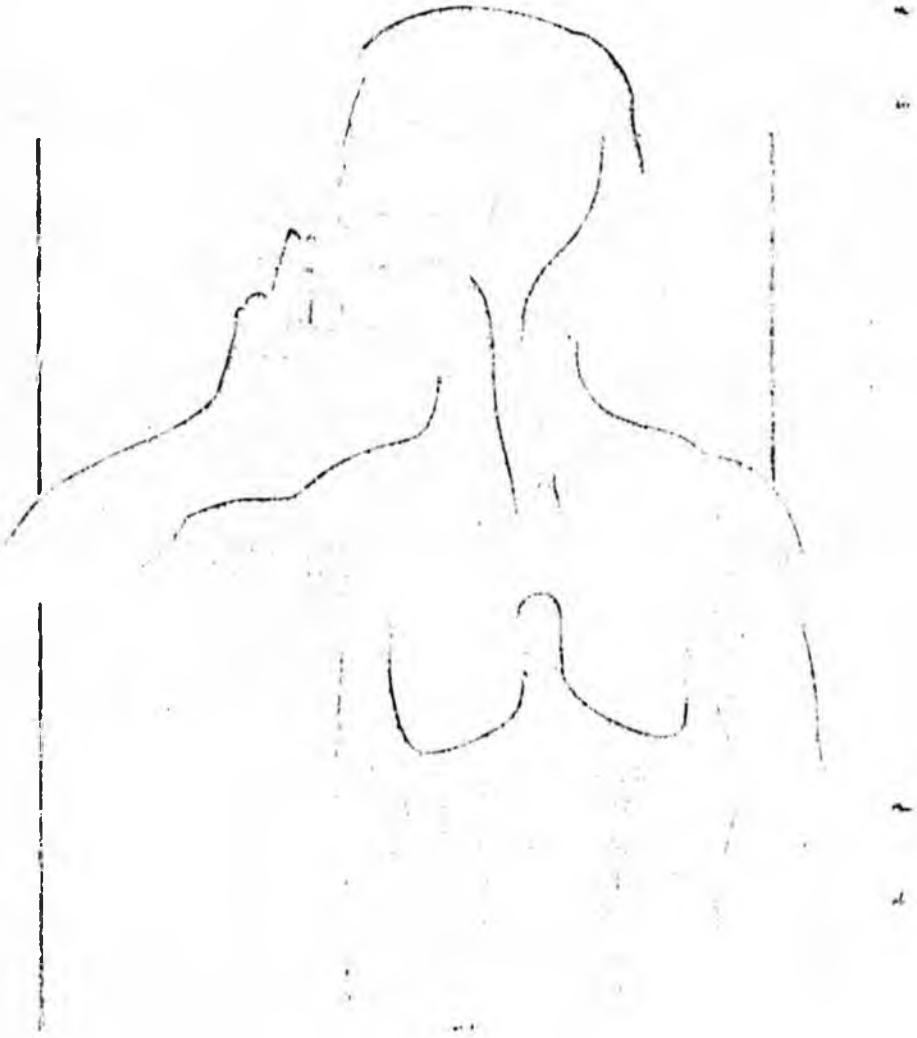
A breakdown of teenage marijuana use shows that—

60 percent of high school seniors had tried it, and one out of nine was a daily user;

8 percent of the 12- to 13-year-olds reported that they had smoked marijuana at least once, and half of this group were current users; and

32 percent of the 14- to 15-year-olds had tried it, and 17 percent were still using it.

While children under the age of 12 were not surveyed, many in the 12-to-17 age group report that they first tried marijuana, and even started smoking it regularly, while they were still in grade school—and probably before their parents even suspected they knew about the drug.

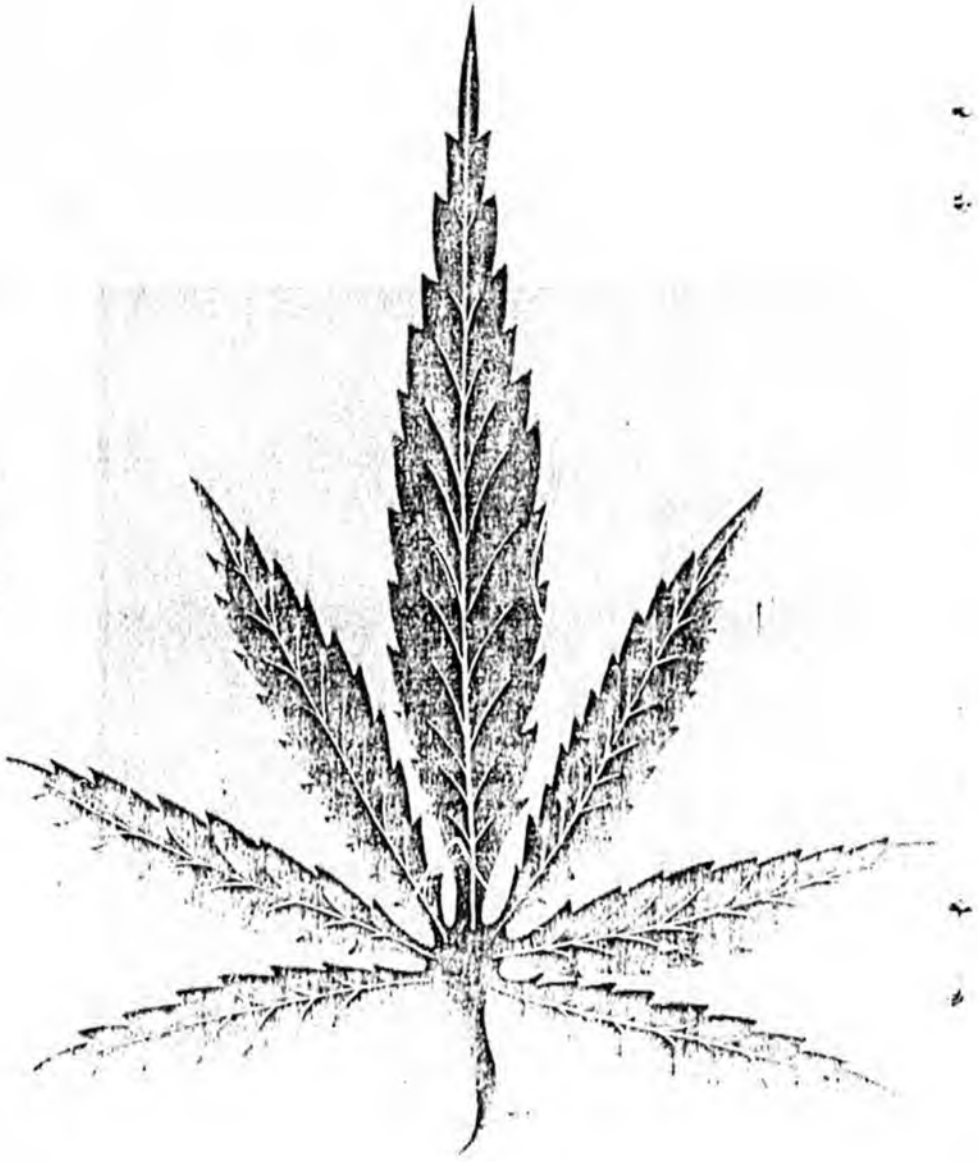


What Happens if You Drive After Smoking Marijuana?

Marijuana delays a person's response to sights and sounds—so that it takes a driver longer to react to a dangerous situation. The ability to perform sequential tasks can also be affected by smoking marijuana. As a result, a marijuana smoker's biggest driving problems occur when faced with unexpected events, such as a car approaching from a side street or a child running out from between parked cars. The greater the demands of a driving situation, the less able the marijuana user will be to cope. The driver who doesn't feel high may still be under the influence of marijuana since its effects may last for several hours after the high has passed.

The combined use of marijuana and alcohol is more hazardous than the use of either alone. But combined use is becoming widespread; one researcher reported that nearly half of regular marijuana users combine

alcohol with marijuana use. Surveys have indicated that from 60 to 80 percent of marijuana users sometimes drive while high.



Marijuana's Effects on the Body

Most of the information on marijuana's effects on the body has been established through studies on both humans and animals, some only by research on animals. Stringent U.S. drug-testing laws require that most research be conducted on men over 18; very few studies have involved women, and none have used adolescents.

Marijuana research is relatively new by scientific standards. Many more years and additional studies will be needed before the long-term effects of marijuana use are fully known.

How Long Does Marijuana Stay in the Body After It Is Smoked?

When marijuana is smoked, THC, its active ingredient, is absorbed by many tissues and organs in the body. The body, in its attempt to rid itself of the foreign chemical, chemically transforms the THC into metabolites. Human tests on blood and urine can detect THC metabolites up to a week after marijuana is smoked. Tests involving radioactively labeled THC have traced these metabolites in animals for up to a month.

Can Marijuana Cause Brain Damage?

To date, no definitive neurological study of humans has turned up evidence of marijuana-related permanent brain damage. However, in a recent study of rhesus monkeys, the animals were trained to smoke a marijuana cigarette 5 days a week for 6 months. The researcher reported that persistent changes in the structure of the monkeys' brain cells followed.

This and other studies have led researchers to conclude that the possibility of subtle and lasting changes in brain function from heavy and continuous marijuana use cannot be ruled out.

How Does Marijuana Affect the Heart?

Marijuana use increases the heart rate as much as 50 percent and can bring on chest pain in people already experiencing a poor blood supply to the heart. For this reason, doctors believe that people with heart conditions, or those who are at high risk for heart ailments, should not use marijuana.

How Does Marijuana Affect the Lungs?

Scientists believe that marijuana can be particularly harmful to the lungs because some users inhale the unfiltered smoke deeply and hold it in their lungs as long as possible, thereby keeping the smoke in contact with lung tissue for prolonged periods. Repeated inhalation of smoke, whether marijuana or tobacco, inflames the lungs and affects pulmonary functions. In one study on humans, it was found that smoking five joints a week over time is more irritating to the air passages and impairs the lungs' ability to exhale air than smoking almost six packs of cigarettes a week. Another study on animals using THC levels similar to daily human use found that extensive lung inflammation developed after 3 months to a year of use.

Can Marijuana Cause Cancer?

While marijuana smoke has been found to contain more cancer-causing agents than tobacco smoke, there is no direct evidence so far that marijuana can cause cancer in humans. However, biopsies of human lung tissue

chronically exposed to marijuana smoke in a laboratory showed cellular changes called metaplasia that are considered precancerous. In laboratory tests, the tars from marijuana smoke have produced tumors when applied to animal skin.

Does Marijuana Affect the Body's Ability To Fight Infection?

This question remains unresolved. Some reports suggest that white cell formation central to the body's immune response is affected by heavy marijuana smoking. Some laboratory animal studies have found that the immune response is significantly suppressed in mice and rats subjected to high doses of marijuana. Other studies have not confirmed these findings. Because the immune response is so important to good health, long-term studies are essential to determine if marijuana users become more susceptible to disease.

How Does Marijuana Affect the Hormonal and Reproductive Systems?

MEN

A few studies of adult males have found that chronic marijuana users had lower levels of testosterone (the principal male sex hormone) than nonusers, and that abstention from marijuana after heavy use produced a reversal of this condition. Other research has shown that the sperm count in young adult males diminishes as marijuana use increases. Still other studies have shown that some of the sperm of chronic marijuana users are defective and nonfunctional. On the basis of these findings, scientists feel that those with marginal fertility or endocrine functioning should avoid marijuana. In addition, marijuana has been shown to affect the growth hormone from the pituitary. These findings indicate that marijuana may be particularly harmful during adolescence, a period of rapid physical and sexual development.

WOMEN

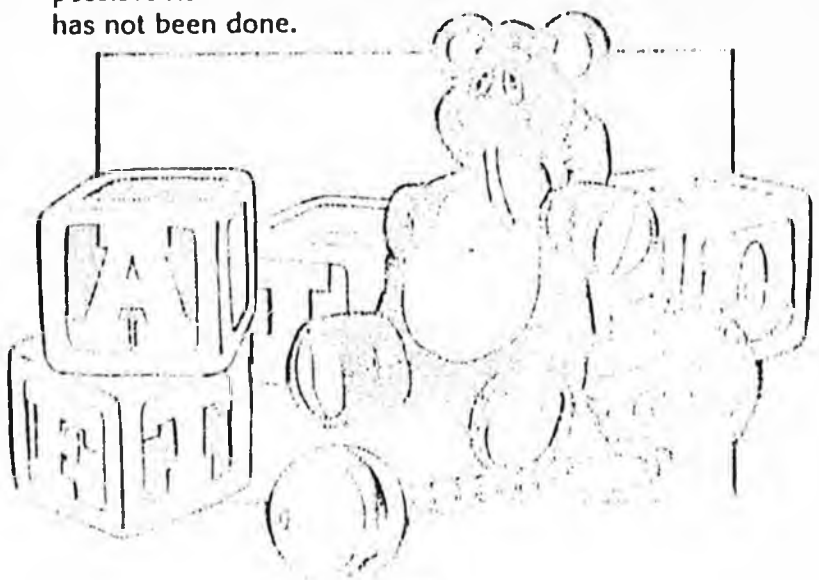
Information about the reproductive effects of marijuana on women is scarce; marijuana research on women of childbearing age is not permitted because of possible reproductive risks. But one recent study of marijuana use and human female endocrine functioning with 26 women using street marijuana for 6 months or more found they had defective menstrual cycles three times more frequently than a similar group of nonusers. These defective cycles involved either a failure to ovulate or a shortened period of fertility—findings which suggest that regular marijuana use may reduce fertility in women. Many female animal studies have been completed and show that marijuana influences levels of estrogen, the principal female sex hormone, and progesterone, another reproductive hormone, as well as the growth hormone from the pituitary. These studies suggest that heavy use should be avoided by the physically and sexually developing adolescent girl.

Is It OK To Smoke Marijuana if You Are Pregnant?

Definitely not. As stated earlier, research on women is limited because of possible risks to the unborn child. Laboratory animal tests, however, have shown that THC-treated female monkeys were four times more likely than untreated monkeys to abort or have stillborn infants. And males born of the THC-treated monkeys were lighter than usual in birth weight. Scientists believe that marijuana, which crosses the placental barrier in the pregnant mother's womb, may have a toxic effect on embryos and fetuses. Use of marijuana or any other drug during pregnancy is an unnecessary risk.

What About Breast Feeding?

Animal studies have shown that THC from marijuana can be transmitted to a baby through the mother's milk and that traces of THC have been found in the baby's urine and feces after nursing. Scientists have no doubt that THC is also transmitted in human milk, but because of possible risks to the mother and child, human research has not been done.



Possible Medical Uses of the Chemicals in Marijuana

Research on marijuana has led to findings which indicate that some of the plant's chemicals, particularly THC, may have medical value. The following summarizes those areas currently being investigated.

Open-Angle Glaucoma

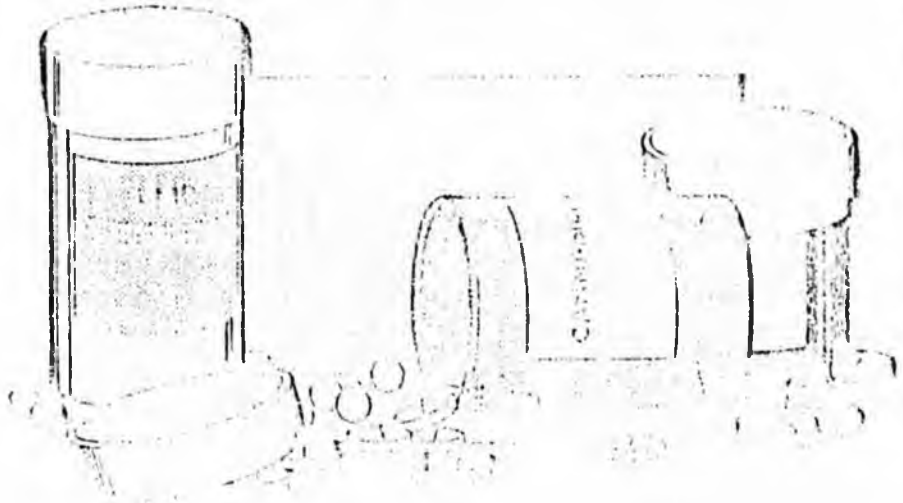
One of the first potential medical uses of marijuana to be explored was the treatment of open-angle glaucoma. This disease, which often leads to blindness, is caused by pressure within the eye. Marijuana cigarettes, often in combination with standard eye medication, have sometimes reduced this pressure. Synthetically made THC eye drops are also being tested on patients. However, mounting evidence suggests that tolerance (the need to increase amounts to achieve the effects produced by initial doses) develops and that ultimately little or no effect may be realized from the drug.

Use of marijuana does not prevent glaucoma or any other eye disorder, or improve vision.

Nausea

One of the more promising uses of THC is as a means of controlling the overwhelming nausea and vomiting which cancer patients experience during chemotherapy. These side effects sometimes force patients to discontinue necessary treatment. Because the available substances that control these symptoms are not effective for all patients, several research projects are now being sponsored by the Federal Government and a number of States and independent researchers to further investigate THC's anti-nausea effects.

But marijuana does not prevent cancer. As discussed earlier, marijuana smoke contains more cancer-causing agents than tobacco smoke.



Multiple Sclerosis

Some small studies are being conducted to test whether THC has any effect on reducing spasticity or involuntary muscle contractions in patients with multiple sclerosis. While the results are not conclusive, some patients have shown lowered spasticity after taking the drug. Whether this reduction will make any difference in the patients' ability to function is not yet known.

Epilepsy

A number of human and animal studies have been done to determine if marijuana or any of its ingredients has an effect on epileptic seizures. Some research on THC has shown that it may actually trigger convulsions in epileptics. Scientists hypothesize that this occurs when the drug stimulates high voltage brain waves, and that the likelihood of its happening is determined by the amount of THC in marijuana and the amount inhaled.

Another marijuana ingredient, cannabidiol, has been shown in limited studies to reduce or control seizures. It should be pointed out, however, that cannabidiol is dominant in only one strain of marijuana and that this particular "fiber" strain contains little of the mind-altering THC. This means that the marijuana available for sale on the street contains only trace amounts of cannabidiol. Cannabidiol has been synthesized and is administered orally or by injection to patients involved in studies.

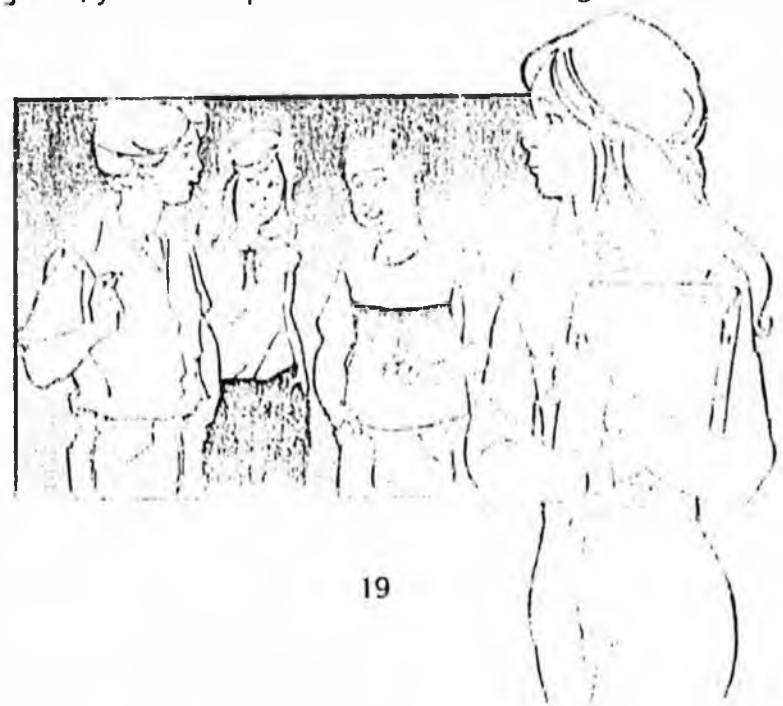
What's a Parent To Do?

Sooner or later, nearly all youngsters find themselves in situations in which they must decide whether or not to take drugs. These decisions are especially hard to make in the midst of conflicting information, peer pressure, curiosity, and the many other influences that are part of adolescence.

If your child has not tried marijuana, consider yourself fortunate, but do not discount the possibility that it could happen sometime in the future. Learn the facts and be prepared to answer questions or deal with the situation if it should occur.

If you think your child has tried marijuana and may even be smoking it regularly, remain calm. Outbursts of anger and emotion are not going to help. They will only interfere with the dialog that is now essential. If you find yourself unable to control your feelings, consider bringing in a third party whose advice and counsel will be respected by both you and your child.

If your child was the one who told you about using marijuana, you should praise him or her for being honest.



and be proud that you created the atmosphere that encouraged your child to confide in you. As you discuss marijuana with your son or daughter, try to find out why s/he smokes and how often. The reasons most often cited are, "Because everybody else does" or "It makes me feel good." A closer look may reveal that your child smokes marijuana to avoid rejection by the other kids, to overcome shyness, or to cope with boredom or feelings of failure.

If you suspect your child may be smoking marijuana to get your attention, take a look at your relationship. Perhaps spending more time with your child is called for. Consider planning activities together away from home, school, and business pressures. Try listening and becoming sensitive to your child's feelings and problems, no matter how trivial they seem.

If your child smokes heavily, you might point out the dangers of heavy use and consider seeking help from a doctor or other health professional even if you have to do this without the youngster's consent.

Saying "No"

A recent study with adolescents has shown that teaching them how to say "no" may actually be more important than giving them the reasons for saying it. Since peer pressure is so important in drug use, you might consider teaching your child how to handle the time when s/he will be faced with making a decision about marijuana or other drugs.

Guilt Doesn't Help

Don't feel guilty or ashamed about your child's marijuana use. Even children of loving parents who have set a good example and taught moderation can become caught up in drug use. Peer group pressure is often strong enough to override the best parental influences.

As you try to cope with the "hows" and "whys" of marijuana, it is important to remember that children are not the only ones who have peers. Your own friends, your neighbors, and the parents of your child's friends are facing the same problems and asking the same questions.

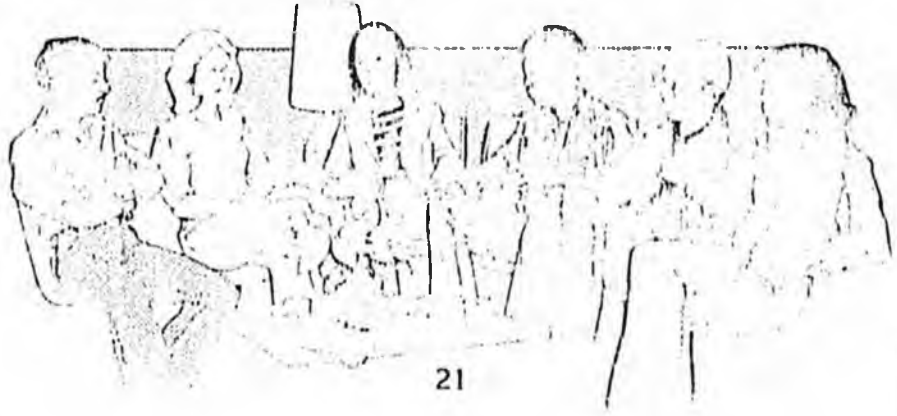
In fact, parents all over the country—of every race, ethnic background, and social class, in cities and suburbs and small towns—are waking up to the dangers of marijuana and other drugs.

Talk About Drugs With Other Parents

If you know your child's friends are smoking marijuana and you would like to do something to stop it, start by inviting their parents to your home one evening. Tell them of your concerns and share all the information you have. Some will probably report similar experiences and may be relieved to find someone who shares their troubles and will work with them to look for solutions.

Some parents may become defensive and insist that marijuana use is not a problem in their families. This is a natural reaction for people who are frightened and confused. For many, a stigma is still attached to marijuana use. They believe that drugs are used only by "bad" children of "unfit" parents.

At any parent meeting try to avoid accusations and blame—"your child does this," "well, *your* child does that." Remember that the purpose of a parent group is cooperation and sharing.



Establish Uniform Rules for the Peer Group

An approach some parents have tried is establishing uniform rules to make access to drugs harder. If you and the parents of your child's friends can agree on appropriate curfews, limits on spending money and use of the family car, and other guidelines, the young people in your community will not be able to justify or excuse their behavior by saying, "But all the other kids are allowed to!" This will also help develop a sense of an extended family in the community where the parents cooperate and the young people are treated alike.

Parent groups that have tried this approach report that:

> Their children seem more active and attentive, and their grades improve.
>
> Their youngsters are now voluntarily following rules that they used to think were unreasonable.
>
> The parent-child relationship is better than ever.
>
> Younger children are not falling into the same drug-oriented culture which influenced their older brothers and sisters.

Develop Alternatives to Drug Use

There are any number of healthy activities which can show your child how to have a good time without being high on a drug. Whenever possible, do them together. Here are some examples:

Remember, what is most important is not the activity but that you are taking a personal interest and that your child is developing a focus on things other than drugs.

Marijuana Jargon

Parents today are trying to cope not only with marijuana but also with the drug's vocabulary. While drug terms are continually changing and are often different in various parts of the country, this list may help you decipher the most popular marijuana jargon.

Acapulco Gold—a potent strain of marijuana with gold or yellow highlights.

Bong—a cylindrical water pipe used to smoke marijuana.

Burn out—a slang term for a state of apathy and deadened perceptions which can result from habitual use of marijuana.

Buzz—slang term for a high or a drug-induced euphoria.

Colombian—a potent strain of marijuana.

Decriminalization—process of reducing penalties for personal use of marijuana from prison sentences to civil fines.

Dime—a quantity of drugs which sells on the streets for $10.

Dope—slang term for marijuana and other drugs.

Duster—cigarette made of tobacco, mint leaves, marijuana, or parsley sprinkled with phencyclidine (PCP), also known as Angel Dust.

Ganja—a potent form of *Cannabis* obtained from the flowering tops and leaves of the plant. It may also be used to refer to marijuana in general.

Grass—slang term for marijuana.

Hashish—a form of *Cannabis* made either from the *Cannabis sativa* plant or its resin.

Hash oil—a form of *Cannabis* which is extracted or distilled from the *Cannabis sativa* plant.

Head shops—stores which specialize in the sale of drug paraphernalia and drug-related items.

High—a widely used slang term for euphoria and intoxication.

Hit—a single drag or inhalation of marijuana smoke.

Joint—a hand-rolled marijuana cigarette.

Killer weed—slang term for PCP-treated parsley or marijuana.

Loaded—slang term for state of being high or intoxicated.

Nickel—a quantity of marijuana which sells on the street for $5.

Ounce—a standard unit of measurement for marijuana.

Paraphernalia—drug equipment or gadgets usually sold in head shops.

Pot—slang term for marijuana.

Reefer—slang term for marijuana.

Roach—the small end of a marijuana joint which remains after most of the cigarette is smoked.

Roach clip—a device used to hold the roach or the tail end of a marijuana joint.

Rolling papers—cigarette papers used to make a marijuana joint.

Scales—paraphernalia used to weigh drug quantities for selling purposes.

Smoking stones—paraphernalia used to hold marijuana joints while smoking.

Space cadet—slang term for a habitual marijuana user whose senses have become dulled.

Spaced out—slang term for a drug-induced state of being lost or out of touch with surroundings.

Stash—Any container or place used to store marijuana or other drugs.

Stoned—slang term for being high or intoxicated from marijuana.

Supergrass—slang term for marijuana treated with phencyclidine (PCP or Angel Dust).

Toke—slang term for an inhalation of marijuana or hashish smoke.

Water pipe—paraphernalia used to smoke marijuana or hashish which filters the smoke through water.

Weed—slang term for marijuana.

Common Drugs of Abuse

CATEGORY	Drugs	Sample trade or other names	Medical uses	Dependence: Physical	Dependence: Psychological	Effects in hours	Possible effects	Effects of overdose	Withdrawal symptoms
CANNABIS	Marijuana	Pot, grass, reefer, sinsemilla	Under investigation	Unknown	Moderate	2-4	Euphoria, relaxed inhibitions, increase in heart and pulse rate, reddening of the eyes, increased appetite, disoriented behavior	Anxiety, paranoia, loss of concentration, slower movements, time distortion	Insomnia, hyperactivity, and decreased appetite occasionally reported
	Tetrahydrocannabinol	THC							
	Hashish	Hash	None						
	Hash oil	Hash oil							
DEPRESSANTS	Alcohol	Liquor, beer, wine	None	High	High	1-12	Slurred speech, disorientation, drunken behavior	Shallow respiration, cold and clammy skin, dilated pupils, weak and rapid pulse, coma, possible death	Anxiety, insomnia, tremors, delirium, convulsions, possible death
	Barbiturates	Secobarbital, Amobarbital, Butisol, Tuinal	Anesthetic, anti-convulsant, sedative, hypnotic	High-moderate	High-moderate	1-16			
	Methaqualone	Quaalude, Sopor, Parest	Sedative, hypnotic	High	High	4-8			
	Tranquilizers	Valium, Librium, Equanil, Miltown	Anti-anxiety, anti-convulsant, sedative	Moderate to low	Moderate				
STIMULANTS	Cocaine	Coke, flake, snow	Local anesthetic	Possible	High	½-2	Increased alertness, excitation, euphoria, increase in pulse rate and blood pressure, insomnia, loss of appetite	Agitation, increase in body temperature, hallucinations, convulsions, possible death, tremors	Apathy, long periods of sleep, irritability, depression
	Amphetamines	Biphetamine, Dexedrine	Hyperactivity, narcolepsy						
	Nicotine	Tobacco, cigars, cigarettes	None	High	High	2-4		Agitation, increase in pulse rate and blood pressure, loss of appetite, insomnia	
	Caffeine	Coffee, tea, cola drinks, No-Doz		Low	Low				
HALLUCINOGENS	LSD	Acid	None	None	Degree unknown	8-12	Illusions and hallucinations, poor perception of time and distance	Drug effects becoming longer and more intense, psychosis	Withdrawal symptoms not reported
	Mescaline and peyote	Button, Cactus							
	Phencyclidine	PCP, angel dust	Veterinary anesthetic	Unknown	High	Variable			
	Psilocybin · psilocin	Mushrooms	None	None	Degree unknown	6			
INHALANTS	Nitrous oxide	Whippets, laughing gas	Anesthetic	Possible	Moderate	Up to ½ hr	Excitement, euphoria, giddiness, loss of inhibitions, aggressiveness, delusions, depression, drowsiness, headache, nausea	Loss of memory, confusion, unsteady gait, erratic heart beat and pulse, possible death	Insomnia, decreased appetite, depression, irritability, headache
	Butyl nitrite	Locker room, rush	None						
	Amyl nitrite	Poppers, snappers	Heart stimulant						
	Chlorohydrocarbons	Aerosol paint, cleaning fluid	None						
	Hydrocarbons	Aerosol propellants gasoline, glue, paint thinner	None						
NARCOTICS	Opium	Paregoric	Antidiarrheal, pain relief	High	High	3-6	Euphoria, drowsiness, respiratory depression, constricted pupils, nausea	Slow and shallow breathing, clammy skin, convulsions, coma, possible death	Watery eyes, runny nose, yawning, loss of appetite, irritability, tremors, panic, chills and sweating, cramps, nausea
	Morphine	Morphine, Pectoral Syrup							
	Codeine	Codeine, Empirin Compound with Codeine, Robitussin A-C	Pain relief, cough medicine	Moderate	Moderate				
	Heroin	Horse, smack	Under investigation	High	High	12-24			
	Methadone	Dolophine, Methadose	Heroin substitute, pain relief						

MARIJUANA UPDATE

Reprinted from Reader's Digest

The first two articles in this booklet, combined under the title "Marijuana Alert" made reprint history for the Reader's Digest. In the 44 years the Digest has offered reprints, no other article has sold so many copies in so short a time. Within 11 months, over three million reprints were sold to schools, colleges, churches, courts, scout groups, the military, PTAs, businesses, clinics and to hundreds of thousands of individuals, young and old. Especially touching have been the letters from young people who said they wished to share this information with their peers.

In this edition of Marijuana Update we are adding Peggy Mann's latest article from the December 1981 Reader's Digest: "Marijuana Alert III: The Devastation of Personality."

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 teen-agers with whom he has worked.

By Peggy 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 metabolism 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.),

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, Wolff 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.

How to Get 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 61 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 results: all 43 EEGs, like Steven's, were "markedly immature" and indicated diffuse brain impairment.

Brain Damage. Dr. Robert Heath, chairman of the department of neurology and psychiatry at Tulane 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 interruption 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 36, 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 "teenaged" mice very high doses of THC daily. "All the mice were mated, and were sacrificed when the fertilized egg 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 youngsters 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 harmless 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-possessed, 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 overachieving 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 slovenly, 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

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, witless 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

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.

REPRINTED FROM THE DECEMBER 1979 ISSUE OF READER'S DIGEST

Marijuana Alert II: More of the Grim Story

By Peggy Mann

In the midst of a virtual marijuana epidemic among young people, Americans are discovering just how injurious this drug can be. Research shows that pot permeates body tissues and fluids, and can damage almost every human organ and system tested. Last December, The Reader's Digest published a report describing how marijuana can harm the brain and reproductive system. More than three million reprints have already been ordered by readers. This follow-up continues the devastating story, documenting how pot can damage the lungs, heart and immune system.

Fourteen-year-old Teddy waited nervously for Dr. Ingrid Lantner's diagnosis. Unexpectedly, the doctor asked, "How much pot do you smoke a day?"

Teddy stared. How did *she* know?

"I've had a number of teen-age patients with this type of chest pain," Dr. Lantner told him. "My prescription is: cut out pot. The pain should disappear in 4 to 12 weeks." Teddy followed the doctor's orders and his pain went away without medication.

Dr. Lantner of Cleveland, Ohio, is just one of many pediatricians concerned about the swelling caseload of pot-smoking* youngsters. "We never used to see teen-agers with chest pain," she says. "In fact, we hardly used to *see* teen-agers; they're over the childhood diseases and usually in the prime of health. But now young pot smokers show up with a variety of symptoms, some of which—like severe chest pain, certain respiratory conditions and short-term memory loss—are normally associated with middle and old age. Many pediatricians, and I am one of them, are convinced marijuana is the single most dangerous health hazard facing American youth today."

According to Dr. Robert DuPont, founding director of the National Institute on Drug Abuse (NIDA), those pediatricians may be right. Over the past two decades, asserts DuPont, American teen-agers suffered deteriorating health, the only age group in the United States to do so. The time segment exactly coincides with the epidemic of marijuana use among young people.

Psychiatrist Dr. Carlton Turner, director of a NIDA marijuana research project at the University of Mississippi, says there is no other drug used or abused by man "that has the staying power and broad cellular actions on the body that cannabinoids do." (Cannabinoids are chemicals found only in the can-

*"Pot" comes from the Mexican *potaguaya*, or hemp plant.

nabis plant, from which marijuana and hashish are prepared.)

Only a handful of the 61 cannabinoids identified so far in pot have been studied. Each is metabolized, or broken down, into many other chemicals. Some are psychoactive; some are not. But all are biologically active. "In human studies, the chief psychoactive cannabinoid, delta-9-THC, and its by-products showed up in all body fluids tested," Turner adds. "The cannabinoids are fat-soluble and accumulate in the fatty sections of the cells and in the fatty organs. We know from animal studies that only five percent of the THC [for tetrahydrocannibinol, a group of compounds found exclusively in the cannabis plant] gets across the blood-brain barrier, which we assume creates the 'high' in humans. That five percent causes problems enough. But what concerns me even more is what the other unknown 95 percent of this and the other cannabinoids are doing to the body."

Some of the non-psychoactive cannabinoids have been shown to be more harmful to certain organs than the psychoactive ones. And cannabinoids make up only a fraction of the 421 known chemicals in the cannabis plant; new ones are constantly being identified. (In contrast to marijuana, most other drugs of abuse—LSD, cocaine, alcohol, etc.—are single chemicals.)

Recent research documents that marijuana smoking is harmful to the entire pulmonary tree, ranging from the sinus cavities to the deepest recesses of the lungs. Marijuana may be even more injurious to lungs than tobacco smoke, and its symptoms may strike faster. Dr. Forest S. Tennant, Jr., former director of a U.S. Army drug-abuse program in West Germany, studied more than 1000 U.S. soldiers stationed there and found that heavy cannabis smoking produced sinusitis, pharyngitis, bronchitis, asthma and other respiratory disorders in a year or less. In number and severity, the pulmonary symptoms far outranked those of older soldiers who had averaged 1½ packs of cigarettes a day for 11 years or more. "I saw chronic bronchitis and emphysema—generally found only in 45- or 50-year-olds—in hashish-smoking soldiers who were only 18 years old," says Dr. Tennant.

Cancer Risk. Pot smokers without symptoms can also have hidden lung disease. Dr. Donald Tashkin, director of the Lung Function Laboratory of U.C.L.A. Hospital in Los Angeles, uses highly sophisticated equipment to look for subclinical damage that otherwise cannot be detected. In one study of 28 seemingly healthy young men who averaged five "joints" a day for 47 to 59 days, Tashkin found highly significant dose-related impairments of lung function. These impairments are similar to those seen by other researchers studying moderate to heavy tobacco use over many years. In a more recent study, Tashkin and co-worker Barry Calvarese showed that marijuana smokers who averaged 2.2 joints a day for five years had 25-percent more airway resistance than a matched group of tobacco smokers who averaged 16 cigarettes a day for the same period.

"Airway resistance," explains Dr. Gary Huber, head of the University of Kentucky's Tobacco and Health Research Institute, "determines in part how well we can get oxygen into our bodies and how well we can get out the toxic carbon dioxide that can poison the cell." Working with rats, Huber has found that marijuana enhances—by some 200 percent—enzymes that potentially contribute to the "eating" or digesting of the lung itself.

Can pot cause lung cancer? A 1971–74 study compared a typical unfiltered U.S. tobacco cigarette with a marijuana joint. (Note: in the early '70s the THC potency of street pot was much lower than it is today.) Both smokes contained roughly equal amounts of such irritants and gaseous toxic agents as carbon monoxide, ammonia, acetone and benzene. But the carcinogens benzanthracene and benzopyrene were present in marijuana smoke in amounts 50 to 70 percent greater than in the smoke of cigarettes. When these researchers applied marijuana- and tobacco-smoke condensates to the backs of mice, both produced cancerous tumors.

Dr. Rudolph Leuchtenberger and his wife, Cecile, of the Swiss Institute for Experimental Cancer Research at Lausanne, studied more than 5000 animal and human lung-cell cultures exposed to puffs of smoke from a marijuana cigarette and from a tobacco cigarette. Their conclusion: Fresh smoke from marijuana cigarettes is harmful to lung cells in that it contributes to the development of pre-malignant and malignant lesions. The smoke from the tobacco cigarette had much less effect.

Lung-Tissue Damage. In February 1980, Dr. Tennant published the result of actual lung biopsies taken from 30 soldiers (average age 20), who had smoked hashish heavily for eight months to a year. Ninety-one percent of those soldiers who had smoked both hashish and cigarettes showed squamous-metaplasia cells, a step removed from "wild" or cancerous cells. Those who had smoked either hashish or cigarettes alone had a substantially lower incidence of these pre-cancerous cells. "However," Tennant noted, "the hashish-smoking soldiers were also more likely to be cigarette smokers too." He summed up: "We know that if the condition that caused the squamous-metaplasia cells doesn't stop, then cancer will likely ensue." The soldiers had smoked hash with a THC content comparable with that in pot smoked by millions of U.S. schoolchildren today.

Nor was there much difference in amounts smoked. The latest (1979) National High School Senior Survey shows that not only does one out of ten 12th-graders smoke pot daily, but these daily users now average 3½ joints a day, and 13 percent of them smoke more than seven joints daily. Of the 51 percent who smoked pot at

A Pot-Detection Test

In March 1980, after several years of research, an inexpensive, reliable, easy-to-use method was finally perfected for detecting cannabinoids in urine. Says Dr. Robert Willette, chief of the National Institute on Drug Abuse's Research Technology Branch: "The cannabinoid test is a real breakthrough. It can determine in 60 seconds, with 95-percent accuracy, the presence of cannabinoids in the urine for up to 48 hours after a joint has been smoked."

Many hospitals and private clinical laboratories now have the facilities for running the test, and many physicians are already finding it useful. For example, Dr. Donald Ian Macdonald, president-elect of the Florida Pediatric Society, plans to encourage every pediatrician in Florida to routinely use the new test when examining students from the sixth grade up. "It serves an invaluable function in alerting the physician," says Macdonald, "by eliminating 'the games of denial' many pot smokers play. It can save time and money needlessly spent on batteries of tests when, in fact, pot proves to be the sole cause of the problem."

all during their senior year, 43 percent said they usually stay high three to six hours or more.

Thus far, clinical evidence shows that all obvious symptoms, such as cough, chest pain and rales (abnormal sounds in the lungs or air passageways), disappear in time, if pot smoking is stopped. But what about the damage that shows up only in microscopic examination? The findings of Harris Rosenkrantz of EG&G Mason Research Institute are far from reassuring.

In three separate studies, rats were exposed to several puffs of pot smoke each day, the "human-equivalency dose" of an adult smoking one to six joints a day. Exposure from 3 to 12 months resulted in extensive dose-related lung damage, and the condition remained even after the smoking had been stopped for a month—which is roughly equivalent to two years for humans.

Another condition that remained 30 days after the pot puffs stopped involved the lungs' immune system. "In the healthy lung," says Rosenkrantz, "there are very few clumps of macrophages, scavenger cells that absorb and devour foreign matter. Rats were given the 'human equivalent' of one to six joints a day. After 180 days the macrophage clumps increased some 300 percent, clogging the air sacs. Some were so heavily blocked that they could not function."

A Weak Attack Force. Sue Powers was a beautiful girl of 16. But, as she frequently declared, "I'm *sick* of being sick!" She had a chronic cough, recurrent fever, sore throats. She'd recover from one illness and promptly come down with another. Her parents then learned she had been a daily pot smoker for two years. One day Mrs. Powers gave Sue a scientific report about marijuana's effect on the body's defense system, and suggested, "Why don't you cut out the pot and see what happens?" Sue did so. Within six months all her symptoms had disappeared. Coincidence? Perhaps. However, other parents and pediatricians have reported similar stories.

The scientific paper Mrs. Powers showed her daughter was done by Dr. Gabriel Nahas of Columbia University College of Physicians and Surgeons. The study centered on T-lymphocytes, white blood cells that play a key role in the body's defense system. T-cells constitute 70 percent of the lymphocytes in the bloodstream, and they respond by "charging up" (dividing rapidly) to increase their attack forces when they sense invasion by a virus, bacterium or other foreign body.

Nahas's study involved 51 young, chronic pot smokers—average age 22, who had averaged four joints a week for an average of four years—and 81 non-pot-smoking controls average age 44. Nahas found that the biochemically measured rate of division of the T-lymphocyte cells was a startling 41 percent lower in the young cannabis smokers than in the middle-aged controls.

Nahas then took his study a step further. He tested 24 kidney-transplant patients being given regular doses of special medication to *suppress* the immune system so that fighter cells would not reject the "foreign body"—the newly transplanted kidney. As an extra comparison, he also tested 60 cancer patients, who are known to have depressed immune systems. The results: the specially medicated transplant patients showed the highest impairment of T-lymphocyte response—53 percent. However, pot smokers ran neck and neck (41 percent) with the cancer patients (40 percent) in the suppression of their T-lymphocyte fighter cells.

Perhaps the most dramatic examples of defense-system impairment are the photo-micrographs taken by Dr. Marietta Issidorides of the University of Athens, Greece. Neutrophils (bacteria-fighter cells) from subjects who had never used cannabis showed up on slides as round, "plump," with a distinct "skin," or cell membrane. However, neutrophils from long-term (20-year) hash users were smaller and crumpled-looking, with dramatic alterations in the cell membrane. They were described as deformed cells, which probably could not function when challenged to do their assigned task of cleaning the blood.

All animal studies and most human studies show that marijuana not only inhibits immune cells' ability to recognize the encroachment of disease or a "foreign invader"; it also suppresses the ability to take any action once encroachment is recognized. Says immunologist Robert McDonough, "That's like having a feeble, half-blind night watchman, taking his gun away from him—and *then* expecting him to function."

Other Serious Hazards. All existing research clearly shows that marijuana should never be used by anyone with heart trouble. In one study,

Dr. Wilbert S. Aronow, professor of medicine and chief of cardiovascular research at the University of California at Irvine, gave a relatively weak joint to ten patients with angina pectoris (chest pain caused when insufficient oxygen is supplied to the heart muscle because of narrowing of the coronary arteries). Their average heart rate was 70 beats a minute. Ten puffs of pot jumped it to 100 beats a minute. Blood pressure also increased significantly. "By increasing either the heart rate or blood pressure, you increase the amount of oxygen needed by the heart muscle," says Aronow. "With ten puffs of pot you increase both simultaneously. But that's not all. Marijuana increases the amount of carbon monoxide in the blood as well—thereby reducing the amount of oxygen delivered to the heart muscle."

In other studies, Aronow showed that the amount of time one can exercise before chest pain occurs was reduced almost 50 percent after ten puffs of pot whereas ten puffs of a high-nicotine tobacco cigarette reduced exercise time only 23 percent. He also showed that marijuana significantly weakened the heart muscle's pumping action.

"Not only could marijuana precipitate a heart attack or cause sudden death in patients with known coronary disease," concludes Aronow, "but people who might have subclinical heart disease—without symptoms—could also be taking a risk. Remember that nearly 25 percent of persons dying suddenly from coronary heart disease have had no prior recognized symptoms of heart disease."

What about the cardiovascular systems of the hundreds of thousands of youngsters who are stoned more than three hours every day? Drs. Louis Vashon and Adam Sulkowski studied more than 100 young pot smokers (ages 18 to 25) and found that during all the hours of the "high," their heart rate was significantly elevated, in many cases rising from the normal 60 to 70 beats per minute to 130 to 150. The more THC absorbed, the faster the heart rate. "Such over-stimulation of the heart muscle," says Sulkowski, "could be the cause of the chest pains so commonly felt by young, chronic pot smokers."

Chest pain, emphysema, chronic bronchitis—these are conditions not normally seen in young people. Yet, at a time when four million of them, ages 12 to 17, are pot users, research and clinical evidence strongly suggest marijuana as a cause of these and other early symptoms and diseases of middle and old age. We already know that tobacco smoking is the largest preventable cause of death in America. There are many reasons to believe that marijuana smoking may be even more harmful.

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Marijuana Alert III: The Devastation of Personality

By Peggy Mann

Reader's Digest has published two previous Marijuana Alert reports. The first, in December 1979, described marijuana-caused impairment to the brain and the reproductive system. The second, in November 1980, emphasized the harm pot does to the lungs, the heart and the immune system. This third report examines the drug's dramatically impairing effects on cells and how this can damage man's most precious possessions: the mind, the personality, the spirit.

In 1978, Dr. Marietta Issidorides of Athens, Greece, one of Europe's most respected biologists, conducted electron-microscope studies on the white blood cells of 40 long-term hashish smokers. "We learned," she reported, "that long-term use of cannabis (the plant from which marijuana and hashish come) deformed a significantly high proportion of the cells. Impaired white blood cells are unable to function properly and protect the individual from infections."

Two years earlier, Dr. Akira Morishima of Columbia University looked at the white blood cells of 25 apparently healthy young males who had smoked marijuana at least twice a week for four years. He

found that one-third of their cells contained only 5 to 30 of the normal human complement of 46 chromosomes. These are the particles in every cell's nucleus that pass on genetic instructions to the next generation. "In my twenty years of research on human cells," said Morishima, "I have never found any other drug that came close to the DNA damage done by marijuana."

A study completed earlier this year showed a relationship between marijuana use and cancer. Dr. Josel Szepsenwol of the department of biological sciences of Florida International University injected 216 mice with very small amounts of THC or cannabinol (2 of the 61 cannabinoids, chemicals found only in the cannabis plant) dissolved in sesame-seed oil, once a week. *Over 50 percent developed cancer.* Only 4 percent of the control mice (injected with oil only) developed cancer, a normal percentage for this strain of mice.

Erosion of Life. These research findings are just a few examples of marijuana damage to basic life processes. Since 1975 some 300 studies of cannabis's harmful effects on animal and human cells have appeared in scientific journals. These effects include: botched division, slowed growth and abnormal-sized nuclei in cells, disturbed production of protein, and also damage to sperm cells and ova, nerve and connective-tissue cells.

Pioneer marijuana researcher Dr. Gabriel Nahas sums up the central role of marijuana's effects on human cells: "The many findings of cell damage caused by cannabis explain all the other damaging effects of the drug—on the lungs, sex organs, brain, immune system. I call the slow cell damage done by regular pot smoking over the years *a slow erosion of life.*"

Psychological signs of pot impairment are often not slow to appear and, generally, the younger the user the more rapid the onset of the impairment. Last year marijuana use was second only to heroin addiction as reason for admission to federally funded drug-treatment facilities, and half of those admitted had begun smoking pot at age 14 or younger.

Marijuana use is now so endemic in every stratum of society that there is no longer such an identifiable entity as a pot-*prone* personality. Only one characteristic remains as a "prone" factor: youth. According to the latest (1979) U.S. National Survey on Drug Abuse, one out of six youngsters in the 12-to-17 age group was a current (within the past month) pot smoker. In the 18-to-25 age group, *one out of three Americans was a current pot smoker.* However, after young people *become* heavy pot smokers, these widely diverse users tend to gel into a startling sameness, with a distinct pot-induced profile.

The Pot Personality. "Not all kids have all the symptoms," says Dr. Dean Parmelee, director of adolescent in-patient services at Charles River Hospital, a teaching affiliate of Boston University School of Medicine. "In fact, some bright youngsters with outgoing personalities seem to be able to maintain their grades and activities for a few years. But gradually all users—youngsters and adults—compromise their potential, their activities and their life-style. And heavy *young* users eventually develop most, if not all, of the 'pot personality' symptoms."

Dr. Harold Voth of the Menninger Foundation's School of Psychiatry, and chief of staff of the Topeka VA Medical Center, has studied the psychopathology of marijuana in depth for the past eight years. He defines the pot personality: "The most obvious impairments caused by chronic marijuana use are in the area of Organic Brain Syndrome (OBS). These include impaired short-term memory, emotional flatness, and the amotivational—or dropout—syndrome. This can progress from dropping out of sports, to dropping out of school, to dropping out of the family."

Voth lists other typical symptoms of pot-induced OBS: "diminished will power, concentration, attention span, ability to deal with abstract or complex problems, and tolerance for frustration; increased confusion in thinking, impaired judgment, hostility toward authority.

"Another pernicious symptom," says Voth, "is the element of denial—refusal to believe the hard medical evidence that marijuana is physically and psychologically harmful." He also points out that it takes years of heavy drinking to reach the same point of psychological impairment that marijuana can induce in a matter of months, particularly in the case of the very young user.

Personality Changes. Unlike the heavy drinker who generally "becomes himself again" when sober, the underlying personality structure of the chronic pot smoker seems to change. Dr. John Meeks, medical director of the Psychiatric Institute of Montgomery County, Maryland, says, "If someone smokes twice a week or more, sobering up—in any total sense—never occurs. Even when not 'high,' he or she remains in a state of subacute intoxication; in most cases, without even recognizing this 'holdover' effect."

While alcohol is water soluble and washes out of the body in a matter of hours, cannabinoids are fat soluble and accumulate in fatty sections of the cells and in fatty organs (the brain is one-third fat). Only very slowly do the cannabinoids seep back into the bloodstream so they can be metabolized and eliminated. Thus they act like time-release capsules, constantly emitting subtle intoxication.

Rhesus-monkey studies done by psychiatrist-neurologist Robert Heath give further insights into cellular causes of psychological symptoms. The monkeys were exposed to the smoke of two to three "monkey-sized" marijuana ciga-

rettes (one-quarter the size of a human "joint") five days a week, for six months. In each monkey, several thousand brain cells from 42 different areas of the brain were examined under the electron microscope. Although there were some structural cell changes in all the brain sites, striking impairment was found in the sites specifically related to the typical pot symptoms of apathy and flatness. Dramatic cell impairment was also found in sites correlated with irritability and fear—prominent symptoms of pot-induced paranoia.

"I don't know of any other drug, including alcohol," says Heath, "that causes such a wide spectrum of brain changes as we saw in those cells. And today tens of thousands of U.S. teen-agers are inhaling proportionally far more pot smoke every day than we gave those monkeys."

Senile Symptoms. In March 1980 Dr. Adam Sulkowski, a geriatric psychiatrist, published the first scientific paper to set forth the many similarities between the psychological symptoms seen in marijuana intoxication and senility. In July 1981 Dr. Stephen Williams, professor of psychology at Houston Baptist University, and psychiatrist Jason Baron, director of Deer Park Hospital in Houston, also found a number of "senility symptoms" in a study of 60 teen-agers in a drug-treatment program who were daily pot smokers but used no other drugs. At the beginning of the study, they were given a battery of psychological tests, which were then repeated after six pot-free weeks in the hospital.

Williams reported: "In many very elderly people, we see an unreasonable preoccupation with how one's body feels, obsessive-compulsive tendencies and inflexibility. All these symptoms were strikingly evident in our study of teen-age pot smokers, and all these symptoms decreased markedly once the drug was out of their systems.

"Depression," says Williams, "is perhaps the most common psychological symptom among old people. It is usually associated with feelings of loss, such as loss of loved ones, of health, etc. The chief cause of depression among our teen-age subjects was also loss: a tremendous loss of self-esteem. One good-looking, well-dressed 16-year-old put it this way: 'I'm like an empty shell. There is nothing left that I like about myself. And pot did it.' "

Another finding is regressive immaturity. Says psychiatrist Mitchell Rosenthal, the director of Phoenix House in New York City, the nation's largest residential drug-treatment facility, "Just when our youngsters need most to grow psychologically, they are pushed back toward infantilism by self-absorption and the desire for instant gratification. When they need most to learn how to cope with the emotional storms and squalls of the troubled teen-age period, they are instead copping out, blowing

their problems away with pot."

Rosenthal predicts: "A sizeable number of our young people will not mature as they should. Instead, we can look forward to a growing population of immature, underqualified adults, many of whom will be unable to live without economic, social or clinical support."

Risk of Relapse. In August 1981 Dr. Mark Gold completed a study of 100 teen-age and adult "marijuanaholics"—chronic users of pot, who are psychologically, physiologically and socially disabled. Gold, a recipient of the American Psychiatric Association's 1981 Foundation Prize for Research in Psychiatry, is director of research at Fair Oaks Hospital in Summit, N.J., one of the few psychiatric hospitals in the country that specializes in treatment of the marijuanaholic.

"Our study," says Gold, "shows that in the case of youngsters who abstain completely for an average of six months, there is return of concentration, attention and memory to expected levels.

"This is not true for older marijuanaholics. In respect to short-term memory loss, in some cases, they do not appear to come back all the way. Furthermore, because older users are usually long-term users, they have made subtle changes in their lives that are hard to undo. For example, they slide into less-demanding jobs."

Gold also found that, like alcoholics, marijuanaholics are always at high risk of relapse. "Even if off the drug for a year," he says, "one or two joints can send them on a pot binge, and they relapse quickly into their former use patterns. And although it may have taken two years to reach their prior seriously disabled state, it may take only two weeks of renewed pot smoking to revert to that same level."

According to Dr. Carlton Turner, now Senior Policy Adviser on Drug Policy for the White House and former director of the National Institute on Drug Abuse Marijuana Research Program at the University of Mississippi, most Americans do not realize the pandemic proportions of marijuana use among our youngsters. Turner warns: "The inescapable fact is that unless our current pot-smoking habits are reversed sharply, marijuana will have drastic long-term physical and psychological health effects on our young people and, therefore, on the future of our families and our nation."

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MARIJUANA AND DRIVING: The Sobering Truth

A growing number of stoned motorists is endangering lives on our highways. Here's what must be done

By Peggy Mann

RECENT STUDIES blow the warning whistle on a little-publicized but nonetheless frightening new menace to motorists: the pot smoker driving "high" on the highways. Persuasive evidence is mounting that such drivers often have a distorted sense of space and time, altered peripheral and central vision, and impaired manipulative and coördination skills.

Surveys reported by the National Institute on Drug Abuse (NIDA) reveal that 60 to 80 percent of the marijuana users questioned sometimes drive while "intoxicated" on pot. Every day, increasing numbers of stoned drivers are endangering lives—as pot use escalates into what NIDA calls "a national epidemic among young people." (The latest countrywide survey shows that one out of every nine high-school seniors smokes pot *daily,* almost twice the 1975 figure.)

Our nation is both unaware of the marijuana highway crisis and unprepared for it. Many states have inexpensive and legally recognized tests for establishing alcoholic intoxication. However, we have no workable roadside test for marijuana intoxication. (NIDA is funding research on such a test, but it is probably three or four years away from being ready.)

In 39 states, possession of marijuana is still a crime, but enforcement is generally lax—and pot smokers know it. Of the 11 states that have decriminalized marijuana, only Alaska and Minnesota have thus far enacted a special increased penalty for possession of pot in a vehicle. In all 11 states, many pot-smoking drivers mistakenly believe that decriminalization implies governmental sanction to smoke marijuana—anywhere.

The politicization of pot has helped to obscure the picture. But when emotions and polemics are cleared away, both pro- and anti-decriminalization forces agree that it is dangerous to drive stoned. Even the National Organization for the Reform of Marijuana Laws (NORML), which supports removal of all legal penalties for possession of pot for personal use, "strongly discourages driving while under the influence of marijuana or any other drug, and recognizes the legitimate public interest in prohibiting such conduct."

The "legitimate public interest," however, is *not* being protected. Highway officials nationwide express profound concern. Richard L. Burton, former commissioner of Alaska's Department of Public Safety, is among the most apprehensive, saying, "The alcohol problem on the highways will soon be only half as serious as marijuana—and that's not because the alcohol problem is going to get any better!" And Lee Dogoloff, White House adviser on federal drug policy, states: "It is essential that Americans understand the very real hazards of driving while marijuana-intoxicated."

How much does marijuana

Research findings have been remarkably consistent. In 1975, the Boston University Traffic Accident Research Team surveyed 267 drivers deemed "most responsible" for a fatal accident. Sixteen percent of the 267 drivers had been smoking marijuana prior to the fatal accident. Statistically, "marijuana smokers were over-represented in fatal highway accidents," the study concluded. Other traffic-fatality studies in Albuquerque, N.M., Baltimore, and in Oklahoma City yielded a similar incidence of marijuana involvement.

California's Department of Justice has made the first large-scale study directly relating marijuana to traffic arrests. The study, completed last year, covered 46 of the state's 58 counties and examined 1792 blood samples (randomly selected from 19,000 turned in by the California Highway Patrol) from drivers arrested for traffic accidents or for driving under the influence of drugs. The tests were made with an expensive radioimmunoassay laboratory technique that can analyze blood samples for molecules of THC (tetrahydrocannabinol), the chief mind-altering ingredient of marijuana. Sixteen percent of the 1792 arrested drivers had sufficient THC in their blood to constitute marijuana intoxication.

Victor Reeve, supervisor of the California study, pointed out: "This must be regarded as a conservative figure because, of the drivers arrested, fewer than half agreed to give a blood sample. How many of the remaining drivers were under the influence of marijuana we will never know."

More than 50 studies have been made in the United States since 1970, when standardized grades of so-called "NIDA marijuana" were made available to researchers. Says Herbert Moskowitz, a University of California research psychologist who has probably done the most work on marijuana with simulated driving studies: "The preponderance of evidence indicates that marijuana impairs skills performance and perceptual processes, including vision, attention, and tracking behavior—all important components of driving performance."

Such impairments as tracking performance are significant after two "street joints." Drivers may imagine they are doing a fine job of keeping the car in the correct lane, when in fact they are weaving.

In addition, marijuana can cause: impaired night-driving abilities, impaired short-term memory function, impaired concentration, impaired ocular motor control and impaired vigilance.

These results are generally obtained in driving-simulator tests—and most people drive *better* under simulated conditions than they drive normally.

However, one test was carried out in *actual* driving conditions by Dr. Harry Klonoff, professor of psychiatry at the University of British Columbia. He chose 64 psychologically stable subjects who had used marijuana before. One third were given a low dosage of one street joint, one third received a high dosage of two joints, the other third received placebos. With dual controls and an observer in each car, all 64 volunteers drove through a closed course with no other traffic. Low-dose subjects showed a 33-percent significant decline in driving skills, while high-dose subjects showed a 55-percent significant decline.

Thirty-eight drivers also covered a 16-mile route from the university campus to the traffic-heavy downtown area, and back again. These 38 were rated by the system used to examine drivers for licensing. Final figures for the road test showed that those on the low dose had a *42-percent decline* in driving skills, while the high-dosage subjects had a *63-percent decline.* Unusual driving behavior, Klonoff reported, included missing traffic lights or stop signs, poor handling of the vehicle in traffic, unawareness of pedestrians and stationary vehicles.

Of 11 behavioral components tested, the three of greatest vulnerability were judgment, caution and concentration—despite the fact that some of the subjects paid special attention to their driving to prove that pot had no impairing effects.

Studies in 1972 showed a definite decrease in skills performance 5 to 6 hours after intake of a strong social dose of marijuana. Another worrisome factor, reported in 1976 by NIDA, is that a person may attempt to drive without realizing that his functioning is still impaired—even though he

or she no longer feels "high."

A 1972 study of driving behavior in a safety-controlled area showed a "marked" decline in driving abilities was still present 5 to 6 hours after intake, a "definite" effect 8 to 10 hours after intake, and a lingering effect as long as 24 hours later. Another factor: Many chronic pot smokers reported that only a few puffs of "good pot" (with a high THC content) can result in a sudden intense high (if this happens on the highway it can be frightening and dangerous).

Chronic pot smokers tend to view their driving impairments through rose-colored glasses. Among more than 1000 people arrested for marijuana possession in Minnesota, 25 percent thought pot had no effect on their driving. More than 25 percent thought pot actually improved their coördination. Some enthusiasts *prefer* driving stoned, saying that it becomes less boring. "I get more into my driving" goes the refrain.

Dr. Joseph Davis, the medical examiner in Dade County, Fla., with Arnold W. Klein and Dr. Brian D. Blackbourne surveyed 571 local college and post-graduate students on pot and driving. In every driving category former and infrequent users sharply downgraded their ability to perform while stoned, while chronic pot smokers gave themselves quite good grades. Despite their cheery assessments, 53 percent of the chronic users had been stopped by police for driving under the influence of drugs; 22 percent had three or more violations, compared with 2.3 percent of non-users. Eight percent had had their license revoked, compared to one percent of the non-users.

The alcohol-drunk driver usually finds it hard to hide his condition, if stopped by the police. But the pot-high driver often believes he can "come down" and carry on a seemingly normal conversation with a police officer. This apparent ability to "hide their high" gives many pot smokers confidence that they can drive stoned.

One such self-assured driver, a 30-year-old medical sociologist—a heavy drug user and daily pot smoker for about five years before he swore off drugs—reported smoking a few joints at a friend's house. Then he borrowed his friend's car, certain that he could handle whatever might turn up on the road—including the police. "But," he recalls, "as I drove down one of the busiest streets in the city, the dream-like pleasure I usually felt when driving stoned suddenly burst into a total psychedelic experience. All I could see was a myriad of tiny dancing lights. I was so totally spaced out that I had no awareness of even being *in* a car, much less driving one."

When a traffic light turned red, he didn't notice it, and crashed into a small car. He got out, danced a little jig, walked away and wandered around the city for hours. "I knew something had happened. But I didn't know what."

Around 4 a.m. he remembered, and turned himself in to the police. He learned that he had wrecked his friend's car, and had totally demolished the small car in front of him—which had, in turn, crashed into the sedan in front of it. Remarkably, no one had been seriously injured.

What can be done—now? We need not wait helplessly until scientists come up with a roadside kit for testing THC levels, and states enact laws to deal with marijuana-intoxicated drivers. There are two avenues we can take right away.

First, state legislatures should immediately pass laws imposing a high fine and/or other stiff penalty for possession of marijuana *in a vehicle*—including taxis, buses, trucks, trains and planes.

Second, we must inaugurate educational programs by governmental agencies, insurance companies, foundations, private groups and, especially, high-school and private-driving instructors. (A friend of mine taking a driving course was offered a joint by an instructor, "to relax.") Coördination of effort will increase the impact of the message: *it's dangerous to drive stoned.*

Brochures should be distributed at toll booths, gas stations, garages. Car users are a captive audience, and "spot warnings" can be tailored to a range of radio programs. The American Automobile Association and National Safety Council could begin a nationwide information campaign.

Unless we move in these directions, warns NIDA's Robert Willette, who is responsible for developing THC test kits, more and more pot users will be driving high. "We can only hope that growing awareness of the problem," he says, "will prevent a national disaster."

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Municipality of Anchorage

POUCH 6-650
ANCHORAGE, ALASKA 99502-0650
(907) 264-4111

TONY KNOWLES, MAYOR

DEPARTMENT OF HEALTH AND ENVIRONMENTAL PROTECTION

February 13, 1984

The Honorable Charlie Bussell
The House of Representatives
Pouch V
Juneau, Alaska 99811

Dear Representative Bussell:

Enclosed please find a concise outline of needs regarding drug abuse, alcoholism and mental health services in Anchorage. Following the statistics identifying the scope of the problem (section one) is the requested amount of state dollars (section two) needed to sufficiently fund treatment services. It is with concern the Department asks that you review the attached in an effort to responsibly fund Anchorage behavioral health treatment and prevention services.

As noted in the enclosed, the amount of money lost yearly to the potential market productivity of substance abusing youth in Anchorage alone is over 11 million dollars and the money lost to Alaskan industry yearly is greater still.

If you have any questions do not hesitate to contact the Behavioral Health Division.

Respectfully,

James C. Parsons, Division Manager
Susan Johnson, Program Coordinator
Frances Purdy, Program Coordinator

JCP.L2/dl/s

LEGISLATIVE PACKET
DEPARTMENT OF HEALTH AND ENVIRONMENTAL PROTECTION
DIVISION OF BEHAVIORAL HEALTH
825 "L" Street
Anchorage, Alaska 99501

Contact Persons: James C. Parsons, Division Manager
Susan Johnson
Frances S. Purdy
264-4775

DRUG ABUSE AND ALCOHOLISM SERVICES

THE PROBLEM: SECTION ONE

PREVALENCE OF DRUG TAKING BEHAVIOR BY YOUTH:

Prevalence is defined by the Center for Alcohol and Addiction Studies (1983) as the incidence of drug-taking as represented by the percent of respondents who ever tried a drug, (i.e., has used the drug one or more times in a lifetime). Prevalence is particularly important as an indicator of potential drug abuse and as a descriptor of high risk populations. Hence, its greatest relevance is in relationship to the development of prevention programs. Although the Anchorage School District recently conducted a survey in which prevalence rates have dropped (approximately 5%) rates still exceed the national average.

COMPARISON OF PREVALENCE WITH PSYCHOACTIVE DRUGS IN ANCHORAGE AND NATIONWIDE
(Students: Grades 7 - 12)

°ANCHORAGE STUDENTS HAVE TRIED:

- ° STIMULANTS 4.4 times the national average
- ° COCAINE 3.6 times the national average
- ° TRANQUILIZERS 3.6 times the national average
- ° DEPRESSANTS 3.4 times the national average
- ° MARIJUANA 1.9 times the national average
- ° HALLUCINOGENS 1.8 times the national average
- ° CIGARETTE smoking in youth is one strong predictor of future drug abuse: 50% of the Anchorage student population has tried tobacco
- ° ALCOHOL use by Anchorage youth is only slightly higher than the national average yet an alarming 82% of the student population has tried alcohol

(Center for Alcohol and Addiction Studies, 1983)

- ° 77 MILLION DOLLARS IS LOST TO ALASKAN INDUSTRY YEARLY DUE TO ALCOHOLISM ALONE.
- ° 11.3 MILLION DOLLARS IS LOST YEARLY TO THE POTENTIAL MARKET PRODUCTIVITY OF ALCOHOL MISUSE BY YOUTH (GRADES 9-12) IN ANCHORAGE ALONE.
- ° NATIONALLY, 23% OF THE POPULATION WHO HAD "EVER TRIED" COCAINE BECAME REGULAR USERS AND 20-25% OF THAT GROUP BECAME DEPENDENT ON COCAIN .
- ° PREVALENCE OF DRUG USE IN ADULTS (26+ YEARS) IS TWICE THE NATIONAL AVERAGE FOR EVERY DRUG BUT ALCOHOL AND TOBACCO.

- PREVALENCE OF DRUG USE IN YOUNG ADULTS (18-25 YEARS) FOR MARIJUANA, COCAINE AND STIMULANTS IS ONE AND ONE-HALF TO TWO AND ONE-HALF TIMES THE NATIONAL AVERAGE.

- ONLY 15% OF THOSE PEOPLE NEEDING HELP FOR DRUG AND ALCOHOL PROBLEMS RECEIVE IT.

- THE MUNICIPALITY OF ANCHORAGE SERVED 30% OF THE STATEWIDE DRUG AND ALCOHOL ABUSING POPULATION TREATED WITH STATE OFFICE OF ALCOHOL AND DRUG ABUSE (SOADA) MONIES IN FY-83.

- THE MUNICIPALITY OF ANCHORAGE SERVED 22% OF THE STATEWIDE ALASKA NATIVE SUBSTANCE ABUSING POPULATION TREATED WITH SOADA MONIES.

- THE MUNICIPALITY OF ANCHORAGE SERVED 74% OF THE SUBSTANCE ABUSING POPULATION 17 YEARS OF AGE AND YOUNGER TREATED WITH SOADA MONIES.

WHO IN ANCHORAGE RECEIVES DRUG AND ALCOHOL TREATMENT AND AT WHAT COST

- 3400 PEOPLE RECEIVED DRUG AND ALCOHOL SERVICES IN FY83;

- DEPENDING ON THE PROGRAM FROM 10% TO 35% OF THE CLIENTELE SERVED WERE ALASKANS FROM OUTSIDE THE ANCHORAGE AREA;

- DRUG ABUSE PROGRAMS RECEIVE 46% OF THEIR FUNDS FROM ALCOHOL MONIES;

- COST PER UNIT OF SERVICE PER DAY:

SOURCE	AVERAGE COST
ANCHORAGE JAILS	76.00*
ADULT RESIDENTIAL	46.00
DRUG AND ALCOHOL OUTPATIENT	55.00
YOUTH RESIDENTIAL	107.00**

ESTIMATED COST TO MAINTAIN NARCOTIC DRUG HABIT "ON THE STREET" IS $400.00 A DAY.

* THIS DOES NOT INCLUDE CENTRAL ADMINISTRATION, OVERTIME FOR EMPLOYEES IN A 24 HR. INSTITUTION OR MAJOR CAPITOL EXPENDITURES: WE SUSPECT THIS FIGURE TO BE SIGNIFICANTLY LOWER THAN ACTUAL COST

** THIS REPRESENTS ONLY 61.4% OF THE COST OF COMPARABLE SERVICES, WHICH DOES NOT INCLUDE TRANSPORTATION OR FAMILY COUNSELING

DO THESE PROGRAMS WORK?

- RESEARCH CONDUCTED NATIONALLY (1982) CONCLUDED THAT ONE YEAR AFTER TREATMENT THERE WAS;

NO CRIMINALITY AND NO DRUG USE IN:

38% OF THE THERAPEUTIC COMMUNITY GRADUATES
34% OF THE DRUG FREE OUTPATIENT GRADUATES
32% OF THE METHADONE MAINTENANCE GRADUATES

AND

NO DAILY OPIOD USE IN:

71% OF THE THERAPEUTIC COMMUNITY GRADUATES
70% OF THE DRUG FREE OUTPATIENT GRADUATES
67% OF THE METHADONE MAINTENANCE GRADUATES

MENTAL HEALTH SERVICES

THE PROBLEM

- MORE INDIVIDUALS FROM API ARE DISCHARGED TO ANCHORAGE THAN ARE ADMITTED FROM ANCHORAGE EACH YEAR.

- 53% OF OUTPATIENT SERVICES ARE PROVIDED BY PUBLICALLY FUNDED ANCHORAGE PROGRAMS.
  OVER 50% OF THE API DISCHARGES ARE MADE TO ANCHORAGE.
  ONLY 25% OF THE STATE FUNDS COME TO ANCHORAGE ($806,000 IN 1983).

- EVEN WITH THE HELP OF THE PRIVATE SECTOR MENTAL HEALTH SERVICES, ONLY 32% OF INDIVIDUALS NEEDING HELP ARE SERVED.

- ANCHORAGE SERVES AS A REGIONAL CENTER WITH SPECIALIZED MENTAL HEALTH AND NECESSARY ANCILLARY SERVICES.

- OVER 450 ATTEMPTED SUICIDES OCCURRED IN ANCHORAGE IN 1982.

- OVER 4,800 CRISIS CALLS CAME FROM DEAF INDIVIDUALS.

- BETWEEN 400-450 CHRONICALLY MENTALLY INDIVIDUALS RESIDE IN ANCHORAGE.

- THE DIVORCE RATE IS ALMOST TWICE THE NATIONAL AVERAGE.

- OVER 1000 NEW CASES OF CHILD ABUSE AND NEGLECT WERE REPORTED IN ANCHORAGE IN 1982 OVER 1981.

DO THESE PROGRAMS WORK

IN 1982:

39 SUICIDES IN PROGRESS PREVENTED BY CRISIS INTERVENTION

506 VICTIMS OF RAPE RECEIVED ASSISTANCE

353 INDIVIDUALS WERE MAINTAINED OUTSIDE API

68% OF FAMILIES SEEKING HELP SUCCESSFULLY SOLVED THEIR PROBLEMS.

COST OF TREATMENT

IN 1982:

3,511 INDIVIDUALS RECEIVED MENTAL HEALTH COUNSELING
12,432 CRISIS TELEPHONE CALLS WERE ANSWERED

AVERAGE COST OF CRISIS TELEPHONE CALL	$ 10.89
AVERAGE COST OF INDIVIDUAL THERAPY SESSION	$ 63.39

COST PER DAY FOR CARE OF THE CHRONICALLY MENTALLY ILL:

IN THE COMMUNITY	$ 82.68
IN A.P.I.	$275.00

INDIVIDUALS WITH ACUTE OR CHRONIC MENTAL ILLNESS HAVE A BETTER THAN 20% CHANCE OF AVOIDING HOSPITALIZATION IF INITIAL CRISIS INTERVENTION IS PROVIDED IN THE COMMUNITY. IF THEY MUST BE HOSPITALIZED, THEY WILL SPEND 50% LESS TIME IN THE HOSPITAL.

BUDGET REQUEST: SECTION TWO:

FY-85 BUDGET REQUEST BY
DIVISION OF BEHAVIORAL HEALTH
DEPARTMENT OF HEALTH AND ENVIRONMENTAL PROTECTION
DRUG, ALCOHOL, MENTAL HEALTH TREATMENT

	STATE			
	Alcohol	Drug	Mental Health	Local
Primary Prevention (Education, Information, Alternatives)	-0-	-0-	1,500	202,200
Early Intervention: Consultation/Education (Anchorage Community Mental Health Center) (Alaska Council on Prevention of Alcohol and Drug Abuse)	36,430	-0-	67,500	47,280
Youth Residential Services (Volunteers of America - ARCH)	231,390	214,300	-0-	102,500
Youth Outpatient Services (Akeela House)	24,530	32,960	-0-	14,590
Women's Residential Services (Salvation Army - Reflections)	255,770	-0-	-0-	27,150
Women's Outpatient Services (Akeela House)	33,210	36,540	-0-	16,820
Women's Long Term Care Services (Alaska Women's Resource Center)	29,570	-0-	-0-	64,930
Native Residential Services (Cook Inlet Native Association - Amouak)	306,450	-0-	-0-	32,520
Native Outpatient Services (Cook Inlet Native Association)	138,120	-0-	-0-	14,660
Methadone Maintenance/Drug Free Outpatient (Narcotic Drug Treatment Center)	-0-	239,570	-0-	87,130
Suicide Prevention/Emergency Treatment (Suicide Prevention and Crisis Center)	-0-	-0-	270,020	89,980
Community Service Patrol (Salvation Army Clitheroe Center)	277,000	-0-	-0-	29,400
Interface Domestic Violence-Substance Abuse	27,000	-0-	-0-	3,000
Halfway House (Salvation Army Clitheroe Center)	40,240	-0-	-0-	9,580
Detoxification Services (Salvation Army Clitheroe Center)	598,930	-0-	-0-	63,560
Residential Treatment				
(Akeela House - Drug Therapeutic Community,	215,830	183,220	-0-	89,550
Salvation Army Clitheroe Ctr. - Alcohol)	867,020	-0-	-0-	92,010
Outpatient Services				
Family (in-home) (Family Connection)	-0-	-0-	91,552	30,510
Family (Akeela/Suicide Prevention and Crisis Center/ Anchorage Community Mental Health Center)	300,390	68,800	70,971	80,540
Chronically Mentally Ill (Anchorage Community Mental Health Center)	-0-	-0-	387,346	89,980
Adult (Anchorage Community Mental Health Center)	-0-	-0-	130,660	43,540
Elderly (Anchorage Community Mental Health Center)	-0-	-0-	112,321	37,430
Evaluation & Intake (Akeela)	34,880	29,610	-0-	14,470

* It is important to note that the Division continues to support the provision of prevention efforts, which have been sanctioned by the Municipal Health Commission. However, there has never been any significant funding allocated to prevention. The Division would like to respectfully request that you rigorously consider the importance of funding prevention in FY-85.

POUCH V
JUNEAU, ALASKA 99811
(907) 465-4990

Alaska State Legislature
HOUSE OF REPRESENTATIVES

REPRESENTATIVE
CHARLIE BUSSELL
CHAIRMAN

Committee on Judiciary

GUEST SPEAKERS

2:00 P.M.
Dr. Reese T. Jones
Professor of Psychiatry
Langley Porter Psychiatric Institute
University of California - San Francisco

Dr. Jones is a clinical psychiatrist at the University of California at San Francisco and served as a member of the distinguished commission of scholars sponsored by the Institute of Medicine to study the physiological and psychological effects of marijuana. The report, entitled "Marijuana and Health," is recognized by the medical community as one of the preeminent academic works on the subject.

2:30 P.M.
Gabriel G. Nahas O.B.E, M.D., Ph.D.
Professor of Anesthesiology
Columbia University
College of Physicians and Surgeons

Dr. Nahas is a professor at Columbia University in New York City and is reknowned as a pioneer in the research of the biological effects of marijuana. Considered by many as the foremost authority on the subject, Dr. Nahas has authored two books Keep off the Grass and Marijuana: Biological Effects.

ANCHORAGE DAILY NEWS
9 MARCH, 1984
3.9.84

Bussell: 'Close door on marijuana use'

By K.C. MOON
Daily News reporter

House Judiciary Chairman Charlie Bussell, R-Anchorage, has drafted a bill that would "close the door on marijuana use" in the state by making illegal the possession of any amount of the drug.

The bill was introduced by the committee earlier this week.

Current statutes, barely a year old, permit possession of up to a quarter pound of marijuana for personal use in one's own home.

Rep. Don Clocksin, a minority member of the committee, said the bill is "a waste of time" for legislators because they decided the marijuana issue just two years ago.

Law enforcement officials say the proposed law would not have a substantial effect on current enforcement patterns. Busting drug dealers, not users, would continue to be the focus of police and courts.

Bussell said he drafted the bill because Alaska's current law is "out of step with other states' laws and federal guidelines regarding marijuana."

Alaska, Hawaii and Oregon are the only states that permit any use of marijuana. Federal laws prohibit marijauna possession.

He said the bill reflects a conservative wave that he said is sweeping the country. "As a rough guess, I would say that the public would support (recriminalizing marijuana) about 60-40."

But Clocksin, D-Anchorage, said he doubts Bussell's reasons for introducing the bill. "There's no justification for it.

"The law we passed in 1982 was a delicate and fair compromise," he said. "We should stick with it. This new bill is a waste of the legislature's time."

The Alaska Legislature voted to allow private use of marijuana and decriminalize public use in 1975, the same year the state Supreme Court ruled that possession of marijuana in a person's home for personal use was constitutionally protected.

The court ruled that alleged health hazards associated with marijuana use were not substantial enough to justify the state's intrusion into citizens' constitutional right to privacy.

Revised drug laws passed in 1982 made public marijuana-smoking a criminal offense but allowed possession of less than four ounces in one's home.

The latest proposal would make possession of smaller amounts of the drug a misdemeanor offense with a maximum punishment of $1,000 fine and 90 days in jail.

Bussell said medical evidence published since the 1975 court decision gives the state reason enough to ban marijuana-smoking completely.

He cited no specific health studies, saying such research would be brought out when hearings on the bill begin.

Dan Hickey, chief prosecutor for the state, said the state's policy on prosecuting drug users would not change if lawmakers pass a blanket ban on marijuana.

"Our emphasis is not in the prosecution of drug abusers," he said. "Our focus is on major distributers and traffickers."

"Our opinion on that would not change if this (bill) becomes law."

Anchorage Police Chief Brian Porter said he supports banning all marijuana use but does not see the department shifting its sights to individual users. "We might make a few arrests initially to get the message out," he said. "I don't see the department putting out 25 more officers" to bust private users.

Porter said such a law would rid the state of hypocrisy in the current statutes, which ban the sale of marijuana while permitting its use.

"There's a hole in the current law," said Lt. George Novaky, who heads the Anchorage Police Department's Metro Drug Unit. "We're creating a market for the use of marijuana — turning people into purchasers — while the sale of pot is still illegal.

"Obviously the majority of users don't grow their own," he said. "If they are, I want to know who's buying all the stuff that's being smuggled into the state."

Clocksin said he has heard nothing about health studies that would justify prohibiting private use of marijuana. "What (Bussell) is trying to do is to break into people's homes and tell them what to do," he said.

He called Bussell a "conservative extremist who doesn't represent the mainstream" of public sentiment.

STATE OF ALASKA 1984 LEGISLATIVE SESSION
FISCAL NOTE

Revision Date:

REQUEST
Bill/Resolution No.: HB 698
Title: An Act Relating to Marijuana
Sponsor:
Requestor:
Date of Request:

FISCAL DETAIL
Agency Affected: Alaska Court System
Program Category Affected:
BRU, Program or Subprogram(s) Affected:

EXPENDITURES/REVENUES: (Thousands of Dollars)

	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89
OPERATING						
100 PERSONAL SERVICES						
200 TRAVEL						
300 CONTRACTUAL						
400 SUPPLIES						
500 EQUIPMENT						
600 LAND & STRUCTURES						
700 GRANTS, CLAIMS						
800 MISCELLANEOUS						
TOTAL OPERATING		-0-	-0-	-0-	-0-	-0-
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND						
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

This zero fiscal note is based on the assumption that additional resources will not be added to State troopers, local police, or prosecuting attorney offices as a result of this legislation.

ANALYSIS: Attach a separate page for analysis

Prepared By: Richard Barrier
Phone: 264-0545
Division:
Date: March 14, 1984

Approved by Commissioner:
Date:
Agency:

Distribution (by Agency preparing fiscal note):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

12/1/83

We are very concerned about the health hazards of marihuana use. These hazards are described in the Seventh Annual Marihuana Report to the Congress from the Secretary of Health, Education, and Welfare (HEW), which was released on April 18, 1979. This report summarized recent research on the medical and social effects of marihuana use and pointed out the dramatic increase in marihuana smoking among teen-agers and adolescents.

A need remained, however, for a comprehensive review of marihuana research efforts that would identify the most urgently needed and promising lines of inquiry upon which future decisionmaking in this area could be based. Therefore, Secretary Califano announced that the Department of HEW will undertake a comprehensive review of the existing scientific evidence on marihuana. This review will encompass research into the physiological effects of chronic marihuana use as well as behavioral research on use-related problems, such as intervention strategies to help adolescents resist peer pressure, evaluate evidence, and assess risks.

Responsibility for seeing that this review is conducted has been assigned to the National Institutes of Health (NIH). An independent scientific group will implement this review and is expected to produce a report within 12 months.

Since 1967 the Federal Government has spent approximately $35 million on marinuana research to support over a thousand research projects. This research effort continues. For example, this fiscal year, FY 1979, the National Institute on Drug Abuse (NIDA) will support approximately a hundred research studies totaling $3.8 million. NIDA-supported research includes investigations into the effects of marihuana on the heart and lungs, on psychological, social, and physical development, and on pregnancy, as well as research into possible medical use, including the treatment of glaucoma.

Mr. Chairman, presently available evidence clearly indicates that marihuana is not a "safe" substance. While I will not attempt this morning to review all of the scientific findings described in the Marihuana and Health Report, I would like to briefly indicate to the Committee what the hazards of marihuana use are for adolescents and to various organs and systems of the human body.

Acute Intoxication Impairs Learning, Memory and Intellectual Performance

Virtually all of the many studies which have been done of performance while "high" converge toward the conclusion that marihuana interferes with immediate memory and intellectual performance in ways that impair thinking, reading comprehension, and verbal and arithmetic problem solving. Less familiar, more difficult tasks are interfered with more than well-learned performance, and the effect depends on the amount used and the tolerance for the effect.

Marihuana Intoxication Impairs Driving and Other Skilled Performance

Evidence strongly suggests that being "high" interferes with driving, flying, and other complex psychomotor performance at usual levels of social usage.

Despite their commonly expressed belief that their driving skills are impaired by cannabis intoxication, there is reason for believing that more marihuana users drive today while "high" than was true in the past. As use becomes increasingly

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Health Consequences of Marihuana Use

William Pollin, M.D.
Director
National Institute on Drug Abuse

common and socially acceptable, and as the risk of arrest for simple possession decreases, still more people are likely to risk driving while "high." In limited surveys, from 60 percent to 80 percent of marihuana users questioned indicated that they sometimes drive while high. Marihuana use in combination with alcohol is also quite common, and the risk of the two drugs used in combination may well be greater than that posed by either alone.

A study reported in 1976 of drivers involved in fatal accidents in the greater Boston area was conducted by the Boston University Accident Team. They found that marihuana smokers were overrepresented in fatal highway accidents as compared to a control group of nonsmokers of similar age and sex.

While there have been no recent studies, research thus far indicates that even experienced pilots undergo marked deterioration in performance under flight simulator test conditions while "high." Thus, flying an aircraft while marihuana-intoxicated should be considered dangerous.

A continuing danger common to both driving and flying is that some of the perceptual or other performance decrements resulting from marihuana use may persist for some time, possibly several hours, beyond the period of subjective intoxication. Under such circumstances, the individual may attempt to fly or drive without realizing that his or her ability to do so is still impaired although he or she no longer feels "high."

Effects on the Heart

Acute effects of marihuana use on heart function in healthy young male volunteers have been viewed as benign. However, the increased heart rate produced and evidence that chest pain associated with poor circulation to the heart muscle occurs more rapidly with marihuana use than with cigarette smoking have led to a consensus that those with heart conditions, or at high risk, should not use marihuana.

Effects on Lung Functioning

Since, like tobacco, marihuana is usually smoked and typically deeply inhaled, adverse pulmonary effects may be expected. Based on both clinical observation and laboratory measurement, marihuana shows evidence of interfering with lung function and producing bronchial irritation in habitual users. One study has found that smoking four or more "joints" per week decreases vital capacity—the amount of air the lungs can move following a deep breath—as much as smoking nearly a pack of cigarettes a day. This comparison, while widely quoted, needs confirmation by independent studies. As yet there is no direct clinical evidence that marihuana smoking causes lung cancer. It has been reported that marihuana smoke contains more carcinogens than tobacco, that in animal testing the smoke residuals produce skin tumors, and there is laboratory evidence that human lung tissue exposed in the test tube to marihuana smoke shows more cellular changes than when exposed to similar amounts of standard tobacco smoke. Very heavy marihuana smoking by healthy young male subjects under controlled experimental conditions has been demonstrated to cause mild but statistically significant airway obstruction. Under conditions of ready availability, there is also evidence that the number of marihuana cigarettes consumed (up to ten "joints" daily) may approach that of tobacco cigarettes.

From the total body of clinical and experimental evidence accumulated to date, it appears highly likely that daily use of marihuana may lead to lung damage similar to that resulting from heavy cigarette smoking. Since marihuana smokers often smoke both tobacco and marihuana, the effects of the combination require additional study.

Effects on the Immune System

Research findings are divided as to whether marihuana use adversely affects the body's natural defenses against infection and disease. Of the studies reviewed, the majority have shown that such an alteration occurs. Whether or not such changes, when they are found, have practical implications for users is not known at this time.

Brain Damage Research

A British research report, which originally appeared in 1971, attributed brain atrophy to cannabis use in a group of young male users. It continues to be widely cited, particularly in the mass media. In the original study, 10 patients, with histories of from 3 to 11 years of marihuana use, were examined by a neurological technique (air encephalography) used to detect gross brain changes. The authors concluded that their findings suggested that regular use of cannabis may produce brain atrophy. This research was faulted on several

grounds. All the patients had used other drugs, making the causal connection with marihuana use questionable; and the appropriateness of the comparison group and diagnostic technique was questionable.

Two studies were subsequently conducted in Missouri and Massachusetts. They examined two samples of young men with histories of heavy cannabis smoking using computerized transaxial tomography (CTT), a brain scanning technique for visualizing the anatomy of the brain. In both studies, the resulting brain scans were read by experienced neuroradiologists, indepedent of the drug histories. In neither was there any evidence of cerebral atrophy. Several additional points should, however, be stressed. Neither study rules out the possibility that more subtle and lasting changes of brain function may occur as a result of heavy and continued marihuana smoking. It is entirely possible to have impairment of brain function from toxic or other causes that is not apparent on gross examination of the brain in the living organism. One researcher has used electrodes implanted deep within the brains of monkeys instead of more conventional scalp recording techniques to record brain electrical activity changes related to marihuana use. He has found persistent changes related to chronic use. This same investigator has reported that rhesus monkeys trained to smoke a joint of marihuana five days per week for six months show persistent microscopic changes in brain cellular structure following this treatment. While both these experiments demonstrate the possibility that more subtle changes in brain functioning or structure may occur as a result of marihuana smoking, at least in animals, the implications of these changes for subsequent human or animal behavior are at present unknown. Other studies, using more conventional EEG techniques to measure brain electrical activity, have found changes temporarily associated with acute use but no evidence of persistently abnormal EEG findings related to chronic cannabis use.

As I indicated earlier, many clinicians feel that regular marihuana use may seriously interfere with psychological functioning and personality development, especially in childhood and adolescence. There is increasing clinical concern that at least some percentage of regular heavy daily users do develop a psychological dependence on marihuana to the extent that it interferes with functioning in a way analogous to heavy alcohol use.

Overall, of the studies reviewed, the majority have suggested enduring impairment occurs. The quality of studies in this area, in particular, is highly variable,leaving the issue in significant doubt.

Effects on the Endocrine System

There is evidence that marihuana can affect the network of glands and hormones which are involved in such functions as growth, energy levels and reproduction. Levels of the male hormone testosterone have been found to be reduced (though still within normal range) in some, but not all, studies. There is animal and human preliminary evidence that relatively heavy use, ranging from several times a week to daily use, may reduce fertility in women. Of eleven studies dealing with these areas, seven have reported endocrine changes, with four reporting no such change. The long-term significance of these results remains to be determined. Concern over possible effects on adolescent development and possible interference with sexual differentiation of the male fetus whose mother smokes marihuana during pregnancy has been expressed.

Reproductive Effects of Marihuana

There are a variety of both animal and human studies suggesting that marihuana used daily and in substantial amounts similar to those of a regular heavy tobacco smoker may adversely impair aspects of the reproductive function. One study of 16 male, healthy, chronic marihuana users, smoking from eight to twenty standard marihuana cigarettes per day for four weeks in a hospital environment, found a significant decline in sperm concentration and total sperm count. Evidence was also found of a decrease in the motility of the sperm. In this and another study, abnormalities of structure in the sperm of heavy users were detected.

Three studies in animals of the effects of marihuana on testicular functioning, including the production of sperm, have also found adverse effects. While the clinical implications of such findings are not yet known, and the effects noted may be reversible when marihuana use is stopped, they do indicate a basis for concern. Reduced levels of testosterone in male users, though still within the normal range, have been reported by some but not all the investigators.

Animal and human research on female reproductive function has detected changes that may have serious implications for human reproductive capacity. Because of the restrictions on experimental administration of marihuana to women, little is known about the effects of the drug on

human female endocrine and sexual functioning. One recently completed study of 26 females who used "street" marihuana three times a week or more for six months or more found that these women had three times as many defective monthly cycles (38.3 percent defective vs. 12.5 percent of the cycles of nonusers) as nonusing women. By "defective" was meant a failure to produce a ripened egg during the cycle or a possibly shortened period of fertility. Unfortunately, since the marihuana-using women also used more alcohol, it cannot be assumed that the effects observed were necessarily the result of marihuana use.

Research directly concerning effects on human reproduction is, however, very limited. We know of no clinical reports directly linking marihuana use and birth abnormality.

Chromosome Abnormalities

There is no new evidence to report in this area. While there were earlier reports of increases in chromosomal breaks and abnormalities in human cell cultures, more recent results have been inconclusive.

A team investigating the effect of marihuana smoke on human lung cells in laboratory culture has found an increase in the number of cells containing an abnormal number of chromosomes. Another investigator, who previously reported a high proportion of cells in marihuana smokers with reduced numbers of chromosomes, has more recently reported that the addition of delta-9-THC (the principal psychoactive ingredient of marihuana) to human white blood cell cultures also resulted in an increased frequency of cells with abnormally low chromosome numbers. The implications of these findings continue to be uncertain.

Overall, there continues to be no convincing evidence that marihuana use causes clinically significant chromosome damage. However, it should be emphasized that the limitations of the research to date preclude definitive conclusions.

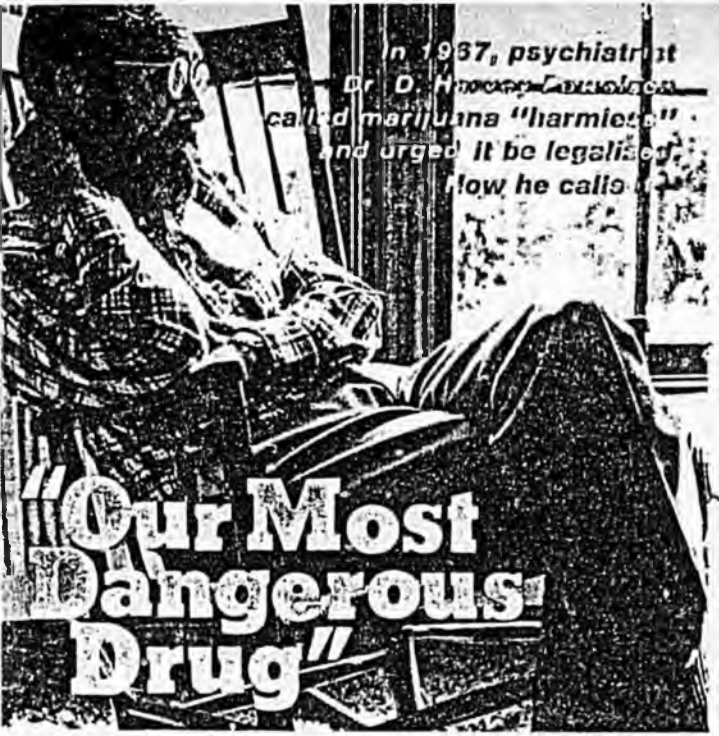
I believe we can state that there is no controversy with respect to the hazards of use by children and young people. Studies by Dr. Gene Smith, which involve nearly 12,000 junior and senior high school students in the Boston area, indicate that the earlier marihuana use begins, the more likely is use to become heavy use and to include other illicit drugs. In addition, although there is still much to be learned about the impact of heavier use on the physical functioning of the child or adolescent, studies indicate that use may cause alterations in endocrine functioning which are more serious than endocrine involvements in older mature users.

Unfortunately, the hesitancy of the scientific community in not drawing unwarranted definitive conclusions from what are preliminary research findings has led many to conclude that marihuana is without serious medical hazard, even for the very young. In reality, the situation is more like that following the popularization of cigarette smoking at the time of World War I. It required fifty years of research for the truly serious implications of cigarette smoking to become apparent.

In view of the rapidly increasing numbers of high school students who use marihuana on a daily basis during the course of the school day, these findings are especially worrisome. For example, figures derived from an ongoing study of successive yearly nationwide samples of high school seniors indicate that as of 1978 one in nine smoked marihuana daily—nearly twice as many as in 1957. In two states, Maryland and Maine, still more recent figures indicate nearly one in six high school students use marihuana daily or nearly daily.

Our most recent national household survey, conducted in 1977, indicates that there was a significant increase of 25 percent over the 1976 level in the number of persons between the ages of 12 and 17 who had ever used marihuana. More importantly, there was a nearly 30 percent increase in the number currently using, i.e., those who had used in the preceding month. Moreover, as the figures from our annual survey of high school seniors indicate, there has been a significant trend toward beginning use at increasingly younger ages. While 16.9 percent of the class of 1975 had used marihuana by the end of the ninth grade, 25.2 percent of the class of 1978 did so.

While much remains to be learned about the health implications of marihuana, I would like to emphasize that our present evidence clearly indicates that it is not a "safe" substance. As a psychiatrist, I would also like to stress that virtually all clinicians working with children and adolescents agree that regular use of marihuana by youngsters is highly undesirable. Although experimental evidence concerning the implications of use in this group is not easily obtained, there is little serious question that regular use of an intoxicant that blurs reality and encourages a kind of psychological escapism makes growing up more difficult. While there is controversy over the implications of present research concerning adult use, few would argue that every effort should be made to actively discourage use by children and adolescents.



Interviewed by Ted Torkelson and Leon Cornforth

DR. POWELSON, you were once quoted in the "Daily Californian" (April 12, 1967) as saying, "Marijuana is harmless. There is no evidence that it does anything except make people feel good. It has never made anyone into a criminal or a narcotics addict. It should be legalized." But now you are widely quoted as the psychiatrist who has reversed his opinion on legalization of marijuana. Why did you change your mind?

Well, I was at the University of California when I made that statement. As director of the student health service I was seeing a lot of patients and supervising people who were seeing many more. In the course of the next two years, either directly or indirectly, I saw literally thousands of students.

One patient whom I knew quite well and worked with for a long time, took up marijuana and hashish, which is a more concentrated form of marijuana, during the time I was seeing him. It became clear to me and to my wife, who also saw him, that there was something changing about his ability to think, to remember, to judge, to understand.

Dr. D. Harvey Powelson was formerly chief of the psychiatry department of Cowell Memorial Hospital at the University of California at Berkeley. Currently he is in private psychiatric practice in Berkeley and also serves as Mental Health Program Chief of Calaveras County, California.

The things happening to his brain were things we would expect from somebody who was having brain damage from alcohol or a tumor or organic brain damage. But he was a young healthy man. Then we discovered that the sessions that were particularly bad occurred when he said he'd used hashish within the previous two or three days. We both began to notice this connection.

Then I began to see the same connection in other patients. Since then, a lot of recent scientific evidence has supported and explained these observations.

How do the effects of using marijuana compare with the effects of other drugs?

I think marijuana is the most dangerous drug we have to contend with, for a number of reasons.

First, unlike any other drug except DDT, marijuana stays in the body for a very long period of time. It stays in the brain, and it keeps operating long after people are high. This time element is anywhere from six weeks to six months. Biochemically, using tracers has proved that only half of the marijuana leaves your body in a week.

Marijuana is soluble in oil and fat, and totally insoluble in water. The ratio is 600 to 1, so that once it gets inside the cell, it can't get back into the bloodstream the way other drugs do. If you drink alcohol, it's soluble in water and also in the bloodstream. As fast as you drink it, it goes into the bloodstream and continues to circulate, and then it is burned and leaves the body.

Marijuana just stays there. When marijuana users get high—it usually takes them two or three times, because they have to build up a certain amount in their brain. Once they get high, they take another joint and get a little higher, then the high drops off and they think they are sober again. But the marijuana is still active. Then three days later they take another joint and they get high again. But they are suffering the effects of marijuana all that time.

Is this what is called the cumulative effect?

It could be called a cumulative effect, but what I'm really talking about is the fact that marijuana stays active in the brain long after the user feels high. It's very deceptive. Since it doesn't lead to staggering or leave a smell on your breath, nobody else can tell that you're high and you don't know that you're high or whether you're stoned. You're not high in the sense of feeling good, but you're stoned. Your brain isn't functioning right. And this can be proved. You can give a person mental tests before he takes a joint, and then you can show that he can't do the same test as well for as long as 72 hours after the equivalent of one to three joints. It depends on the concentration.

What is marijuana's effect on the function of the brain?

If you ask somebody to take 100 minus 7 back to 0, he has to do two things at once. He has to remember what he is doing, and he has to keep track of the last number. It's not very complicated, but it's the kind of memory function that marijuana interferes with. Marijuana users tell that it focuses their attention. What that means is that they can't

do two things at once. This particular memory test make them do two things at once. If you time them on that test, takes about 1½ minutes. Then they smoke three joints. day later it will still take them longer than 1½ minutes t do the same test.

In real life it's much more complicated. One of my pa tients was an airplane mechanic who worked on airplane going from Alaska to Japan. He was staying stoned all th time. His supervisor didn't know it; nobody on the jo knew it. He didn't care whether the instruments checke out or not. All he was interested in was staying stoned o the job. He wasn't thinking about anything but how goo he felt. Yet pilots and passengers were depending on tha man.

Right now some pilots in the Midwest are trying to ge the Federal Aviation Agency interested in the fact tha there are pilots and navigators and instrument testers wh are stoned. Many people in this country—literall millions—are using marijuana and are stoned. And the may be people you and I are depending on to fly a airplane or drive a bus or perform our surgery, or drive o the highway.

What do you think about the comparison tha marijuana is no worse than alcohol?

I think there is no comparison. It's hard to compare th two because there are some things about alcohol that ar worse than marijuana. Alcohol is bad for the liver. And a far as I know, marijuana probably doesn't affect the liver But overall, marijuana affects the mind much more tha alcohol, much sooner, and in a much more profound way.

How can a person, particularly kids in schools, sort ou fact from propaganda about marijuana?

There are liars and prostitutes in every field—in science in medicine, in law, and in the newspapers.

The marijuana thing is particularly difficult because th stakes are so high. That's one way of putting it, I guess Different people are putting out propaganda all the time.

Consumers' Union report (March 1975) is a beautiful example. The man who wrote it knows nothing scientifically. He selected the data and the research. It's pure

propaganda, but all the kids quote it. It has no scientific standing at all.

On the other hand, it's next to impossible to train kids to make scientific judgments of the kind that are necessary to sort out the scientific literature. I think an intelligent person can read scientific literature. There are no reputable scientific journals now that say marijuana is harmless.

The Jamaica study was noted in the "New York Times" early this year. It says, "Several recent studies of chronic marijuana users, conducted independently in half a dozen countries, one of them being Jamaica and another Greece, indicate that the drug has no apparent significant adverse effect on the human body or brain or on their functions."

To begin with, the Jamaica study was never published in reputable scientific journals. It was leaked to the newspapers in various pieces. I and my colleague Dr. Jones, who is also very involved in this, tried for months to get a copy of it. I think it was finally published in book form in Holland.

Marijuana effects have been demonstrated in reputable centers in this country, such as the University of Utah Medical Center. The head of genetics research there demonstrated the effects of marijuana on chromosomes in very difficult laboratory procedures. The people who reported that there was no chromosome damage in Jamaica have no credentials for doing that kind of study. In fact, they did it so poorly that something like half of their study had to be discarded because it was inadequate technically, which really cancels out the whole study in any reputable scientific laboratory.

The Jamaica study also says marijuana doesn't affect function. But the study was of very marginal laborers hoeing in cane fields, and we know that the main effect of marijuana is on the brain. It would be very hard to measure its effect on hoeing. However, literally hundreds of studies of all kinds of intellectual functions have been done not only in this country but all over the world, and these all show that marijuana has an adverse effect on people's ability to function.

I think that the best counter to the confusion in kids' minds is not more scientific evidence, because they're really not capable of making those judgments. There's always going to be another scientist who sells his stuff to the highest bidder. By now there are enough marijuana users in every community that people are beginning to know that he's a head, he's stoned all the time, and you can't trust him. You can't trust what he's thinking, you can't trust his judgment.

Often I ask marijuana users, Would you like your surgery done by somebody who is high? They all say, Are you crazy? They know that they're not trustworthy. And other people are beginning to know this.

It seems that the majority of our population are for the use of pot. Why is supporting marijuana use more popular than speaking out against the harm that people are doing to themselves?

I think it's so dangerous because it's so tempting. It makes you feel good. It's an easy, cheap way to feel good. You can easily be deceived into thinking it's not doing you any harm because you don't feel it. By the time it is doing visible harm, your own judgment about it is itself impaired.

Other people then become a mirror. You see healthy people who say you shouldn't do that, and your urge is to destroy them. This is just human nature. When people are doing something they want to do, they want to get rid of the person who says you shouldn't do that.

We have the same problem with alcohol, really with anything else. In the process of growing up, you have to say, Just because it makes me feel good isn't necessarily the only reason or the only thing to judge by. Ask, Is it good for my mind? Is it good for my society, for my family, the people I live with?

We hear quite a bit about the fact that smoking pot interferes with motivation, what is called amotivational syndrome. Do you believe this is a valid strike against the use of marijuana?

Yes, I think there's no question that people who use marijuana regularly over a significant period of time are clearly in a state of not being interested in anything but feeling good. There are physiological explanations for that.

Marijuana contains a chemical which affects the pleasure center. You get the illusion of feeling good. Then this illusion becomes more important than really feeling good. At the same time the effect of the drug is wearing off as you become tolerant to it. So you use more of it. And as that goes on, you either have to use stronger drugs or get another high. But this time the high is going to be a chemical or other false illusion, because you have lost the capacity to feel good in natural ways.

At that stage, in the amotivational syndrome, people lose interest in everything else but the drug. And there are literally thousands of people who are only interested in getting high. They may have shifted from marijuana to heroin. A lot of them are shifting to alcohol, and this whole false question about marijuana or alcohol is going down the drain because we're seeing younger and younger alcoholics. First they begin combining the two, then they find out they can get drunker with alcohol than they can with marijuana.

Egypt had such a terrible problem with marijuana that Nasser—even though they are a very poor country—spent a lot of money for one of the best research studies that has ever been done on marijuana. It was done by an American-trained scientist, published in 10 volumes in Arabic. It shows in a very scientific way without question that marijuana affects people's ability to function. It also showed over a long period of time a very high percentage of people shifting from marijuana to heroin.

Egypt is one of the countries that is concerned about what's happening in this country. We're a part of the Geneva Convention which says that we're going to try to control marijuana. We're decontrolling it when other countries who have had the problem for centuries, like Egypt, are trying to control it. If we decontrol it, they are going to lose what little control they have. The last convention having to do with marijuana came out very strongly with a resolution urging the United States not to decontrol marijuana.

In 1972 the National Commission on Marijuana and Drug Abuse decided unanimously to recommend that all criminal penalties be eliminated for private use and possession of marijuana. Other voices spoke out in favor of decriminalization of marijuana, but against legalization. What is your opinion about this dichotomy?

In this state [California] they said we just want to decriminalize it; we're not talking about legalizing it. I testified against it, and I said that this is just a step toward legalization. They publicly said, No, all we are asking for is decriminalization. A month later the same man was saying, Now what we have to do is legalize it, it doesn't make any sense to decriminalize something and at the same time have it illegal to grow it. Well, that's obviously a crazy law. And now they're saying, Look at how inconsistent this law is. But they're not saying, Let's go back to the old law. They're saying, Let's make it legal to grow it. That was simply a ploy, and I think everybody knew it at the time.

I think marijuana should be illegal, but it would be very hard to do that now. I think we're going to be faced with some very difficult decisions about the whole drug problem very soon. We will wake up to the fact that we're in the middle of an epidemic, that drugs spread from one drug user to the next, and that the consequences are devastating to society, to the people, to our country.

The legal procedure, which we're going to have to think about, is something like public health procedures—isolate a person for his good and for the good of society. You say to somebody, You can't use marijuana or heroin or cocaine anymore. And then it's his choice. He stops. Or if he doesn't stop, you help him stop by certain sanctions, or education, or medical or therapeutic help.

In 1971 you stated that pot use was leveling off. How does it look to you now?

Did I say that in 1971? In Berkeley the number of people using it is leveling off because we've reached the saturation point. In the university, around 80 to 90 percent use marijuana. There's another 10 percent who will never use it, such as Mormons, Orthodox Jews, etc., who won't use pot, but they won't use any other drug either.

What's happening is that the people who are using it are using more and more of it. The number of people using it may be leveling off because you have reached the available population in a particular area, but the next step is that those same people use more. Statistics show that the country as a whole is using more marijuana all the time.

What effect does marijuana have on driving?

It affects judgment, the ability to keep more than one thing in your mind at the same time, to take into account all the factors at once which have to do with driving instead of just where you are going. Particularly bad is the fact that it is often combined with alcohol. When you combine the lack of judgment, on the one hand, with poor reflexes, it's more than twice as bad.

Dr. Jones, your colleague here, is quoted as saying that by far the most significant and shocking result of the current studies on marijuana use has been the discovery of its effect on genes and chromosomes. Could you explain this?

It has been demonstrated in humans and in animals that marijuana, in socially used doses, affects chromosomes. Chromosomes are what determine our inheritance. They are also the determiners of the function of every cell. The two most striking effects of marijuana on chromosomes affect the DNA and RNA metabolism. It affects the immune cells in such a way that immunity drops way down through the social use of marijuana. And that's true, presumably, of its effect on chromosomes.

The other effects are on the germ cells, that is, the parent cells of the next generation. We know they are damaged, but it is a very hard thing to demonstrate in humans, since we don't know yet what it's going to do to the next generation. It's a fifty-year study.

I may tell high school students that marijuana damages chromosomes. As a physician I think that is a very dangerous thing to be messing with. Then someone else comes along and says, "Well, Powelson says that it damages chromosomes. That may be true, but he hasn't proved that it damages the next generation." That statement is also true. But those two statements are not equal.

Does the user develop hostility against anyone who speaks to him against using it?

Yes, that is universal. When I first began talking about it at the university, people physically threatened me and shouted at me. The situation was sometimes riotous. If you take heroin away from heroin users, or cocaine away from cocaine users, or alcohol away from people who drink alcohol, they will use any means they can to get it back.

What would you say to high school kids if you had the opportunity?

I would say that there is no evidence whatsoever that marijuana in any way is good for you. There's very strong evidence, which you can see for yourselves if you look around, that it damages the brain, that it damages your ability to think, it damages your chromosomes, it damages your immunity system—all of this at a rate of something in the neighborhood of 20 times as rapidly as alcohol.

You owe it to yourselves, to your parents, to your society, to be healthy and intelligent, and to use all your strength in the best way you possibly can. ◇

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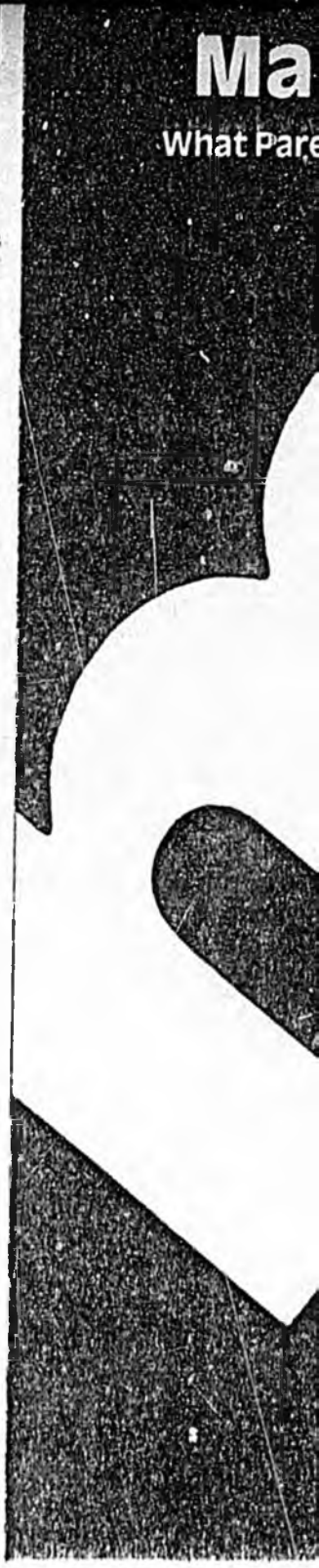
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WHY DO CHILDREN USE MARIJUANA?

What are some possible reasons that children might experiment or continue to use marijuana or other drugs?

- Boredom
- To boost self-esteem
- Peer pressure
- Experimentation or curiosity
- A need to reject parents' values
- To relax
- Pop culture promotes drug use
- Lack of positive role models
- To create a new image
- For immediate gratification
- Imitation of parents' drinking and/or smoking behavior
- For independence
- Availability of drugs
- To escape from daily stress
- To have fun

First experimenting with most drugs occurs during the final three years of high school. However, for marijuana, alcohol and cigarettes, most initial experiences take place before high school. Analysis of six-year trend data collected by the National Institute on Drug Abuse indicates that age of first use of marijuana has consistently decreased; such that, the majority of users are introduced to marijuana between the ages of 12 and 14.

WHAT IS MARIJUANA?

Marijuana is the common name for the hemp plant **cannabis sativa.** The plant may grow wild in most temperate climates or can be intentionally cultivated for legal or illegal purposes. There are more than 420 chemicals, including 61 cannabinoids, currently identified in the cannabis plant. The major mood altering chemical of these is delta-9-tetrahydrocannabilol (THC).

Marijuana varies in its strength of THC. In much of the marijuana available today there is a much higher THC potency than there was five years ago. Psychoactive effects of marijuana depend not only on the amount of THC but on the body size and weight of the user. That is, a younger, smaller person will experience more of an effect than a larger adult using the same quantity of the drug.

Marijuana is most commonly smoked; however, some users prefer to combine it with food. The psychoactive effect of marijuana when smoked occurs within minutes. When eaten, the mood-altering effect might not begin until up to an hour and a half after ingestion.

WHAT ARE THE OUTWARD SIGNS OF USE?

Outward signs of the recent use of marijuana may include:

- Redness of the eyes
- Increased appetite
- Talkativeness or withdrawal

Outward signs of chronic use may include:

- Gradual drop in the quality of school work
- Unusual or increased money requests
- Often over-reaction to criticism
- Personality changes
- Secretiveness
- Physical evidence such as cigarette papers, ashes, odor

One or more of the above signs is not enough for identification of use; most are typical of adolescent behavior. Immediate signs are not always obvious. Talking with your child on a regular basis will help you understand his/her behavior.

WHAT DOES MARIJUANA DO TO THE BODY?

The health consequences of marijuana use have been the subject of scientific and public debate for almost 20 years. Based on scientific evidence published to date, the Surgeon General of the U.S. Public Health Service concludes that marijuana has a broad range of psychological and biological effects, many of which are dangerous and harmful to health. Unfortunately, the available information does not tell us how serious this risk may be.

During March 1982, *Marijuana and Health*-1982, (the ninth in a series), was given to the U.S. Congress by the Secretary of Health and Human Services. The report reviews the health consequences of marijuana use:

- Acute intoxication with marijuana interferes with mental functioning; learning and thinking are impaired. It is a marked impediment to classroom performance.
- Marijuana produces serious acute effects on perception and skilled performance which impairs such everyday tasks as driving and other complex tasks involving judgment or fine motor skills.
- A combination of marijuana and alcohol is particularly dangerous, causing temporary changes in depth perception, concentration, time perception and reaction time.

Among the known or suspected **chronic** effects of marijuana use are:

- By-products of marijuana remain in body fat for several weeks with unknown consequences. The storage of these by-products increases the possibilities for chronic effects as well as residual effects on performance even after the acute reaction to the drug has worn off.
- Impaired immune response
- Decreased sperm count and sperm motility
- Interference with ovulation and prenatal development
- Possible adverse effects on heart function
- Impaired lung function similar to that found in cigarette smokers (indications are that more serious effects may ensue following extended use)
- Impaired short-term memory and slowed learning
- The "amotivational syndrome" has been attributed by some to prolonged use of marijuana by youth. The syndrome is characterized by a pattern of loss of energy, diminished school performance, harmed parental relationships, and other behavioral disruptions.

HINTS ON PREVENTING YOUR CHILD'S DRUG USE

There are some specific steps you can take to lessen the chance of your child using drugs. Prevention consists of:

- Setting a good example in your use of alcohol, tobacco, prescription and over-the-counter drugs;
- Demonstrating positive behavior of the many alternatives life has to offer at work, at play, in nature, through art, music, and other creative endeavors;
- Involving your children in setting family guidelines that encourage positive behavior, with fair and consistent discipline;
- Learning more about drugs so that you have accurate information to share with your children.

WHAT TO DO IF YOUR CHILD IS USING

If you suspect that one of your children may be using marijuana, discuss the issue with him/her in a calm, non-arguventative manner. Keeping communications open is of the utmost importance.

If your child is using, do not condemn the child, their peers, or deny the problem. Children need to hear clearly stated values and standards from the family. Remember, when a child is independent and self-supporting s/he can make their own decisions; however, up to age 18, your child's health is your responsibility.

Your child may not respond positively to your best efforts to prevent their marijuana use and association with drug using peers. If that is true, consider professional help or a peer-support group. You are not alone.

Being a good parent is a difficult task. But, there are community resources to assist you. Community agencies may offer: course in parenting skills and drug education; family and individual counseling; drug treatment; and referral to parent peer-support groups. Contact your local alcohol, drug or health agency. Or, contact the Alaska Council on Prevention of Alcohol and Drug Abuse, 7521 Old Seward Highway, Suite A, Anchorage, Alaska 99502.

Note: A portion of the material contained in this pamphlet was taken from *Marijuana and Health: Ninth Report to the U.S. Congress 1982.*

Related Readings

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ALASKA COUNCIL ON PREVENTION
OF ALCOHOL AND DRUG ABUSE, INC.

7521 OLD SEWARD HWY SUITE A ANCHORAGE ALASKA 99502 (907) 349-6602


MARIJUANA

MARIJUANA

Marijuana comes from the Indian hemp plant, usually cannabis sativa. The plant can grow wild or it can be intentionally cultivated for legal or illegal purposes. Marijuana is usually seen on the street as a mixture of chopped leaves, stems, flowers and seeds. It can come in a number of different colors including brown, green, gray and red. Hashish, or hash, is a resinous extract of the topmost leaves and flowering parts of the marijuana plant.

Marijuana and Hashish

HOW USED:

Individuals who use marijuana to get high usually smoke it. Marijuana can be smoked as a cigarette (joint, reefer) or in a pipe. Some marijuana smokers also use such marijuana paraphernalia as "bongs," "smoking stones" and a wide selection of pipes specifically intended for use with marijuana.

COMMON NAMES:

There are many slang names for marijuana. Ten of the most common are: Dope, grass, herb, joint, pot, reefer, roach, smoke, stuff, and weed.

HISTORY:

Marijuana has been used as both a medical and a non-medical drug for more than three thousand years. In the United States marijuana has been used off and on as a medicine since the 1850s. Recreational use of marijuana was not widespread in this country until the early part of the twentieth century.

PHYSICAL EFFECTS:

Marijuana was not generally considered to cause physical addiction. A study carried out at UCLA, however, challenged that assumption. The study involved healthy male smokers in their early to mid-twenties. After the subjects smoked large doses of marijuana for several weeks it took more marijuana to get them to report being as high as they had been previously with less marijuana. When the subjects stopped using marijuana many of them felt nauseous and irritable and they didn't sleep well. Administering marijuana would remove these feelings. The subjects smoked an average of five and one-half two gram 2% THC joints per day for more than six weeks during the study.

There seems to be agreement on the following physical effects of marijuana: Marijuana (1) dries the eyes and the mouth, (2) increases the appetite, (3) causes a reddening of the eyes, (4) impairs one's driving ability, (5) impairs one's short-term memory while one is under the influence of the drug, (6) impacts the way stress does on the heart and circulation system, (7) raises the heart rate, (8) frequently raises the user's blood pressure, (9) produces inflammation and neoplastic changes in the airways of heavy smokers, (10) may well lead to cancer of the respiratory tract among prolonged, heavy marijuana smokers, (11) causes modest reversible suppresive effects on sperm production in men, (12) can cause tremors and startle response withdrawal symptoms in the newborn children of women who smoke five or more marijuana cigarettes per week while they are pregnant, (13) may effect chromosome segregation during cell division (although these results are a concern, their clinical significance is unknown), (14) is a fat soluble molecule, parts of which can be stored in the body for up to thirty days or more, and (15) when smoked reduces the lungs' ability to absorb oxygen.

In addition, an association has been identified between maternal use of marijuana during pregnancy and diminished birth weight in the child and the development of characteristics associated with the fetal alcohol syndrome.

Marijuana Paraphernalia

PSYCHOLOGICAL EFFECTS:

Marijuana, when taken in mild to moderate doses, tends to cause an altering of perception that includes sight, sound, touch, sense of time and taste. It can produce feelings of euphoria and intimacy. It has been reported to develop new insights in some individuals who experience its effects.

Some individuals who use marijuana become psychologically dependent on the effects of the drug. This means that the effects of marijuana have become so psychologically essential to the individual that he/she may experience emotional discomfort in the absence of the drug.

Some believe that heavy long term use of marijuana results in a loss of motivation in the user. Others disagree.

MEDICAL USES:

Marijuana had many medical uses in the U.S. in the nineteenth century. By 1937, when the first federal laws were passed to control the use and possession of marijuana, it had more or less been dropped from medical use. In the past several years more than twenty states (including North Carolina) have legalized the experimental use of marijuana to treat glaucoma and the nausea that frequently accompanies cancer chemotherapy. Efforts are now underway to develop satisfactory synthetic THC-type drugs that might be administered in place of natural marijuana.

crises situations concerning marijuana, when they occur, tend to take the form of an anxiety reaction to the marijuana high. A calming and reassuring approach has proven effective in dissipating the anxiety.

TREATMENT OF LONG TERM INVOLVEMENT:
Individuals who have developed a psychological dependence upon marijuana may need to have individual counseling, or some kind of group therapy, to develop skills to live their lives happily without dependence upon this or any other drug.

LETHAL DOSAGE:
There is no record of a human death attributable to an overdose of marijuana. The literature does contain a report concerning a dog that died of an overdose after being given approximately 40,000 times the normal dose of marijuana.

RESOURCES:
Individuals wishing to get treatment should contact their single state agency for drug abuse services or the National Institute on Drug Abuse, 5600 Fishers Lane, Rockville, Maryland 20857. (In Charlotte, N.C., treatment services are available from Open House Counseling Service, Inc., 145 Remount Road.)

LEGAL CONTROL:
The Federal government classifies marijuana as a drug with a high potential for abuse and no approved medical use. Individual states, however, have their own laws controlling the use and possession of marijuana within their own jurisdictions. (Unauthorized possession of any amount of marijuana is illegal in North Carolina. The penalty for the first conviction of illegally possessing one ounce or less of marijuana in North Carolina is a fine of not more than $100. The penalty for illegally selling marijuana in North Carolina includes a prison sentence of no more than five years and/or a fine of no more than $5,000.)

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NOTE:
There are many differences of opinion about marijuana (i.e., marijuana use is really very dangerous; marijuana use should be decriminalized; marijuana should be legally available as a medicine, etc.). Because of these differences of opinion, marijuana issues are often emotionally charged. As a result, scientific studies can be used in efforts to influence public attitudes and social policy without, at times, apparent concern for the quality of a particular study or the applicability of its findings.

Charlotte Drug Education Center, Inc.
1416 East Morehead Street
Charlotte, N.C. 28204

MARIJUANA: THE MYTH OF HARMLESSNESS GOES UP IN SMOKE

by Peggy Mann

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MARIJUANA: THE MYTH OF HARMLESSNESS GOES UP IN SMOKE

New medical research puts a match to the myth that smoking marijuana is not harmful. The real dope is that the daily habit is damaging to the body as well as the mind.

by Peggy Mann

Is marijuana just the "innocent high" some have made it out to be? New medical research into the effects of this widespread drug points to heretofore unknown risks, as this exclusive two-part Post *series will show.*

"It's unreal," the school guidance counselor told me. "The kid looks you straight in the eye and says—full of conviction—'Well, pot doesn't hurt *me*!' His grades have slid from As and Bs to Cs and Ds. He's been put off the basketball team because of poor performance. He's irritable, hostile, always tired, feels depressed. He cares less about everything. He has a cough, chest pains. He's really going down the tubes. But blowing grass every day, he insists, has no relation to any of this.

"To my mind, the scariest thing about marijuana is that the user can't see what the drug is doing to him. Or, if he does admit to a symptom, he shrugs it off. Yesterday a seventh grader told me, 'I know pot's done bad things to my memory. But I don't really need my memory because I decided I'm not going to college.' "

The guidance counselor is Rick Gibson from Goddard, a small town in Kansas. I met him at lunch in another small Kansas town, Wellington. We were both attending a two-day "Grass Roots Conference on Grass." Wellington's population is 8,500. The school auditorium has 1,000 seats. And both days there was standing room only. Physicians, teachers, school administrators, guidance counselors, psychologists and parents came from all over Kansas and from nearby states to attend.

The Wellington conference was part of a burgeoning new movement throughout America. Schools and parents' groups are waking up to the fact that: (1) marijuana abuse has reached pandemic proportions among our youth; (2) something must be done about it; and (3) they are the ones who must do it. They realize that a vital first step is to educate themselves about the rising tide of medical evidence showing that pot can have serious psychological and physical effects. It can cause cellular damage and impair lung function, the reproductive system and the brain. Furthermore, the younger the user, the more deleterious the effects.

The roster of speakers at Wellington was an impressive one. The first speaker after lunch was Dr. Harold Voth, senior psychiatrist and psychoanalyst at the famed Menninger Foundation in Topeka, Kansas. He has studied the psychopathology of marijuana in depth for the past eight years. Coincidentally, his first point carried on from the one the guidance counselor had just made to me.

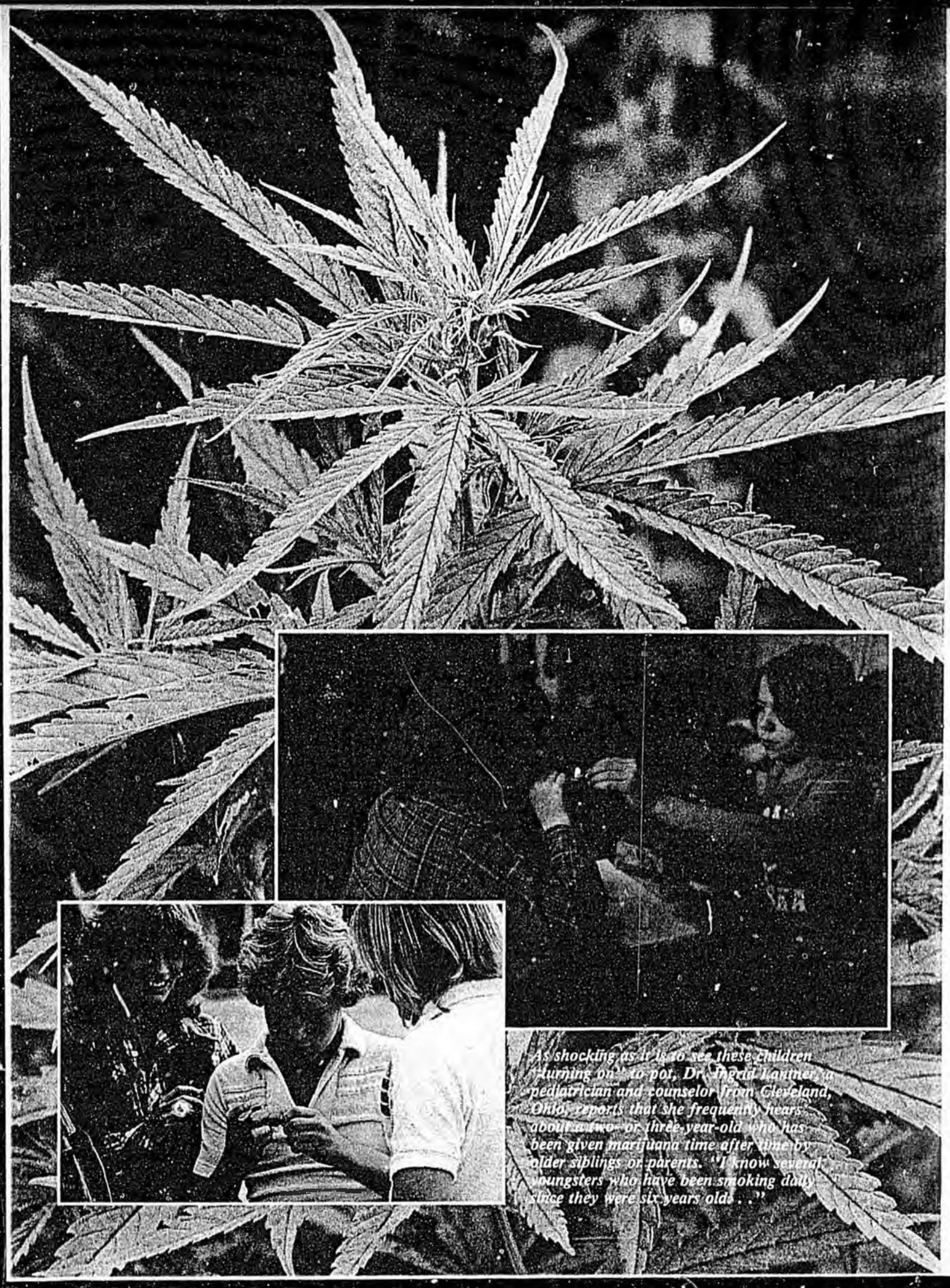
"Marijuana produces a wide spectrum of symptoms," said Dr. Voth. "Some affect some people; some affect others. And there are those who seem to 'get away with it' reasonably well, for a while. But there is one truly pernicious symptom—specifically related to marijuana—which seems to be evident in *every* chronic pot user, youngster or adult. This is the extraordinary refusal to accept the hard scientific evidence about the harmful effects of marijuana. The user will scoff at the evidence, twist it, pervert it, call it 'reefer madness'—anything except look it straight in the face.

"This may be one reason much of the media have, until recently, done shockingly little to relay the medical findings about the harmful effects of marijuana to the American public.

"In my opinion, marijuana use in the United States today constitutes a national crisis, and all-out efforts from all segments of our society are essential in view of the enormous harm being done to millions of Americans, particularly our youth."

Statistics on youth drug abuse clearly show why Dr. Voth's prescription for "all-out efforts" must be heeded on a national scale. For example:

- According to a report published by the House of Representatives Select Committee on Narcotics Abuse and Control, "The United States is the most pervasive drug-abusing nation in history and marijuana is our most pervasive illegal drug of abuse." Says Congressman Lester Wolff (D-NY), chairman of that committee: "Our young people are the first in all history to have used marijuana on a mass scale. Neither this nation—nor any other nation—has ever before faced a problem that is so insidious and so dangerous."
- Last year, according to the federal government's drug abuse network, marijuana accounted for the second largest number of admissions to our federally funded drug treatment facilities, and 33 percent of these had started their pot use before age 14.
- According to a recent national



As shocking as it is to see these children "turning on" to pot, Dr. Ingrid Lantner, a pediatrician and counselor from Cleveland, Ohio, reports that she frequently hears about a two- or three-year-old who has been given marijuana time after time by older siblings or parents. "I know several youngsters who have been smoking daily since they were six years olds . ."

drug abuse survey covering ages 12 and up (1976-1977), use of marijuana is twice as high for youngsters as for adults, and use by youngsters ages 12 to 17 increased by nearly a third in one year. (A new national survey has just been carried out by the National Institute on Drug Abuse and, according to Dr. Robert Peterson, assistant director of research, "We would be very surprised if this did not show an increase in use, especially among young users.")

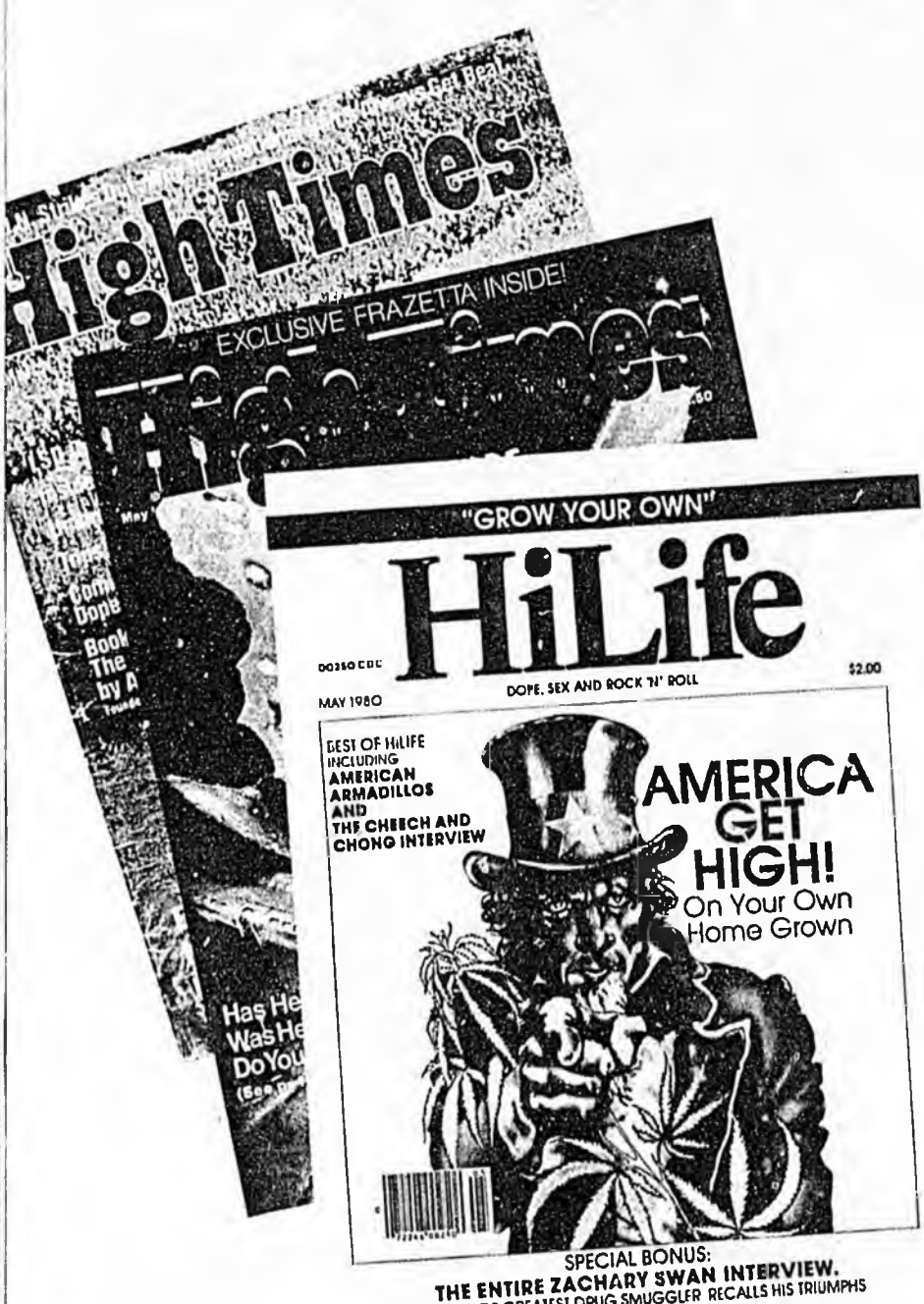
● According to the High School Senior Survey, the only national drug abuse survey taken every year since 1975 (representing every state except Alaska and Hawaii):

• In 1979, one out of ten high school seniors smoked pot daily, or almost daily—an 80 percent increase since 1975. Of these, daily users averaged 3½ joints (marijuana cigarettes) a day; 13 percent smoked more than seven joints daily.

• Of the 50 percent of seniors who smoked pot at all during 1979, 37 percent said they "usually stay high three-to-six hours." (Add to this the fact that marijuana is up to ten times more potent than that smoked a decade ago.)

• Forty-nine percent of all seniors who used pot "during the past 12 months" also used one or more additional illegal drugs during that period.

Popular drug-culture magazines teach how to grow your own, how to smuggle dope into the U.S., how to dress for pot parties, how to get around the law. Their advertisers reach a market of young people with money to spend, and the drug paraphernalia in their pages is available by mail—portable head shops, accessible to young residents of even the smallest, most remote communities. (Paraphernalia shops have been outlawed in Indiana.)



It is worth noting that this study surveys only those students who have made it to the end of their senior year. Drug use among dropouts is notably higher than among those who finish high school. (In some areas, for example, grocery store delivery boys no longer take coffee breaks, but "pot breaks.") Also not included are those who were not in school the day the survey was taken. Truancy is another "symptom" of regular pot use.

All recent state, city, suburban and rural surveys show that pot use has increased rapidly among youngsters of all income levels and all grade levels, with the highest increase at junior high school age. Throughout the country, surveys show that junior and senior high school kids are getting stoned on the way to school, during school, after school and at home—where they often "smoke out the window" or burn incense to cover the smell. One local newspaper series on the subject started: "For many middle school students, marijuana has replaced Wheaties as the morning 'meal.'"

In some areas, pot use starts as early as the fourth and fifth grade. If the saying is true, "as Maine goes, so goes the nation," it is worth noting that a 1979 two-county survey in rural Maine showed that in the fourth grade, 6 percent had tried marijuana at least once and one percent had used it "many times." ("And," says Mel Tremper of Maine's Office of Alcohol and Drug Abuse Prevention, "as drug use goes, we in Maine are kind of behind the times.")

California is a state "ahead of

"The target for drug paraphernalia in the 1980s is ages 6 to 16," the operator of one of Florida's largest head shop chains recently admitted, claiming it was "an industry decision." Organized campaigns of this sort, added to tremendous peer pressure, are misleading young people into believing that pot smoking is a normal part of growing up.

the times" in this area. Dr. Richard Blum, one of the country's foremost authorities on drug abuse, studied 3,200 school children in California and found that some started pot use in third grade. Said Dr. Blum: "The phenomena that appear in California generally appear in the rest of the country several years later." Dr. Blum's survey was conducted in 1976.

For the past two years, pediatrician Dr. Ingrid Lantner has been speaking on the subject of marijuana at schools in the suburbs of Cleveland, Ohio. She speaks two or three times a week, often to fifth and sixth graders. She always asks them: "How old is the youngest child you know who has smoked marijuana?"

Dr. Lantner told me: "I have never asked this question without hearing about a two- or three-year-old who has been given marijuana by older siblings or parents—and not only once. I know several youngsters who have been smoking daily since they were six years old. In all these cases, the parents are users. I have never known of a grown-up who would give a child that age a tobacco cigarette or any other drug."

Dr. Lantner also asks for written questions from her young audiences. Every time she speaks she receives one or two questions which indicate that parents give pot to their young children. Two typical questions:

"I am ten. My parents let me smoke pot since I was six. Will my eggs be damaged?"

"My brother smoked M.J. since age seven but not every day. Will he have his growth affected? He is now 11. He gets the M.J. from my mother."

Another question Dr. Lantner often receives from fifth and sixth graders is: "What shall I do if someone physically forces me to

Rhesus monkeys exposed to the human equivalency dose of one to two joints per day for three years exhibited a loss of drive, motivation and interest in the care of their offspring. A picture of a control, or non-drugged, rhesus shows a rhesus mother nicely nursing her baby. But the THC-treated mother (right) has been exposed to the human equivalency dose of one to three joints a day. Typically, these mothers didn't nurse their babies, groom them, retrieve them or cuddle them as the control mothers did. Dr. Ethel Sassenrath at the Primate Research Center of the University of California, who conducted the experiments, also noted that the THC-exposed babies showed deficits in attention and over-concentration on different stimuli in the environment—the types of deficits of behavior which indicate that the central nervous system had been affected in early development.

smoke pot?"

"School principals tell me," says Dr. Lantner, "that after a ball game, a group of potheads—older students—often come around to sell drugs, and they're very aggressive with the little ones, insisting they buy and smoke on the spot. This happens in a nice, upper-middle-class area in the suburbs of Cleveland."

Nor are the suburbs of Cleveland Ohio, the only area in the country where parents are giving pot to very young children. Take Missouri, for example. Ed Moses, drug information officer of the state of Missouri, works full time lecturing and teaching about drug abuse. "Every year drug abuse is affecting younger age groups," he told me. "They commonly start feeling the pressure to turn on as early as the fifth and sixth grades. Also, every year the marijuana is getting stronger and more easily available in larger quantities.

"I think the most disturbing thing I've found is many parents' attitude that marijuana is so harmless that it's okay to reward their three- and four-year-old child with getting high.

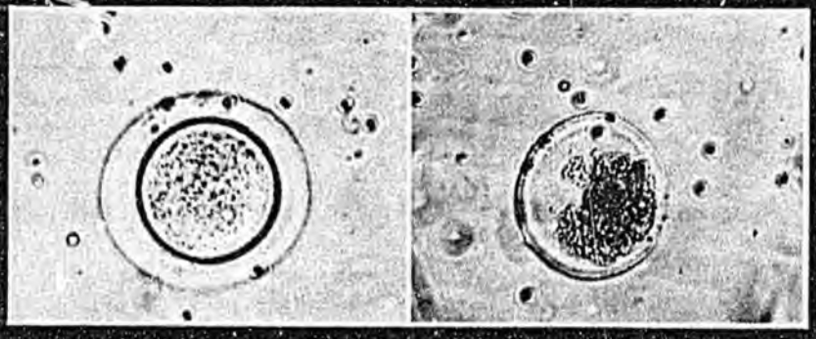
"For example, at parties, the parent will let the three- to five-year-old child carry the joint around to the toking [pot-smoking] guests. And, as a reward, the child is allowed 'to take a hit' and get stoned. This is becoming more and more common among young parents who are heavy users.

"The youngest I have seen in a home was with a couple in their early 20s who got their nine-month-old baby high by 'shotgunning' the child [turning the cigarette backwards with the lit part in the mouth so that a concentrated rush of smoke can be blown into someone else's mouth or face]. The father told me, 'We like to get Annie high so she won't be afraid to walk.' I pointed out that she was so stoned she couldn't even crawl. The father said, 'Well, that's cool. At least she's not afraid to try.' 'She boogies around when she gets high,' the mother said, laughing. This meant that the baby bounced around a little while. Then she sat—spaced out."

A kindergarten teacher in a South Texas town told me, "My

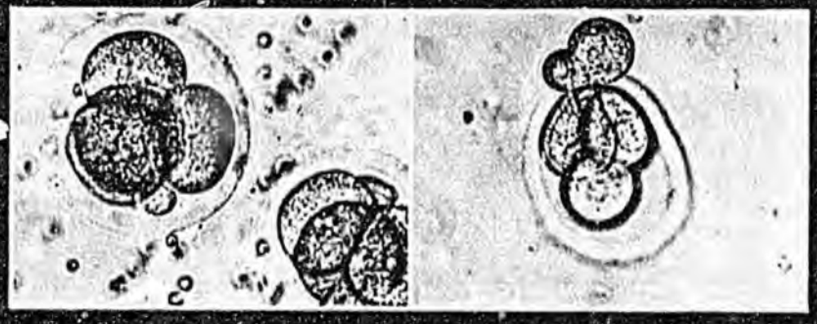
THC-Injected Mice. Produce Abnormal Eggs

Current research indicates that THC (the active agent in marijuana) may induce genetic mutation. One recent experiment involved mouse ova (female reproduction cells, commonly called "eggs"). Two groups of 26-day-old female mice were used in the experiment. The control group was allowed to proceed with a normal routine while the test group was injected with daily doses of THC. The animals were then allowed to mate with non-treated young adult mice. Forty-eight hours after mating, the animals were sacrificed and the fertilized eggs were recovered from the oviducts. Abnormal cells occurred in 37.5 percent of ova recovered from the THC-treated mice, compared with 10 percent in those obtained from the controls.



A normal ovum (left) shows the chromatin (that part of the cell nucleus that is composed of DNA and is the carrier of the genes) to be finely granular and evenly dispersed throughout and responsive to fertilization and normal cell division.

In stark contrast is the abnormal ovum (above), taken from the THC-treated mice, where the chromatin has clumped together. The fact that it has coagulated is an indication that it is damaged and probably is a nonviable chronosomal substance, in which case there would be no pregnancy at all.



A normal fertilized ovum demonstrates predictable cell division.

Irregular shapes and sizes of fertilized cells appear in the mice ova in the THC-treated group 48 hours after mating.

It was the conclusion of this research that THC does act as a mitotic (dividing cell) poison and therefore is considered a chromosomal mutagen. It is also important to note that unlike male sperm, which is replenished during the entire life of the male, the number of female eggs is determined at birth and, once they are damaged or destroyed, they can never be replaced—the damage is permanent.

children don't smoke pot. But the first grade teachers tell me that some of *their* children come in stoned—always the ones with older brothers and sisters."

Maryland is so "typical" that it is often referred to as "America in miniature." Certainly the 1978 Maryland statewide survey reflects what is being found in local surveys throughout the country: "Students began using one or more illegal drugs at about one year earlier than the same grade level use in the last Maryland survey (1975)." And the "one" drug is invariably marijuana. Most local surveys show that, each year, initial marijuana use drops one year lower.

Older siblings are the chief source of supply for very young users. Because the myth of marijuana's "harmlessness" has so permeated our society, youngsters often feel they are doing their smaller brothers and sisters a favor by getting them high. There is also another motive. If the younger child gets involved, he or she won't "narc" (tell Mom and Dad).

It is quite possible for Mom and Dad to be unaware of the fact that their children are stoned. With marijuana use it's easy to "hide the high" or to "come down" by dinner time. The clearest tell-tale symptom—red eyes—is handled by kids via eye drops. (The eye drop industry reports a boom in sales.) Youngsters who use a local swimming pool have an easy excuse—"chlorine in the water"—even though the closest they may have been to the water was hanging out in the locker room blowing grass.

There are, of course, discernable symptoms of the youngster who is a heavy pot user. Unfortunately, most of them are so much like the "blow up" symptoms of normal adolescence that many parents tend to disregard such as merely something their child will "grow out of." But this is not likely to happen unless the child gets some firm, supportive help from parents and from the school.

Parents should realize that even the "straight" kids (non-drug users)—who represent about 50 percent of most surveys of junior high and high school classes—are under constant peer pressure to "Try it: It's great." And this pressure to start pot use comes not only from peers. All kids are affected by aspects of adult industries which make drug use in general—and pot use in particular—seem like a normal part of growing up in America today.

For example, a recent survey in Atlanta, Georgia, showed that while one third of non-drug-using kids listen to rock music on the radio three hours or more a day, virtually *all* drug-using youngsters listen three or more hours a day. Some reported: "I listen all the time when I'm home." In addition, they have favorite records and cassettes that they put on when they're high and "float with them."

The same Atlanta researcher, Dr. Fred Crawford, studied the contents of rock lyrics to determine what messages they contained suggesting or supporting drug use. He found that more than half of the current rock songs had messages condoning or suggesting the use of drugs, and that many students start listening to rock music at about the time of first use.

And what do they hear when they listen? There are countless songs with "do drug" messages such as this from Eric Clapton:

Cocaine, cocaine
She's all right.

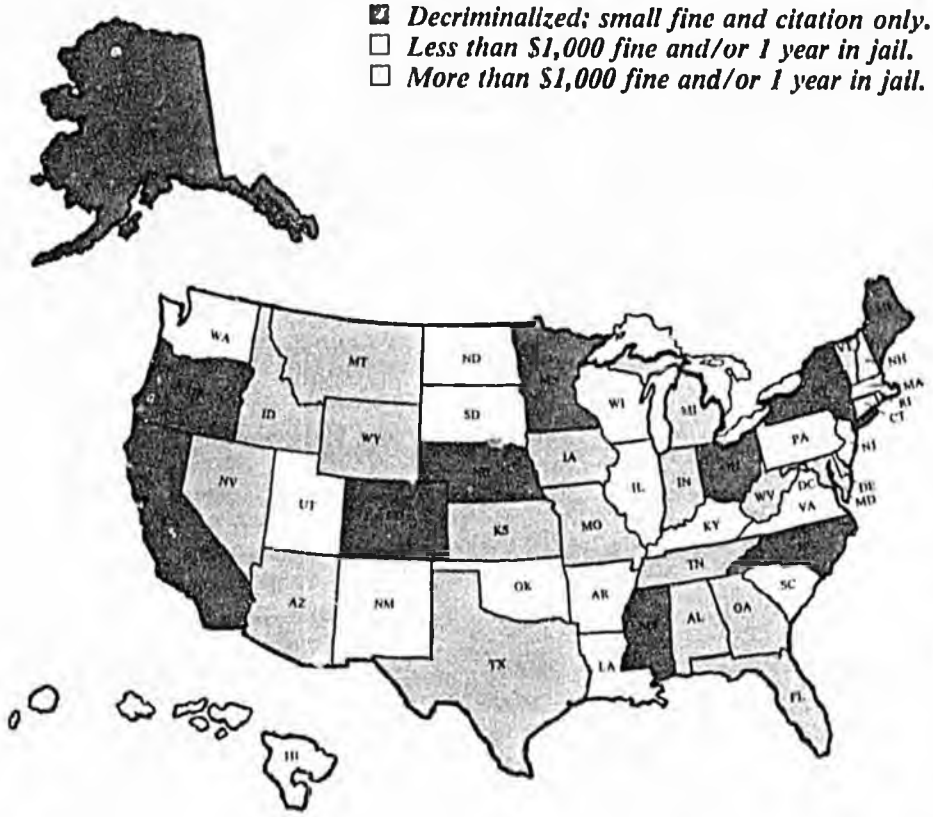
And this from Dr. Hook's Medicine Show, the *Sloppy Seconds* album ("killer weed" is marijuana):

Some men need some killer weed
And some men need cocaine
And some men need some cactus juice
To purify their brains.
Blow your whistle,
Bang your gong,
Roll up something to take along
Feels so good it must be wrong
Freebin' at the freakers' ball.

Another example of the "mes-

First-time marijuana-possession penalities for 1 ounce or less:

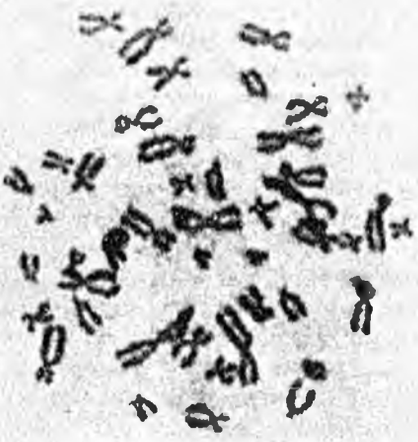
- ☑ *Decriminalized: small fine and citation only.*
- ☐ *Less than $1,000 fine and/or 1 year in jail.*
- ☐ *More than $1,000 fine and/or 1 year in jail.*



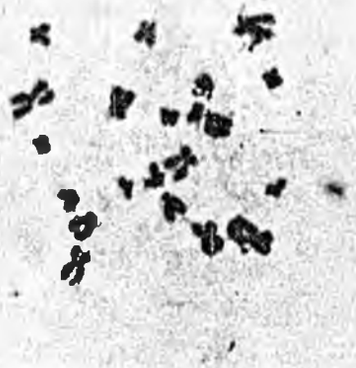
In most areas, laws for possession of an ounce or less of marijuana (30 to 60 joints) for personal use are not enforced. Some say this is reason to relax the laws (decriminalization) or to eliminate them (legalization). However, in states which have decriminalized pot, law enforcement officials point out that marijuana use among youths has escalated greatly, and traffic accidents and drug-related crimes have increased dramatically.

sages" youngsters receive from the adult community comes from the drug paraphernalia industry—now a $3 billion business. A highly profitable line is the "kiddie" drug paraphernalia, which includes such items as baby bottles and "Catch-a-Buzz" flying discs which double as pot-smoking devices, skateboards and kiddie belt buckles for "hiding your stash" (your supply of pot), comic books which show how to cut and snort cocaine and *McGrassey's Reader*, an easy-to-read, 20-page primer which includes clear directions on how to roll a joint, a pot vocabulary, advice on what to wear to your first pot party, plus a packet of alfalfa "practice grass." For more advanced readers there is *The Whole Drug Manufacturers' Catalog*, one-third of which is devoted to "Kitchen Chemistry and Bathtub Dope: How to Produce Drugs from Non-Prescription Items and Household Chemicals in Your Kitchen Without Prior Chemical Knowledge."

In most states such items are legal and can be found in various varieties of stores, including posh gift shops, boutiques, record stores, flower shops and stores which specialize in magic, Oriental gifts, leather goods, smoking goods, etc., as well as in the "head shops." And some head shops advertise openly in school newspapers as "novelty shops." The kids know what they are, but (presumably) the teachers don't. One of the biggest head shop chain operators in Florida recently told Florida state legislator Mary Ellen Hawkins: "The target for drug paraphenalia in the 1980s is ages 6 to 16." He said this was an industry decision.



A. Non-marijuana smokers have more white cells with 46 chromosomes.



B. Marijuana smokers have an increased percentage of cells with fewer chromosomes.

While a normal cell has the typical complement of 46 chromosomes within its nucleus (left), recent experiments indicate that heavy-marijuana smokers have marked increases in the number of cells with micronuclei (nuclei with less than 46 chromosomes, as pictured right). The experiments were performed to determine the effects of marijuana on human lymphocytes (white blood cells, which are a major part of our bodies' defense systems). Five volunteers with histories of chronic marijuana smoking were used. They ranged in age from 22 to 32 and had histories of smoking at least ten marijuana cigarettes per week for six years or more. Seven healthy students who had no history of smoking marijuana served as the control group. After repeated periods of smoking followed by deprivation, blood samples were obtained from all subjects in the test group. Similar samples were obtained from control subjects on the same day. The cells from the non-marijuana smokers showed a 15 percent incidence of micronuclei, while the cells from the marijuana smokers showed a 36 percent incidence of micronuclei. Dr. Akira Miroshima of Columbia University noted that the marijuana smoker might run a greater risk of disease, since THC lowers our resistance to infection.

What does all this mean in terms of our youngsters' health? And what can parents look for as possible signs or symptoms of chronic pot use among youngsters?

The psychological symptoms are often the first to manifest themselves. These include decreasing school performance; increased irritability ("stop *hassling* me" flared out for no justifiable reason); a general apathy; depression; drastic, inexplicable mood changes; feelings of isolation; a cutting off of communication between parent and child and a general loss of interest in everything except pot smoking and the accompanying "kiddie drug culture."

There are two very common physical symptoms: a chronic cough—a bothersome, constant hacking—and chest pains. Says Dr. Ingrid Lantner, "I have yet to see a teen-age tobacco smoker complain of chest pains, but it's quite common among pot smokers. School nurses tell me this, too."

However, it is the nonvisible physical symptoms which may be the most damaging. And this is the information which is finally crossing the chasm between the scientific community on one shore, which has been putting forth these findings at ever-increasing rates, and the general public on the other shore. For years this chasm has not remained empty. It has been industriously filled with misinformation, distortion and perversion of the facts and, at times, even outright lies emanating from pro-pot organizations and individuals whose purpose seems to be to discredit the findings which prove that pot is harmful and to make it seem an essential and harmless ingredient of the "now" way of life.

Because of this constant surge of misinformation, which is still heard loud and clear throughout the land, pot smokers often have pat answers when confronted with the warning signals now coming loudly and clearly from the scientific community.

One common "turnoff" of these findings is the shoulder-shrug comment, "For every study showing that pot is harmful, there's another showing it's harmless."

This is simply not true.

One of the world's most knowl-

edgeable experts in the field of marijuana is Dr. Carlton Turner, director of the Federal Marijuana Project funded by the National Institute on Drug Abuse (NIDA). Dr. Turner and his associate, Dr. Coy Waller, have just completed a hefty two-volume work: *Marijuana: An Annotated Bibliography*. The first volume has already been published by Macmillan; the second will be published this summer. In preparing these works, Dr. Turner abstracted more than 5,000 scientific publications on cannabis (the plant from which marijuana, hashish and hash oil are prepared). He says: "As a scientist, I have to be objective. I am not a crusader for or against any drug. I am for evaluating any drug on its merit, which I base on all scientific publications about that drug. There is not a single paper on the crude drug marijuana which gives it a clean bill of health, not a single paper to support it as an innocuous drug.

"A widely quoted study of 30 Jamaican cane workers was never published by a scientific journal. It could not stand the scientific review process.

"There *are* some reports on *individual* cannabinoids indicating possible therapeutic use." (Cannabis contains 61 known cannabinoids—substances unique in nature, found only in the cannabis plant.) "However, it must be remembered that any drug has some side effects, and with the broad biological action of the cannabinoids at the cellular level, the side effects may outweigh the benefits in long-term use. This is the reason that marijuana has no place in modern medicine. Using marijuana would be like giving people molded bread to eat to get penicillin.

"Media, with some exceptions, have not taken the time to understand the nature of the crude drug marijuana. If you attend a conference and there are 15 scientific papers cautioning against the use of marijuana, and *one* saying that a single extracted cannabinoid might be useful in a therapeutic area, the media headline this by saying that *marijuana* has been found to be useful. The findings are reported in such a way that the public is led to believe joints of street pot are being smoked by people with glaucoma or by cancer patients to control nausea after chemotherapy treatments, when the research is actually being done with a synthesized THC capsule. And by the time this 'news' sifts down to the school yard, you have kids saying that pot cures cancer, pot cures nearsightedness and pot cleans out your lungs after you smoke tobacco cigarettes." (The latter comes from early findings which indicated that marijuana might be helpful in cases of asthma. Further research clearly showed just the opposite is true.)

"Incidentally, why the media have generally been so 'up' about publicizing the possible medical benefits of marijuana and so 'down' on relaying the consistently emerging evidence concerning the harmful effects of marijuana is a matter to be comtemplated."

Another common argument of pot-smoking youngsters is this: "You have your martini, so why can't I have my pot?"

Dr. Nicholas Pace has a solid answer for this question, and he is well qualified to give it. Dr. Pace is the co-founder and past president of the New York City Affiliate of the National Council on Alcoholism. He is also one of the founding directors of the American Council on Marijuana and Other Psychoactive Drugs.

Dr. Pace points out: "There are two important differences between alcohol and marijuana. First, alcohol has a single chemical, and it is water soluble. One ounce is metabolized and is completely excreted from the body within 12 hours.

"What about pot? Youngsters like to consider it a 'natural weed.' Some even believe it to have health-giving properties. In reality, however, cannabis is an extremely complex crude drug containing 421 known chemicals. When you smoke a joint you are combusting these chemicals into hundreds of other different compounds. And we don't know how they are affecting the body.

"We do know, however, that among the 420 basic chemicals are

The only long-term (20-year) study of the effects of THC on the male reproductive cell (sperm) was conducted in the small laboring village of Piraeus, Greece, by Dr. Marietta Issidorides and Dr. Costas Stefanis of the University of Athens, Greece. Spermatozoa from nonsmokers and from chronic hashish smokers (hashish has a high concentration of THC) were photomicrographed. Normal spermatozoa from a non-hashish-smoking male show a proper density, indicating that it is rich in protein and other essential chemical substances. In the center and right panels, sperm taken from a hashish-smoking male shows a definite breakdown of protein substances and a clumping together of chromosomal material. The research team also noted changes in the ultrastructure of the spermatozoa of chronic hashish-smoking males which could result in genetic disturbances or prevent fertilization.

61 known cannabinoids (new ones are being discovered all the time), and so far scientists have studied only a few of them. We know that at least four of the cannabinoids are psychoactive, or mind-altering. But a few of the nonpsychoactive cannabinoids which have been studied thus far appear to be even more harmful to certain organ systems than the psychoactive ones.

"Therefore," says Dr. Pace, "the first important point to be kept in mind is that even the so-called 'NIDA marijuana' used by scientists is, in fact, a Pandora's box of unknowns."

"NIDA marijuana" is grown on a well-guarded five-acre "pot farm" on the outskirts of the University of Mississippi. This project, funded by the National Institute on Drug Abuse and directed by Dr. Carlton Turner, supplies to researchers marijuana which has a relatively stable Delta-9-THC content of about 2 percent. (This is the chief psychoactive cannabinoid in marijuana.)

Dr. Pace points out that so-called "good street pot" has a four, five or even six percent THC content. Therefore, sobering as the research findings are, they gain an even greater impact when we realize that they represent work with THC half as potent as that which many of our youngsters are smoking regularly today.

"The second important point regarding marijuana," says Dr. Pace, "is the fact that it is fat soluble, like DDT. And we have, of course, banned the use of DDT because it accumulates in body cells and organs.

"The cannabinoids are not only fat soluble. They are, in fact, lipophilic—fat loving. The fatty sections of cells and membranes and the fatty organs of the body act like magnets attracting the cannabinoids. The cell membrane—the coating surrounding the cell—is at least 60 percent fat. When the fat-soluble cannabinoids dissolve in the cell membrane, they make it difficult for the most important constituents of the cell, the proteins, to enter. And cannabinoid clogging of the cell has additional deleterious effects.

"What about the fatty *organs*? It should be remembered that the chief fatty organs of the body are the gonads (sex glands) and the brain. Indeed, the three-pound human brain is composed chiefly of fat. As one prominent researcher once noted: 'We're all fatheads, from that point of view.' "

Dr. Pace and every other marijuana researcher I have interviewed agree that the fat solubility of marijuana is the most important—and ominous—single factor about this drug.

Why? Dr. Pace puts it this way: "The most studied cannabinoid, the popular 'Delta-9,' has been traced radioactively in the body in human and animal studies. All the studies show that it takes three days to a week for the body to rid itself of *half* the THC in a single joint and much longer (some studies show up to 30 days) to get rid of all of it. This means that even if a youngster smokes only one joint a weekend, about half the THC and other cannabinoids *remain* in the body. Half the cannabinoids in next Saturday night's joint are added to the first. And so on, for a smoke-filled series of Saturday nights."

Dr. Robert C. Gilkeson, who has spent 15 years in neurophysiologic research, puts it this way: "No drug or chemical improves the normal cell. Marijuana is a known intoxicant. Toxic means poison. Anyone who smokes or ingests more than the equivalent of one marijuana cigarette every 30 days will accumulate an acute neurotoxic substance in his or her body."

What are the results of "cannabinoid accumulation?"

A single article can only touch the iceberg's tip. This becomes clear when picking up a 777-page volume, *Marijuana: Biological Effects*, published by Pergamon Press. This contains 50 scientific papers given at the two-day Reims Conference held in France in July 1978. The conference was limited to marijuana's effects on four areas: the lungs, the reproductive system, the brain and the cells.

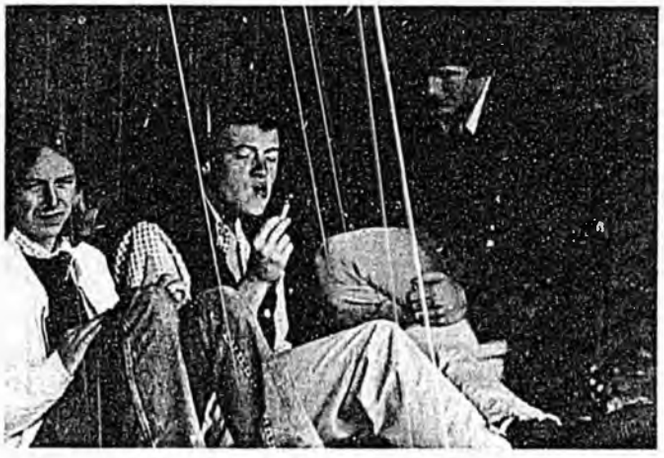
The September issue of the *Post* will discuss these four areas in depth, as well as give some useful pointers for parents and other interested adults who wish to combat this "grass fire" of marijuana use among our young people. ✖

PUTTING A MATCH TO THE MARIJUANA MYTH

Most kids are fully convinced that the use of marijuana is not harmful. But new medical research proves them dead wrong.

by Peggy Mann

We have found that students in the lower grades will look their counselors straight in the eye and say—with full conviction—"Pot doesn't hurt me!" But the latest medical research has determined that marijuana can cause cellular damage and impair lung function, the reproductive system and the brain. In the conclusion of this article, we take a closer look at these four areas of abuse--and offer suggestions to parents and other adults interested in combating this "grass fire" now raging through our schools.



Although one in every ten high school seniors admits smoking pot daily, and in some areas pot usage now starts as early as the 4th and 5th grades, the highest usage of all is in the 18- to 25-year age group.

Marijuana and Cellular Damage

Many scientists, including pioneer "pot researcher" Dr. Gabriel Nahas, consider the reports on marijuana's impairing effects on body cells to be the most alarming because, as Dr. Nahas says, "they are the underlying cause of all the other deleterious effects that have been reported."

Not only do cannabinoids clog the cells, inhibiting their functions to some degree, but many studies have shown that heavy pot smokers have an abnormally large number of abnormal cells.

Dr. Akira Morishima, of the Columbia University College of Physicians and Surgeons, has done studies on the increased incidence of cells in marijuana smokers which have less than the normal number of chromosomes and which tend to revert back to the normal level after the individual has stopped smoking pot. In more recent studies, published in June 1980, Dr. Morishima found that THC disturbs the *movement* of chromosomes which, he says, "probably accounts for the production of cells with an abnormal number of chromosomes." A similar finding has just been published by Dr. Arthur Zimmerman in Canada, using an entirely different methodological technique.

Pot advocates are swift to "discredit" chromosome studies by saying that "aspirin and coffee also cause chromosome breaks." Dr. Morishima points out that his studies did not relate to chromosome *breaks*. Furthermore, in the 1980 studies he used the same technique to test the effects of aspirin, caffeine and alcohol on chromosome movement. He also used "comparable doses," except that in the case of alcohol, "we went up to 100 times the equivalency dose." The result? Neither aspirin, caffeine nor alcohol produced abnormal movement of the chromosomes.

As early as 1973, Dr. Nahas found that THC lowered the rate of cell division by diminishing the cell's ability to make DNA, RNA and essential proteins. DNA is the all-important genetic material of the cell. RNA controls gene "expression." These findings have since been replicated by scientists in 12 important research centers in the U.S. and abroad.

Said Dr. Nahas: "These findings indicate that the pot smoker may not only be damaging his own mind and body, but may be playing genetic roulette with his or her unborn children."

Marijuana, Sex and Reproduction

There are other ways in which pot smokers may be damaging their unborn children.

As noted, cannabinoids collect in the fatty gonads *and* in the brain. In the brain, THC seems to affect the hypothalamus which, in turn, affects the pituitary, a pea-like structure at the base of the brain which is a control center for sex and reproductive hormones.

It is not surprising that this double-barreled influence on the reproductive system should result in some dysfunction and abnormalities.

A sexual performance study of 500 pot-smoking men was made by Dr. Robert Kolodny of the Reproductive Biology Research Foundation in St. Louis. He summed up: "The general trend was that with increasing use,

there were lower rates of sexual activity and a lower frequency of orgasm." A study of 1,238 male users in India showed similar results.

Other researchers have shown that marijuana smoked in moderate to heavy doses results in an abnormally large number of abnormal sperm. And this is dose-related. The more joints smoked, the more abnormal sperm there are.

Dr. Carol Grace Smith did a recent study on male rhesus monkeys. Both males and females of this breed have a reproductive system close to humans. "In fact," says Dr. Smith, "under the microscope, rhesus sperm are almost indistinguishable from human sperm." She gave male monkeys the "rhesus THC equivalent" of one to two joints a day. She summed up: "THC profoundly inhibits testosterone and hormones which stimulate the sex organs, bringing them down to the level of a castrated animal. One dose 'shuts down production' for as long as 24 hours."

Testosterone is the all-important male sex hormone. A number of other human and animal studies have also shown that THC lowers the testosterone level in males.

There has been only one study made on long-term (20-year) human male cannabis smokers. The researcher, Dr. Mariette Issidorides, of Greece, summed up: "Cannabis interfered with protein substances essential for the normal development of the sperm, and it altered the metabolism of the sperm cell, thus possibly affecting expression of the genetic material."

Since males produce so many millions of sperm, all indications are that, if the pot smoker ceases and desists, sperm return to normal. Females, however, may be another matter. An infant girl is born with her lifetime supply of eggs. If these are damaged, there's no replacement. And cannabinoids collect in the ovaries, a fact proved by radioactively tagged THC. What effect might this have on the eggs? Thus far, the only researcher to have delved into this question is Dr. Akira Morishima. He worked with "teen-aged" female mice. He gave them miniscule mouse-size doses of THC. Scientists figure in "human equivalency doses," which can be "checked out" by testing THC in blood levels. If a mouse has a percent of THC in its blood which is equal to the percent of THC a human adult has in his or her blood after smoking—for example, one joint at 2 percent THC—then this is the "human equivalency dose." According to human equivalency charts just published by another "pioneer pot researcher," Dr. Harris Rosenkrantz, Dr. Morishima's female mice received the THC "equivalent" of an adult woman smoking two joints a day. In his report, published in July 1979, he revealed that in the control group, very few of the mice had abnormal eggs. But in the THC-exposed group, about half the eggs were dying or had died. "And," said Dr. Morishima, "of those that lived, 20

Magazines extolling the joys of drug taking are found on newsstands throughout the U.S. As some fold, others are born. The slick **High Times** *boasts 4 million readers. Such publications make illicit drugs seem as "normal" as popcorn and apple pie.*

or 30 percent looked unhealthy."

Dr. Ethel Sassenrath at the Primate Research Center of the University of California has done other types of investigation into pot's effects on the female reproductive system. She works with female rhesus monkeys, whose reproductive system is very close to the human female's, including a 28-day menstrual cycle. Every day for three years—she even came in on Christmas—Dr. Sassenrath fed her monkeys the THC human equivalency dose of one to two joints. (She gave THC on raisin cookies.)

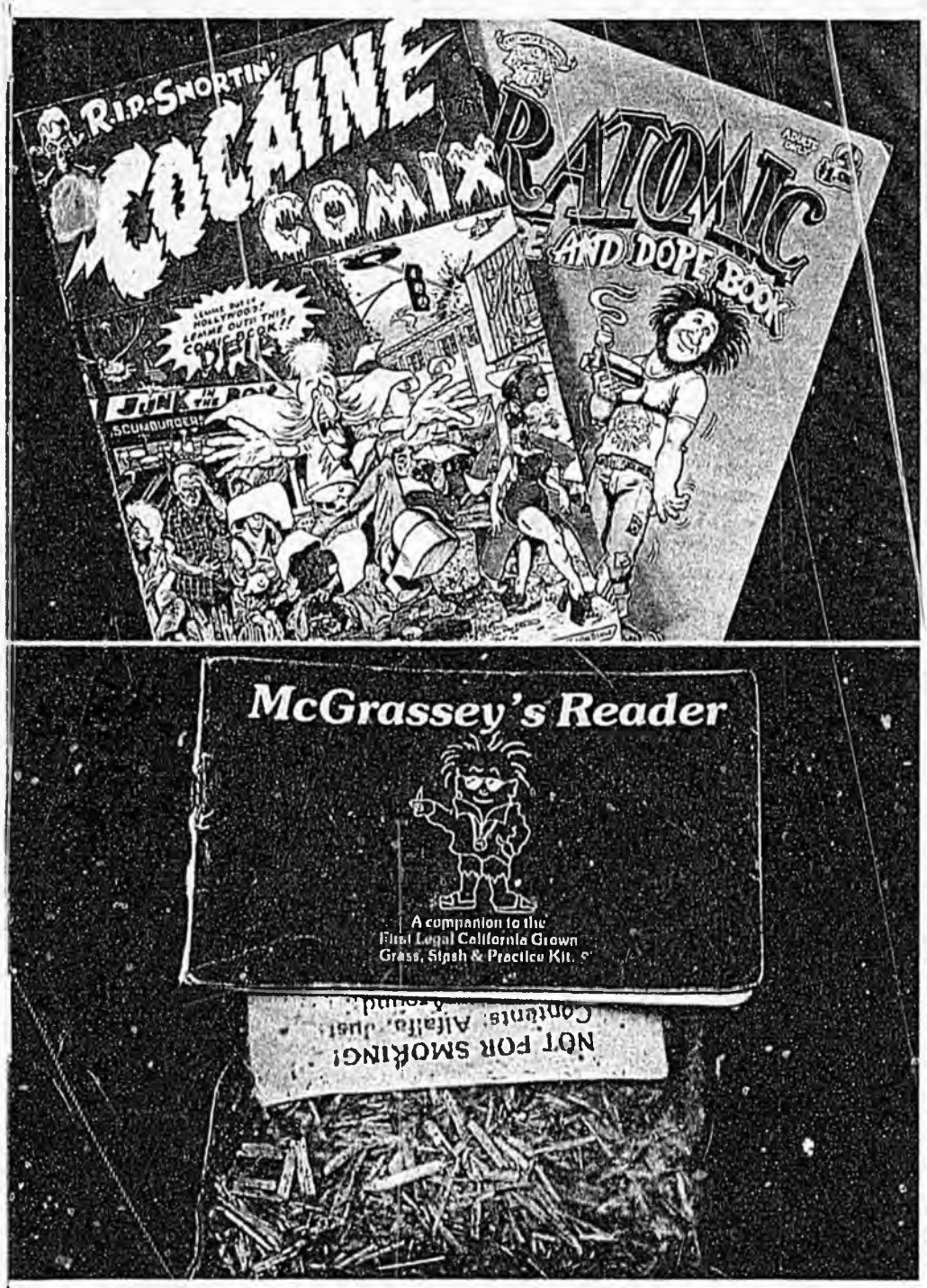
Result: Forty-four percent of the pregnancies of the THC-treated mothers did not result in living offspring. The losses occurred as abortions, reabsorptions, *in utero* death, stillbirth or death just after birth. The control mothers had a 12 percent birth loss—which is normal for a monkey colony.

Of even greater concern were the results obtained when the pathologist did microscopic evaluations of tissues and organs from the dead fetuses and infants. This was a double blind study. He did not know whether tissues came from the THC-exposed offspring or the offspring of undrugged mothers. Result: Although the dead THC-exposed offspring appeared to be normal, in each case he found subtle developmental abnormalities in various organ systems and tissues which were not found in the offspring of the undrugged mothers.

"Furthermore," said Dr. Sassenrath, "the THC-exposed babies that survived acted differently than the others. They over-responded. They didn't seem to have normal 'brakes' on such behavior as active playing without stopping or clasping cagemates who struggled to get away. They all showed deficits in attention and over-concentration on different stimuli in the environment. They had the type of deficits in behavior which indicate that the central nervous system has been affected. This kind of subtle behavioral difference can be characteristic of marginal brain damage in early development."

It has been well established that THC easily passes through the placenta. But how does it affect the placenta itself? In March 1979, Dr. Paige Besch of Baylor College of Medicine in Houston, Texas, completed a four-year study on the subject. He found that the more THC was added to the human placenta, the less estrogen was produced. Says Dr. Besch: "Decreased estrogen results in decreased blood flow to the placenta, which means decreased nutrition to the developing baby."

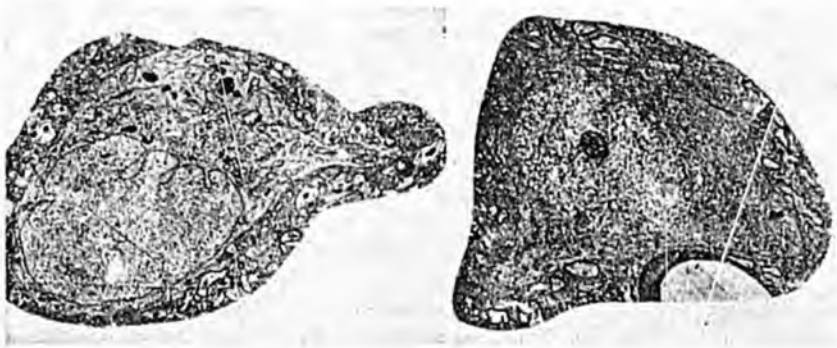
Other scientists working with rhesus monkeys and with human females have found that THC appears to interfere with the hormonal system and with the menstrual cycle. For example, Dr. Joan Bauman and Dr. Robert Kolodny found that 38.8 percent of pot smokers they studied had defective



A profitable branch of the drug publications industry is aimed at children. Comic books show how to "smoke dope," how to cut and snort cocaine. McGrassey's Reader, *an easy-to-read primer, explains how to roll a joint and comes with "practice grass" (alfalfa), rolling papers and a "roach clip."*

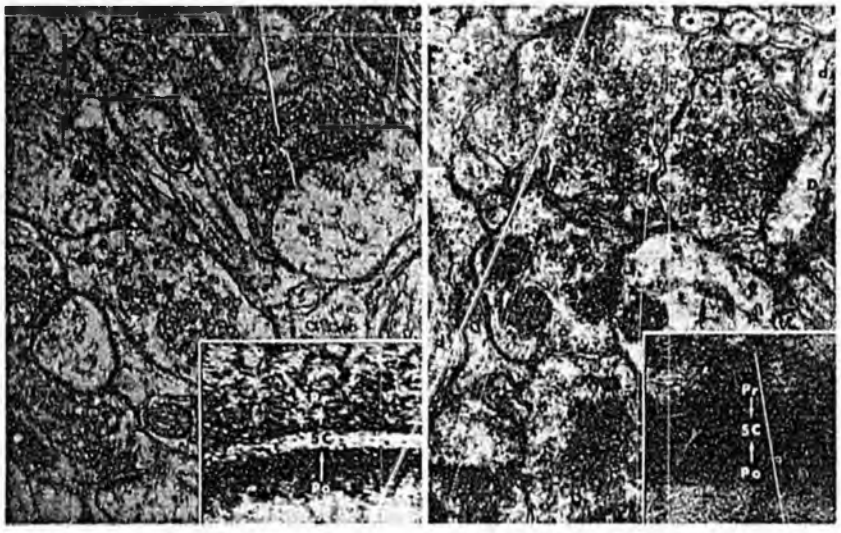
Marijuana and Brain Damage

To determine the effects of marijuana on the brain, Dr. Robert Heath of Tulane University gave rhesus monkeys 2 to 3 "monkey-sized" joints per day (inducing blood levels equal to those of human subjects smoking 3 joints per day) for six months. A control group was given an equal number of marijuana cigarettes with the active ingredient THC removed. Heath reported significant damage.



Normal Brain Cell *Damaged Brain Cell*

While no changes were noted in cells taken from the "control" group, cells from the THC-exposed brains show a marked increase in the number of inclusion bodies that appear in the nuclei, and the rough endoplasmic reticulum is disrupted. These changes in the cell structure may be interpreted as a sign of injury in most cells, including brain cells. These injured cells have a reduced capacity for normal function.



Normal Synapse *Damaged Synapse*

Vital to survival, the synaptic membrane serves as the body's communications network, transmitting messages to the brain. While a normal synapse (left) allows for free flow of messages, the THC-exposed synapse (with widening of the synaptic cleft, electron opaque materials in the cleft and some clumping in the synaptic vesicle) will not properly transmit these necessary messages.

In the light of recent experiments, little doubt can remain as to the gradual, yet significant, consequences of smoking marijuana. Perception, motor activity, sensation, emotional response, motivation, memory and states of awareness can all be affected.

menstrual cycles, compared to 12 percent of the non-pot smokers. Sex hormones were also affected.

Dr. Bauman pointed out: "Researchers are forbidden by FDA regulations to administer marijuana to teen-agers in the course of controlled experiments. But we are particularly worried about what the drug may be doing to pre-teen and teen-aged girls. Any of the effects we found could be even stronger before the body's endocrine-regulated systems have matured."

It should also be remembered that in our country, for the first time in the history of any country, pre-teen and teen-aged girls are smoking cannabis on a mass scale. Our pot-smoking teen-aged girls, therefore, are unwittingly turning themselves into guinea pigs.

Many animal experiments have shown that the mother's THC exposure affects the "next generation," to whom no additional THC has been given. One particularly strange result was found by Dr. Susan Dalterio of the University of Texas Medical School at San Antonio. She gave nursing mice mothers a tiny drop of sesame oil containing THC—the human equivalent of two joints a day. Aside from one equally small dose the day before they gave birth, none of the mother mice had ever before received any THC. The offspring were fed no THC at all. Yet when the males reached young adulthood, they all became very fat and half were "grossly overweight": 50 grams. (The normal male mice of their breed weigh 10 grams.) These fat fellows were also sexually inept, "showing," said Dr. Dalterio primly, "deficient copulatory behavior." When autopsies were performed, there were globs of fat throughout the bodies of all the male mice—whose only exposure to the drug had been as infants, through their mothers' milk.

Other researchers working with mice, rats, dogs, rabbits and rhesus monkeys have shown that the mother's exposure to THC—or to other cannabinoids—causes smaller-than-normal litters and smaller-than-normal babies.

Research on animals has proven that marijuana is not teratogenic

[producing deformed babies]. It is, however, embryocidal [having a fetus-killing effect].

Marijuana and the Brain

Pot is smoked to get a "high"—to "alter" the mind. But no smoker wants his brain cells affected, structurally changed. Yet this may be what is happening.

Dr. Robert Heath, chairman of the department of neurology and psychiatry of Tulane University, has pioneered in the study of the limbic area of the brain, working with humans and with rhesus monkeys. This particular brain area is very similar in both species. This so-called "old mammalian brain" is the site of such specifics as time sense, sexual activity, appetite and emotions—both pleasurable and painful.

In July 1978, Heath showed some startling slides to more than 100 marijuana researchers at the Reims Conference. These were magnified pictures of brain cells from rhesus monkeys that had been exposed to the smoke of two to three "monkey-sized" joints a day (one-fourth the size of an average human joint) at 3 percent THC for six months. The monkeys had received *no* THC for the following six months (equivalent to a much longer time in human terms). Then they were sacrificed and the pictures taken.

Dr. Heath, a distinguished-looking, white-haired man, stood by the large screen. Using a pointer, he illustrated what were, perhaps, the most sobering slides shown during the entire two-day conference. He identified the following structural brain cell changes which were glaringly evident when the cells of the THC-exposed monkeys were compared to the cells taken from the same brain area of the control monkeys.

"Here," said Dr. Heath, "we see an accumulation of granular material in—and a definite widening of—the synaptic cleft between nerve cells [where the flow of messages jumps from one cell to the next]. This," he said, "causes a slowing down in the movement of the messages and may impair some brain processes."

The pointer moved on to another spot. "Here we see a clumping of the synaptic vesicles [small sacs in the endings of nerve cells, containing the essential nerve transmitters: chemical activators of the brain]. We find the identical conditions in cases of early brain damage in humans.

"And here," said Dr. Heath, "note the significant increase in inclusion bodies. These foreign substances are seen in degenerating brain cells of very old animals and humans, but not to the degree that we see them here in very young pot-exposed rhesus monkeys."

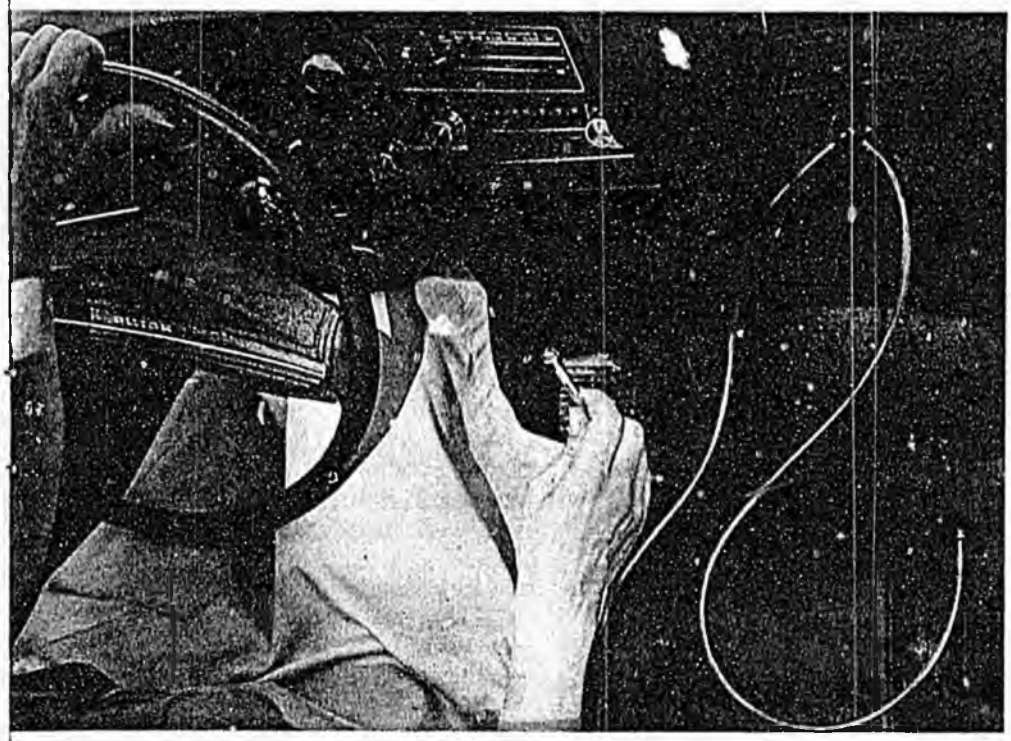
Dr. Heath summed up: "Since the monkeys had received no pot smoke for six months prior to being sacrificed, it is clear that, at least in the limbic area, structural brain changes caused by marijuana are not readily reversible."

Dr. Robert Gilkeson of Cleveland, Ohio, is completing a study of pot-smoking teen-agers which concentrates on EEG readings of the highly developed, cognitive cerebral cortex, or "new brain." Gilkeson specializes in neurophysiologic research and electroencephalography in learning disabilities. In addition to the standard hour-long EEGs, he developed another half-hour of techniques to pinpoint learning disabilities. In a unique on-going study, he has applied this technique to more than 50 youngsters, ages 13 to 18. All come from the affluent suburbs of Cleveland. All said they did not "do" other drugs. All had met the "criteria" of being high on pot at least two or three times a week for the four months preceding the EEG. But all were forbidden to smoke pot for at least 24 hours prior to the test.

Results: *All* EEGs were "markedly immature for age." They also had an abnormal amount of slow theta rhythms, "sufficient," said Gilkeson, "to be diagnostic of diffuse brain impairment. In the EEG section of academic tasks, none of these youngsters could speed up when challenged. Their brain waves failed to respond to these stimuli in the usual way, according to the standardized norms."

Reading the encephalographer's report shocked many youngsters into "getting off the pot." Those who stayed off for three months had normal EEGs when they took the test again. "Of even greater significance," said Gilkeson, "are those who progressed from abnormal to normal with abstinence—and a return to abnormal again when the youngster returned to chronic pot use."

Gilkeson's findings are con-



Dashboard pot pipes enable the smoker to "drive high." More than 50 research studies show that one or two joints seriously impair driving performance, even after the high has gone. Despite this, surveys reveal "60 to 80 percent of users say they sometimes drive while "intoxicated on marijuana."

firmed by a number of other scientists. Dr. Turin Itel, one of the foremost investigators of the effects of drugs on human EEGs, sums up: "Acute or chronic use of marijuana produces an EEG shift toward slow. This is definitely associated with impairment of cognitive functions."

Marijuana and the Lungs

Since pot smoke enters the body through the lungs, it obviously reaches its highest concentration in these organs. A 1975 study compared the compounds in a "weak" marijuana cigarette (.8 percent THC) with a high-tar standard tobacco cigarette. Aside from the fact that tobacco smoke contains nicotine and pot smoke contains cannabinoids, the two types of "smokes" have roughly the same compounds, including lung irritants and carcinogens (cancer-producing agents), co-carcinogens and carcinogen activators. Furthermore, a number of these are present in pot smoke in amounts 50 to 100 percent greater than in tobacco smoke—for example, the carcinogens benzanthracene and benzopyrene, with the latter also being a strong cancer initiator.

In addition to the carcinogens, there are elements in both types of cigarettes which irritate and inflame the lungs. Here, too, marijuana smoke comes out with an even "darker" picture than tobacco smoke. And, whereas tobacco smokers avail themselves of filters, low-tar cigarettes, etc., pot smokers consider "good pot" to be the strongest they can get. In addition, an entire "line" of the drug paraphernalia industry—the "power hitter"—blasts the smoke deep into the lungs. Some power hitters are produced in such kiddie-appealing shapes as red plastic space guns and miniature footballs. Many pot smokers use "bongs" in the belief that drawing the smoke through water or ice lessens the harshness of the smoke by cooling it down. The bong, however, concentrates all the smoke inside a chamber so that none is diffused into the air. As one manufacturer advertises: "The only thing wasted is you."

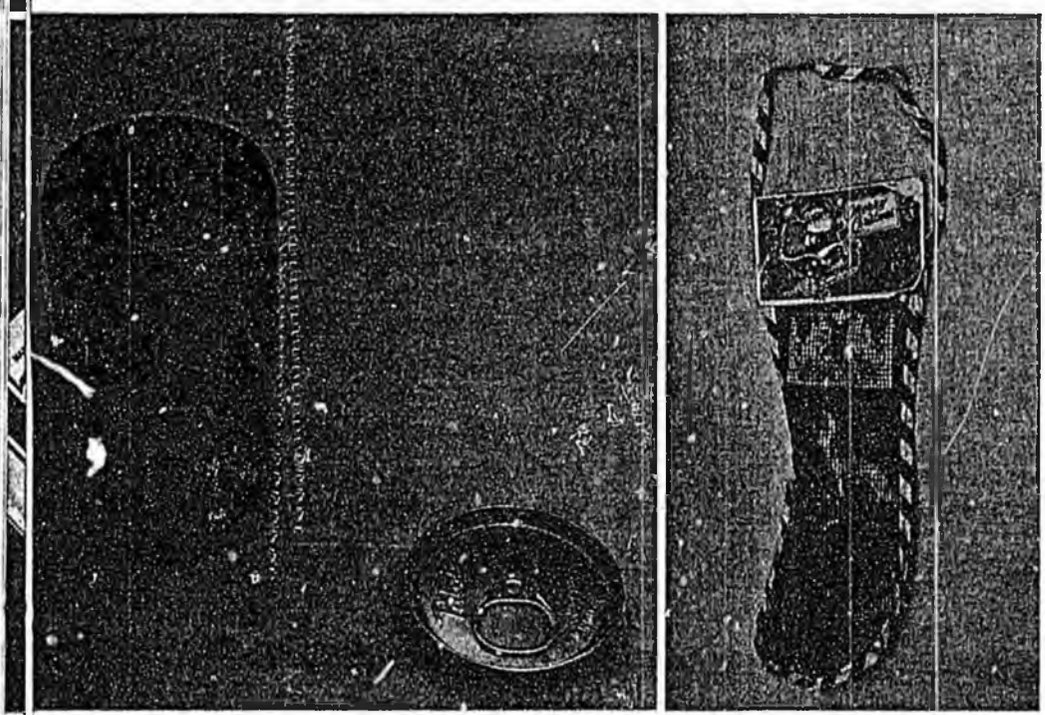
Pot advocates claim that comparisons between marijuana and tobacco do not hold up, since the tobacco smoker generally puffs on a pack a day or more, whereas the chronic pot smoker may use only one or two joints a day, or less. The noted researcher Dr. Sidney Cohen, who has done one of the three major human studies with marijuana, points out: "There are two factors which equalize the risks involved. First: People—especially young people—are, in fact, smoking more joints per day than ever before [this despite the ever-increasing potency of marijuana available on the streets today]. And it is the younger age groups who seem to be smoking the most.

"Second: Typical tobacco cigarette smokers either do not inhale the smoke into the bronchial passages or, if they do, it is for short periods of time. In contrast, the usual method of smoking marijuana is to inhale the material as deeply as possible, keep it in the lower airways for as long as possible and exhale only when another breath must be taken. At times the inhalation is so complete that no smoke is detectable in the exhaled air.

"This means that not only are the irritants and carcinogens in contact with the actual lung tissue for a longer time, but more of the toxic elements may be absorbed into the bloodstream than is the case with cigarettes. These elements are then delivered to other tissues. New studies show that heavy tobacco smokers are more prone than nonsmokers to cancer of the bladder, the esophagus and other nonpulmonary organs. Presumably, therefore, the carcinogens in both tobacco and marijuana smoke do 'carry.' "

Pot advocates like to point out that "there are no dead bodies from marijuana." With the notable exception of highway accidents caused by stoned drivers, this is true. "However," says Dr. Cohen, "we should not forget that it takes 20 to 30 years of consistent heavy use of tobacco to produce a lung cancer. We have been smoking marijuana heavily in the U.S. for a decade or less. Also, with all our medical sophistication, it was not until the 1950s that we noted any relationship between cigarette smoking and lung cancer.

"In those countries where cannabis has been smoked by adult males for centuries, there have been no long-term longitudinal studies regarding cancer and can-



Stash cans for pot come in many guises—and disguises. A popular item: Christmas stockings with candy-flavored rolling papers and pot pipes. Drug paraphernalia has been banned in ten states so far, and the Drug Enforcement Administration's new "model" anti-paraphernalia law is available to all states.

nabis. Studies have been done, however, which show a high incidence of bronchitis, pharyngitis, etc., among cannabis smokers, especially those who used the stronger varieties."

(In this context, it is interesting to note that in the oft-quoted "Ganja in Jamaica" study of 30 cane workers, lung cells were not analyzed. Furthermore, only healthy people were accepted for the study, thereby excluding those with chronic lung disease. In the words of Dr. John Hall, chairman of the department of medicine in Kingston, "Omitted were all cannabis smokers who showed pathological symptoms such as we see in our clinic." Among other "pathological symptoms" evidenced by long-term "ganja" smokers, Dr. Hall listed emphysema, an irreversible lung disease.)

The 1979 surgeon general's report on tobacco cigarette smoking contained some 30,000 research papers all bearing out the slogan: "The surgeon general warns that cigarette smoking is dangerous to your health." And, based on past statistics, the surgeon general said that "this year alone, cigarettes will kill 346,000 Americans."

Research on marijuana and the lungs is in its infancy compared to that on tobacco and the lungs. But, thus far, the findings are hardly reassuring. For example: Dr. Donald Tashkin, a specialist in pulmonary medicine at UCLA, found a 25 percent increased airflow resistance among pot smokers compared to non-pot smokers. (Airflow determines how well we can get oxygen into our bodies and how well we can get carbon dioxide out.) This was an abnormality which did *not* occur in heavy tobacco smokers.

In studies published in February 1980, Dr. Gary Huber, director of the Smoking and Health Research Program of Harvard University, showed that marijuana activates—by some 200 percent—enzymes which contribute to the "eating" or digesting of the lung itself.

In animal studies where marijuana and tobacco smoke condensates are painted on mouse skin, both produce cancers.

A further gloomy point is that many pot smokers also smoke tobacco cigarettes, and the harmful effects may be additive. Dr. Cohen sums up: "There is real reason for concern that marijuana alone, or marijuana smoked with tobacco, will bring forth a new wave of lung cancer in another 10 to 20 years."

Many people who once believed marijuana to be harmless have now concluded that it may be the most dangerous drug in America today, for many reasons. One such person is Dr. Robert DuPont, chairman of the Drug Dependence Section of the World Psychiatric Association and former federal director of the National Institute on Drug Abuse.

Dr. DuPont says: "I believe it to be our most dangerous drug because of widespread frequent use, especially by our youth, and because the psychological as well as the physical effects are insidious and ultimately devastating. Furthermore, for millions of our youth, marijuana is the gateway to the use of many other illegal drugs, including angel dust, LSD and heroin.

"One of the most disturbing aspects of marijuana use is that the user's judgment about the effects of the drug is clouded by his or her own use of marijuana. If an enemy nation were to plan to undermine America's future, they could not think of a more effective strategy than poisoning our youth. Marijuana is such a poison. The tragedy is more painful because the poison is not being administered by an enemy, but by ourselves. Not only the marijuana-using youth, but all of us as well, must share the responsibility for this tragedy, and we must all participate in combating and overcoming this marijuana plague.

"The one hopeful sign on the horizon is the mobilization of concerned parents. They are distraught—sometimes terrified—by the effects of marijuana on their children. And they are angry at the "professionals" who make them feel that *they* are the problem, rather than the drug. These parents throughout the country are discovering one another and are forming action groups which are beginning to have a positive impact on their own children as well as on our local and national leadership. But parents can't do the job alone. Government, business, educators, media—all segments of our society—must join in a massive endeavor to stop our kids from going to pot."

What Parents Can Do

Three national organizations have spearheaded the movement for "combating" the marijuana plague. The pioneer group in this effort is the American Council on Marijuana, founded in 1977 by the Myrin Institute. On its board were the leading scientists in the field at that time. They developed the first accurate resource materials: scientific information on marijuana for the lay public. Their publication, *Marijuana Today*, by Dr. George Russell, was the first such compilation of medical findings and is now in its fourth updated edition, having sold more than 100,000 copies.

In addition, ACM has held three major conferences at New York University Medical Center and at Columbia University. The second of these, which focused on "Marijuana: Biological Effects and Social Implications," a two-day conference, was the largest gathering of scientists, drug-abuse specialists and educators ever to be held in this country. It was also the first lecture series on marijuana to be accredited by the AMA.

The second organization, also founded in 1977, was PRIDE—Parent Resources and Information on Drug Education—which now has active parent groups in more than 19 states. PRIDE has two main functions: One is to disseminate reliable medical information on the health hazards of marijuana (a "PRIDE Packet" is available to individuals and organizations); the second is to stimulate the organization of new parent groups, using a concept originated by PRIDE—that of developing parent peer pressure groups comprised of the parents of the children's friends (not the parents' friends—these parents may not even know one another) in order to combat teen peer pressure and the "do drug" messages of the "kiddie-youth drug culture." In addition, PRIDE sponsors drug education and prevention conferences for schools, educators and parents to encour-

age them to work together to establish ongoing programs.

The third national organization, Citizens for Informed Choices on Marijuana (CICOM), whose staff helped plan Wellington's "Grass Roots Conference on Grass," has organized similar conferences from Connecticut to Washington.

Lee Dogoloff, White House drug policy advisor, supports the efforts of these groups, saying:

"I truly believe that our brightest hope for the future of hundreds of thousands of young people in the U.S. today is the burgeoning movement of parent/citizen groups now organizing in virtually every state of the nation. There are at this time thousands of adults all working toward the same goal—to see that our children grow up drug-free." ★

Marijuana Reprints

Extra copies of the two marijuana articles which have appeared in *The SatEvePost* may be ordered by enclosing a check or money order as follows:

1 to 9	$1.50 each set of two articles
10 to 99	85¢ each set
100 to 999	65¢ each set
1000 to 1500	40¢ each set

For special bulk purchases, call Susan Hanley at 317-636-8881 for price quotes (any more than 1500).

For reprints, write to: MERF, Dept. M-Reprint, P.O. Box 2166, Indianapolis, IN 46206.

Make your check or money order payable to: MEDICAL EDUCATION AND RESEARCH FOUNDATION.

Check or money order *must* accompany order. Remit in US funds *only*.
Postage is included in the above prices. Special shipping will require additional charges.

Additional References:

American Council on Marijuana (ACM), 6193 Executive Boulevard, Rockville, MD 20852. *Marijuana Today*, by George Russell, Ph.D. Medical findings for the layman. $3.00. *Keep Off the Grass*, by Gabriel Nahas, M.D., Ph.D. The marijuana story from 1969 to 1980. $9.50. *Twelve Is Too Old*, by Peggy Mann. The first novel on the pot scene for teens and pre-teens. $7.95.

Citizens for Informed Choices on Marijuana (CICOM), 300 Broad St., Stamford, CT 06901. A one-year membership, including series of four booklets, "How to Help Your Child Resist the Marijuana Culture," plus bimonthly newsletter. $10.00.

Committees of Correspondence, P.O. Box 1590, Cathedral Station, New York, NY 10025. Information on one important drug abuse issue each month, plus suggestions on how correspondents can most effectively communicate their concerns on each issue and thus influence the outcome. $5.00 per year.

Essex County Grand Jury Presentment, Prosecutors' Office, New Courts Building, Newark, NJ 07102. Startling 60-page report on drug abuse in schools, plus Grand Jury's 31 practical mandates (to schools, courts, PTAs, etc.) which can be adopted or adapted by any community. $5.00.

Families in Action, 1436 Cornell Rd. NE, Atlanta, GA 30306. 164-page manual on how to organize your community to combat the "kiddie drug culture," including drug paraphernalia. $10.00. Plus quarterly newsletter which includes latest information on the drug scene at state, national and international levels. $3.00.

Drug Enforcement Administration: Preventive Programs, Washington, D.C. 20537. (Or GPO, Washington, D.C. 20402.) Excellent 44-page magazine with articles and pictures on health hazards and articles on drug paraphernalia. Single copies free.

Mini-Courses, 4290 Raintree Lane NW, Atlanta, GA 30327. Six-unit teaching manual, "Drug Abuse and the Growing Child," for third through eighth grades (for schools, homes and agencies). $10.00. Cassette with narration, plus 80 color slides showing youth drug subculture, plus prevention methods. $46.75.

National Drug Abuse Foundation, 6500 Randall Place, Falls Church, VA 22044. Information on commonly abused drugs, plus recommended resources and reading. $2.00.

National Institute on Drug Abuse, P.O. Box 2105, Rockville, MD 20852. *Parents, Peers and Pot*. Experiences of parents who successfully dealt with the pot problem. *For Parents Only: What You Need to Know About Marijuana*. (Single copies of both books free.) *For Parents Only: What Kids Think About Marijuana*, a 30-minute 16mm film available on free loan to parent groups and adult community organizations (specify needed date). Modern Talking Picture Service, 5000 Park St. North, St. Petersburg, FL 33709.

Narcotics Education, Inc., 6830 Laurel St. NW, Washington, D.C. 20012. Six Q & A booklets on marijuana and P.C.P. $2.00. *Listen* (magazine for teens) issue on marijuana. $1.00.

Phoenix House, 164 West 74th St., New York, NY 10023. Free information on drugs, plus advice on school programs.

Prevention Materials Institute, P.O. Box 152, Lafayette, CA 94549. *Communicating About Drugs*, for parents and teachers. $1.75.

PRIDE (Parent Resources and Information on Drug Education, University Plaza, Georgia State University, Atlanta, GA 30303. Information on drugs, including action plan for parents and their school/community. $10.00. Quarterly newsletter. $4.00.

STOP (Society to Oppose Pot), P.O. Box 6772, Silver Spring, MD 20906. Booklet and briefing by lawyers on how to muster local political pressure to influence elected officials in reference to antidrug legislation. $3.00.

Executive Information Resources, Box 611, Wellington, Kansas 67152. Unedited cassette tapes of the general sessions of the "Grass Roots Conference on Grass" held in Washington. Tapes are priced at $6.40 each or $35.00 for a complete set of seven tapes. Prices include shipping.

These organizations cannot process C.O.D. orders.

Drug Abuse Issue of the Month

Vol. 1 No. 1 May 1980

Why Decriminalization of Marijuana Must Be Opposed At Once

The issue of decriminalization of marijuana is currently under consideration by the House and the Senate and could be voted on very soon.

Experts who are fighting "the drug battle" feel that the battle would be irrevocably **lost** if decriminalization becomes Federal law -- since Federal law historically serves as a model for State law.

Dr. Robert DuPont, former Director of the Federal Agency, the National Institute on Drug Abuse -- who used to favor "decrim" -- is just one of a number of leading experts who have completely changed their minds about this issue. Dr. DuPont now says: "I have learned that it is impossible to be pro-decrim and anti-pot, **because no matter how you try to explain it to them, young people interpret decrim as meaning that pot must be okay because the government has legally sanctioned it.**"

Decriminalization is not synonymous with legalization. However, in the 12 states which have already decriminalized simple possession of marijuana (without intent to sell), it is "read" as legalization of marijuana -- which gives further impetus to the idea that decriminalization and legalization are one and the same.

The Federal Law now being proposed in the Senate, and soon to be taken up in the House of Representatives, would decriminalize simple possession of 30 grams of marijuana for personal use. How much **is** 30 grams of pot? A little over an ounce -- and enough to make 30 to 60 joints, depending on how it is rolled.

At first glance the idea of "decrim" may sound sensible to some. However, a look below the surface clearly shows that there are many important reasons to oppose decrim, and virtually no valid reasons to support it.

Pro-pot forces have muddled the issues by their constant repetition of the statistic: 450,000 marijuana arrests were made last year. They follow this up by saying that "the trauma of an arrest and a child being thrown into jail is far more harmful than the drug itself." Some of the pro-pot forces go further, claiming this is "the only really harmful thing about the drug."

The Facts Are These

1. So far as "being thrown into jail" is concerned:

> The President of the International Association of the Chiefs of Police, Chief Edward Davis, testified at the House of Representatives sub-Committee hearings on decriminalization, and summed it up like this:
>
> "Let me say in closing, that this foolish statement that we are putting our children in prison is pure poppycock. I don't think there has been one child **or** adult put in prison for simple possession of marijuana in the last five years."
>
> -House Select Committee on Narcotics Abuse and Control hearings, March 1977

This statement is, in effect, "proved out" by NORML and by other pro-pot organizations. They obviously pick the best case they can find to make their point. The Jerry Mitchell case is their "prize"; used as a powerful fund-raising platform for NORML.

Note first that the Jerry Mitchell case does not even **concern** "simple possession" (without intent to sell). Mitchell was arrested for **selling** marijuana. And NORML officially claims to be concerned only about possession, not sale. However, if this important point is overlooked, the case -- as reported by NORML -- does appear to be a miscarriage of justice where the punishment does not fit the crime. Mitchell was, says NORML, arrested in 1975 and given seven years (of which he served 15 months) for selling $5.00 worth of pot (to an undercover agent of the Missouri State Highway Patrol Narcotics Division).

What NORML does **not** mention -- though the facts are well known to them -- is the following: DURING THE PRE-SENTENCING INVESTIGATION, **MITCHELL HAD PLED GUILTY TO SELLING:**

- One pound of marijuana (the equivalent of some 500 to 900 joints, or marijuana cigarettes) which he sold for $125.00;
- one hundred tablets of what he thought was amphetamines, which he sold for $25.00.
- He also offered to sell the agent an ounce of cocaine for $800.00

Continued on page 2

The Facts (continued from page 1)

• Furthermore, he had been under prior probation -- under the same judge -- for possession of marijuana. Mitchell had just finished the probation period. This means that since the judge knew it to be a second offense, when sentencing he took into account the other drug involvements to which Mitchell had admitted.

Obviously, if they had a solid "possession" case, NORML would use it.

So much for "being thrown into jail" for simple possession of an ounce or less of marijuana.

2. So far as marijuana possession **arrests** are concerned:

• Law enforcement officials throughout the nation point out that for the past 5 or 6 years or more, most of those charged with "simple possession" of an ounce or less of marijuana, have really been arrested for some other violation of the law. Then, because marijuana was found on them, they were also charged with possession of marijuana.

• Furthermore, law enforcement agencies in some states no longer enforce any marijuana laws -- including arrest. (For example, according to **Time** magazine, March 13, 1978: "Federal prosecutors in Miami are so swamped they rarely bother with pot cases of less than one ton.") If the courts aren't going to do anything, why should the police bother to make arrests?

• Drug Enforcement Administrator, Peter Bensinger, wrote in **International Drug Report**, "Judges are not dealing with users, or small time user-dealers, but with organizations dealing in tonnage quantities of marijuana."

• A police chief in Maine wrote: "Since the decriminalization of marijuana in Maine, I have noticed a substantial increase in marijuana cases. Also, the chemists who analyze police-confiscated samples say they are finding more marijuana sprayed with PCP. This enables the dealer to charge more for what the customer is told is a better grade marijuana. Apparently, there is now so little risk that the dealer is willing to take more chances. He has an attitude of: "It will only cost some money if I get caught."

The fact is: In the states which already have decriminalization, marijuana use has increased. In the other states, we have far too much "de facto decriminalization" as it is. We certainly don't need the Federal Government offering the states a "pilot project" for more!

A Few Q's and Their A's

Q: Why have a law that isn't obeyed?

• As a noted Washington, D.C. attorney put it: "As any prosecuter knows, there are thousands of laws on the books that are enforced only sparingly; prosecutorial discretion is built into our criminal justice system."

• Another Washington attorney says: "The marijuana possession law, as it stands, states our national attitude and policy toward marijuana: we, as a nation, do not sanction its use."

• As a highway patrol officer put it: "The 55-mile-an-hour speed limit is a heavily violated law. But in the first four years after the law was enacted, highway deaths were reduced by 36,000. The fact that the law is heavily violated does not mean it should be eliminated."

Q: Why take police time worrying about marijuana possession when they could better be doing something else?

• As pointed out, the police generally do not worry about simple possession. Furthermore, marijuana use has increased in states which have decriminalized, and traffic accidents and other drug-related crimes have increased, requiring more police time than before "decrim". In California, for example, in the first six months following decriminalization of marijuana in 1976, arrests for driving under the influence of drugs increased 46.2% in the case of adults, and 71.4% in the case of juveniles!

• During prohibition of alcohol the statement was made that it should be legalized so that the officers didn't have to waste their time enforcing those laws. Today, according to the National Council on Alcoholism, at least 50% of police time is spent on some alcohol-related problem.

It is obvious, therefore, why police throughout the country are generally vehemently opposed to decrim, which -- they say -- would, in the short and long run, make their jobs much more difficult.

Q: I have heard that in the 12 states which have, thus far, decriminalized marijuana, pot usage did not increase.

• This is not true. For example, NORML publicizes the figure that in Oregon, the second state to decriminalize marijuana, "current pot use" increased only 1%. However, what they neglect to mention is that this figure was arrived at by computing pot usage of everyone in Oregon, ages 18 to 100! Since usage is generally negligible in the over-35 age group, the age span of the computation evened out the increase in usage figures. However, the same study showed that **in the 18 to 29 age group, usage increased 16% after decrim.** And the study did not even consider usage under 18.

A police chief in Oregon reported: "Local use of marijuana has expanded greatly in the five years since adoption of the decriminalization law in this state -- **particularly in the lower high school and upper grammar school.**"

Here Are Three Bottom Line Reasons For Opposing Decriminalization

1. The fact that marijuana is understood by young people and their parents as being illegal, is, in many cases, an important deterrant to marijuana use.

2. **Youngsters "read" decrim as a green light to smoke pot.** Jeff Hamilton, son of Joe and stepson of Carol Burnett Hamilton, put it this way when testifying before the Senate Sub-Committee Hearings on Health Hazards of Marijuana: "The worst thing about decrim is the unmistakable message of 'okayness' it gives to kids. Not only that it's okay to smoke grass, but also that pot must be harmless, since the government would obviously not decriminalize a harmful drug. I have searched, and honestly can find no sound reason to feel that decriminalization would have any other effect than a negative and slow deterioration of the minds of the people of this nation."

3. **Decriminalization would be a step toward legalization.** It is important to realize that, for 10 years, NORML officially claimed they were only for decrim and not for legalization. **Then,** having achieved a climate of acceptance for "decrim", they officially adopted the policy of legalization of marijuana.

In their January 1979 "Official Policy" adopted by the Board of Directors, Executive Committee, Advisory Board and Regional and State Co-ordinators, NORML first redefined its concept of decriminalization. This included: "The removal of all criminal **and civil** penalties for the private possession of marijuana for personal use." (Emphasis added -- civil penalties include such regulatory measures as tickets and fines for traffic violations.)

Other clauses from the NORML policy statement: "The right of possession should include other acts incidental to such possession, **including cultivation, and transportation** for personal use, and the casual, non-profit transfers of small amounts of marijuana." "... It must be recognized that where personal use and possession of marijuana are no longer serious crimes. It is both inconsistent and irrational to **provide lengthy prison terms for those who distribute marijuana for profit.**" (Emphasis added.)

The statement concludes: **"Specifically, NORML supports the eventual legalization of marijuana."**

At NORML's annual convention where this policy was presented and adopted, then-Executive Director Keith Stroup said to the Conference: "We finally took the honest step to declare to the world we want legal marijuana." (As quoted in **The Atlanta Journal**, Dec. 29, 1978.)

At a seminar for lawyers sponsored by NORML on December 16, 1978, Keith Stroup was asked why the Seminar dealt not only with marijuana, but with cocaine and other drugs. Stroup answered: "NORML will always focus on marijuana, but I'd hate like hell to think decriminalization (of marijuana) would stop there." (As quoted in **The Atlanta Journal and Constitution**, Dec. 3, 1978.

In a debate on decriminalization with Sue Rusche at Emory University in February, 1979, Stroup told the students: "The next thing NORML's going to work on is decriminalizing drug dealers and drug smugglers because, after all, they're not criminals either."

Remember

Because of the well-orchestrated and well-financed pro-pot letter writing campaigns, elected representatives have become convinced over the past decade that the public wants decriminalization of marijuana. (Stroup has testified before Congress that NORML speaks for 15,000,000 marijuana users in this country.) A White House aide said at a meeting of Federation of Parents for Drug-Free Youth: "You must realize that the loudest voices -- indeed, almost the only voices -- we hear from are pro-potters." We must let our voices be heard. It is **essential** that you take ten minutes to write to your Congressman, to both your Senators, and to President Carter. (In case you do not know the name of your elected representatives, call your local library, or Board of Elections, or newspaper.)

You can phone the White House 202-456-1414 and ask for the Comments Office. Give your views on decriminalization. A report of all calls is given to the President every week.

Here are some sample letters and telegrams. **But we urge you to write your own for greater effectiveness.**

Be sure to ask your elected representatives to advise you of their position on decriminalization of marijuana. Only by asking a question of this sort can you be sure that your letter will actually be shown to him (or her). Otherwise, your letter may be answered by an aide. Please send a copy of your letter to Box 6272 Silver Spring, MD 20906, so our representatives in Washington will have a record of the number of Committees of Correspondence people responding.

Sample Letters

Dear Senator:

Please vote against any relaxation of marijuana laws. Decriminalization is not the answer to this country's marijuana pandemic. Would you please join Senator Mathias of Maryland as a co-sponsor of his amendment to remove Section 1813 of Senate Bill 1722, and return to current law. Please advise me of your position on this issue.

Dear Congressman:

Please vote against decriminalization of marijuana. Current medical and scientific evidence has proven marijuana to be a much more dangerous drug than many once believe it to be. Decriminalization will only make marijuana more available to our youth, and the epidemic will increase to even more dangerous levels. Please advise me as to your position on this issue.

Dear President Carter:

I am strongly opposed to relaxation of the marijuana possession penalties. Decriminalization is certainly not the answer to this country's massive marijuana epidemic. Indeed, as shown by the states which have decriminalized, it only makes the problem worse. Please advise me as to your present position on this issue.

Continued on page 4

HHS NEWS

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

EMBARGOED FOR A.M. PAPERS
Thursday, August 12, 1982

Shirley Barth - (202) 472-5663

Statement by
C. Everett Koop, M.D.
Surgeon General of the U.S. Public Health Service

As surgeon general, I urge other physicians and professionals to advise parents and patients about the harmful effects of using marijuana and to urge discontinuation of its use.

The health consequences of marijuana use have been the subject of scientific and public debate for almost 20 years. Based on scientific evidence published to date, the Public Health Service has concluded that marijuana has a broad range of psychological and biological effects, many of which are dangerous and harmful to health.

Marijuana use is a major public health problem in the United States. In the past 20 years, there has been a 30-fold increase in the drug's use among youth. More than a quarter of the American population has used the drug. The age at which people first use marijuana has been getting consistently lower and is now most often in the junior high school years. In 1978, nearly 11 percent of high school seniors used the drug daily; and although this figure declined to 7 percent in 1981, daily use of marijuana is still greater than that of alcohol among this age group. More high school seniors smoke marijuana than smoke cigarettes The current use (during previous 30 days) of marijuana is 32 percent; 29 percent smoke tobacco.

On March 24, Secretary Schweiker transmitted to the U.S. Congress a report reviewing the health consequences of marijuana use.

(More)

Marijuana and Health: 1982, the ninth in a series, is primarily based on two recently-conducted comprehensive scientific reviews on the subject: one by the Institute of Medicine of the National Academy of Sciences and the other by the Canadian Addiction Research Foundation for the World Health Organization. Both independent reviews corroborate the Public Health Service prior findings of health hazards associated with marijuana use: Acute intoxication with marijuana interferes with many aspects of mental functioning and has serious acute effects on perception and skilled performance, such as driving and other complex tasks involving judgment or fine motor skills.

Among the known or suspected chronic effects of marijuana use are:

- Marijuana impairs short term memory and slows learning;
- impaired lung function similar to that found in cigarette smokers. Indications are that more serious effects may ensue following extended use;
- decreased sperm count and sperm motility;
- interference with ovulation and prenatal development;
- impaired immune response;
- possible adverse effects on heart function; and
- by-products of marijuana remaining in body fat for several weeks with unknown consequences. The storage of these by-products increases the possibilities for chronic effects as well as residual effects on performance even after the acute reaction to the drug has worn off.

I am especially concerned about the long-term developmental effects of marijuana use on children and adolescents, who are particularly vulnerable to the drug's behavioral and physiological effects. The "amotivational syndrome" has been attributed by some to prolonged use of marijuana by youth. The syndrome is characterized by a pattern of

(More)

loss of energy, diminished school performance, harmed parental relationships and other behavioral disruptions. Though more research is required to clarify the course and extent, in recent national surveys up to 40 percent of heavy users report that they observe some or all of these symptoms in themselves.

The Public Health Service review of the health consequences of marijuana supports the major conclusion of the National Academy of Sciences' Institute of Medicine:

> What little we know for certain about the effects of marijuana on human health--and all that we have reason to suspect--justifies serious national concern.

# # #

Marijuana: more harmful than you think

Committees of Correspondence, Inc.

P.O. Box 232, Topsfield, MA 01983
(617) 774-2641

MARIJUANA FACTS

WHY DO CHILDREN ABUSE DRUGS?

- Peer pressure
- It is fun.
- They think it is harmless
- To escape from daily stress
- To create a new image.
- "Pop Culture" promotes it.
- Lack of positive models.
- Experimenting & curiosity.
- To relax.
- High-risk behavior.
- Imitation of parent's drinking and smoking habits.
- Their short-term thinking precluded consideration of long-term consequences.
- For independence.
- Because they feel a need to reject parent's values.
- To boost their self-esteem.
- Drugs are available.

WHAT IS MARIJUANA?

It is a drug made from the dried leaves and flowering tops of the hemp plant (cannibus sativa) containing more than 421 known chemicals.

THC (delta-9 tetra-hydrocannabinol) is the major mind-altering chemical. There are also other active agents in marijuana.

Marijuana varies in its strength of THC. Today it is up to 10 times more potent than prior to 1970.

When combined with other mind-altering drugs such as alcohol, the THC becomes significantly more potent. THC is fat soluable and it *builds up* and is stored in fatty tissues, especially in the brain and in the reproductive organs.

Half of the THC ingested stays in the body for three to five days. It takes up to 30 days for a single dose of THC to be completely eliminated.

Whereas alcohol is water soluable and fully metabolized in 12 hours, marijuana lingers in fatty tissues and causes cumulative effects.

A combination of marijuana and alcohol is particularly dangerous, causing changes in *depth perception, night blindness, concentration and reaction time.*

According to Carlton Turner, one of the world's most knowledgeable experts on marijuana research: *"There is no other drug used or abused by man that has the staying power and broad cellular actions on the body."*

WHAT DOES MARIJUANA DO TO THE BODY?

EFFECTS ON THE BRAIN

- It widens the gap between brain cells, thus slowing down the nerve impulses.
- Short-term memory is impaired.
- It impairs the ability to evaluate situations and sequencing ability.
- It impairs psycho-motor performance.
- It impairs sense of time and depth perception.
- There is decreased dream activity.
- A tendency towards insomnia.
- It produces apathy and lethargic behavior.

EFFECTS ON THE LUNGS

- Marijuana smoke is more irritating and harmful than cigarette smoke.
- Studies show that smoking one joint is more impairing to the lungs than smoking a pack of cigarettes.
- It can cause pre-cancerous lesions in 2 to 3 years (as compared to 20 years for heavy cigarette smokers).
- It makes lungs more susceptible to emphysema and bronchitis.

EFFECTS ON REPRODUCTIVE ORGANS

- There is a decrease in sperm count and mobility.
- Decreased testosterone level.
- It can cause chromosome change, thus slowing down cell renewal (an ongoing process essential for the maintenance of life).
- Prevents synthesis of DNA.
- Marijuana crosses the placental membrane - passing from the mothers' blood to the unborn child.

EFFECT ON BLOOD CELLS

- There is a decrease in white cell production, therefore it interferes with the body's ability to fight off infection and disease.

EFFECT ON PERSONALITY

- Users develop the "amotivational syndrome" which is characterized by apathy, vagueness, withdrawal and lack of motivation.
- There is a tendency toward paranoia (unfounded fear and suspicions).
- Users experience illusions of accomplishments, with unrealistic evaluation.

WHAT ARE THE OUTWARD SIGNS OF MARIJUANA USE?

- Personality changes may occur.
- Lack of agressiveness in males.
- There is a gradual drop in the quality of school work.
- Often over-reaction to criticism.
- Weight loss may occur.
- Unusual money requests.
- Physical evidence: cigarette papers, ashes, odor, roach holders, etc.

- Secretiveness.
- Red eyes.
- Slowing of speech.
- One of these signs is not enough for identification. Most are typical of adolescent behavior. Immediate signs are not always obvious.

HOW MUCH DOES MARIJUANA COST?

- $2.00 for one joint.
- $5.00 for 3 joints.
- $60 to $80 per ounce (dealer price).

HOW TO DEAL WITH THE PROBLEM OF YOUR OWN CHILDREN USING MARIJUANA.

- Be informed and up-date your facts.
- Do not deny the problem.
- Do not condemn the child.
- Keep cool and calm; do not lecture.
- Keep communications open.
- Refer to resources.
- Children need to hear clearly stated values and standards from their family.
- When a child is independent and self-supporting, they can make their own decisions. Up to then, their health is *your* responsibility.

HOW TO HELP PREVENT YOUR CHILD FROM USING DRUGS

- Hold family discussions about drugs and encourage open family discussion.
- Be an active listener.
- Provide alternative activities: sports, outings, etc.
- Form parental support groups.
- Discuss with family member that stress is normal. Explain how you cope with stress.

- Discuss how we can all cope with stress other than anestetizing ourselves.
- Encourage a good self-image.
- Promote individual interests - not always following what everyone else is doing.

POINTS OF CONSIDERATION

- Any form of drug use has more serious consequences with vulnerable individuals such as children and adolescents.
- The effects of drugs on those in the early stages of mental and physical development can be more pronounced and persistent than on mature adults.
- Learning to cope with stress is a normal and necessary developmental process.
- Marijuana use provides escape from stress and robs the child of developing skills needed to cope with stress.

Animal studies prove that marijuana use causes reproductive and fetal disorders.

- Of all fatal automobile accidents, 16% are marijuana related.
- Marijuana is addictive. The more you use, the more you need.
- Marijuana is more prevalent, more potent and more frequently used today than five years ago.
- Users are getting younger.
- The contents of cigarettes and alcohol are government regulated. However, since there is no regulation of marijuana, each joint is a surprise package.

The Heritage Foundation Backgrounder

No. 140 | The Heritage Foundation • 513 C Street • N.E. • Washington, D.C. • 20002 • (202) 546-4400

A-7

May 4, 1981

THE MARIJUANA EPIDEMIC

> I get a sick feeling in the pit of my stomach when I hear talk of marijuana being safe. Marijuana is a very powerful agent which is affecting the body in many ways. What the full range of these consequences is going to be, we can only guess at this point. But from what we already know, I have no doubt that they are going to be horrendous.[1]
>
> Dr. Robert DuPont
> Former Director of the
> National Institute on Drug
> Abuse.

INTRODUCTION

Marijuana smoking has reached epidemic proportions in the United States. Some sixteen million Americans are now regular users; and among high school seniors, about one in ten are daily smokers -- averaging 3½ joints a day.

The extent of current marijuana consumption raises many important concerns. While use of the drug is widespread throughout the world, for instance, only in the United States is it so prevalent among young people of all classes that an entire generation is affected. In other countries, the smoking of marijuana is not usually found throughout the entire society -- generally use is confined to certain religious groups or classes. Only in this country does it involve the whole culture.

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1 Washington Post, July 30, 1978.

The most frightening aspect of the widespread use of the drug is that the overwhelming majority of smokers have no knowledge of the demonstrated medical effects of marijuana. Most regard it as completely harmless, or at least as no worse than alcohol or tobacco. During the 1960s, when the drug became common in America, reliable scientific evidence was sparse. Marijuana seemed harmless enough to most people, and the very expression of doubt by experts was all too often discounted as deriving from opposition to the political and social attitudes of the users.

This absence of hard evidence regarding the consequences of the drug caused many scientists and legislators to take a liberal view of marijuana usage -- how could one condone alcohol and tobacco and then condemn marijuana? But in the last ten years, the climate has changed. Many detailed studies have been published on the medical aspects of the drug, and a body of scientific literature has been assembled which was unavailable only ten years ago. The National Institute on Drug Abuse (NIDA), a division of the Department of Health and Human Services, has taken the lead in sponsoring over a thousand tests, employing sophisticated procedures to control dosage, strength, etc., consistant with patterns of social usage. Other organizations have funded similar research projects.

It took sixty years of studies to establish a strong correlation between tobacco smoking and a number of serious diseases. Yet the results of experiments carried out in the last decade already suggest a strong relationship between the use of drugs and several medical disorders. Marijuana appears to impair memory, learning performance, motivation and may permanently damage brain tissue. It would also seem to have damaging effects on the lung, reproductive organs and the immunity system.

The powerful evidence now available has caused many experts to revise their position from one of indifference to one of great concern. Dr. Robert DuPont, quoted above, is a case in point. In various senior governmental positions, he did much to soften attitudes towards the use of marijuana -- indeed he was often cited in the literature of the decriminalization lobby. But now, as president of the American Council on Marijuana, he is in the forefront of a campaign to end the consensus that marijuana is no worse than many other drugs taken for pleasure. That belief, he says, "is a disaster and I feel very badly to have contributed to [it]."[2] Like so many of those who have changed their minds in light of the evidence, Dr. DuPont is particularly anxious about the long-term consequences of marijuana smoking on the current school population.

- "Reading, Writing and Reefer," ABC News Report, broadcast December 10, 1978.

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This Backgrounder will review the scientific evidence which has led to the dramatic change of heart by so many people. It will then examine the policy options available to deal with the situation.

THE GROWING USE OF MARIJUANA

What is Marijuana?

Marijuana (also known as pot or grass) comes from the plant Cannabis Sativa (Indian hemp or hashish), which has been cultivated for hundreds of years as a source of rope. The principal psychoactive, or mind-altering, ingredient of marijuana is a substance know scientifically as delta-9-tetrahydrocannabinol (or THC), although several hundred other chemicals with various effects are also present.

An intake of between five and ten milligrams of THC into the bloodstream is usually sufficient to induce intoxication -- a "high." In the 1960s, when the drug was becoming fashionable, most of the marijuana smoked in this country was of domestic origin. At that time, most American marijuana had a rather low THC content (0.2 percent to 1 percent), and so a 1 gram joint might contain in the region of 2-10 milligrams of THC. By 1970, however, Mexican marijuana with an average THC of between 1.5 percent and 2 percent, had begun to dominate the market. By the end of the 1970s, Jamaican and Colombian varieties, with concentrations of 3 percent to 4 percent THC began to enter the country in increasing quantities. In addition, liquid hashish, with a concentration of 30 percent to 90 percent THC, began to appear. At a potency rate of 50 percent THC, an ounce of this oil is sufficient to intoxicate one thousand people. In 1974 alone, 369 pounds were seized by federal agents.[3]

The rise in potency of marijuana available in the United States is central to any discussion of the medical impact of the drug. The early, inconclusive studies carried out in this country were based on the low-potency marijuana then being consumed. But now we are dealing with far stronger varieties, and the studies using these strains of marijuana are far from inconclusive.

Usage of Marijuana

Twenty years ago, marijuana was hardly used in this country. Only in the late 1960s did the drug become widely used, and not until the mid-1970s did it become commonplace. The increase in use has been dramatic by any measure. The most recent major study on usage was conducted by the National Institute on Drug

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3 J. M. Jenson, Testimony before the Senate Subcommittee on Internal Security, May 1975, ref. 51, pp. 491-505.

Abuse, using a national sample carefully broken down by age and other characteristics.[4] As Table I indicates, this study found that 68 percent of young adults in 1979 had tried marijuana, compared with only 4 percent in 1962. Among 12- to 17-year-olds, the proportion had grown over the same period from just 1 percent to 31 percent. Even among 12- to 13-year-olds in 1979, the study showed 8 percent had been introduced to the drug. When NIDA examined current users (those who had used the drug within the last month), the pattern illustrated by Table II emerged. As the figures indicate, widespread use now occurs among children of high school age and 40 percent of the college-aged population are current users.

Among those who reported current use of the drug, the NIDA study found that about two-thirds of young adults and one-half of older adults and youths have used marijuana once or more times in the last month. Of our high school seniors, some 10 percent were found to be daily users, consuming an average of 3½ marijuana joints every day. Not only has the proportion of daily users doubled among high school seniors since 1975, but it now exceeds the number who use alcohol on a daily basis (stable at about 6 percent since 1975).

When one remembers that the potency of the average marijuana joint has increased many fold in the last ten years, it becomes clear that we are dealing with a staggering increase in the consumption of THC, particularly among the student population. In the 1960s, the medical implications of marijuana use were of direct concern only to a small number of people, and the dangers of heavy chronic use to an even smaller group. But today, the drug is so widespread that the medical evidence is important for the entire population.

The volume and market value of the marijuana trade now makes it a major industry. According to the Wall Street Journal even domestically produced marijuana rivals some leading farm crops. In California, the value of production may soon pass the $1 billion grape industry -- the state's number one farm commodity. In Hawaii, the level of marijuana production and sales may exceed the islands' largest business, the $300 million sugar industry.[5] The Federal Drug Enforcement Administration (DEA) estimates that domestically produced marijuana now accounts for up to 20 percent of the value of the entire trade. The American growers have specialized in recent years on developing very high grade varieties, by selective breeding. The most potent California strains

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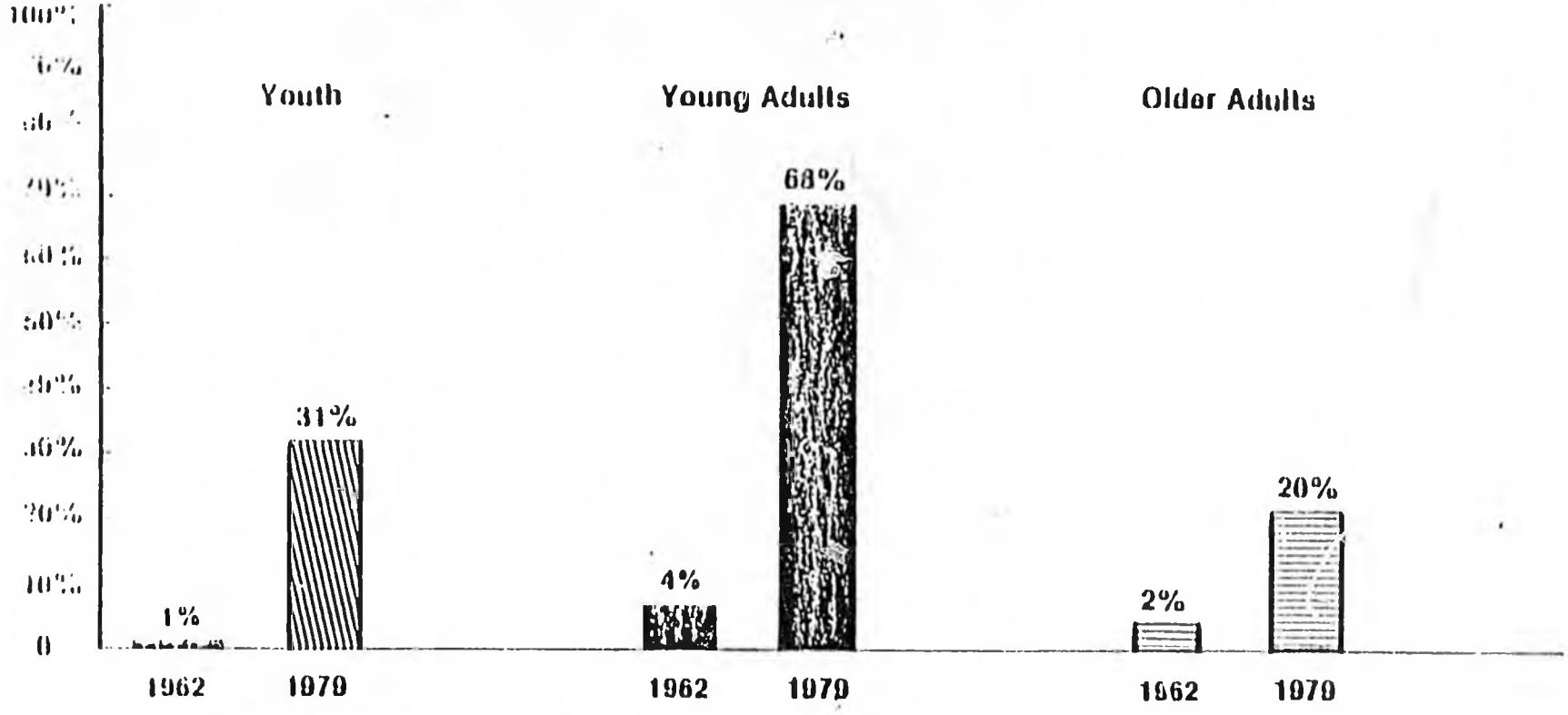
4 National Institute for Drug Abuse, National Survey on Drug Abuse: Main Findings 1979 (Rockville, Maryland: NIDA, 1980).

5 Wall Street Journal, August 4, 1980.

TABLE I

Marijuana Lifetime Prevalence

(i.e., have tried marijuana)



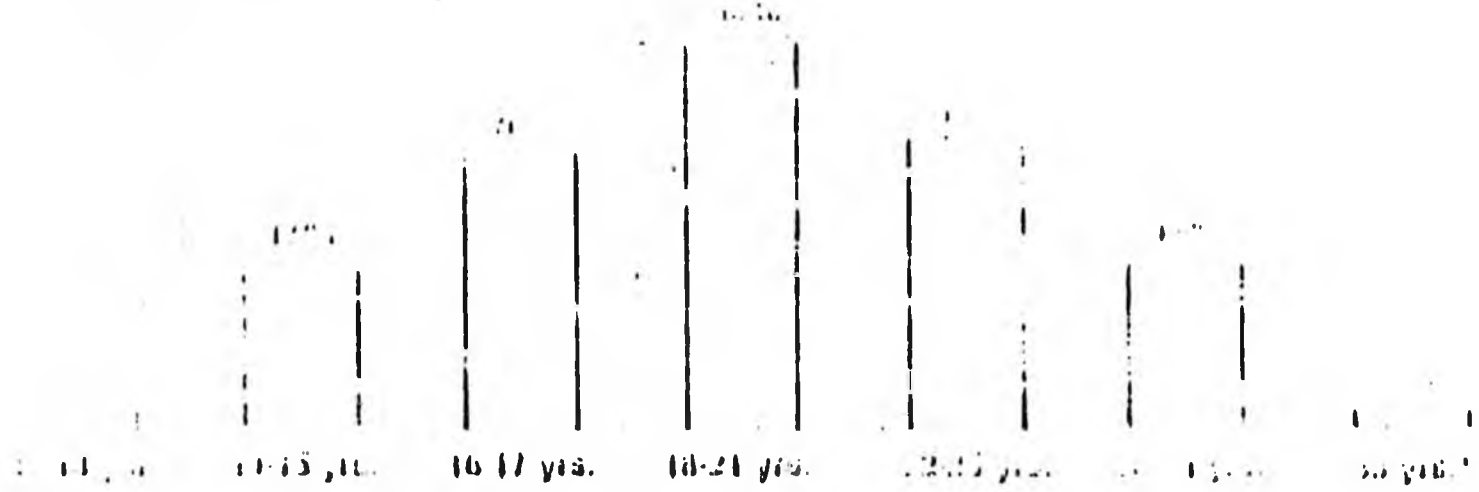
Source: A Drug Retrospective (NIDA, 1988).

Note: Youth: persons 12-17 years old
Young Adults: persons 18-25 years old
Older Adults: persons 26 years and older

40% of young adults who had tried the drug reported that they had done so at least 100 times.

TABLE II

Marijuana 1979
Ages of Current Users
(i.e., have taken drug
within last month)



Source: A Drug Retrospective.

can contain as much as 6 percent pure THC. A single plant, on a three-foot diameter plot, can yield $1,000 -- a moderate-sized garden will produce $100,000 worth of the drug.[6] The size of the total American trade, including imports, can only be determined roughly, but it has been estimated that the amount of marijuana coming into this country every year is between ten and twenty thousand tons, with a street value in the region of $20 billion.[7]

The 1970s also saw the rapid growth of what has now become a multi-million dollar industry providing drug-related paraphenalia, magazines and books. Publications such as High Times (which boasts a readership of four million), carry in-depth articles on the use of drugs and legal issues, and are full of glossy advertisements for drug equipment. High Times even provides full listings of the prevailing market prices for many drugs, much as the Wall Street Journal carries the latest stock market quotations.

While the commercial return available on marijuana has been a major contributor to its ready availability, there are other important factors behind the growth in usage. In the late 1960s and early 1970s, the drug was an integral part of the non-conformist lifestyle in universities and elsewhere. The attempt by "authority" to stamp out marijuana consumption, or even discourage it, was seen as an attack on the alternative lifestyle, and the illegality of the drug was quite probably a significant stimulus to its consumption. This mood of resistance was only encouraged by exaggerated claims (on the basis of then available evidence) regarding the health dangers connected with marijuana.

In all probability the most important cause of the explosion in use has been simple ignorance. If, as most people believe, the drug is fairly harmless, then why not use it if it is pleasant? As we shall see in this study, nothing could be further from the truth, but survey after survey shows that while the dangers of alcohol and tobacco are widely appreciated, those associated with marijuana are not.[8]

THE SCIENTIFIC EVIDENCE

General Considerations

Before we examine the evidence regarding the effects of marijuana on the body, it is important to put this evidence in its historical perspective. The early American studies on marijuana, such as they were, were unsatisfactory for several reasons.

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6 Washington Post, February 15, 1981.

7 20,000 tons would be sufficient to make approximately 12 billion joints.

8 See, for instance, L. D. Johnston, J. G. Bachman, and P. M. O'Malley, Drug Use Among High School Students, 1975-1977 (Rockville, Maryland: NIDA, 1977).

The strength of THC in test samples was often not known with precision, and so it was debatable in many instances what was actually being measured. In addition, as has been explained, the THC strength of the average joint has increased dramatically in recent years. We are dealing with a totally different level of consumption than was the case in the 1960s. Using typical test results from the 1950s and 1960s as a guide to the effects of present-day use patterns is rather like trying to determine the consequences of a bottle of gin a day on the average person by testing the effects of a single daily martini!

Given the shortcomings of early tests, it is not surprising that many were inconclusive, and this gave powerful ammunition to the pro-legalization lobby. Even among the scientific establishment, a comparatively sanguine attitude seemed justified.

The first determined challenge to this consensus came from clinical psychiatrists -- particularly from those associated with educational institutions where the drug was in heavy use. Clinicians have often been the first people to warn the world of the unforeseen effects of a drug -- thalidomide being perhaps the most well known case -- and the importance of their front-line role cannot be understated. Typical of such clinicians was Dr. Harvey Powelson, head of the Psychiatric Division of the Student Health Service at Berkeley between 1964 and 1972. Powelson's eight years of extensive exposure to Berkeley students during the period in which marijuana use accelerated greatly make him probably the most experienced campus psychiatrist in the country. Like so many of his associates in the 1960s, Powelson took a tolerant attitude to marijuana in his early days at the University of California; but as he watched individual users over an extended period of time his attitude changed completely, to the point where he came to believe that it is the most dangerous drug with which the nation must contend.[9]

It was the conclusions of observers such as Powelson that created the pressure for the very thorough testing which began in the early 1970s. This series of tests have been far superior to the research of the 1950s and 1960s: more carefully controlled THC doses have been used, for instance, and strength levels in both human and animal tests reflect current usage. It should be noted, however, that there are still some unavoidable obstacles to testing. Marijuana <u>is</u> an illegal substance, and so it is not always easy to obtain statistically perfect volunteer groups. In addition, early studies showed that THC is highly toxic, and that it may pose significant dangers to certain individuals and to the fetus. So there are strong moral and legal impediments to certain important types of study, necessitating the use of animals rather

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9. H. Powelson, Testimony before the Senate Subcommittee on Internal Security, May [illegible], ref. 30, pp. 18-21 and "Marijuana: More Dangerous Than You Think," Reader's Digest, December [illegible].

than humans for test purposes. But in these cases, the animals possess medical characteristics that parallel human functions, and dosages given to the subjects have been equivalent to those taken by humans. Furthermore, the results with appropriate animals correspond closely with clinical observations of human users.[10]

THC and the Body

Unlike water soluable drugs such as alcohol, which is metabolized and "washed out" of the system within twelve hours, THC is fat soluble and remains in the body for a considerable time. The THC in marijuana has a half-life of about three days; that is, it takes three days for half the THC in a joint to leave the body. It may take over three weeks for all the THC to be broken down. According to one expert, observations suggest that the younger the age of first use, the greater may be the long-term effects resulting from the THC in the body.[11]

This pattern of retention in the body means that even the occasional marijuana smoker may never be free of THC. Furthermore, there is strong evidence from animal tests that the toxicity is cumulative -- small amounts of THC administered over a period seem to be far more harmful than the same total quantity in one dose.[12]

The fat solubility of THC, which is exceeded only by substances such as DDT, affects the way in which the substance is distributed within the system. Intravenous injections of radioactive THC confirm that it concentrates in the fatty tissue, and also that it lodges in the liver, lungs, reproductive organs and the brain. It was not until the early 1970s, with the work of Julius Axelrod and others, that the pattern of THC absorption by the body, or the period for which it was retained, was known with any real certainty.[13] Until then, it was assumed that THC was broken down and removed from the body as quickly as alcohol.

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10 For excellent reviews of the scientific studies concerning marijuana, see George K. Russell, Marijuana Today (New York: Myrin Institute, 1980 -- published in cooperation with the American Council on Marijuana); Gabriel G. Nahas, Keep Off the Grass (New York: Pergamon Press, 1979); "Twelve Things You Should Know About Marijuana," Consumers Research Magazine, April 1980; I. Lantner, J. O'Brian and H. Voth "Answering Questions About Marijuana Use," Patient Care, May 30, 1980.

11 Carlton Turner, Associate Director, Research Institute of Pharmaceutical Sciences, University of Mississippi, Address to Seminar sponsored by the J.M. Foundation, New York, September 9, 1980, (unpublished transcript).

12 W. D. Patton, Testimony before the Senate Subcommittee on Internal Security, May 1974, ref. 30, pp. 70-79.

13 Ibid.; Also D. S. Freud and J. Axelrod, "Delta-9-Tetrahydrocannabinol: Localization in Body Fat," Science, 179 (1973).

This discovery that THC is retained for a considerable time in certain organs of the body is crucial to a proper understanding of its effects. It means that the drug is quite unlike alcohol, with which it is often incorrectly compared. And the moderate user is running far greater risks than the moderate user of alcohol and many other drugs.

Tolerance and Addiction

A discussion of the cumulative effects of a drug leads to the issue of tolerance. One of the popular misconceptions regarding marijuana is that the user develops a "reverse tolerance" -- he needs gradually less and less THC to produce the same "high." It is possible that this belief developed from an examination of the effects of the low dosages commonly used in the 1960s. There may also be a "learning effect" that develops with low doses that leads to a greater appreciation of the high by the user. In addition, it is possible that low doses of THC may cause the release of quantities of the drug stored in the body's organs.

But it has now been firmly established through careful studies with doses typical of current use that a profound tolerance develops -- that is, steadily larger doses are necessary to produce the same effect.[14] Tolerance means that the heavy chronic smoker must increase his THC intake to obtain the same psychoactive results; which in turn means that he must increase the concentration of THC in his brain, lungs and other organs. Tolerance effects also encourage the user to try more potent drugs, such as LSD, and to combine marijuana with alcohol or other available drugs.

One reason why marijuana is considered as relatively safe by so many people is the belief that it is non-addictive. But a misconception regarding the nature of addiction lies at the heart of this impression. If the sole criterion is physical addiction, meaning a physical dependence on the drug followed by severe physical withdrawal symptoms, then the evidence would indeed suggest that marijuana is only mildly addictive, even at high doses.[15] Of much greater concern, however, is the degree of psychological dependence that is associated with marijuana. Many users dismiss the notion of psychological dependence as synonymous with "liking marijuana" in the sense that one might like chocolate ice-cream or tennis. But the term implies a more subtle and dangerous effect on the user. As Gabriel Nahas of Columbia University has explained:

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14 Marijuana and Health: Eighth Annual Report to the U.S. Congress (Rockville, Maryland: NIDA, 1980), p. 26; Marijuana Today, p. 79.

15 R. T. Jones and D. Benowitz, "Clinical Studies of Cannabis Tolerance and Dependence," Annals of the New York Academy of Science, 282:221 (1976). Because of the slow elimination of THC from the body, withdrawal effects are not severe.

> The desire for instant gratification is a profound psychological reinforcer....Addiction to a drug is not a function of the drug to produce withdrawal symptoms. Drug dependence results basically from the reproducible interaction between an individual and a pleasure-inducing biologically active molecule. The common denominator of all drug dependence is the psychological reinforcement resulting from reward associated with past (use) and the subsequent increasing desire for repeated performance.[16]

It is this psychological dependence that makes the marijuana habit difficult to break. It is clear from clinical evidence that it is very common for heavy users to continue smoking even when they concede that it severely impairs their health and motivation, and that professional help is regularly needed to enable a user to give up the drug. The plain fact is that in the case of marijuana, the distinction between physical and psychological addiction is semantic, not real.

Marijuana and Other Drugs

Little could be further from the truth than the idea that a daily joint is merely the equivalent of a lunch-time martini. There are crucial differences. In the first place, as has been pointed out, alcohol leaves the system far more rapidly than marijuana. Even when taken to excess, the effect of alcohol is short-lived. It takes very heavy drinking over a long period to cause irreversible damage to the liver, or to the proper functioning of the brain (and then it is due primarily to a protein deficiency resulting from liver deterioration). The effects of THC, on the other had, occur with only moderate dosage, and it appears to cause damage to more organs in a much shorter space of time.

There is also little evidence to suggest that alcohol and marijuana are in fact considered as alternatives by users. The usage of alcohol among school students, for example, has not fallen during the period in which marijuana smoking has rapidly increased. If anything, there appears to be a small positive correlation between marijuana use and the taking of other drugs, due in large part to the fact that a combination of THC with many other drugs leads to a greater effect than that achieved with either drug alone.[17] Alcohol in combination with marijuana, for example, enhances the sedative result obtained with just the same dosage of alcohol. This is also the case with Valium, Librium, antihistamines, barbiturates, and narcotics such as opium, heroin,

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16 G. G. Nahas, Marijuana - Deceptive Weed (New York: Raven Press, 1973).

17 A. J. Siemans, "Effects of Cannabis in Combination with Ethanol and other Drugs," in R. Peterson (ed.), Marijuana Research Findings, 1980 (Washington, D.C.: U.S. Government Printing Office, 1980).

morphine and codeine. With other drugs, the combination with marijuana increases the stimulant effect, followed by a heavier depression. Such drugs would include cocaine, Benzadrine and Dexadrine.

The reason for this enhancing effect may be that the cells of the liver perform as identifiers and disposers of foreign chemicals in the body through the action of enzymes. When the THC is taken, however, the efficiency of this liver function is impaired and detoxification is reduced. Consequently, the power of the other drug to affect the body is increased.[18]

With some therapeutic drugs, the combination with THC may have the opposite result, leading to a reduction in the effectiveness of the prescribed drug. Taken with anticonvulsants such as Dilantin and Pegamone, for instance, THC antagonizes the drug and lowers the seizure threshold. Similarly, THC can inhibit the results of beta-blockers, used to treat hypertension and some heart conditions. And when taken by a diabetic, marijuana can alter the amount of insulin necessary to maintain balance.[19]

The incidence of marijuana use in combination with other drugs is increasing. Not only is the enhanced effect sought of itself by the user, but it is also a means of obtaining better "value for money" from more expensive drugs. The availability of low-cost marijuana may therefore increase the use of harder drugs.

Psychological Effects

Summary:

There is now a considerable body of scientific data regarding the behavioral effects nad intellectual impairment resulting from marijuana use. Roy Hart and Gabriel Nahas have surveyed the extensive foreign literature. As Hart points out, impairment of memory, judgment, intellectual functions, orientation and motivation have been accepted as consequences of marijuana use for many years.[20] The evidence from this country leads to the same conclusion. Dr. Powelson has summarized the clinical evidence as follows:

> Its early use is beguiling. It gives the illusion of feeling good. The user is not aware of the beginning loss of mental functioning. I have never seen an exception to the observation that marijuana impairs the

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18 Nahas, Keep Off the Grass, p. 22.

19 Lantner, "Answering Questions About Marijuana," p. 17.

20 R. Hart, "A Psychiatric Classification of Cannabis Intoxicant," Journal of the American Academy of Psychiatric Neurology, I, pp. [illegible] pp. 43-54; Nahas, Marihuana, and Keep Off the Grass.

> user's ability to judge the loss of his own mental functioning.
>
> After one to three years of continuous use the ability to think has become so impaired that pathological forms of thinking begin to take over the entire thought process.
>
> Chronic heavy use leads to paranoid thinking.
>
> Chronic heavy use leads to deterioration in body and mental functioning which is difficult and perhaps impossible to reverse.
>
> Its use leads to a delusional system of thinking which has inherent in it the strong need to seduce and proselytize others. I have rarely seen a regular marijuana user who wasn't "pushing." As these people move into government, the professions, and the media, it is not surprising that they continue as "pushers," thus adding to the confusion that (the scientific community) is obliged to ameliorate.[21]

Behavioral Effects:

Broadly, light marijuana smoking results in enhanced sensitivity to sensory stimuli. Heavy smoking tends to result in apathy and withdrawal. Research conducted on moderate and heavy smokers shows that a distortion of reality is common, together with confusion, memory loss, diminished concentration, reduced motivation, and hostility towards discipline and authority. Among relatively inexperienced users, acute anxiety can develop as the smoker grows aware that reality is becoming distorted. The same anxiety can also occur when a joint of higher potency is smoked.[22] Heavy usage of marijuana accentuates these effects. Marked memory impairment and confusion is common among such users, and there is evidence that heavy smoking can exacerbate mild and latent paranoia and schizophrenia.[23]

The consequences these effects have on adolescents may be very damaging. At precisely the time that difficult arrangements need to be made, marijuana may distort both the reality that must be faced and the judgment needed to deal with it. The maturing process is inhibited, and a concern with the moment overshadows any assessment of the future. Dr. Mitchell Rosenthal, president of Phoenix House in New York, has summarized the consequences of marijuana use among adolescents as follows:

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21 Roselson, Testimony before the Senate, May 1974, quoted in Russell, Marijuana Today, p. 22.

22 Marijuana and Health, p. 21.

23 Ibid., pp. 21-22.

> To grow, to develop, to achieve adulthood, adolescents must cope with the emotional storms and squalls of the troubled teenage period. They turn to marijuana or to alcohol to self-medicate and to relieve the anxieties of the moment. They do not cope and they do not know how to cope. They blow away their troubles in clouds of smoke and they blow away their chance of becoming mature and responsible adults.[24]

Social Behavior:

Marijuana use does appear to foster alientation, towards both the family and society in general. In school and college settings, the tendency of users to form subcultures hostile to prevailing social customs and attitudes is well known. A large-scale study of Boston schoolchildren, for example, showed that early use of the drug was closely correlated with truancy, alienation from authority, poor academic achievement and the early use of alcohol and tobacco.[25]

It remains to be seen what sort of society will emerge as a generation so heavily associated with marijuana attains the position of leadership.

Intellectual Functions

Motivation:

It is all too common to hear of a marijuana user who appears to have lost all will to succeed. The decline in motivation among heavy and moderate smokers -- and even some occasional users -- is probably the effect noticed most often by a user's friends. Chronic heavy use can lead to almost total withdrawal (often rationalized in such terms as "getting out of the rat race"). Clinicians dealing with high schools and colleges report constantly of gifted students who are marijuana users and who lack the drive necessary to reach their full potential.[26] The user is often quite unaware of just how great a decline in motivation he is experiencing, and increasingly, as Dr. Franz Winkler

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24 M. Rosenthal, "Marijuana and Effects on Adolescents," given at "Marijuana: Biomedical Effects and Social Implications," Second Annual Conference on Marijuana, New York University Post-Graduate Medical School and the American Council on Marijuana, New York, June 28-29, 1979 (unpublished transcript).

25 G. Smith and C. Fogg, "Psychological Predicators of Early Use, Late Use, and Non-Use of Marijuana among Teenage Students," in D. Kandell (ed.), Longitudinal Research on Drug Use (New York: Halstead Press, 1978).

26 See, for example, H. Kolansky and W. T. Moore, "Effects of Marijuana on Adolescents and Young Adults," Journal of the American Medical Association, [illegible] and "Toxic Effects of Chronic Marijuana Use," Journal of the American Medical Association, [illegible] pp. [illegible].

has pointed out, the smoker loses all interest in normal student activities:

> The lasting effects of moderate amounts of marijuana are minimal in contrast to the harmful effects of even a couple of reefers a week....An early effect of marijuana and hashish use is a progressive loss of willpower, already noticeable to the trained observer after about six weeks of moderate use....Soon all ability for real joy disappears, to be replaced by the noisy pretense of fun. While healthy teenagers will eagerly participate in all kinds of activities, such as sports, hiking, artistic endeavors, etc., a marijuana user will show an increasing tendency to talk aimlessly of great goals, while doing nothing about them.[27]

A particularly disturbing aspect of this reduction in motivation is that in some cases it may be permanent. It will be shown later that THC appears to have long-term physical effects on the brain, and clinicians such as Powelson have cited several instances of patients who gave up marijuana and yet are still unable to regain their normal level of motivation and concentration after a year or more of abstinence.[28]

Learning and Skills:

The decline in motivation common among marijuana users is closely related to a general reduction in intellectual performance. Chronic use of the drug can seriously inhibit powers of comprehension, judgment and learning -- and this effect is not confined to the period of intoxication. The most distinctive influence is on short-term memory. THC appears to interfere with the transfer of learned information from the short-term memory, leading to difficulty in recalling material learned when intoxicated.[29] Given the widespread daily use of marijuana among school children, this effect has most serious educational implications.

The use of marijuana has also been shown to have detrimental effects on the smoker's ability to operate certain machinery, such as an automobile or airplane. Several studies have demonstrated a distinct impairment of driving skills, and that users are overrepresented in accidents compared with non-users.[30] It must be emphasized that this impairment does not only occur during a "high"; it continues for many hours after the subjective intoxication. Since judgment itself is affected, a driver may be totally unaware that his skills have diminished and that his

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27 F. E. Winkler, About Marijuana (New York: Myrin Institute, 1970), quoted in Russell, Marijuana Today, p. 40.

28 Powelson, "Marijuana," pp. 95-99.

29 Marijuana and Health, p. 10.

30 Several of these studies are summarized in Marijuana and Health, p. 11.

reactions are slower. And since the influence of marijuana, unlike that of alcohol, is not easily detected by others, passengers travelling with the user may be unaware of their own danger.

There are certain aspects of the effect of THC on skills and intellectual functioning which need to be understood to appreciate the full impact of marijuana use, and the shortcomings of some studies. In the first place, THC has a much greater influence on the performance of less familiar tasks than on well learned activities. The impact on the student, in other words, is likely to be much greater than on the assembly line worker. Furthermore, the effects are dose related -- the heavy smoker experiences markedly greater impairment than the occasional user (although frequent but light smoking does have a cumulative effect). Thus, studies based on the relatively low doses generally used in the 1960s do not provide an accurate guide to the influence of high-potency marijuana currently used.

Another key feature of the drug is that its effect on skills and performance appears to be correlated strongly with the intelligence level of the user. Thus, the impairment seen among students and professionals is usually greater than that among people of average or low intelligence. More generally, the impact of the drug on middle class smokers tends to be more significant than in the case of manual or working class users. This is particularly important when examining evidence from abroad, since in countries such as Egypt, Morocco or the West Indies, the use of marijuana is a habit usually confined to the poorer, less educated classes. Only in the United States is marijuana widely used by better educated segments of society -- the very groups most prone to its damaging effects.

By appreciating these distinctions in the influence of the drug one can appreciate the deficiencies of tests such as the "Jamaica Study," which is widely cited by the pro-legalization lobby as a demonstration of the benign effects of the drug.[31] In this study, the researchers selected a group of thirty ganja (i.e., marijuana) smokers and a control group of thirty non-smokers. The groups were given a battery of psychological and other tests, and their brain wave patterns were examined. No significant differences between the groups were detected.

This study has been faulted on several grounds, some of them technical,[32] and the findings ran strongly against the clinical evidence available in Jamaica.[33] But, more importantly, the

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[31] V. Rubin and L. Comitas, Ganja in Jamaica: A Medical Anthropological Study of Chronic Marijuana Use. The Hague, The Netherlands: Mouton Press, 1975.

[32] See Russell, Marijuana Today, pp. 28-30; Nahas, Keep Off the Grass, pp. 101-102.

[33] Russell, Marijuana Today, p. 28.

study ignored both the relationship between intellectual capacity and impairment, and the difference in the influence of THC or skilled as opposed to simple and familiar tasks.

Brain Damage

The personality and learning impairment associated with marijuana use leads naturally to the question, "Does marijuana actually cause physical damage to the brain?" There is now a strong body of evidence to suggest that it does -- in ways consistent with clinical observations.

The most important work in this field has been conducted by Dr. Robert Heath of Tulane University Medical School. In the most significant test undertaken by Heath, groups of rhesus monkeys were used to examine the physical effects on the brain resulting from marijuana use. This species of monkeys has a central nervous system very close to that of man, and is widely used as an indicator of the consequences of therapeutic and other drug use on humans. By using monkeys, Heath was able to remove many problems associated with human volunteers -- such as legal issues and the difficulty of keeping a tight control on the level of drug use. He was also able to sacrifice the monkeys and conduct a close examination of the brain tissue of each animal. In the test THC was administered both by smoke inhalation and by injection -- the intake being equivalent to that normally found among human users. The monkeys were exposed to the drug for six months and studied for a further eight months after the drug was withdrawn, using deep and surface electroencephalograms (EEG), after which they were sacrificed and examined.

Heath found distinct changes in the brain wave pattern in the "deep brain sites" of the limbic region -- the area associated with smell, taste, emotion, pleasure, and the control of drives. This change was noticeable after two to three month's use by monkeys subjected to the equivalent of heavy or moderate intake by humans. There was no such effect in the control group. The alteration in the deep brain pattern resembled that associated with conditions such as schizophrenia, and with the reduction of awareness. Heath continued to monitor the deep brain throughout an eight-month period after THC intake was ceased, during which time the change in pattern continued -- suggesting long-term and possibly permanent brain damage.

After the eight-month period the monkeys were sacrificed and their brain tissue carefully studied. Electron microscope analysis revealed distinct damage, particularly at the synaptic junction, where one nerve cell connects with the next -- regions that are crucial to the operation of the central nervous system. This damage included a widening of the synaptic cleft (i.e., the gap between the cells) by an average of 25 percent; which is a condition seen in brain poisoning associated with substances such as carbon tetrachloride and in cases of severe vitamin B deficiency leading to psychosis. Heath also noted that dense material was

deposited in the clefts, and, among other effects, there were changes within the cells active in memory function.[34]

The changes in the brain observed by Heath correspond with the behavioral and learning function alterations described earlier. His studies show clearly that THC has a detectable physical effect on the brain, even though the implications of the effect are not known. Most disturbing of all, his experiments suggest that the changes in the brain tissue may be permanent, even among moderate marijuana smokers.

While Heath's experiments have provoked considerable controversy, both regarding the methodology and the meaning of the results, there is supporting evidence. A 1971 study, for instance, used air encephalography to examine the brains of a group of young smokers, each of whom had used marijuana consistently for many years and were experiencing severe personality changes. The study, conducted at the Royal United Hospital in Bristol, England, concluded that there was evidence of as much brain atrophy among the group as would be expected in very elderly people. None of the test group displayed clear evidence of any condition prior to smoking the drug that might have produced such a level of degeneration.[35]

More recent research, using CAT scanners to examine the brains of chronic users, has failed to confirm the Bristol results, however, and so further testing is clearly necessary before any firm conclusions can be reached on the question of brain damage.[36] Nevertheless, the weight of existing evidence does suggest that there is good reason to believe that potentially serious physical effects on the brain do result from chronic marijuana use.

Disease and Cell Division

Recent research has shown that THC seems not only to have very damaging effects on the cells of the brain, but also that it may have an impact on cells related to the immunity system. Work by Gabriel Nahas, for example, showed that the cell division rate

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34 R. G. Heath, "Marijuana: Effects on Deep and Surface Electroencephalograms of Rhesus Monkeys," Neuropharm, 12 (1973), pp. 1-4; Heath and W. Myers, "Cannabis Sativa: Ultrastructural Changes in Organelles of Neurons in Brain Septal Region of Monkeys," Journal of Neuroscience Research, 4 (1979), pp. 9-17.

35 A. Campbell, M. Evans, G. Thompson, and M. Williams, "Cerebral Atrophy in Young Cannabis Smokers," Lancet, 2 (1971), pp. 1219-1224.

36 R. Co, D. Goodwin, M. Gado, M. Mikhael, and S. Hill, "Absence of Cerebral Atrophy in Chronic Cannabis Users," Journal of the American Medical Association, 237 (1977), pp. 1229-1231; J. Kuehnle, J. Mendelson, S. Davis, and [illegible] Ness, "Computed Tomographic Examination of Heavy Marijuana Smokers," Journal of the American Medical Association, 237 (1977), pp. 1229-1230.

for the lymphocytes of a group of human users was over 40 percent lower than for a control group (lymphocytes are white blood cells that divide rapidly and attack viruses and foreign tissue). This result would mean a drastic reduction in the ability of users to fight diseases -- a reduction comparable with that found in cancer patients and kidney transplant patients receiving immuno-suppressive drugs to prevent rejection (these patients are highly prone to illness).[37]

The influence of THC on cell division seems to extend even further than the immunity system. Research findings presented by twelve different medical groups at a 1978 international conference on marijuana indicated that use of the drug causes strong interference with the synthesis of proteins, DNA and RNA (the basic "building blocks" of cells) in a wide range of cell types. The substance was also shown to impair the rate of tissue growth, to lead to unnatural cell division, and to the production of cells with an abnormal number of chromosomes.[38] Further work is needed in this area, but it should be noted that chromosome damage in certain cells does lead to leukemia and other conditions; and similar damage to gonadal tissue could affect the physical and mental characteristics of children conceived from the sperm or egg cells of a marijuana user.

Reproduction

Several studies have been conducted recently to determine the effect of THC on the male reproductive system. Research by Dr. Robert Kolodny, using a group of young males who were heavy users (averaging 9.4 joints per week), found that the principal male hormone, testosterone, was reduced by 44 percent within the group (although this was still within the normal range for the population).[39] The hormone plays an important role in sexual change during adolescence, and in sperm production. Whether this reduction has a significant effect, or if it is permanent with chronic use, is not yet known.

Two other studies of smokers indicate that chronic heavy use does result in abnormalties in the sperm count, and that it affects the mobility and physical characteristics of sperm.[40]

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37 G. Nahas, N. Suciu-Foca, J. Armand, and A. Marishima, "Inhibition of Cell-Mediated Immunity in Marijuana Smokers," Science, 183 (1974), pp. 419-420; Nahas, Keep Off the Grass, pp. 116-122.

38 G. Nahas, W. Paton and J. Indanpaan-Heikkila (edit.), Marijuana: Chemistry, Biochemisty and Cellular Effects (New York: Springer Verlag, 1976).

39 R. Kolodny, W. Masters and others, "Depression of Plasma Testosterone Levels in Chronic Intensive Marijuana Use," New England Journal of Medicine, 290 (1974), pp. 872-874.

40 W. Hembree, G. Nahas and H. Huang, "Changes in Human Spermatozoa Associated with High Dose Marijuana Smoking," in G. Nahas and W. Paton, Marijuana: Biological Effects (New York: Pergamon Press, 1979); M. Issidorides, "Observations in Chronic Hashish Users: Nuclear Aberrations in Blood and Sperm and Abnormal Acrosomes in Spermatozoa," in Nahas and Paton, Marijuana: Biological Effects.

Reports from Jamaica, Morocco, India, and this country also indicate a high level of impotence among long-term users.[41] As yet, there are no published reports of a correlation between marijuana use and abnormal offspring.

Testing the effects of THC on women -- especially pregnant women -- poses ethical and legal problems. Rhesus monkeys have therefore been used for certain of these tests, both to overcome such problems and to enable dosage to be tightly controlled. But there is also a good deal of clinical human evidence available.

Research by Dr. Carol Smith on monkeys has shown that exposure to THC for just a few days during the menstrual cycle can lead to the suppression of ovulation and the disruption of the cycle, due apparently to an interruption in the production of necessary hormones.[42] The menstrual cycle returns to normal two to three months after use of the drug ceases. Dr. Joan Bauman of the Masters and Johnson Clinic in St. Louis, studied the menstrual cycles of young volunteers who were frequent users of marijuana (an average of 4 joints per week), and had been so for at least six months. The group was then compared with a control. Dr. Bauman found that 38 percent of the marijuana users experienced problems with their cycles, compared with 12.5 percent of the control group, and a substantial number of them failed to ovulate. The users were also prone to other irregularities, such as hormone imbalance.[43] Although it is not possible to monitor precisely the drug habits of such volunteers, the human results compared sufficiently closely with more exact animal tests for the conclusion to be reached that marijuana use results in definite irregularities in the cycle.

More serious than the evidence on the menstrual cycle, however, are the strong indications that THC may be very damaging to the unborn. Tests by Dr. Ethel Sassenrath of the University of California Primate Research Center, in which rhesus monkeys were exposed to moderately heavy doses of marijuana (the equivalent of between one and two joints per day), resulted in a 42 percent loss of offspring by the monkeys through spontaneous abortion, fetal death, stillbirths or death in early infancy -- four times the rate in the control group. Post mortem examinations of the offspring, moreover, revealed a number of abnormalties, such as fluid in the brain, together with vascular, liver and kidney

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41 J. Hall, Testimony before the Senate Subcommittee on Internal Security, May 1974, ref. 80, pp. 147-154; H. B. Jones and H. C. Jones, Sensual Drugs: Deprivation and Rehabilitation of the Mind (New York: Cambridge University Press, 1977).

42 C. Smith, M. Smith, M. Beach, R. Smith and R. Asch, "Effect of Delta-9-THC on Female Reproductive Function," in Nahas and Paton, Marihuana: Biological Effects.

43 J. Bauman, "Effect of Chronic Marihuana Use on Endocrine Function of the Human Female," in Nahas and Paton, Marihuana: Biological Effects.

disorders.[44] Experiments using radioactive THC (allowing its progress through the body to be traced) have shown that the drug appears in the milk of the mother and passes into the bodies of the infants being nursed. Furthermore, there is evidence that THC passes through the placental barrier, and lodges in the fatty tissue and various organs of the fetus, including the brain.[45]

These results are very alarming. The consequences of marijuana use by pregnant women and mothers has yet to be fully determined, but the evidence so far indicates that use of the drug may be extremely dangerous or even fatal to the unborn child.

The Heart and Lungs

Marijuana use tends to increase the heart rate, leading to a reduced capacity for exercise -- although this effect does diminish as tolerance to the drug builds up. For young, healthy users this presents no particular danger, but in the case of smokers with pre-existing heart conditions, marijuana can accelerate the development of chest pains and heart irregularities.[46]

Results of test examining the effect of marijuana smoking on the lungs are more disturbing, indicating not only that the drug is connected with lung damage, but also that this damage may be more severe than that associated with tobacco. The U.S. Army's drug program in Europe, between 1968 and 1972, for example, revealed a high incidence of serious respiratory ailments among soldiers with access to the very potent strains of marijuana then available in Europe. Bronchitis and emphysema were seen even among young smokers. Emphysema, in particular, is a disease usually associated with later life, and to find it among young soldiers was most unusual. As Dr. Forrest Tennent, who headed the study, testified to the Senate:

> Even though a person can get bronchitis and emphysema from cigarette smoking, one must usually smoke cigarettes for 10-20 years to get these complications. We became alarmed about this because we began seeing these conditions in 18-, 19-, and 20-year-old men.[47]

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44 E. Sassenrath, L. Chapman and G. Goo, "Reproduction in Rhesus Monkeys Chronically Exposed to Delta-9-Tetrahydrocannabinol," in Nahas and Paton, Marijuana: Biological Effects.

45 R. Vardis, D. Weisz, A. Fazel and A. Rawitch, "Chronic Administration of Delta-9-Tetrahydrocannabinol to Pregnant Rats," Pharmcology, Biochemistry and Behavior, 4 (1976), pp. 249-254.

46 R. Prakash and W. Aranow, "Effect of Marijuana on Coronary Disease," Clinical Pharmacology and Therapeutics, 19, iv (1976), pp. 94-99.

47 F. Tennant, Jr., Testimony before the Senate Subcommittee on Internal Security, May 1974, ref. 30, pp. 288-314.

An examination by Dr. Harris Rosenkrantz of the Mason Research Institute in Massachusetts, found that the exposure of laboratory rats to only moderate amounts of marijuana smoke led to a distinct alteration in lung tissue. These effects included intense inflammation, a breakdown of the air sacs, and the formation of deposits in the lung tissue. The air capacity of the lung was also reduced by 15-20 percent. Control experiments showed clearly that far more damage occurred than with the same degree of exposure to tobacco smoke.[48]

Test conducted with humans have reached similar conclusions. A University of California study, for example, matched a group of healthy users with a control group and found a 25 percent higher airway resistance in the lungs of the marijuana smokers after just two months of heavy use.[49] This level of resistance rarely occurs among tobacco smokers before fifteen or twenty years of use.

Therapeutic Uses for Marijuana

Like many drugs that exhibit damaging effects with chronic usage, THC does seem to have some useful properties for patients with certain conditions. It appears to be effective, for example, in providing relief for certain glaucoma sufferers -- although non-psychoactive drugs can achieve the same results in many cases.

Of much greater importance is the possibility of using THC as a treatment for severe nausea often associated with chemotherapy. The National Cancer Institute recently embarked on a $1 million program to distribute THC capsules to a large number of cancer patients undergoing chemotherapy. By using THC in capsule form, rather than cigarettes, the possibility of lung damage is avoided. Some critics of the program do, however, maintain that capsules are inferior to smoking the drug, and there is some evidence available to support such a claim in the case of certain patients. Further testing is necessary to determine the cases where inhalation might be an appropriate method of administering the drug until an effective synthetic version becomes available.

The use of THC for therapeutic purposes is not without its problems. Patients run the risk of the damaging results of marijuana discussed earlier, but these risks are much lower in medical programs. Most of the damaging effects associated with the drug appear to result from moderate to heavy use for a longer period than is usual in medical purposes. And the drug can be

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48 H. Rosenkrantz and S. Fleischman, "Effects of Cannabis on Lungs," in Nahas and Paton, Marijuana: Biochemistry, Etc.

49 D. Tashkin, R. Shapiro and others, "Subacute Effects of Heavy Marijuana Smoking on Pulmonary Function in Healthy Men," New England Journal of Medicine, [illegible]

avoided in the case of high-risk patients. But if THC was widely distributed, even under prescription, it would be difficult to ensure such control. Another problem with the drug is that its psychoactive effects can be very disturbing to some patients, particularly older ones. Again, carefully controlled use allows these side-effects to be detected at an early point. Certain drugs that are chemically similar to THC (such as levo-nantradol) are currently being tested to see if they may be superior in certain instances.[50]

Consideration of THC as a therapeutic drug is not in any way inconsistent with the position that it is very harmful in general. Some highly dangerous drugs are very beneficial in certain circumstances, but this does not imply that they should be made freely available. Occasional use of THC capsules by some carefully chosen patients is not the same as chronic heavy smoking of marijuana.

PUBLIC POLICY CONSIDERATIONS

Marijuana Use and the Law

The inescapable conclusion from the scientific evidence now available is that marijuana is a dangerous substance. The increase in potency in recent years means that we are now dealing with a very different problem than the one faced in the 1960s. The evidence also shows that THC is quite different from alcohol in the way that it lodges in certain organs and causes damage to them in a short period of time.

Yet the question remains, "What, if anything, should be done?" There are many things that we do which are dangerous. Is the use of marijuana any different than these?

There are really four aspects to this question, and each raises important philosophical and practical issues:

1. To what extent should society interfere with the individual's decision to pursue a dangerous activity?

2. Is there harm, or a cost, to non-users?

3. Does society have the right to enforce some collective lifestyle on the individual to preserve some notion of "culture" or "way of life"?

4. Is an effective law possible, given a resolution of the other issues?

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50 Washington Post, November 11, 1980.

Taking each of these questions in turn:

a) Marijuana and Individual Freedom

It has always been a tenet of the idea of liberty that the individual has the right to pursue a dangerous activity, or to knowingly damage his own health. If it were otherwise, we should ban everything from hang-gliding to eating candy.

On the other hand, it has usually been conceded that there may be another justifiable position in the case of certain segments of society. When a person does not realize the consequences of an action, it is reasonable to warn him, and perhaps to physically prevent him from undertaking it. Most smokers of marijuana have very little understanding of the likely consequences of taking the drug. It would seem quite appropriate to embark on a program of education, particularly in schools, to reduce this ignorance. In addition, a policy aimed at making the drug less available, by presenting obstacles to supply, would reduce the liklihood of casual access by the ill-informed -- while the determined user would still be able to obtain supplies.

Drugs do, of course, involve a complication when considering the ability of the user to judge the consequences of his actions. We recognize that children should be protected from many things because inexperience and poor judgment can lead to unforeseen results. But some drugs actually cause reduction in the power of reasoning, or the ability to cease using the substance. This is one reason why we ban heroin but not hang-gliding. Whether there is a sufficient observable effect on the processes of the brain for us to class marijuana with heroin rather than hang-gliding is open to serious question. Yet there is probably sufficient evidence available to suggest that THC does affect motivation and the will to resist higher doses, and other drugs, to justify a policy of active discouragement.

b) Harm and Cost to Others

When a drunk decides to drive his automobile, he poses a physical threat to others, and so it is reasonable for society to impose heavy penalties on such actions for the protection of innocent parties. There is plenty of evidence for us to conclude that the use of marijuana interferes with the reactions and skills of people who drive or fly, and that this is hazardous to other people. In addition, the effects of marijuana usually last longer than those due to alcohol. It is quite reasonable, therefore, for society to punish marijuana users who drive or fly under the influence of the drug. Sophisticated laboratory techniques are now available to enable the level of THC in the body to be known with reasonable accuracy, and routine detection equipment should soon be operational. So it will be possible to provide clear guidelines, and penalties, to deal with the smoker-driver.

The idea of cost is not so simple. If the brilliant scholar becomes a heavy smoker, quits college, and goes on welfare, he is taking from society rather than contributing to it. Yet only a small minority of users could be said to impose costs such as this. Active discouragement would seem to be the most practical way of dealing with the situation.

c) The Imposition of Society's Standards

This is in many respects the most difficult issue of all, and marks a clear difference of opinion between the libertarian and the conservative. If one believes that "society" is simply a collection of individuals, it is difficult to argue that the spreading use of a drug is detrimental to society in any sense, assuming individuals other than the users are not harmed. On the other hand, if one feels that the strength of a society, and the benefits that it can provide to its members, depends on the broad acceptance of certain obligations and customs -- and that the individual is hurt when these customs are eroded -- then it could be legitimate to discourage certain activities.

It is at least arguable that the widespread use of marijuana, leading to a decline in motivation, educational achievement and health, may reduce the benefits of society for us all. If this is so, then it would provide an additional reason for active discouragement.

d) Just and Effective Law

(i) Legislation:

It has been argued by many that we are in a form of "prohibition era" with respect to marijuana. The drug is illegal, but the law is openly and widely flouted, just as it was when alcohol was made illegal. The law is held in disrespect and the punishment of marijuana users is deeply resented. According to this argument, otherwise law-abiding people find themselves dealing with criminals, and only complete legalization will restore faith in the law and get the business of marijuana out of the hands of criminals.

While this argument does have a surface plausibility to it, it is fraught with dangerous implications. In the first place, the almost universal public ignorance of the harmful consequences of marijuana use lies at the heart of the discontent with the law. If the drug were to be legalized, making it available at the corner drugstore, it would confirm the general belief that marijuana was fairly harmless. If the drug were freely available, with the consent of government, it would be virtually impossible to persuade users that they face real dangers. How could one justify a situation where marijuana was made legal when every attempt had been made to ban saccharine?

Illegality may not stop the use of marijuana, but it may serve to hold the line while people are educated as to its dangers. To remove the legal restrictions on its use could also remove any chance of reversing the trend.

(ii) Decriminalization:

There is, of course, a distinction between the issues of legalization and decriminalization. In the one case we are considering making the distribution and consumption of a drug a legal activity; while on the other we are talking about reducing the penalties for taking the drug.

It is a little difficult to justify putting someone in jail when they are probably ignorant of the consequences of taking marijuana. Even if they are fully aware of the possible damage, it does seem unreasonable to apply harsh criminal penalties when no other person is affected. While full legalization would undoubtedly lead to an explosion of use, non-criminal penalities for the possession or use of small quantities of marijuana, together with criminal sanctions for the possession of large quantities or supplying marijuana to children, would be a more just and acceptable position.

There are, however, many experts who feel that even decriminalization would be a grievous error. This view has been put forward very cogently by Dr. Robert DuPont, the former NIDA director:

> For many years, while I was in government, I supported decriminalization of marijuana and was actively publicized by the marijuana lobbying organizations as one of their chief advocates or supporters. I was never this, but I did for some years favor decriminalization of marijuana. I have changed my mind completely on that point and I now strongly oppose decriminalization. I am persuaded that we, as a nation, are dealing with a massive epidemic with grave consequences for our society, and that decriminalization is a signal in this political debate that, however much one might feel that it is not a good idea to put people in prison for possession of small amounts of marijuana, support for decriminalization is seen as support for marijuana. We all need to recognize that the battle lines are drawn and that decriminalization is the major line that is drawn across the political landscape right now.[51]

The argument surrounding the decriminalization issue is thus not so much one of principle as one of practical politics. If removing criminal penalties for the possession of small quantities

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[51] Address to seminar sponsored by the [illegible] Foundation, see note 10.

of marijuana (while maintaining criminal sanctions for distribution) would not lead to a significant increase in use, or to overwhelming pressure for legalization, then decriminalization would have the support of many people who nevertheless consider the drug as very damaging.

ACCESS AND SUPPLY

A policy of active discouragement and education may be pursued in several ways. A number of states, for instance, have banned so-called headshops, where drug-related equipment is sold. The determined user can still find ways of obtaining paraphernalia, but open encouragement to the non-user is reduced by such a measure.

A much more effective form of discouragement, however, would be to actually reduce the level of supplies reaching this country. Enormous quantities of marijuana reach the United States from the Caribbean and South America. It is a multi-billion dollar traffic that involves radio warning planes, large cargo ships, high-speed pickup boats, secret landing strips, and large payoffs to local police. It is not uncommon for seizures of ships to reveal loads of marijuana worth up to $40 million at street prices.

The Coast Guard has been overwhelmed by the volume of the trade, and the tenacity and equipment of the smugglers. Seizures now account for probably less than 15 percent of the total -- making but a small dent in massive profits.[52] If anything is to be done to contain the staggering increase in the quantity of marijuana reaching this country, there must be a significant boost in the resources made available to the Coast Guard, the Drug Enforcement Administration, and other services involved with drug interception. Only by driving up the risks faced by smugglers do we stand much chance of reducing the drug flow.

Some argue that reducing the availability of marijuana in this country might actually be counterproductive. If you deny people marijuana, they claim, they will merely turn to something more dangerous. This is a spurious argument. For the heavy user with psychiatric problems, marijuana is generally only a stepping stone to hard drugs, or a means of enhancing the effect of other substances. If these people are denied marijuana it would make little difference to the damage they will inflict on themselves. Far more important is the person who tries marijuana because it is inexpensive and freely available, and who then becomes a chronic user or moves on to hard drugs. A reduction in the supply of marijuana would lessen the chances of a casual introduction to the drug. Even among existing users, a switch to alcohol or tobacco is far more probable than to hard drugs.

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52 For an account of a typical Coast Guard encounter see the Washington Post, December 20, 1980.

Of course, the marijuana reaching this country has to come from somewhere, and that can present sensitive policy issues. In certain countries, the cultivation of marijuana for export to the United States has become a significant part of the domestic economy, and a major source of foreign exchange. There have been cases of the United States supporting the actions of foreign governments seeking to reduce cultivation, such as Mexico, but this kind of cooperation is rare and not very effective.

Jamaica is a good example of the kind of problem faced by the United States. The country is a major supplier of marijuana to America. The trade is worth well over $1 billion a year, equal to Jamaica's entire foreign debt, and greater than all other exports combined. Jamaica is also unstable and bankrupt, and is a target of Cuban penetration.

When the Jamaican government changed hands in 1980, the United States found itself in a very delicate situation regarding the drug business. The new Prime Minister, Edward Seaga, is a friend of the West, and so the United States is understandably hesitant to undermine what is left of the island's economy. But marijuana is crucial to the economy. As Seaga pointed out recently, "The ganja (i.e., marijuana) trade in the last several months was virtually what was keeping the economy alive."[53] According to him, the trade is "here to stay," and the question is not whether it should be wiped out but whether it should be completely legalized:

> so as to bring the flow of several hundred million dollars in this parallel market through the official channels, and therefore have it count as part of our foreign exchange -- which would mean an extremely big boost to our foreign exchange....

Mr. Seaga's tidy, businesslike approach to the drug trade is complemented by a convenient interpretation of the scientific evidence. Medical reports, he states with authority, "seem to suggest there's no conclusive evidence that ganja is harmful...."[54] Mr. Seaga would be well advised to talk to some of Jamaica's leading psychiatrists at Kingston Hospital, who seem to have reached somewhat different conclusions regarding the effects of marijuana.[55]

While the situation in Jamaica may be outrageous, dealing with it presents many problems. It would be easy to drift into the feeling that really nothing can be done without damaging the

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53 Washington Post, November 10, 1980.

54 Ibid.

55 See, for example, the report by Dr. John Hall, Chairman of the Department of Medicine at Kingston Hospital, Jamaica, quoted in Russell, Marijuana Today, p. 28.

fabric of the country. But if the government of Jamaica (or any other country) condones the cultivation and exportation of a drug that is harmful to the people of the United States, it has only itself to blame for the consequences. It is an absurd form of foreign aid for the U.S. government to stand idly by while a country encourages the supply of a dangerous drug to America, simply because that country needs foreign exchange!

In the interests of its own citizens, the U.S. government should state clearly that marijuana is dangerous and a threat to the American population; that it is an unfriendly act for any government to condone it and that policies will be adopted to dissuade such tacit support. The idea that Jamaica can only survive if marijuana cultivation is allowed continue is ridiculous. The reason that the industry is now so important to Jamaica is that it is highly profitable. If the incentives were altered, other industries would develop. It should therefore be the goal of U.S. policy to apply penalties against Jamaica and similar countries if they continue to allow the trade to flourish, while offering American assistance to develop other industries. Tolerating the present state of affairs is an abrogration of responsibility by Washington. How can we justify putting our citizens in jail for using marijuana when we refuse to deal effectively with the chief suppliers of the drug?

EDUCATION

While effective action must be taken to deal with the flow of marijuana into this country, the other weapon in the battle to control the marijuana epidemic is education. People simply do not know the damage that the drug may do to them, and this misunderstanding of its consequences is at the root of the growing disrespect for the law dealing with it. We spend enormous sums of money teaching children how to use birth control devices but very little educating them about the effects of a drug which large numbers of them use during the school break. The scale of the problem is so great that a major drug education program in the schools should be a priority.

But education should not be confined to the schoolroom. Most adult users know little of the drug's effects, and parents usually have no idea how to recognize the symptoms of use -- or how to deal with the situation if they do recognize them. There are a number of organizations that do seek to educate parents, such as the Citizens for Informed Choices on Marijuana, based in Stamford, Connecticut. The work of groups such as this is crucial and should be encouraged. In addition, groups such as the American Council on Marijuana, in New York City, have taken the lead in providing succinct, readable scientific information for the layman. But a great deal more needs to be done, and both private and public resources should be made available.

CONCLUSIONS

1. Marijuana is a dangerous drug. It is quite unlike alcohol and tobacco in the way in which it remains in the system and the lasting damage it can cause with only moderate use.

2. While it may seem unjust to impose penalties on users, legalization -- and possibly decriminalization -- would be taken as an official declaration that the drug was safe. This could lead to the acceleration of an already rapid growth in use.

3. The thrust of public policy should be a combination of active discouragement and restriction of supply, rather than increasing penalties for use.

4. The public should be made aware of the effect of marijuana on the ability to drive. Firmer penalties for driving under the influence of the drug should be enacted at the state level, and drivers should be made aware of the dangers and the penalties involved -- as they are regarding alcohol.

5. For medical purposes, marijuana should be treated like any other drug that appears to have some benefits for certain patients. Research should not be discouraged because the drug is used illegally for non-therapeutic purposes.

6. The government and private institutions should take the lead in discouraging use of the drug, through a greatly expanded program of education in the schools, and among the general population.

7. Measures should be taken to interrupt the flow of marijuana into the country. Resources should be made available to enable the seizure rate to be increased substantially. In addition, tougher steps should be taken to interrupt domestic production.

8. Sanctions or other pressures should be adopted against countries which allow the cultivation of marijuana for the American market. Damaging the health of U.S. citizens should no longer be considered acceptable as a means of relieving the economic plight of other nations.

Stuart M. Butler, Ph.D.
Policy Analyst

Report

OF AN ARF/WHO SCIENTIFIC MEETING ON ADVERSE HEALTH AND BEHAVIORAL CONSEQUENCES OF Cannabis Use

Toronto, Ontario
30 March - 3 April, 1981

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REPORT OF AN ARF/WHO SCIENTIFIC MEETING ON ADVERSE HEALTH AND BEHAVIORAL CONSEQUENCES OF CANNABIS USE

TORONTO, CANADA, 30 MARCH - 3 APRIL, 1981

1. INTRODUCTION

1.1. Background and Objectives

The report of a WHO Scientific Group on the Use of Cannabis,[1] which was published in 1971, brought together all the available information on the behavioral effects of cannabis use and other useful material. However, despite the existence of a substantial number of clinical case reports, not much accurate quantitative knowledge was available concerning the possible adverse effects of heavy use of cannabis on the health of users. Since that time, the extent of cannabis use in many countries has increased greatly, and a large body of experimental and clinical observations is now available. At the same time, a number of countries are reexamining their legal policies with respect to cannabis control, and require accurate knowledge on cannabis-related health hazards, as one element in their policy discussions.

In 1980-81, a joint study was undertaken by the Addiction Research Foundation (WHO Collaborating Center) and the World Health Organization on "Adverse Health and Behavioral Consequences of Cannabis Use." A meeting of experts on various aspects of cannabis and health was convened in Toronto, Canada, from 30 March to 3 April, 1981,[2] under the joint auspices of the Addiction Research Foundation (ARF) of Ontario (Canada) and the World Health Organization, to undertake a critical assessment of current knowledge concerning the possible health hazards related to the use of this drug. The mandate extended to the participants was to consider only the scientific, clinical, and epidemiological information concerning potential and actual hazards to health resulting from the non-medical use of cannabis and its various psychoactive constituents. The objectives were to review the evidence, assess its completeness and validity, identify significant points of disagreement or gaps in knowledge, and make recommendations with respect to research policy and specific matters requiring further research.

[1] In this report, the term "cannabis" refers to all preparations derived from the leaves, bracts, flowers, or resin of the plant *Cannabis sativa* L.

[2] See Appendix A for the list of the participants
See Appendix B for the list of the members of the planning committee

The present report is to be submitted jointly by the Addiction Research Foundation and WHO to the United Nations and other international bodies and agencies, national bodies, professional and educational groups, and others interested in the prevention and treatment of health problems related to the use of cannabis and other psychoactive drugs. It is anticipated that this information will constitute an important element in the deliberations of national bodies responsible for decisions on social and political policy with respect to drug use. However, such policy decisions are based on many other considerations — legal, political, social, ethical, and others — in addition to health concerns. Therefore, in the interests of effective and objective scientific discussion, the subject of control policies and policy recommendations was specifically excluded from the scope of this meeting.

In addition, it was decided not to consider the therapeutic uses or other beneficial effects of cannabis. This decision is in no way due to a rejection of the possibility of any beneficial or therapeutic effects, but arises from simple recognition of the fact that the evaluation of these effects is not directly related to the evaluation of the health hazards. Inclusion of the former would have enlarged the scope of the meeting beyond the limits of feasibility for the available time and the number of participants. An independent review, now being conducted by the National Academy of Sciences, Institute of Medicine, Washington, DC, USA (1981), draws attention to the question of therapeutic uses and of other matters outside the scope of the present report.

Also in the interests of feasibility, this report does not deal with many basic scientific aspects of the mechanisms of action of cannabis. Such matters as the details of biotransformation, effects on cell membranes, neurotransmitter biosynthesis and turnover, electrophysiological processes, and experimental analysis of behavior are covered only to a very limited extent. The emphasis is on those basic processes and functional alterations which, on the basis of present knowledge, can be related directly to significant malfunction or disease in experimental animals or humans.

1.2. Definitions

Certain terms in this report have been used in the past in various ways. For the present purposes, the following explanatory comments are given.

1.2.1. *"Adverse Effect"*

An adverse effect of cannabis use may be considered to occur when such use produces impairment of an individual's biological, behavioral, or social function. Some effects (such as severe respiratory complications) would certainly be considered adverse in or by all users. However, it is

clear that others (such as alterations of time sense), may be regarded as pleasurable or unpleasant, or as wanted or unwanted, according to circumstances and factors such as age, expectations, setting, or the perceptions and value systems of subjects or observers. Mental effects that are enjoyed by a young user at a party might be considered adverse by a middle-aged patient receiving a cannabis preparation in combination with cancer chemotherapy. A state which a student may describe as "agreeable relaxation" might be considered by the teacher as "impaired concentration." Reduction of blood pressure has been regarded both as a desirable therapeutic goal and as potentially dangerous. From this it is obvious that often no sharp classifications can be made, and the implications of such a phrase as "adverse effect" must be drawn from the context of its use.

1.2.2. *"Intoxication" versus "Toxicity"*

A similar situation applies to the judgment of toxicity. One person's "intoxication" is another person's "toxic reaction." There is a continuous spectrum, which exists also with alcohol and other drugs, and to draw any sharp line is necessarily arbitrary. The decision as to when to draw such a line is shaped by the user's own perceptions as well as by the observer's concern.

1.2.3. *"Acute" versus "Chronic"*

"Acute" is used to refer to single doses and their effects, or to reactions or responses on single occasions of brief duration. At the other extreme, "chronic" assumes various meanings. One of these refers to that duration of exposure beyond which further use reveals no new phenomena. Another meaning refers to a period of time that is a substantial fraction of the lifetime of a human or animal. It is worth noting that the pattern of dosage is important, and "chronic" effects may be evoked earlier with high than with low dose rates. Even when amount and pattern of alcohol consumption are allowed for, the latency of onset of Laennec's cirrhosis may range from 5 to 20 years (Lelbach, 1974). Lung cancer from cigarette smoking, and carcinoma of the vagina following *in utero* exposure to diethylstilbestrol, also show long and variable latencies of onset. Therefore the production — and also the recognition — of some adverse effects of cannabis may require similarly long and variable periods of exposure.

1.2.4. *Rates of Use*

Words describing rates of use are particularly difficult to define. For example, the word "heavy" has been employed to describe use ranging from 1 gram of marihuana (or its equivalent) per week to more than 10 marihuana cigarettes (approximately 2-10 grams) a day. Heavy use in one society may be perceived as light in another. The only satisfactory solution is to specify the use rates quantitatively, highlighting patterns of consump-

tion, route of administration, and the potency of the material, as well as total amount used in unit time. Description of use as more or less "frequent" may sometimes be more appropriate than "heavy" or "light." Significant, too, may be particular details of self-administration; for instance, just as morning drinking of alcohol, or smoking immediately on rising in the morning, are signs of heavy consumption of alcohol and tobacco, so use of cannabis early in the day may be indicative of heavy consumption.

2. GENERAL TOXICITY

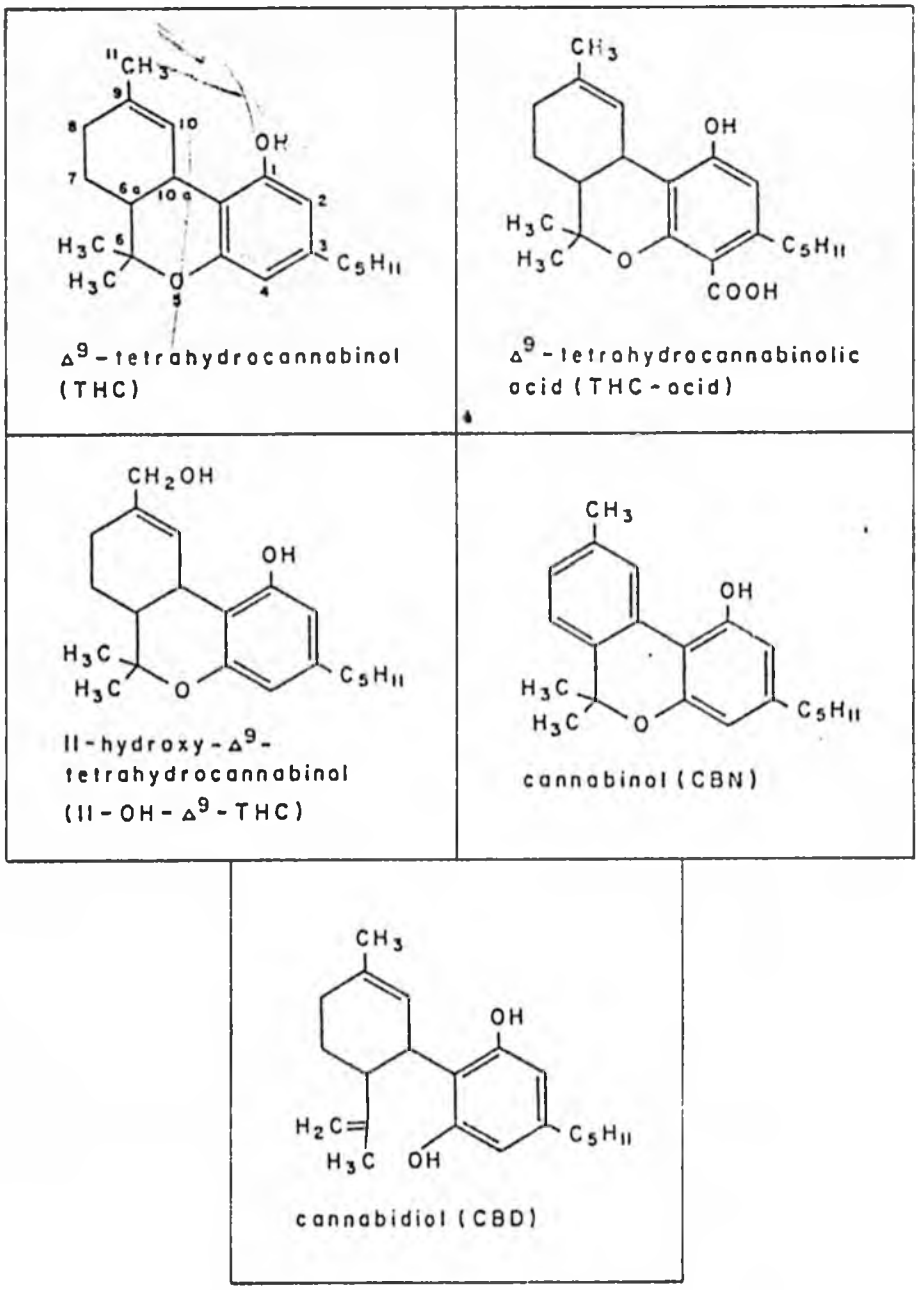
2.1. Cannabis Preparations

Among the 421 compounds thus far identified in the cannabis plant are approximately 61 with the cannabinoid structure (Turner *et al.*, 1980). Of the latter, (-) -Δ^9 -tetrahydrocannabinol (THC) (Figure 1) is of greatest interest in the context of this report, since only structures closely related to THC elicit, at low doses, the characteristic mental effects that constitute the main reason for use of cannabis by humans (Mechoulam *et al.*, 1980). Several other cannabinoids including cannabidiol (CBD) and cannabinol (CBN) (Figure 1), as well as various non-cannabinoid constituents of unpyrolyzed cannabis, may also have biological activities of other types. Dependent on the geographical origin of the plant, the relative and absolute contents of individual cannabinoids vary widely (Turner *et al.*, 1980).

Various preparations derived from the cannabis plant have a wide range of potencies. *Marihuana* or *bhang* consists mainly of dried leaves and stems and can range in content from less than 1% to greater than 8% THC. The content of THC steadily decreases at a rate of approximately 5% per year in refrigerated plant material (Turner *et al.*, 1973). Other preparations *(hashish, ganja, charas)* made from the resin and flowering tops of the plant can contain up to 15% THC. Recently, solvent extracts of leaf material, flowers, or resin have appeared on the illicit markets. The potency of this so-called "hashish oil," "honey oil," or "weed oil" is extremely variable; the THC content can range up to 60%. The toxicity of these preparations appears to be related to their THC content, although other cannabinoids or non-cannabinoids may contribute significantly. The biological effects of the remaining chemical constituents of these extracts are largely unknown at present. The existence of these high potency preparations facilitates the self-administration of large doses of THC.

The pyrolysis of cannabis products produces hundreds of compounds that make up the vapor and particulate phases of the smoke. The vapor phase consists of nitrogen oxides, carbon monoxide, hydrogen cyanide,

FIGURE 1
Structures of Major Cannabinoids



and nitrosamines, together with other known toxic chemicals (Leuchtenberger. 1982). Along with the cannabinoids, the particulate phase contains many known carcinogens including phenols, cresols, and polynuclear aromatic hydrocarbons (Lee *et al.*, 1976). During pyrolysis at usual burning temperatures, tetrahydrocannabinolic acid (Figure 1) is activated by conversion to THC, but there appear to be few other significant cannabinoid interconversions. CBD can be converted to THC, especially when cannabis is pyrolyzed together with tobacco. About 50% of the total available THC is delivered in the mainstream smoke from a marihuana cigarette during the burning procedure (Rosenkrantz, 1982).

2.2. Lethality

2.2.1. *Acute Studies in Experimental Animals*

In acute studies, pure THC appears to be the most toxic cannabinoid of cannabis smoke. The LD_{50} values by inhalation and by i.v. administration are similar in rodents, and the LD_{50} for THC is smaller than those for CBD, cannabichromene, or crude marihuana extract. Intravenous LD_{50} values for THC range from about 40 mg/kg in the rat to 128 mg/kg in the monkey. In mammals, an interesting finding is that the potency of THC in lethality tests decreases as one ascends the phylogenetic tree. For most other effects, the potency is inversely related to the body size of the species, rats and mice being much more resistant than the Rhesus monkey or man (Rosenkrantz, 1982).

Species differences in pharmacokinetics must exist, since the ratio of the intravenous to the oral acute lethal dosages ranges from about 1:30 to 1:40 for rodents but is closer to 1:100 for monkeys and probably dogs (Rosenkrantz, 1982).

In experimental animals, death usually results from cardiac arrest or respiratory failure. Since, at acute lethal doses, artificial respiration is only temporarily effective in preventing death, it appears that cardiac dysfunction rather than the profound hypopnea is the major cause of death (Rosenkrantz, 1982).

2.2.2. *Chronic Studies in Experimental Animals*

Chronic animal studies have indicated a significant degree of unexplained *delayed lethality.* In one experiment, approximately 12% of rats, mainly males, survived the initial dose but died suddenly after 2-3 weeks of continued treatment (Rosenkrantz and Fleischman, 1979). Though the mechanism is not yet clear, it is possible that this delayed lethality may be related to accumulation of THC or its metabolites in the body during prolonged administration (see Section 9.1.1.2.).

2.2.3. *Humans*

No LD_{50} values can be reliably estimated for humans, since only a very small number of fatalities have been reported, and the role of cannabis in these cases is questionable (Rosenkrantz, 1982).

2.3. Clinical and Experimental Toxicity

The past decade has witnessed the clinical documentation of many toxic effects that were previously described anecdotally or superficially. Systematic evaluations of clinical populations, closed-ward drug administration studies, controlled field studies, and accumulated self-reports by users have all been remarkably consistent in their findings. The more prominent effects are summarized below by organ system.

2.3.1. *Respiratory Toxicity*

2.3.1.1. Experimental animals. Single doses of cannabis or THC in animals affect respiration mainly by depression of respiratory rate. This effect is synergistic with that of general anesthetics and other central depressants. Though compliance (elasticity of lung and bronchioles) may be diminished, lung tissue damage has not been observed histologically in acute studies. However, prolonged and repeated exposure to cannabis smoke results in bronchiolar inflammation and morphologic alteration of the lung in rats and dogs (Rosenkrantz, 1982).

2.3.1.2. Humans. Given acutely, THC or cannabis smoke produces a small transient respiratory depression (Bellville *et al.*, 1975) and bronchodilatation (Tashkin *et al.*, 1973).

Respiratory and pulmonary toxicity have emerged as major clinical complications of chronic cannabis smoking. Cannabis smoke appears to be more injurious to the lung than cigarette smoke, as judged by the use of sophisticated pulmonary function testing in well-controlled studies (Rosenkrantz, 1982). Possibly because of its high combustion temperature, hashish appears to yield a particularly irritating smoke. In addition to the ability of cannabis to produce bronchitis, and obstructive pulmonary disease, it might after sufficient exposure produce cancer (see Section 3.2.). In the light of increased frequency of cannabis use, knowledge of the natural course of pulmonary disease suggests that the next three decades may demonstrate an increased prevalence of severe pulmonary disease and possibly of lung cancer. This risk is probably greater in those users (now a majority) who smoke cannabis and tobacco concurrently (Tennant, 1982). In present-day clinical settings the most commonly encountered toxic effects will be the respiratory problems of rhinitis, sinusitis, pharyngitis, and bronchitis (Tennant, 1982).

2.3.2. *Cardiovascular Toxicity*

2.3.2.1. Experimental animals. The major cardiovascular effects of a single dose of THC in most animal species are bradycardia, decreased cardiac reflexes, and hypotension. As a result, cardiac output and cerebral blood flow are usually decreased. Chronic administration may lead to some degree of tolerance to these effects (Rosenkrantz, 1982).

2.3.2.2. Humans. In humans, in contrast, the major effect of a single dose is tachycardia; the heart rate may reach 160 beats per minute or more (Hardman and Hosko, 1976). Acute effects on blood pressure, organ blood flow, and the electrocardiogram are variable and transient (Rosenkrantz, 1982; Tennant, 1982) and are probably due to varying degrees of effect on vasomotor tone (degree of constriction of blood vessels) and vasomotor reflexes (automatic responses to changes in body position, blood volume, etc.). In general, effects on supine blood pressure are relatively slight but postural hypotension has been repeatedly reported. There is little evidence of direct toxic effect on the heart muscle. Chronic use has not resulted in any detectable permanent alterations of cardiovascular function (Tennant, 1982). However, patients with preexisting heart disease due to a relative decrease in coronary blood flow may experience greater risk of angina pectoris and possible infarction because of the extra demand placed on the compromised heart by the drug-induced tachycardia (Tennant, 1982). Cannabis and tobacco smoke contain similar amounts of carbon monoxide. Therefore, the formation of carboxyhemoglobin, which would also contribute to impaired oxygenation of the myocardium, also needs to be considered in cannabis smokers.

2.3.3. *Growth and Body Weight*

2.3.3.1. Experimental animals. Many studies have indicated that either single or repeated exposures to cannabis cause loss, or reduced rate of gain, of body weight (Rosenkrantz, 1982). This is probably due to both decreased food intake and altered endocrine function (see Sections 5 and 6). The long-term health consequences of growth impairment by these factors are unknown but may be most important in relation to the development of the fetus, neonate, or adolescent (see Section 6).

2.3.3.2. Humans. No data on body weight and growth rates before and during periods of cannabis use, comparable to those from controlled animal studies, are available for humans. Numerous clinical case reports from India and North Africa describe regular heavy cannabis smokers as emaciated or malnourished (Bouquet, 1951), and the observations of some modern field studies have suggested that regular users are lighter in weight than non-users (Rubin and Comitas, 1975; Coggins *et al.*, 1980). Social factors such as marital status or other differences in lifestyle may have contributed to this finding (Coggins *et al.*, 1980). In short-term

laboratory studies, a weight increase attributable to increases in body water and caloric intake has been observed (Jones and Benowitz, 1976; Greenberg *et al.*, 1976). There is little or no information on possible long-term effects of cannabis on growth, development, and maturation of humans.

2.3.4. *Gastrointestinal*

2.3.4.1. Experimental animals. In dogs and monkeys exposed to high oral doses of cannabis acutely, vomiting and diarrhea may occur (Thompson *et al.*, 1973). Chronic administration does not appear to be associated with significant gastrointestinal toxicity in animals (Rosenkrantz *et al.*, 1975), but may decrease gut motility.

2.3.4.2. Humans. In humans, acute or sub-acute use may produce vomiting, diarrhea, and abdominal distress (Halikas *et al.*, 1971; Tennant, 1974). Chronic cannabis use may decrease gastric acid secretion and possibly make the intestine more susceptible to *Vibrio cholerae* and *Escherichia coli* infections (Nalin *et al.*, 1978), which may pose a particular threat to travelers. Liver toxicity has been observed occasionally in cannabis users (Tennant, 1982). Concurrent alcohol abuse appears to be a factor in these cases. The mechanism by which cannabis could enhance alcohol-induced hepatotoxicity is unknown. The observation of abnormal liver function tests in users who had developed antibodies to marihuana (Shapiro *et al.*, 1976) suggests a possible antigenic response. Lysosomal damage, observed in animals treated chronically with THC (Mellors, 1976), may also play a role.. The sharing of cannabis products or paraphernalia with other smokers has led to the spread of hepatitis in some groups (Drachler, 1975). Possible decreased immunity to viral infections is discussed in Section 4.3.

2.3.5. *Miscellaneous Toxic Manifestations*

Individual case reports have also described a variety of apparent toxic reactions to cannabis in humans, of relative rarity and possibly dependent on unusual individual sensitivity (Tennant, 1982). For example, cannabis products often contain pathogenic fungi such as aspergillus, and aspergillosis has been reported to occur in cannabis-using persons who had preexisting pulmonary disease or asthma (Kagen, 1981). Other allergic phenomena are often aggravated by cannabis use and one case of anaphylatic shock has occurred in an allergic person after cannabis use (Liskow *et al.*, 1971). Some clinical reports suggest that cannabis possibly aggravates some dermatologic conditions (Tennant, 1982).

2.3.6. *Toxicity Related to Unusual Methods of Cannabis Exposure*

Unusual exposure to cannabis includes intravenous injection of plant

extracts, oral ingestion of large amounts of the raw or cooked plant, swallowing of cannabis-filled balloons to escape police detection, and use of high-potency butter-paste preparations. The use of cannabis by the above routes has led to highly toxic reactions (Tennant, 1982). These reactions are either consequences of gross overdose (e.g., from intra-intestinal rupture of a balloon filled with "hash oil"), or complications produced by the physical rather than the pharmacological properties of the material (e.g., microembolism due to intravenous injection of a particulate suspension).

3. CELLULAR TOXICITY

Cytotoxic effects of cannabinoids have been studied by a number of different techniques, reflecting different research interests. The principal questions addressed include the possibility of cannabis mutagenicity, carcinogenicity, and impairment of biosynthesis of nucleic acids and proteins. These have involved both *in vivo* and *in vitro* approaches.

3.1. Chromosomal Aberrations and Mutagenicity

During the past 11 years, about two dozen publications on the possible cytogenetic effects of cannabinoids have appeared (Bloch, 1982). Two-thirds have dealt with examination of human chromosomes, and the remainder with rodent chromosomes.

Cytogenetic analyses of lymphocyte cultures from chronic marihuana smokers have yielded contradictory results (Bloch, 1982). Four controlled prospective studies (Nichols *et al.*, 1974; Matsuyama *et al.*, 1976; 1977; Morishima *et al.*, 1979) involving experimental administration of 1 to 15 marihuana cigarettes a day for 5 to 13 days, gave no evidence of increased chromosomal breaks or gaps, though heavy doses gave rise to a higher proportion of hypoploid cells (i.e., cells containing a smaller than normal number of chromosomes) (Morishima *et al.*, 1979). This anomaly disappeared after cessation of smoking.

Rodent and human lung cells in tissue culture exposed to marihuana smoke *in vitro* also tended to show reduced chromosome complements, but not increased incidence of chromosome breaks or gaps (Leuchtenberger, 1982). Diverse studies with rodent cells also indicate little interference with chromosomal replication by cannabinoids (Bloch, 1982).

However, in contrast to purified cannabinoids, marihuana smoke has been reported to produce chromosomal aberrations (Leuchtenberger, 1982), hypoploidy (Leuchtenberger, 1982), mutagenicity in bacteria as demonstrated by the Ames test (Busch *et al.*, 1979; Wehner *et al.*, 1980),

and impaired development in the F_2 generation (the second generation of offspring) of treated animals (Fried and Charlebois, 1979). Studies to date have not shown cytogenetic abnormalities or mutagenic effects which are definitely attributable to cannabinoids, or unambiguously identifiable in the human population.

3.2. Carcinogenicity

Analysis of cannabis smoke, animal studies, and one clinical report suggest that cannabis may have significant carcinogenic potential. Cannabis smoke condensate ("tar") is a mutagen (Section 3.1.) and when painted on animal skin has resulted in alterations of cell development (metaplasia) in the sebaceous glands (Magus and Harris, 1971) and tumor formation (Hoffmann *et al.*, 1975). Certain naphthalenes, particularly benzopyrene, are known to be as much as 70% more abundant in cannabis "tar" than in tobacco "tar" (Novotny *et al.*, 1976). Rodents made to inhale cannabis smoke for several months show changes in bronchial epithelium that are compatible with precancerous alteration (Rosenkrantz and Fleischman, 1979).

One study of bronchial biopsies in young men who were heavy users showed histopathological changes similar to those observed in much older smokers of tobacco cigarettes who may develop lung cancer (Tennant, 1980). The combination of tobacco plus hashish smoking may have enhanced the development of precancerous lesions.

One team of investigators has studied the effects of chronic exposure to fresh whole cannabis smoke and to its gas vapor phase on human lung tissue cultures (Leuchtenberger, 1982). Cellular abnormalities developed in essentially the same sequence which occurs with tobacco smoke, and appeared to be related to component(s) of the gas vapor phase of the fresh cannabis smoke. Abnormalities in mitosis, DNA complement and chromosomal number, as well as cellular proliferation, were observed. All these changes were more severe after exposure to cannabis smoke than to tobacco smoke. In hamster lung cultures, both cannabis and tobacco smoke led to malignant transformation; both types of smoke appeared to promote rather than to initiate malignant transformation. When the malignant cells were injected into immunoresistant nude mice, fibrosarcomas developed. It has been reported that ascorbic acid protects human and hamster lung cell cultures from malignant transformation induced by cannabis smoke, but may enhance cancerous cell growth and dedifferentiation (conversion to more primitive cell forms) in human breast cancer cultures exposed to cannabis smoke. The significance of these findings is not yet clear.

At this time there is no confirmed evidence that cannabis has produced cancer in humans. Available information, however, indicates that can-

nabis has carcinogenic potential, and human users should be carefully surveyed and monitored for evidence of cancer development.

3.3. Impairment of Macromolecule Synthesis

Marihuana smoke (whole smoke) evoked a decrease in DNA content in spermatids (immature sperm) of cultured animal testis (Leuchtenberger, 1982). This alteration was not found in spermatids after exposure to the gas vapor phase of marihuana smoke, or after exposure to tobacco smoke (whole smoke or the gas vapor phase). Therefore the cannabinoids of marihuana smoke were probably mainly responsible for the alterations in DNA synthesis. Similar inhibition of DNA synthesis (decreased incorporation of ^{3}H-thymidine) has also been reported in cultured lymphocytes from human users of cannabis and from THC-treated monkeys, rats, guinea pigs, and mice, as well as in various unicellular organisms and cultured malignant cells exposed to THC *in vitro* (Munson and Fehr, 1982). Inhibition of RNA synthesis (decreased incorporation of ^{3}H-uridine) and of protein synthesis has also been reported in a similar range of preparations (Munson and Fehr, 1982).

In most of these studies, the concentration of THC added *in vitro* was 10^{-4} - 10^{-6} mol/1 which is probably well above the range of THC concentrations found in the plasma or tissue fluids of human users of cannabis. But there is some difficulty in specifying concentration of THC since its maximum solubility in water is of the order of 10^{-6} mol/1 or less (Banerjee *et al.*, 1975), so that one must suppose the "free" concentration cannot rise much above this. In plasma, THC and its first metabolite, (11-hydroxy-THC) are strongly bound (up to 99%) *in vivo* to lipoprotein or albumen. *In vitro*, the nominal concentration will be reduced by adsorption to glass and by uptake into the tissue or test material, and some of it may be bound either by protein in the culture medium, or by protein released by the tissue into the medium. The nominal concentration in such experiments must therefore be regarded as representing not "free" concentration, but the amount of THC available to be taken up by the test system. In the few studies in which tissue/medium ratios have been reported, the latter have been in the order of 100-600. The correlation of *in vitro* with *in vivo* work would be greatly aided by further study of these factors.

3.4. Possible Biochemical Mechanisms

Interference with macromolecule synthesis might result from various mechanisms; examples are failure of cellular uptake of the precursor substances, inhibition of the synthesizing enzymes, perturbation of the

cellular membranes in which the enzymes are located, blockade of receptors for hormones which modulate the syntheses, and so forth. The evidence on these points is not reviewed here for reasons outlined in Section 1.1.

Only one hypothesis is mentioned here in some detail, because it is recent and imaginative, and because it proposes a single explanation both for the deficiency in nuclear histone synthesis and for the ultrastructural alterations encountered in the leukocytes and spermatozoa of chronic human users of hashish (Issidorides, 1982). These cells are characterized by a depletion of the amino acid arginine and by abnormal chromatin condensation. According to this hypothesis, the biological effects observed in chronic cannabis users may be explained by arginine depletion which, in itself, can cause chromosomal aberrations, decreased sperm maturity and motility, defective ovulation, growth retardation, immunosuppression and the reactivation of latent viral infections, and CNS effects such as anorexia, motor incoordination, and lethargy. Furthermore, the enzymes reported to be affected by cannabis possess essential arginine residues at their active sites, which would permit a THC/arginine interaction.

4. IMMUNE SYSTEM

The immune system in humans and other higher animals plays a major role in protecting the body against bacterial, viral, and other infections against the growth and spread of body cells which have undergone transformation to a cancerous state, and against foreign proteins and many other substances. A considerable number of scientific reports deal with the effects of cannabinoids on the various main components of the immune system in humans and experimental animals. These principal components are the T-lymphocytes, the B-lymphocytes (which form antibodies or immunoglobulins), and the macrophages.

4.1. Experimental Animals

In contrast to the conflicting findings so far available in humans, there is consistent evidence that THC and marihuana administered parenterally or by inhalation induce immunological defects in mice and rats, and that rats are more sensitive than mice (Munson and Fe! r, 1982). The immunological responses that have been shown to be perturbed include:

a) humoral immune suppression in mice and rats, as measured by decreased antibody responses to T-dependent and T-independent antigens, and decreased lymphocyte response to a B-cell mitogen;

b) cell-mediated immune suppression in mice as measured by a reduction of the delayed hypersensitivity response to *corynebacterium parvum*, sheep red blood cells, oxazolone and skin allografts, and decreased lymphocyte response to the T-cell mitogen, phytohemagglutinin (PHA). The depression of PHA-induced lymphocyte response was also seen in rats and monkeys.

These effects were obtained with doses of THC which produced very little behavioral effect in the mice. However, the molecular structural requirements for immunosuppressant action are different from those for psychoactivity (Smith *et al.*, 1978), so that cannabinoids other than THC may contribute to the suppressant effect of cannabis.

The evidence that marihuana or THC can perturb monocyte or macrophage function is mixed (Munson and Fehr, 1982). Overall there appears to be a reduction in the staphylococcus-killing ability of cells obtained by bronchopulmonary lavage from animals exposed to cannabis smoke, along with a reduction in the release of lysosomal enzymes, in superoxide formation and in oxygen consumption. Decreased phagocytic activity has also been observed after exposure of lung macrophages to cannabinoids or cannabis smoke *in vitro*.

The degree of immunosuppression produced by THC is a function of the temporal relationship between the administration of the cannabinoid and the antigen. The effects are more pronounced if the cannabinoids are administered during the early phase of antibody formation (Luthra *et al.*, 1980) and are more evident in young animals (Pruess and Lefkowitz, 1978). The degree of tolerance that can develop to these effects is not yet clear.

The role of adrenal steroids in the immunosuppressive action of the cannabinoids is not clear. One study (Smith and Munson, 1976) suggests that a cannabinoid-induced increase in corticosteroid release may mediate certain aspects of the immune suppression (e.g., splenic atrophy), but not others (e.g., the inhibition of antibody formation).

4.2. Humans

At present, there is only suggestive but not conclusive evidence that consumption of cannabis or THC may produce immune dysfunction in humans as measured by the following immunological indicators (Munson and Fehr, 1982):

a) the numbers of T-lymphocytes, B-lymphocytes or macrophages
b) the functioning of T-lymphocytes, B-lymphocytes or macrophages
c) serum immunoglobulin levels.

The numerous studies in which these indicators have been used have yielded roughly similar numbers of reports of increased, decreased, or unaltered immune responses in cells from cannabis users compared to non-users.

There is suggestive evidence that T-lymphocyte function may be impaired, as measured by a reduced responsiveness to mixed lymphocyte cultures or to PHA, and reduction in the number that can form rosettes with sheep red blood cells.

There is one report that the phagocytic ability of polymorphonuclear leukocytes is impaired in subjects smoking marihuana (Petersen *et al.*, 1975). There is also one report of biochemical and ultrastructural changes in the leukocytes of chronic hashish smokers (Section 3.4.) (Stefanis and Issidorides, 1976; Issidorides, 1979).

4.3. Biological Significance

If the effects of cannabis on the immune system, as examined *in vitro*, are of biological importance, it should be possible to demonstrate that they reduce the resistance of the living organism to infection or to cancer although the latter effects might be altered by an inhibitory effect of THC on the cancer cells directly. Decreased resistance to infection by *Listeria monocytogenes* and to herpes simplex virus has been found in cannabis-treated mice (Morahan *et al.*, 1979). Since other drugs which suppress immune responses in mice also do so in humans, the apparent differences between the findings with cannabis in humans and rodents may depend merely on relative doses used. In humans, it has been reported that dormant genital herpes infections have been reactivated shortly after the smoking of cannabis (Juel-Jensen, 1972).

It can be expected that the immunosuppressant efficacy of cannabis, like that of any other immunosuppressant drug, will vary along a continuum, ranging from little or no effect against immunity to common viral infections such as influenza, up to marked suppression of resistance to unusual infections such as Listeria pneumonia in the mouse. Since immunological function is normally less effective in older persons than in younger ones (Hallgren *et al.*, 1973; Burnet, 1976), it is also possible (though not yet studied) that the immunosuppressant effect of cannabis would be appreciably greater in the elderly. The magnitude of public health consequences of such a drug effect is therefore difficult to assess. One of the problems of interpretation of these findings is the relative crudeness and high variability of the tests of immune function *in vivo* compared to those *in vitro*. It is necessary to have a high degree of immunosuppression *in vitro* before a statistically significant *in vivo* effect can be demonstrated in a small number of experimental animals. Therefore some immunologists consider the *in vitro* effects of cannabis to be without functional significance for health.

However, epidemiological observations on large populations of users should permit a clearer assessment of the biological significance of small degrees of impairment of immune function. A minor degree of im-

munosuppression in a substantial number of cannabis users might result not in any sudden and dramatic increase in incidence of unusual infections, but rather in a slight increase in incidence, severity, and duration of common ones. Cumulatively, this could have considerable significance for public health and health care delivery systems.

4.4. Cannabis As an Allergen

Cannabinoids have some allergic potential. From the few data available, it appears that allergic reactions in humans are uncommon, although cannabis use has been reported to worsen allergic symptoms in atopic persons (Tennant *et al.*, 1971). Skin tests in cannabis smokers have usually shown little or no reaction to cannabis or its constituents (Tennant *et al.*, 1971; Lewis and Slavin, 1975), although some cannabis users have demonstrated serum antibody responses to THC and other cannabinoids, suggesting that these compounds can act as haptens (Liskow *et al.*, 1971; Shapiro *et al.*, 1976). Antibodies have also been made against THC in experimental animals (e.g., Lecorsier *et al.*, 1977).

5. EFFECTS ON ENDOCRINE FUNCTION

As with the work on the immune system, fairly impressive and consistent effects of cannabis have been observed in endocrine functions in experimental animals, while only weak and inconsistent effects have been reported in humans (Bloch, 1982). It is not clear whether this represents a species difference or a consequence of differences in dosage and pattern of administration, or of clinical variation. The endocrine responses of experimental animals to most other drugs are at least qualitatively similar to those of humans, although there are exceptions to this statement. Therefore, when a particular endpoint or system reacts uniformly to cannabinoid exposure in several species of several classes, including monkeys, a qualitatively similar response in humans may be anticipated.

5.1. Methodological Considerations

A number of the hormones studied, such as testosterone and luteinizing hormone (LH), show very large, short-lived, and quite irregular variations in blood levels, independent of any regular diurnal rhythms (De Lacerda *et al.*, 1973). Therefore occasional measurements at single points in time show very wide scatter and large standard deviations in small

groups of normal subjects. In order to demonstrate reliable though small differences between groups submitted to different treatments, it is necessary to use either:

a) very large numbers of subjects, so that the standard error of the mean for the group is decreased in correspondence with the sample size, or
b) frequent or continuous sampling (e.g., by indwelling venous cannula), to estimate the true mean for each subject.

In human studies, (a) is probably not feasible for financial reasons, but (b) has been employed in the best recent investigations (e.g., Mendelson *et al.*, 1978).

In animal studies, published work has been deficient in a variety of important ways:

a) often only single doses of cannabinoids have been used, rather than full log-dose/response curves, so that the biological significance of the findings is difficult to determine;
b) *in vitro* drug concentrations may often be too high to be relevant to *in vivo* levels of cannabinoids (see Section 3.3.);
c) the duration of cannabis treatment is often variable and arbitrary;
d) the time between drug administration and hormone measurement is variable and often not stated;
e) animal strains are occasionally not specified;
f) data variance within the same study often differ widely;
g) in most experiments, cannabis-treated animals are compared with vehicle-treated controls, but for explanation of mechanisms there should also be comparisons with analogs, homologs, and derivatives of THC.

Despite these shortcomings, a good measure of agreement has been found in relation to the effects of cannabinoids on male and female gonadal and adrenal hormone production and on hypothalamic-pituitary regulation. Much less is known about the effects on other hormones.

5.2. Male Reproductive Hormones

5.2.1. *Experimental Animals*

In rats and mice, cannabinoids disrupt normal *male reproductive* physiology (Bloch, 1982). Testicular metabolic activity and *in vitro* testosterone synthesis are decreased; plasma levels of both testosterone and LH fall, and, upon chronic intake, androgenic target tissues show varying degrees of functional and morphological involution. Prolonged cannabinoid intake leads to diminished spermatogenesis. The effects of marihuana and cannabinoids on male reproductive endocrinology and on spermatogenesis are apparently reversible, since no permanent changes have been described following cessation of cannabinoid intake. These effects have

been studied mainly in immature and pubertal rats. There is a need for corresponding studies in mature male rats.

5.2.2. *Humans*

Only a few studies have been carried out with modern methods of hormone measurement. These have involved young healthy users of cannabis, either with or without controlled experimental administration of cannabis as part of the study design. A few groups of investigators have reported reduced plasma levels of LH and/or testosterone and reduced sperm counts in the users, while other groups have found no changes (Bloch, 1982). To date the difference has not been satisfactorily explained, but in view of the findings in the animal studies, it is possible that the cannabis doses in the humans have been just at or below the lower margin of the effective range.

5.3. Female Reproductive Hormones

5.3.1. *Experimental Animals*

As in the male, the acute or single administration of THC to *non-pregnant female rats* transiently inhibits functioning of the hypothalamic-pituitary-gonadal axis (Bloch, 1982). Plasma LH and prolactin levels are decreased; the pre-ovulatory LH surge is suppressed, and estrus is delayed. Chronic THC or crude marihuana extract intake seems to impair reproductive function reversibly. The uteri and the vagina show signs of morphological and functional involution, and ovarian function may be affected. Estrous cycles are inconsistently interrupted or abolished.

The few studies on monkey and other non-human primates tend to confirm a suppressive effect of cannabinoids on pituitary gonadotropin release, and the blocking of ovulation (Bloch, 1982). Too few studies evaluating other parameters have been carried out to permit even tentative inferences.

In experimental animals, THC exerts few effects unique to pregnancy (Bloch, 1982). High doses suppress or diminish the matenal weight gain normally occurring during pregnancy. THC also decreases prolactin levels, which may explain the reduced and inadequate lactation seen in the post-partum, cannabinoid-ingesting rat.

5.3.2. *Humans*

There is one preliminary report of an increased proportion of menstrual cycles that were either anovulatory or marked by an inadequate luteal phase in marihuana smoking women as compared with a group of non-users (Bauman *et al.*, 1980). Otherwise, this subject has been virtually unexplored in human females.

5.4. Adrenal Cortex

5.4.1. *Experimental Animals*

Pure cannabinoids and crude marihuana extract stimulate adrenal cortical function in rats (Bloch, 1982). Acute administration results in increased plasma corticosterone concentrations; long-term and short-term exposure lead to adrenal weight increase and thymus weight decrease.

5.4.2. *Humans*

Several studies in humans, however, have failed to show changes in adrenocortical function as a result of cannabis use or experimental administration (Bloch, 1982). Only one group (Benowitz *et al.*, 1976) has reported a decreased plasma cortisol response to insulin-induced hypoglycemia in THC-treated males. Again, the difference between the results in humans and animals may reflect differences in relative doses of cannabinoids. In the animal studies, adrenal activation was observed only after rather large doses of THC, and not proportionately at all doses. Therefore, it may reflect a non-specific stress response, above a certain threshold dose, as has been reported with alcohol (Stokes, 1971; Kakihana and Butte, 1979). In the human studies, the doses used may not have been high enough to produce this.

5.5. Other Hormones

Very little information exists on the effects of cannabis on other endocrine secretions. Several animal studies have shown reduction of circulating thyroxine or triiodothyronine levels after acute or chronic administration of THC, but this has not been confirmed in humans (Bloch, 1982). Plasma growth hormone levels have shown variable responses to THC, according to the age of the rat and route of administration (Bloch, 1982). There is one report of decreased growth hormone response to insulin injection in humans taking THC by mouth (Benowitz *et al.*, 1976).

5.6. Locus and Mechanisms of Action

Experimental animal studies have revealed the primary locus of cannabinoid action in the brain, probably in the hypothalamus (Bloch, 1982). Cannabinoid stimulation of the adrenal cortex can be abolished by agents and procedures which block pituitary ACTH production, while LH-releasing hormone will stimulate pituitary LH release in the THC-blocked rat.

Crude marihuana extract and THC probably also exert a direct inhibi-

tory effect on gonadal and adrenal cortical function. This is especially true for the testes, where *in vivo* and *in vitro* experiments have demonstrated an inhibition of testosterone synthesis, perhaps via reduced cholesterol esterase activity. Another possible mechanism is inhibition of testicular synthesis of prostaglandin E which is involved in mediating trophic hormone effects. Diminished metabolic activity and decreased macromolecule synthesis in testes following exposure to cannabinoids may explain the reduced spermatogenesis observed after cannabis intake.

Repeated administration of cannabinoids may result in a direct effect on the uterus, and possibly also on prostate and mammary gland tissue (Bloch, 1982). Interpretation of the data is made difficult by the fact that some investigators have used cannabis extracts while others have used THC. These preparations differ with respect to their respective dose-response relations for each effect. If direct effects exist, they occur at larger doses than are needed to produce indirect effects (e.g., via actions on the hypothalamus and the pituitary), and may reflect a more general toxicity.

The molecular mechanism of cannabinoid action remains to be elucidated. It must also be remembered that marihuana contains other components which may have activity with quite different loci of action.

6. REPRODUCTION AND DEVELOPMENT

The effects of cannabinoids have been investigated to a very limited extent on aspects of reproduction and development other than the endocrine aspects mentioned in Section 5.

6.1. Sexual Behavior

Although there are descriptive references to decreased potency, sexual activity, and fertility of males in India, North Africa, and other regions of the world (e.g., Chopra and Chopra, 1939; Bouquet, 1951), attributed to heavy use of cannabis, these observations are not accompanied by any investigation adequate to support a causal link. In more recent field studies, both the users and their spouses indicated that sexual behavior was normal, but the users stated that they often smoked cannabis in order to prolong or be able to enjoy coitus (Page and Carter, 1980). A few experimental studies have reported decreased sexual reflexes and increased latency to mount in male rats (e.g., Corcoran *et al.*, 1974).

Clearly, the effects of cannabis on sexual behavior require considerably more systematic research.

6.2. Fertility

In animals, fertility in males and females has not been significantly altered by sub-chronic or chronic treatment with THC or cannabis extracts (Grilly *et al.*, 1974; Wright *et al.*, 1976).

In one study in humans, it was claimed that sterility was twice as common among chronic cannibis users as among the general population (Chopra and Chopra, 1939). However, there is no consistent evidence of decreased fertility, as indicated by the number of offspring of males who are chronic cannabis users (True *et al.*, 1980). Fertility has hardly been studied in female users of cannabis. If, as preliminary studies suggest, ovulation is suppressed by THC treatment, fertility would be adversely affected.

6.3. Teratogenesis

Any drug could potentially affect fetal development in two ways. First, exposure to a mutagenic agent prior to conception could alter the germ cells of the male or the female and thus influence the expression of the genes in the offspring. Cytogenetic effects of cannabis have been reviewed in Section 3.1. As noted there, it seems doubtful that crude cannabis extracts or THC are mutagenic in humans, although pyrolysis products present in cannabis smoke may have mutagenic activity.

Secondly, if exposure occurs during pregnancy, drugs can produce direct toxic effects on the fetus. THC administered to pregnant rodents results in a concentration gradient of mother > placenta > fetus (Bloch, 1982). The placenta takes up THC more avidly than the fetal tissues do, but releases it only slowly. This makes the placenta potentially a barrier against, but also a reservoir for, THC transfer into the fetus. A THC-induced disruption of placental development or function as suggested by preliminary observations of Sassenrath *et al.* (1979) may be significant, and could contribute to abnormalities in the fetus.

Cannabinoid administration during the first two-thirds of gestation is associated with increased frequency of fetal resorption and decreased birth weights in mice, rats, rabbits, and hamsters (Bloch, 1982).

There are three reports that the administration of large doses of THC to mice during the critical periods of palate and brain development correlates with increased frequency of cleft palate and exencephaly respectively (Mantilla-Plata *et al.*, 1975; Joneja, 1976; Bloch *et al.*, 1979). Cannabinoid-exposed hamsters also had an increased incidence of malformations (Geber and Schramm, 1969). Other reports of cannabinoid-induced malformations cannot be considered as definitive, and the majority of studies in these species have demonstrated no significant teratogenicity. Cannabis extracts may contain constituents other than THC which are teratogenic. The few reports of teratogenicity in rodents

and rabbits (Bloch, 1982) indicate cannabinoids to be, at most, weakly teratogenic in these species, and the activity, if any, may reside in cannabinoids other than THC, or in non-cannabinoid constituents of cannabis or cannabis smoke.

The teratogenic potential, however, has never been accurately assessed in humans. A major prospective study (Zuckerman *et al.*, 1981) now in progress, should provide valuable information in this area.

6.4. Post-Natal Development

Drug effects on post-natal development may be exerted through alterations in ability of the lactating mother to feed the young adequately, through alterations in other maternal behavior towards the young both during lactation and after weaning, and through tissue alterations in the offspring themselves as a result of drug exposure *in utero* and/or via the milk. In animals, and presumably in humans, cannabinoids can cross the placenta, and are also secreted in the milk (Chao *et al.*, 1976).

There has been very little systematic study of cannabis effects on general maternal behavior toward the offspring. However, animal studies have shown repeatedly that cannabis can impair lactation, probably by central actions leading to reduced prolactin output. This results in neonatal malnourishment, unless cross-fostering procedures (i.e., allowing untreated mothers to rear drug-exposed offspring) are used; consequently there is retardation of weight gain and skeletal growth, and increased neonatal mortality. A clear-cut maldevelopment of any other type such as delayed eye opening or incisor eruption is less often reported (Bloch, 1982). Follow-up observations, now in progress, of babies born of mothers who have smoked cannabis during pregnancy will be informative in this regard (Fried, 1980).

A major concern is the possibility of retardation of later juvenile maturation and development as a result of either *in utero* exposure or early commencement of cannabis use by children and adolescents. This has been until now an almost totally neglected research field and requires specific attention.

7. EFFECTS ON NERVOUS SYSTEM FUNCTION

7.1. Effects of Cannabis on Behavior

7.1.1. *Acute Effects on Intellectual Functions*

The effects of any drug on behavior are markedly influenced by a wide variety of factors, both within the individual user and derived from the

environment at the time of testing. This is just as true of cannabis as of any other psychoactive drug. Consequently the picture of effects seen in any given instance depends on the relative contributions of the drug-specific effects (which are relatively predictable and reproducible) and of the individual and environmental influences (which are much more variable and less predictable). As a result, the behavioral effects of low doses of cannabis are relatively non-specific and can show extensive overlap with those of amphetamines, opiates, hypnosedatives, and alcohol. In contrast, at high doses the cannabis effects are much more characteristic and identifiable. This is true not only for behavioral effects, but also for neurotoxicity and psychiatric effects, which are discussed in the following sections of this report.

In studies with rodents, dogs, and monkeys, behavioral profiles reveal a biphasic dose-effect and time-effect relation of cannabis and of THC. At low doses, hyperactivity and hypersensitivity (particularly to auditory and tactile stimuli) are evident, and there is synergism (mutual enhancement) with the corresponding effects of amphetamines and of low doses of opiates. At higher doses, ataxia, hypomotility, stupor, or coma are encountered, and the corresponding effects of other central depressant drugs are enhanced (Rosenkrantz, 1982). Biphasic patterns of changes in spontaneous activity related to both time and dose have also been described repeatedly in humans (Jones, 1980).

These changes do not, in themselves, constitute adverse effects; rather, they are the characteristic features of intoxication with cannabis. They are adverse effects only when they compromise the health or safety of the user or of others, by impairing the user's ability to carry out necessary cognitive-perceptual or psychomotor functions. The main conclusions concerning the effects of cannabis on these functions can be summarized as follows (Klonoff, 1982):

a) A host of studies have demonstrated impaired functioning on a variety of cognitive and performance tasks during marihuana intoxication;
b) impaired memory, altered time sense, and decrements in performance on a number of tasks — such as those involving reaction time, concept formation, learning, perception, motor coordination, attention and signal detection — are commonly described in the literature;
c) in most laboratory studies, the duration of measurable memory alterations is a few hours after a smoked marihuana cigarette. However, for some marihuana smokers, there may be more lasting problems with transfer of new information into long-term memory storage;
d) greater appreciation has developed for the need to study a range of doses on a variety of cognitive tasks before trying to describe the effects of marihuana. For the most part, impairments are dose-related but there are apt to be multiple marihuana effects depending on the exact demands of the task; for example, performance on some cognitive tasks might even improve when low doses are used;

e) high motivation to perform well can be enhanced by incentives (e.g., more money for correct responses) and this enhancement can decrease some marihuana effects.

7.1.2. *Acute Effects on Driving Skills and Driving Performance*

Retrospective sources of information concerning the effects of cannabis on driving include:

a) self-reported experiences and perceptions of users
b) anecdotal reports by investigators
c) data collected after accidents or traffic violations.

On the basis of such accounts, there appears to be a consensus that marihuana can, and often does, impair driving ability and actual driving performance (Klonoff, 1982). There has been growing evidence that marihuana, used alone or in combination with alcohol and other drugs, is implicated in traffic accidents and fatalities (Woodhouse, 1974; Sterling-Smith, 1974; Cimbura *et al.*, 1980). The nature of this implication, however, is less than clear. Toxicological data, including measurement of cannabinoid metabolites in the urine, may mean only that the person has used cannabis at some relatively recent time (hours to days) before the time of sampling (Rubenstein, 1979). Such information obviously provides no causal link between the drug use and occurrence of an accident. Much greater attention must therefore be given to prospective studies of cannabis effects.

Prospective methods of investigation include:

a) psychomotor tasks that are presumed or known to be related to driving skills
b) driving simulators
c) traffic-free driving test courses
d) road tests under actual traffic conditions.

Psychomotor tasks can test only specific subsets of the complex behavioral demands for driving. While many such studies have reported dose-related impairment of driving skills by cannabis, there is a real question about generalizability to actual driving situations.

Driving simulators have the advantage of permitting control of many variables, but are nevertheless subject to experimental artifacts. The studies to date have operationally defined variables such as speed errors, accelerator errors, brake errors, risk-taking in terms of passing, passing-time judgments, and visual signal detection (Klonoff, 1982). Dose-related effects of cannabis on most of the measures employed have been reported, but again there is a question about generalizing to real-life driving since most of the emotional and motivational factors in real-life driving performance are missing from the simulator tests. Three published studies (LeDain, 1972; Smiley *et al.*, 1974; Hansteen *et al.*, 1976) have reported cannabis dose-related impairment of driving performance. Skilled drivers,

on traffic-free test courses, have reiterated errors similar to those observed in driving simulators.

The most sophisticated study (Klonoff, 1974), and probably the most relevant, is an investigation of actual driving in downtown rush-hour traffic, in cars with dual controls to permit the observer to make the corrections required for safety. Experienced drivers were tested under placebo, small and moderate doses of marihuana, in a double-blind crossover design. Composite driving performance was improved in some cases, unchanged in others, and worse in the majority, compared to the pre-dose control period. However, the number of those who improved or remained unchanged under marihuana was smaller than under placebo, while the number who deteriorated under marihuana was larger than under placebo, and the shift was significantly greater with the higher dose of marihuana.

These findings provide a striking demonstration of the ability of even small doses of marihuana to impair driving ability. Whether or not this is translatable into the production of automobile or airplane accidents will obviously depend upon the degree of impairment relative to the margin of safety between the situational demands and the operator's remaining skills under the drug. There is a need for independent replication of this work, preferably with inclusion of higher test doses, and combinations of cannabis with alcohol and other drugs. Night driving studies should be included, if possible. It is also not known to what extent the degree of impairment observed in these studies might be modified by cannabis tolerance, and by the age and experience of the driver.

7.1.3. *Chronic Effects on Behavior*

7.1.3.1. Experimental animals. Animal studies have indicated that chronic exposure to cannabis can modify the acute behavioral effects not only by the development of tolerance (see Section 9.2.2.) (Jones, 1982), but also by the sudden appearance of new manifestations of behavioral change after several months of administration (Rosenkrantz, 1982). Prominent among these in rats and monkeys are irritability on handling, and increased aggressiveness between animals of the same or other species. Not all investigators have observed these changes, and in some species (e.g., dog) weakness and lethargy have predominated. Therefore it might be questioned whether the aggressiveness is a specific effect of cannabis inhalation or a non-specific result of repeated exposure to noxious stimuli. The relative lack of aggressiveness in control rats exposed to the noxious stimulus of smoke from cannabinoid-free marihuana tends to support the view that there is a specific drug effect (Luthra *et al.*, 1976).

7.1.3.2. Humans. In humans, a number of studies have indicated cannabis-induced impairment of short-term memory by interference with the acquisition and storage phases rather than with initiation and recall (Ferraro, 1980; Klonoff, 1982; Mendelson, 1982). This appears to involve

lack of concentration on the task, and may be modified by specific motivational factors. These effects on memory appear to persist undiminished through a three-week period of daily smoking of marihuana under experimental closed-ward conditions (Rossi *et al.*, 1977). Speech and interpersonal behavior have shown only slight and subtle changes under marihuana (Mendelson, 1982), but the observations have been made only during single sessions or relatively short-term repeated observations. The field studies of long-term heavy users so far conducted have shown no major changes in social behavior (Rubin and Comitas, 1975; Fink, 1977; True *et al.*, 1980), but there are deficiencies of design in these studies, as described in Section 9.3.3.

7.2. Neurotoxicity

It is difficult to avoid arbitrariness in distinctions between behavioral effects of a drug, and drug-induced neurotoxicity. For the purposes of this report, "neurotoxicity" is used to refer to functional aberrations that appear to be qualitatively distinct from those which are characteristic of the usual pattern of reversible acute and chronic effects, and that might be caused by identified or identifiable neuronal damage.

7.2.1. *Experimental Animals*

7.2.1.1. Chronic exposure. In animal studies, two alterations of behavior have been noted to appear during the course of prolonged periods of cannabis treatment (Rosenkrantz, 1982). Sixty percent of rats exposed repeatedly to cannabis smoke for five weeks or longer develop a pattern of sudden vertical jumping which has been labelled the "popcorn reaction" (Luthra *et al.*, 1976). This is also seen in young animals exposed chronically to cannabis *in utero*, and then challenged with a single small dose of THC at 30 days of age (Rosenkrantz, 1979). Electrical and motor seizure activity have also been noted in several studies (Rosenkrantz, 1982), but the definition of abnormal spike-like wave forms reported in the EEG of the cannabis-treated animals have not been defined according to rigorous criteria, and the frequency has not been assessed quantitatively. Nevertheless, the claims of neurotoxicity during chronic cannabis exposure raise the possibility that long-lasting residual changes might be found.

7.2.1.2. Residual changes. Animal studies have shown no effect of chronic cannabis administration on brain weight or histology as evident under the light microscope (Fehr and Kalant, 1982). There has been one claim (Heath *et al.*, 1980) of residual alteration of synapses in the septum, hippocampus, and amygdala, as revealed by electron microscopy, but technical objections have been raised to this work (National Academy of Sciences, 1981) and the reported alterations are not easily quantifiable in statistical

terms. EEG observations in animal studies have shown the possible occurrence of withdrawal effects (Fehr and Kalant, 1982), and three reports suggest the occurrence of long-term residual abnormalities in EEG tracings from the cortex and hippocampus of cats (Barratt and Adams, 1972), rats (Fehr *et al.*, 1976; 1979), and monkeys (Heath, 1976) exposed to long-term treatment. However, these also lack critical quantitative analysis. There is only one group reporting diverse residual neurochemical changes after long-term cannabis treatment (Luthra *et al.*, 1975a; 1975b; 1976) and the functional significance of the findings is not at all clear.

Most studies of post-drug behavioral changes in chronically treated rats have been carried out too soon after the last drug administration to prove whether any residual effects are long-term ones or merely the slow disappearance of intoxication. However, two laboratories have reported decreased learning ability months after the end of long-term treatment (Radouco-Thomas *et al.*, 1976; Fehr *et al.*, 1976; 1979; Stiglick and Kalant, 1982a; 1982b).The alterations found raise the possibility of changes in the hippocampus, since the tests used include conventional and radial maze learning, operant behavior involving time discriminations (DRL schedules or differential reinforcement of low rates of responding), open-field exploration, and two-way shuttle box avoidance learning; correct performance of these tests is dependent on spatial orientation or on response inhibition, both of which are believed to depend heavily on intact hippocampal functions.

7.2.1.3. Prenatal exposure. Several studies of prenatal exposure have indicated that the offspring of cannabis-treated animals show small delays in various stages of post-natal development, such as eye-opening, reflexes of several types, and open-field exploration (Fehr and Kalant, 1982). However, the development appears to be back to normal by several weeks or months after birth. This could mean either that no residual damage was present, that remaining damage was too slight to be detected by available measures, or that plasticity of nervous system organization in the newborn permitted adequate compensation for the loss of function of any damaged cells. Charlebois and Fried (1980) reported that the retarded development did not occur in groups of cannabis-exposed rats that were fed an enriched protein diet during pregnancy. This suggests that prenatal nutrition (possibly mediated by cannabis-induced anorexia) is a factor in the development of post-natal deficits.

7.2.2. *Humans*

7.2.2.1. Amotivational syndrome. Numerous clinical reports from several countries have described heavy, chronic cannabis users who exhibit behaviors that some observers have labelled "amotivational syndrome"

(Fehr and Kalant, 1982). Included in the various descriptions of this syndrome are the following characteristics: apathy; reduced drive and ambition; impaired ability to carry out complex tasks; failure to pursue long-term plans; reduced tolerance to frustration; diminished communication skills; neglect of personal appearance; and sluggish mental responses. The syndrome takes several weeks to clear after the termination of drug administration. This fact suggests that the symptoms are related to CNS changes rather than to the continued presence of THC. Since no estimations of plasma or tissue THC levels in chronic users are available, the actual mechanism cannot be resolved. A variety of clinical studies and reports in the past decade clearly reveal, however, that the "amotivational syndrome" is neither diagnostic of, nor specific to, chronic cannabis use. The signs and symptoms of the "amotivational syndrome" are essentially those found with chronic intoxication with a number of psychoactive drugs, particularly those that are sedative-hypnotic in nature. It may, therefore, be more appropriate to refer to "chronic cannabis intoxication" and discard the non-specific term "amotivational syndrome."

At this time the dosage of cannabis or the frequency and duration of cannabis exposure required to produce chronic intoxication are not precisely known. Well-controlled clinical studies and close clinical observations (Mendelson, 1982), however, indicate that this picture is not particularly common. In addition, personality and concomitant drug-use factors make it difficult to diagnose this state, or to specify that cannabis, per se, may produce alterations in motivation.

7.2.2.2. Residual brain damage. Human studies after the end of a period of chronic intoxication with cannabis have generally yielded no evidence of residual brain damage. There has been one report of cerebral atrophy, as indicated by air encephalography, in young cannabis users complaining of a variety of neurological symptoms, including memory and cognitive dysfunction (Campbell *et al.*, 1971). However, no atrophy was found in later studies in which computer-assisted tomographic (CAT) scans were performed in young cannabis users who were not also regular users of other drugs, and who were totally asymptomatic (Kuehnle *et al.*, 1977; Co *et al.*, 1977). CAT scans also failed to demonstrate cortical atrophy in monkeys treated chronically with cannabis extract by mouth (Rumbaugh *et al.*, 1980).

Most studies which have compared the performances of chronic users and controls in neuro-psychological tests have failed to elicit significant differences. Significant cognitive deficit is not a commonly demonstrated effect of chronic use of cannabis in clinically healthy subjects. However, to provide an appropriate comparison, most daily users of alcohol are healthy and do not show cognitive deficits, even though such abnormalities are common in clinically diagnosed alcoholics (Parsons and Farr, 1981; Wilkinson and Carlen, 1981). Therefore, it is clear that studies on

relatively small samples, such as are at the moment available for cannabis, cannot be expected to rule them out.

The overall conclusions from a review of this literature are hampered by a general inadequacy of reported data, especially in the clinical studies, which have often been characterized in the past by poor sample size and selection; poor or no differentiation between intoxication, withdrawal, and residual change; and an absence of before-and-after longitudinal studies of regular users. The animal studies which revealed long-lasting impairment of learning ability after a period of chronic cannabis treatment raise the clear possibility that residual long-lasting damage can be caused by cannabis, but a decision as to whether or not it does occur in humans will probably have to await the performance of adequate confirmatory studies on brains from long-term users

7.2.2.3. Prenatal exposure. In a follow-up study of a small number of babies exposed daily or less frequently to marihuana *in utero*, Fried (1980) observed dose-related abnormalities in responses to visual stimuli and an increased prevalence of irritability, tremor, and startles as compared to a group of non-exposed controls. Since the babies were observed only at two or three days post-partum, the described symptoms may have been the manifestation of a neonatal abstinence syndrome of the type described for a variety of CNS depressant drugs (Finnegan and Fehr, 1980). Ongoing assessments of these, and additional children, should yield information on the persistence and significance of these symptoms.

7.3. Psychiatric Effects of Cannabis Use

7.3.1. *Acute Consequences*

Acute panic and paranoid states are the most commonly observed short-term adverse psychological effects of cannabis use (Negrete, 1982). The validity of these conditions is no longer questioned, as they have been seen both in clinical settings and in laboratory experiments. The marked difference in frequency with which such problems are reported in different countries, and the diminishing frequency of clinical reports on this type of reaction in Europe and North America, tend to support early contentions that they may be due mainly to adverse social conditions and the user's lack of experience. Alternatively, the decreased frequency of such reports might be due to loss of novelty, and therefore decreased incentive for physicians to describe additional cases in the clinical literature. Nevertheless, it has now been satisfactorily demonstrated that setting alone does not explain their occurrence. Additional work is needed to identify the intervening pharmacological, neuro-physiological, and psychopathological factors.

Other acute reactions of increasing clinical relevance are severe

dysphoric states which have been observed in the course of THC therapy (e.g., Shiling *et al.*, 1980). Such reactions were described frequently in the clinical literature at the turn of the century when therapeutic use of cannabis extract was common. A concerted effort must be made to develop specific treatment procedures with a view to preventing or minimizing these untoward psychiatric side-effects, especially in older subjects.

7.3.2. *Problems Related to Chronic Use*

These are seen mainly in younger users, principally males. This may be more a reflection of the criteria for defining "problems" or "cases" than of real differences in fr uency of occurrence in different groups of users. The problem of "amotivational syndrome" has been covered in Section 7.2.3. The most important other chronic psychiatric complication is that of cannabis-related psychosis.

The only cannabis-induced psychosis picture which is supported by sufficient evidence to this moment is a short-lasting condition — from a few days to four weeks — with symptoms of mental confusion, memory impairment, regressive and impulsive behavior, delusional formations, and sensory-perceptive distortions (Negrete, 1982). The frequency of occurrence in Western societies is quite low, and it seems to affect mainly very heavy users. A commonly found predisposing factor is a high degree of premorbid personality disturbance. This condition can be expected to show a rising incidence as the numbers of daily and heavier users in the population increase. More research is needed to identify risk factors other than excessive use.

A highly relevant area of research where current data are clearly too limited, is the problem of cannabis influence on independently occurring psychiatric illness. The evidence already available, however, is sufficient to warrant large-scale prospective studies on the effects of cannabis on the phenomenology of some of the most prevalent psychiatric disorders, in terms of both symptomatology and evolution (Negrete, 1982). Also, specific research is urgently needed on the interaction between cannabis and chemical agents commonly used in psychiatric pharmacotherapy, including its possible influence on therapeutic response.

7.3.3. *Flashback*

Most of the evidence available on the recurrence of drug-related symptoms during abstinence (flashbacks) originates from self-report answers to rather imprecise questionnaire surveys, and from subjective descriptions given by individuals who believe they have experienced flashbacks (Negrete, 1982). The systematic phenomenological analysis of this clinical condition has been largely neglected, and controlled studies of the intervening etiopathogenic factors do not appear to have been carried out up to the present.

7.3.4 *Cultural Influences on Cannabis Use and Its Consequences*

7.3.4.1. Social role of cannabis and social control of its use. The most prevalent purpose of cannabis use in most cultures appears to be the recreational one, both in societies where it has been practised in a traditional manner and in those which have only recently adopted it. Medicinal and ceremonial/ritual patterns of use have also been observed, but clearly more in non-industrial than in industrialized societies (Mohan, 1982).

There appear to be major cross-cultural differences in the type of population involved in cannabis use at this time. Poorer, older, and more predominantly male sectors are typical in non-industrialized societies (Mohan, 1982). In industrial countries sex differences are relatively minor and the use tends to be confined to adolescents and young adults (Smart, 1982).

However, as is the case with other drugs of abuse, there seems to be an incipient trend towards universalization and homogenization of cannabis use patterns. Patterns in other countries are tending toward the North American picture, particularly in larger urban populations around the world (Mohan, 1982).

There are cross-cultural differences in setting of use, type of cannabis preparations preferred, route of intake, dose levels, and the concomitant use of other psychoactive agents. Oral ingestion, for instance, is more prevalent in societies in which cannabis use is traditional. Such societies appear to attribute great importance to the variations in the psychoactive potency of the different cannabis preparations in use. Social reaction towards use may vary in accordance with the type of product involved. In India, for example, there is considerably more social lenience towards the use of cannabis leaf material than to that of resin. In the past, social control mechanisms have varied cross-culturally in accordance with local social perception of use. To the extent that legal controls come to be determined by national and international perceptions and agreements, such variations tend to disappear. It is conceivable that the repeated use of cannabis would be perceived as a greater threat in the more industrialized societies, where individuals are under higher pressure in regard to productivity and mental performance.

These differences in patterns of use and level of social acceptance probably infuence the levels of use and the expectations of drug effect. Therefore they may also be expected to affect the types and incidence of various behavioral and health consequences of cannabis use.

7.3.4.2. Behavioral effects. The available literature includes reports of cultural variations in the behavior of individuals under the effects of cannabis (Rubin, 1975). Attitudes varying from aggression, psychomotor agitation, and delinquent tendencies, to passivity and easier conviviality have been recorded as typical of cannabis effects in different parts of the world. Most such differences are likely to be determined by factors other

than the pharmacological action of the drug and should be scientifically re-examined. Another item that requires exploration is the possibility of ethnic variation in drug response, which has not yet been studied systematically with respect to cannabis.

7.3.4.3. Psychiatric consequences. It is quite possible that there is less cross-cultural variation in the psychiatric consequences of cannabis use than was previously believed. The higher frequency of "cannabis psychosis" observed in North Africa and India, for example, may soon disappear as the validity of this diagnosis is being questioned and the use of this term is being abandoned in that region. However, the difference in prevalence of dose-related acute reactions is likely to remain as long as there are major cross-cultural differences in the potency of cannabis preparations used.

7.3.4.4. Neuropsychological testing. At present, there is no satisfactory evidence that culture in itself may explain variations in neuropsychological test performance, provided that the tests have been properly validated in each population where they have been used.

8. EPIDEMIOLOGY

8.1. Sources of Information

A large number of studies mainly in developed countries have produced a variety of data about cannabis use. Among the most common epidemiologic sources are those listed below:

Self-report surveys of users
Observations of users
Official registration and notification records
Studies of special populations of high risk groups
Hospital, clinic, and emergency service admissions
Arrest and conviction records
Social and welfare agency records
Production and seizure records.

All of these sources of information are potentially able to give relevant and good information, although each has certain clear limitations with respect to the specific groups studied, which do not always allow generalized interpretations.

Various methodological defects impair the accuracy and uniformity of data collection, especially from self-report studies and from routine statistics of health care delivery systems. Clinical patients represent a self-selected population. Where cannabis use is illegal, it may not be reported

by the user with a health problem for fear of self-incrimination, unless confidentiality of medical records is guaranteed. In emergency treatment services, the need for prompt treatment often interferes with thorough collection and recording of information on drug use, especially when the ratio of treatment staff to case load is low. High turn-over of staff may create major difficulties for systematic data collection, unless there is continuous training of new personnel and use of specific incentives for accurate recording of histories. Nevertheless, information from such sources may give useful indices of the relative magnitudes of problems related to different drugs. More detailed discussion of these questions, and specific recommendations for steps to solve them, are contained in a recent report of the WHO Expert Committee on Implementation of the Convention on Psychotropic Substances, 1971 (1981).

Despite the shortcomings in the accuracy and uniformity of data collection, and the low quantity and quality of data in some countries, much is known about incidence and prevalence of cannabis use (Smart, 1982). However, there is less epidemiological knowledge about the adverse health consequences of cannabis use. This is not surprising, since the effects described in Sections 2 to 7 of this report are not specific to cannabis in the sense that Laennec's cirrhosis is fairly specific to alcohol (Schmidt, 1977). Therefore the diagnostic entities themselves cannot be used retrospectively as indicators of hazardous levels of cannabis use in a large population.

For this reason, assessment of the contribution of cannabis to the production of public health problems will require (a) long-term prospective studies of sufficiently large groups of users and non-users to measure the comparative incidence and prevalence of various adverse effects, and (b) large-scale retrospective correlational studies, similar to those on tobacco cigarette use, when details of cannabis use have been recorded accurately in hospital case records for long enough to provide a suitable body of statistical data. Until such studies are carried out, we can have only rough impressions, at best, concerning the real magnitude of cannabis-related health problems.

The value of individual case reports (which are sometimes dismissed as "anecdotal" evidence) should not be overlooked. With cannabis as with any other drug, relatively uncommon but potentially serious untoward effects are usually identified first by astute clinicians and published as case reports. When attention has thus been drawn to a possible problem, it may then be possible to devise experimental studies of causal mechanisms, and large-scale statistical analyses.

8.2. Epidemiological Findings

8.2.1. *Studies on Distribution of Cannabis Use*

In general, recent epidemiological studies in developed countries

(Smart, 1982) indicate that:

a) In most countries that have been surveyed, cannabis has been used by about 17-19% of the general population. Among the student populations, rates of "ever used" vary from less than 1% (Belgium) to more than 50% (USA), with most countries falling in the range of 23-32%. In both student and general populations, the proportion of daily users ranges from less than 1% to more than 11%, with the student groups tending toward the upper end of the range. The apparent average for the countries surveyed was 3-4%.

b) In most countries with good trend studies (Canada, USA, Australia) cannabis use has increased greatly since the late 1960s, i.e., the proportion of users has increased by a factor of 3 to 5. There are some recent signs of stabilization in use over the past few years in Mexico, the USA, and Norway.

In developing countries (Mohan, 1982) the picture is much less clear. Use of cannabis is widespread in Africa, the Middle East, southern and southeastern Asia, Hong Kong, and the Philippines, both among lower socio-economic groups (agricultural and urban laborers, taxi and lorry drivers) and in affluent upper-class groups (adults as well as students). However, there is a scarcity of sound epidemiological studies of general populations, hospital/clinic patients, and selected population groups.

The main reasons for the scarcity of studies appear to be lack of finances and trained people to carry out the surveys, and the relatively low priority allotted to cannabis in the health sector, both nationally and internationally. Nationally, more urgent health problems, such as communicable diseases, nutrition, and sanitation, make stronger demands on scarce resources. Internationally, the Geneva Single Convention laid greatest emphasis on control and movement of opiates across national boundaries rather than of drugs such as cannabis.

One important aspect of use in some developing countries is the difference between socially sanctioned limited use of cannabis for ceremonial purposes, and socially unsanctioned regular use. In India, for example, the great majority of the Hindu population participates in ceremonial use, as in the festival of Shiva (Hasan, 1975), but regular self-administration is carried on by only a small fraction of the population (Mohan, 1982). If the unimodal distribution-of-consumption curve holds for cannabis in the same way as for alcohol, India would be expected to have a very low modal *per capita* mean daily consumption and a very low percentage of users employing large amounts, despite the availability of potent preparations. In contrast, in North America and Europe the absence of a prescribed social role for cannabis, and of traditional social controls of use, might pose a much greater risk of hazardous consumption as potent preparations become more widely accessible.

8.2.2. *Epidemiology of Adverse Effects of Cannabis*

Knowledge about the frequency of various adverse reactions to cannabis is difficult to assemble. The epidemiologist would like to know how often adverse reactions occur, in what types of users, and to identify the explanatory variables such as cannabis dose, previous drug use, and psycho-social characteristics (Smart, 1982). The epidemiologist would also like to know if there is a "safe" (non-harmful) dose of cannabis, and whether some users are *not* at risk for adverse consequences. Answers (such as they are) to these questions typically come from studies not ideally designed to answer them. Nevertheless we might be able to accept the following tentative conclusions about adverse reactions (Smart, 1982):

a) No studies of general populations have determined the rate of adverse reactions serious enough to require treatment or hospitalization. So far, no studies have been made of adverse reactions, whether of a serious or non-serious nature, in general *adult* populations of cannabis users.
b) Usually, studies of cannabis effects on biochemical and neurological functions give very little information on the frequency of adverse reactions to be expected in large populations of users (and, of course, were not designed specifically to do so). Typically, such studies use a selected and narrow range of the cannabis-using population as subjects, mainly young males experienced with cannabis. The sample sizes are usually small (less than 100), and hence the chances to detect uncommon forms of adverse consequences could be quite small.
c) The total number of patients with psychological adverse reactions reported from treatment facilities is not great for a drug used as extensively as cannabis. Unfortunately, this information does not permit calculation of a rate of incidence of such reactions. However, the low number reported suggests either that *serious* psychological disturbances from cannabis use are not common among users in general, without telling us just how uncommon, or that a large proportion of such cases is not reported in the literature.
d) Most of the reported adverse cases come from the USA; cases from outside the USA represent only about 42% of the total. That cases from the USA are over-represented should be expected, because rates of cannabis use and heavy use are higher there than in other Western countries.
e) More cannabis-related psychological problems have been reported for males than females, and for persons under than over 21. The ratio is about 3 males for 1 female, even when the survey studies with all-male military samples are deleted. The ratio of overall and daily use for males and females in the USA, at least among young persons (from which most clinical cases of adverse reactions come), is about 1.5:1. There is a clear suggestion that female users and older persons are at lower risk than young male users for serious psychological conse-

9.1. Dose-Response Relationships

9.1.1. *Pharmacokinetics of THC*

When inhaled in smoke, THC is absorbed rapidly from the lungs. Peak blood levels are reached within minutes of the beginning of smoking, and decline very rapidly to about 5-10% of their initial level within one hour, even though the subjective symptoms of intoxication may persist for 2-3 hours and the objective signs, even longer (Jones, 1980). After oral administration, an equivalent dose of THC is absorbed more slowly, producing a less intense intoxication with a longer latency of onset and a longer duration than after smoking. The decline of blood levels of THC is due to rapid conversion of THC (mainly in the liver) to the psychoactive metabolite 11-hydroxy-THC and numerous other metabolic products of little or unknown biological activity (Gudzinowicz *et al.*, 1980). THC and its metabolites are also rapidly sequestered by the fatty tissues. These compounds are then released back into the bloodstream over a period of several days; this phenomenon slows the elimination of cannabinoids from the body. In experienced users, the terminal half-life of THC (a measure of the rate of biotransformation and elimination) is 19 hours, and of its metabolites about 50 hours (Hunt and Jones, 1980). In the human, elimination of the metabolites occurs mainly through the feces, although detectable amounts are also present in urine.

9.1.1.1. Correlation of cannabis-induced effects with blood levels of THC. Because of the rapid sequestration of cannabinoids into fatty tissues, the tissue:blood ratio of these compounds is not constant. Unlike the situation with alcohol, one cannot expect the blood levels of THC to be a good predictor of biological effects (Jones, 1980). In the absence of tolerance, brain levels of psychoactive cannabinoids in the appropriate but as yet unknown subcellular fraction would provide the only estimate that could be expected to correlate with behavior. Measures of blood levels of THC may have some value, however. If, for example, the relevance of different routes of administration, or patterns of use, to peak or average blood levels can be established, blood level determinations may be more reliable than estimates of administered dose for the cross-cultural comparison of adverse effects in heavy users (Petersen, 1979).

9.1.1.2. Relevance of tissue sequestration to toxicity. Because of the sequestration of cannabinoids, THC or its biologically active metabolites could theoretically accumulate in fatty tissues during chronic or intermittent administration (Jones, 1980). This accumulation would not be measurable by determinations of blood levels of cannabinoids, and has not, as yet, been demonstrated in human tissue samples.

Although a slowly cleared drug is not necessarily more toxic than one rapidly eliminated, the slow clearance will have the effect of prolonging

drug exposure, thus enhancing any toxicity that the drug may inherently possess. The irregular dose and administration schedules employed by most cannabis users make accurate determination of actual drug exposure almost impossible.

In humans, cumulative behavioral or physiological effects have not been demonstrated under conditions of controlled administration of up to three months duration, although the simultaneous development of tolerance may have masked this phenomenon (Jones, 1980). In animals, cumulative toxicity, as manifested by delayed lethality and the sudden appearance of neurotoxicity after several weeks of treatment (Luthra *et al.*, 1976), has been observed at doses relevant to those consumed by chronic human users. The possible occurrence of cumulative toxicity in humans, therefore, is a question that should be examined.

9.1.2. *Structure-Activity Relationships*

There has been considerable research into the biological activity of naturally occurring cannabinoids and their synthetic analogs (Mechoulam *et al.*, 1980). Many studies were designed to assess the potential therapeutic efficacy of these substances (Cohen, 1980). Of the major cannabinoids, only THC has significant psychoactivity. Several other cannabinoids, however, demonstrate immunosuppressant activity in the mouse (Munson and Fehr, 1982), cause endocrinological and testicular disturbances in the rat (Bloch, 1982), and inhibit the synthesis of macromolecules *in vitro* (Munson and Fehr, 1982). Thus it appears that the mechanism of the psychoactive effect of THC can be separated from those of some of its other pharmacological effects. Also, if the other major cannabinoids are present in high concentrations in plant material with a low THC content, they may contribute significantly to the spectrum of cannabis-induced immunological and endocrinological toxicity.

9.1.3. *Drug Interactions*

A third major consideration in the relationship of dose to effects is that of drug interactions. The latter, like tolerance, can be explained by dispositional mechanisms (i.e., related to the metabolic fate of the drug in the body) or by functional mechanisms (i.e., related to the manner in which drugs produce their effects), or by a combination of both.

Interactions between cannabis and other drugs and chemicals in the environment should be expected, but their magnitude and health consequences cannot, in most cases, be specified now. Our understanding of the pharmacology of cannabis is only sufficient to say that interactions with a wide variety of licit, illicit, and therapeutic drugs, and probably with almost all chemicals, can occur in principle, and often do occur in fact.

We know that it is unusual for someone to use cannabis regularly without using other drugs concurrently. For example, in North America,

cannabis is commonly combined with tobacco and alcohol, and less frequently with cocaine, phencyclidine, and many other drugs (Smart, 1982). In some other parts of the world opium is often used concurrently with cannabis (Mohan, 1982). The drugs which are combined, and their doses, vary with age, culture, country, socio-economic status, availability, and many other factors not well characterized in controlled surveys.

We know from a small number of studies that cannabis alters the effects of a number of other drugs (for example, alcohol, barbiturates, nicotine, amphetamines, cocaine, phencyclidine, and opiates) (Siemens, 1980). Similarly, the other drugs can alter cannabis effects. However, the precise nature of the alterations is difficult to predict. This is probably because of the complexity of the interactions. Cannabis is a mixture of many chemicals with varied pharmacology (Turner *et al.*, 1980). THC administered orally probably has different effects on the metabolism of other drugs than does smoked cannabis. This is because a cannabis smoker would be exposed to chemicals (i.e., enzyme inducers in smoke) capable of interacting with other drugs different from those that an oral user would be exposed to. CBD has more marked effects on metabolism of certain other drugs than does THC (Siemens, 1980). Simultaneous exposure to unrecognized environmental chemicals can confound the situation even further. Since cannabis, THC, or CBD can alter the bioavailability, metabolism, clearance, and distribution of other drugs or chemicals (Benowitz and Jones, 1977), interactions could occur by means of various mechanisms. Other drugs may similarly modify the fate of cannabinoids in the body.

Cross-tolerance and cross-dependence between cannabis and other drugs can theoretically also occur by functional (non-dispositional) mechanisms. This might lead, for example, to a situation in which, because of metabolic interactions, blood barbiturate levels are elevated in a cannabis user; yet, despite this elevation, the effects of the barbiturate might be lessened because of cross-tolerance probably determined by functional interactions. Hence the prediction of behavioral consequences would be difficult.

In addition to producing drug interactions by altering shared hepatic enzyme systems important in metabolism, THC could potentially interact with other drugs because of competition for available binding sites on plasma and tissue proteins. The quantitative significance of such an interaction, if it occurs, is unknown.

In summary, one can only conclude that cannabis is likely to interact with many drugs so as to enhance, diminish, prolong, or shorten the effects of both cannabis and the other drugs. Thus the complexity of cannabis pharmacology and the paucity of adequate research studies in animals or humans makes precise predictions of health significance of drug interactions impossible. Some interactions may be mainly of interest to scientists trying to understand mechanisms of drug action; others (e.g.,

the delayed absorption of alcohol or slowed metabolism of anticonvulsants observed in cannabis users) (Benowitz and Jones, 1977) will without question have health significance. The well documented cross-tolerance and the possible occurrence of cross-dependence with many licit and illicit drugs make the prediction of health consequences even less precise.

Marked and serious drug interactions are often not recognized or appreciated by clinicians until a number of patients have been harmed. Although clinical data are hard to obtain from cannabis users, we know enough already to predict that such interactions *could* occur. Both laboratory experiments (human and animal) and adequate epidemiological and field studies are needed to define properly the nature and consequences of these interactions.

9.1.4. *Tolerance*

A final factor in the discussion of dose-response relationships is tolerance. The occurrence of this phenomenon, characterized by a loss of sensitivity to the effects of a drug, must be considered whenever a drug is given more than once, and thus is relevant to any study of chronic toxicity. Tolerance to most THC effects has been demonstrated repeatedly, both in animals and in humans (Jones, 1982). It will occur after administration by any route, but the rate of its development is increased if an attempt is made to maintain the blood level relatively constant (as by giving the drug orally or in frequent parenteral doses). The differential development of tolerance to various effects, together with the available pharmacokinetic data, suggest that the mechanism is more functional than dispositional (Jones, 1982).

Tolerance to some effects develops rapidly after administration of doses that many would consider surprisingly small. For many effects, tolerance disappears equally rapidly (Jones, 1982). There is a little more uncertainty as to the precise rate of disappearance of tolerance in different organ systems and in different species, since systematic studies on tolerance loss have rarely been done. The degree of tolerance that can develop is similar to that produced by some opiates. Many characteristics of tolerance to THC are similar to those of tolerance to opiates, nicotine, and alcohol (Jones, 1982).

The so-called "reverse tolerance" (an apparent increase in drug sensitivity after a few exposures to low potency cannabis), if it occurs at all, is likely due to conditioned responses linked to familiar cues, such as those related to smoking or to other environmental factors, which facilitate the production of drug effects as the user gains experience with the drug (Jones, 1982).

The significance of tolerance as a potential adverse effect is unknown. However, various dramatic and fundamental neurochemical and physiological changes occur along with the development of tolerance. Many of

these can possibly be assumed to have implications for long-term health (Jones, 1982).

9.2. Some Parameters Affecting Self-Administration

9.2.1. *Titration*

There is some evidence that adverse reactions to cannabis are fairly infrequent in experienced users, in part because these individuals have learned to "titrate" their dose (Negrete, 1982). This means that they adjust their rate of smoking according to their subjective feeling of the degree of intoxication. This phenomenon is by no means unique to cannabis; it is common practice among users of alcohol, tobacco, cocaine, and other psychoactive drugs. Titration is not fully effective in preventing dysphoria, however, since even experienced users can suffer adverse effects after smoking cannabis, particularly when it is unexpectedly more potent than usual or differently constituted. Adverse reactions also appear to be more common after oral ingestion of cannabis than after smoking (Weil, 1970). This observation probably results from the user's inability to titrate an oral dose because of the long latency of onset of effects.

9.2.2. *Tolerance and Physical Dependence: Their Relationship to Drug-Seeking Behavior*

Dependence, both physical and psychological, can develop rapidly in animals and in humans who are exposed to cannabis at doses and frequencies that produce sustained THC blood levels for a significant period of time (Jones, 1982). Some components of the withdrawal syndrome are similar to those produced by opiates, and by alcohol and other sedatives, when they have been given for relatively short periods of time. Controlled clinical studies (Jones and Benowitz, 1976; Nowlan and Cohen, 1977; Georgotas and Zeidenberg, 1979) have shown a picture that includes disturbed sleep, anorexia, restlessness, irritability, sweating, chills, slight hyperthermia, nausea, muscle spasms, tremor, diarrhea, and intestinal cramps. In controlled experiments, subjects first experienced symptoms about four hours after their last oral drug administration. The reactions peaked at about eight hours and had largely dissipated by the third post-drug day. The onset of symptoms corresponded closely to the period when THC blood levels were dropping rapidly.

Other studies (Miles *et al.*, 1974; Rossi *et al.*, 1974) using different designs have failed to confirm all of these findings although some post-drug irritability was reported. The prevalence of these symptoms among populations of cannabis users is unknown. Although some symptoms of cannabis withdrawal resemble those associated with withdrawal from

other central depressants, no conclusions can be made with respect to common mechanisms at this point.

On theoretical grounds, tolerance and dependence could increase drug-seeking behavior in several ways:

a) Selective tolerance to the aversive effects of a drug might unmask the rewarding effects and thus increase the probability of use;
b) tolerance, by leading to more frequent use and larger doses, might strengthen the cycle of reward and repetition;
c) the progressive narrowing of interests and activities in dependent users (particularly in urban industrial societies) might make the drug occupy a steadily more significant role in everyday life, and give rise to secondary and conditioned mechanisms that would have the effect of increasing drug use (reinforcement);
d) abstinence symptoms, occurring during drug withdrawal, could generate a new reinforcement for use to alleviate the discomfort.

For the first three ways there is no information available specifically on cannabis, though the general principles derived from the study of other drugs (Cappell and LeBlanc, 1979) would be expected to apply equally to it. With respect to the fourth point, the observations cited above suggest strongly that mild to moderate withdrawal reactions can and do occur in some regular users, especially frequent users of high doses.

9.3. Principles of Experimental Design

9.3.1. *Relevance of Animal Models for Predicting Toxicity in Man*

Although some pharmacological effects can be measured directly in humans, it is evident that experimental assessment of all risk potential of cannabis use cannot be performed safely in humans. Therefore, animal models must be utilized. The resulting problems of extrapolating from animals to humans should be minimized by selecting those *in vivo* paradigms that are relevant to human physiological and pharmacological responses. It is also important that administration of cannabis products extend over a sufficiently long fraction of the animal's life-span to simulate use of cannabis for a period of years by humans. On the other hand, some animal life-spans (e.g., dog and monkey, 15-25 years) are long enough that the investigator who wishes to use these species must have high motivation and longevity, and reliable long-term funding. If possible, the experimental designs should be comparable to current human practices such as the smoking of high potency cannabis preparations mixed with tobacco, or the combination with other drugs, and the use of oral and other routes of administration.

Advantages and disadvantages are inherent in each potential animal model. For example, several rodents can be exposed simultaneously to the

smoke of the same marihuana cigarette(s). Larger animals must be exposed to the smoke of individual samples of a batch of cigarettes that may differ considerably from each other in physicochemical properties. Physiological disposition of drugs also varies among species but sufficient basic data exist on these differences to permit appropriate interpretation of differences in time of appearance, intensity, and duration of responses in laboratory animal species and in humans. It must be noted, however, that the results from some animal models (such as immunosuppression in the mouse) may be extrapolated to humans more reliably than from others (such as placental transfer of drugs in rodents).

In cannabis research, the strongest evidence supporting the relevance of animal models is the consistent dose range over which similar pharmacological events, including certain behavioral changes, can be observed and measured in rodents and non-human primates after administration of the drug by several different routes (see, for example, Rosenkrantz and Braude, 1976). These drug-related aberrations observed in animals have been produced by inhalation or oral doses that are relevant to those used by man. Indeed, circulating blood levels of THC associated with these effects have been similar in animal models and humans. Even such a phenomenon as the characteristic biphasic response to cannabinoids (CNS-stimulation/inhibition) has been observed in both animals and man (Rosenkrantz, 1982).

9.3.2. *Optimal Design of Toxicological Studies*

Apparent contradictions in the experimental literature are often difficult to interpret because of differences in experimental design. For this reason, it seems desirable to specify some basic requirements for soundness of toxicological studies. This section is not intended to be comprehensive or definitive, but identifies a few areas of special concern.

The design of toxicology studies should be such as to permit clear identification of the organs which undergo dose-dependent morphological, physiological, or biochemical disturbances. For this purpose, the ideal study would evaluate the drug effects on *all* organ systems at several dose levels. Subchronic and chronic toxicological studies should be performed in both sexes of several species of experimental animals including rodents and non-human primates. The subchronic study should be long enough to identify appropriate dose ranges and to point to specific target organs or systems that would be investigated in greater detail in the chronic study. The chronic study must be of reasonable length as discussed in Section 9.3.1., especially to provide sufficient time to determine the potential for carcinogenicity. Both inhalation and oral routes of administration should be used. Inhalation studies should use a standardized smoking system to assure direct inhalation of smoke. For inhalation studies, the cannabis preparation should be derived from standard marihuana cigarettes with

sufficiently high concentration of cannabinoids to deliver the desired dose of active substance with a minimum amount of carbon monoxide. Control cigarettes should consist of the same marihuana extracted in a manner designed to maximize the difference in cannabinoid content while minimizing the loss of other constituents. A group of animals receiving the smoke from an appropriately standardized tobacco should be included so as to facilitate comparisons between the results from different laboratories.

Oral administration should be accomplished by feeding unless the drug preparation reduces food intake, in which case gavage should be used. The cannabis preparation used for oral administration should simulate as closely as possible those which are in widest use throughout the world. Adequate dose/response data must be provided, over a range extending up to the estimated maximum tolerated dose.

The toxicological study should not only assess the standard parameters such as growth rate, food and water consumption, hematology, clinical chemistry, urinalysis, and histopathology but should make every attempt to evaluate the functional aspects of the major organs and body systems. The pulmonary system should be evaluated at regular intervals in the larger animals by measuring respiratory parameters such as rate, volume, and blood gases. Behavioral effects should be monitored at regular intervals by accepted operant and non-operant methods. The cardiovascular system should be monitored regularly, primarily by electrocardiograms. Liver and kidney function tests should be followed at regular intervals. In the larger animals, simple immunological assays should be carried out during the study but detailed humoral and cell-mediated immune responses need to be tested only at the end of the sub-chronic (90 day) study. Evaluation of the endocrine system should be carried out at regular intervals and should include measurement of plasma levels of appropriate hormones.

Animals should be set aside for use in three-generation reproductive and teratogenicity studies.

Carcinogenicity should be determined by appropriate histopathological studies of tumors and tissues at time of necropsy.

9.3.3 *Selection of Subjects and Designs for Clinical Experiments*

Most individuals who have participated as subjects in cannabis-related research in North America and Western Europe have been healthy young adult males who generally have used cannabis for five years or less. Most were students from middle to upper-class socio-economic backgrounds. Therefore some data obtained in these studies may have limited generalizability to females and to individuals who use cannabis in other social, economic, and cultural environments. Cross-cultural generalization of the findings appears to be very limited, since studies of cannabis use and effects in countries such as Egypt, Jamaica, India, and Greece in-

volved subjects who were older, less affluent, and who used higher dosages and for longer periods of time than research subjects in North America. Since patterns of dosage (both amount of drug and frequency of administration) are, in part, culturally dependent, comparisons between cultures are especially difficult (see Section 9.1.).

Many problems in design of cannabis studies are similar to those encountered in research with other psychoactive drugs. Many studies of experimental administration of cannabis have not employed placebo controls, although it should be emphasized that effective placebo control in chronic studies with highly discriminable psychoactive compounds such as cannabis, especially with experienced users, is difficult. Interpretation of results has often been rendered difficult by factors such as variable and unstated expectations or biases of subjects and experimenters, variations in criteria for defining chronicity and dosage, and variables associated with set and setting. Important controls for basic variables (e.g., drug use other than, or in addition to, cannabis) have been difficult to achieve in research on humans, except in experimental studies in monitored research ward environments. Only a few studies have provided subjects with specific incentives for cooperation, or special compensation for achieving best performance during the assessment of cannabis effects on behavior (see, for example, Cappell and Pliner, 1973). In some studies, subjects (all cannabis users) were apparently self-motivated to perform well, in order to establish the absence of cannabis-related adverse effects (Kalant, 1969). Since virtually all studies have employed volunteer subjects, there remains some question as to whether these healthy individuals are truly representative of the general population of cannabis users.

9.3.4 *Sex Differences*

There have been very few controlled administration studies in human females, or examinations of sex differences in response to cannabis in animals. Male animals demonstrated a different pattern of behavioral toxicity, and were more susceptible to delayed lethality than the females (Luthra *et al.*, 1976). Otherwise the results have revealed no overall pattern. In the past, for reasons related to U.S. Food and Drug Administration policy, or equivalent policies in other countries, there have been practically no studies of the effects of cannabis administered experimentally to human females, and none involving chronic administration.

9.4. Discussion of the Nature of Proof Required to Establish a Drug Effect

The question often arises as to the rigor of evidence or standard of proof required to substantiate statements about the effects of cannabis use. Under more readily controlled circumstances, namely, *in vitro* and in

animal *in vivo* experiments, a cause-effect relationship in the action of a cannabis constituent on some biological endpoint (metabolic, molecular, physiological, etc.), may be considered established if the following three requirements are met:

a) molecular or structural specificity of the constituent causing the effect;
b) an appropriate dose-response relationship, both with respect to range and slope; and
c) absence or inhibition of effect by neutralization or removal of the constituent.

In addition, in *in vitro* experiments the relevance of effect would need to be established by comparing the required drug concentration *in vitro* to that found *in vivo*.

The assessment of clinical evidence, however, has posed many more problems. Historically, the most common sequence of development of knowledge about a new clinical problem has included the following steps: recognition of individual cases; study of series of cases in comparison with clinical control groups; epidemiological study of incidence and prevalence in defined populations; inferential identification, from the foregoing data, of possible etiological factors; and experimental demonstration of probable mechanisms. The value of the initial steps, despite the obvious limitations of the information they provide, has not been questioned in relation to other clinical problems. In contrast, very high standards of proof are sometimes demanded from evidence concerning cannabis (see, for example, Grinspoon, 1977). It is instructive to make comparisons with the study of effects of other drugs, such as tobacco or alcohol. With these drugs, "risk-factors" have been freely identified, although full causality has not yet been established. Nevertheless, such risk-factors deserve and receive serious attention with respect to the latter drugs. It is puzzling that the same reasoning is often not applied to cannabis.

In some cannabis research on humans there are numerous constraints which are difficult to overcome directly. For example, in many of the epidemiological, laboratory, or clinical quasi-experimental studies, it seems that researchers can demonstrate relationships only by establishing statistical association. Whether in the area of cannabis research, investigations of other drugs or in other less complicated areas, the research worker more often than not is faced with a variety of possible interpretations of the findings, due to the multiplicity of variables that arise particularly from dealing with human beings. Moreover, in field studies comparing matched groups of users and non-users, it must be remembered that it is, by definition, impossible to determine a drug effect on the variable with respect to which the groups are matched. For example, if the users and controls are matched with respect to socio-economic status, any possible effect of drug use on socio-economic performance is automatically excluded.

Therefore, the researcher can only proceed towards formulating new

hypotheses about possible mechanisms or processes involved, and progress by what is usually labeled the method of successive approximations, i.e., gradually narrowing the range of possible interpretations. This method is followed in all endeavors in science, cannabis research included. To provide rigid proof of causality in such investigations is logically and theoretically impossible, and to demand it is unreasonable.

10. SUMMARY

The acute use of moderate doses of cannabis produces a state of intoxication. This is associated with a dose-related impairment of the ability to drive a car or operate complex machinery. In some situations, the user may not feel the desired euphoric state but rather may experience a short-lived dysphoric reaction which can range in intensity and character from mild anxiety to an acute psychosis. Other acute physiological effects are also transient and do not appear to be of major significance in individuals with no pre-existing disease.

Intermittent use of low-potency cannabis is not generally associated with obvious symptoms of toxicity. Daily or more frequent use, especially of the highly potent preparations, can produce a chronic intoxication which may take several weeks to clear after drug use is discontinued. The seeming inconsistency of this observation throughout the world may reflect differing exposures to THC because of the large variation of potencies and smoking techniques, as well as different cultural preferences for the route of administration.

Respiratory toxicity is observed in heavy users and is probably related to smoke components other than THC. Therefore its severity may depend more on the smoking techniques employed by the user and the combustion properties of the material, than on the THC content. Cannabis effects on the hormonal, reproductive, and immunological status of these users is, as yet, unclear.

Chronic administration of cannabis results in the development of tolerance to a wide variety of the acute drug effects in both humans and experimental animals. Though scientific opinion is more divided on the question of dependence on cannabis, there is now substantial evidence that at least mild degrees of dependence, both psychological and physical, can occur.

Some individuals may be particularly susceptible to the effects of cannabis for a variety of reasons. Adolescents who are undergoing rapid developmental change and elderly populations with decreased rates of drug metabolism, increased prevalence of disease and a more conservative and less flexible mental set may be more sensitive to the effects of cannabis and other drugs. The symptoms of patients with a variety of diseases in-

cluding various forms of mental illness, diabetes, cardiovascular disease or epilepsy may be exacerbated by cannabis use. Interactions with a variety of substances including tobacco and alcohol may also potentiate the observed effects.

The epidemiological studies necessary to assess the frequency of adverse effects and to relate their occurrence to factors such as potency and amount of cannabis used, length of exposure, set and setting have not, as yet, been conducted. The low prevalence of adverse effects observed in field studies of small numbers of heavy users suggests that the adverse effects described in many of the clinical reports occur relatively infrequently in these carefully selected populations. Given that millions of individuals are now using the drug, even relatively infrequent but serious adverse consequences could be of public health significance.

The results of experimental studies in animals have consistently demonstrated toxicity at doses comparable to those consumed by the human who smokes cannabis several times per day. Respiratory toxicity, CNS dysfunction, endocrinological disturbances, reproductive deficits, and immunosuppression have all been observed after treatment with THC or cannabinoids in experimental animals. Most, but not all, of these effects disappear when treatment is discontinued. *In vitro* studies have also been used to demonstrate cannabis-induced cytotoxicity. The results of these experiments are, for the most part, qualitatively consistent with the *in vivo* observations, and may provide valuable information about the mechanisms of action of the cannabinoids and other plant components or products of pyrolysis.

11. RECOMMENDATIONS FOR FUTURE RESEARCH

Based on a discussion of the available information on cannabis toxicity and the lack of relevant data in certain key areas, several recommendations for future study were reached. A comprehensive understanding of any biological phenomenon almost always demands the synthesis of information derived from a variety of experimental designs. Therefore, it is important that no single "best" scientific design be recommended. On the contrary, it is recognized that a broad, integrated approach employing different techniques is most likely to provide the information needed for valid conclusions regarding the adverse effects of cannabis on health and behavior.

1. As outlined in Section 1, there is a lack of consensus on what constitutes the criteria for "social" or "problem" use. Standardization of terminology with respect to patterns of use would greatly facilitate the comparison of clinical reports. There should be a search for "biochemical

markers" to indentify heavy users (such as the changes in transferrin or abnormal hemoglobin A used to identify recent heavy users of alcohol) that could be used as an objective measure of hazardous use.

2. Many general considerations were raised. There is an obvious need to relate biological responses not only to the doses given but also to blood and relevant organ levels of THC and its major active metabolites and to the duration of exposure to such levels. For this reason, further studies of the pharmacokinetics (both acute and chronic) of THC and other cannabinoids are indicated. It is important to explore the contribution of THC to biological effects, as compared to the possible role of other cannabinoids and of other substances contained in the cannabis preparations.

3. Wherever possible, the effects of cannabis should be compared with those of equieffective doses of other drugs with respect to some common action, so that cannabis toxicity can be considered within the context of toxicity of psychoactive drugs in general. This will indicate which effects are specific to cannabis and which are common to many drugs.

4. It must also be emphasized that, with the exception of a few case reports and limited experimental studies, almost all information so far obtained has emerged from observations of healthy mature males. This limits the extrapolation of results to other segments of the population. For example, there is virtually no information on the effects of cannabis in women. Because of the increasing prevalence of use by women and the evidence of sex differences in the biological response to many other drugs, studies in this area are vitally necessary.

5. Other groups may, for various reasons, be particularly at risk for the appearance of adverse consequences. The effects of cannabis on children and adolescents, a group undergoing rapid physical and psychological maturation, should be intensively studied since, in some countries, cannabis use is already very high and increasing rapidly. Effects on academic achievement, and on endocrinological profiles during puberty, are areas particularly deserving of study.

Based on evidence from animal studies, it is also recommended that children exposed *in utero* to cannabis should be examined post-natally for signs of impaired growth and delayed maturation, and for long-term health and behavioral problems.

It is possible that cannabis is producing serious but as yet unrecognized toxic effects on persons with underlying psychiatric, pulmonary, cardiovascular, gastrointestinal, allergic, and dermatologic disease, or with pathological or therapeutically produced immunosuppression. Greater attention should be directed to the problem of cannabis-induced precipitation or exacerbation of these disorders.

Because of animal experiments suggesting that nutritional status may to some extent influence the magnitude and nature of the drug-induced effects, the relationship between poor nutrition and various cannabis-related effects should be studied.

Conversely, efforts must be made to identify special risk factors in those experiencing adverse effects, so that additional groups at risk may be identified.

6. There were also suggestions aimed at improving the quality and reliability of the data available from clinical and experimental studies. Case reports are still necessary to identify rare drug-induced effects, and to confirm the existence of other previously reported signs of toxicity. More complete and consistent descriptions of clinical observations, including the extent and pattern of drug use (cannabis and other drugs) accompanied if possible by objective testing, would add to the value of these reports. There is also a need to identify, in the community, those individuals who may not be seeking medical attention for adverse effects. These "outreach" studies would provide a more accurate estimation of the prevalence of the relevant symptoms than can be provided by case reports alone. More systematic enquiring and reporting with respect to drug use by clinic and hospital patients would also assist in the assessment of the prevalence of adverse effects.

The data from carefully designed retrospective studies should not be underestimated. By means of controlled retrospective studies, the apparent over-representation of certain characteristics (such as age, sex, and pre-existing psychopathology) among patients presenting complaints related to drug use can be assessed. Since adverse drug effects are more likely to be found in individuals who are identified as "patients," i.e., who present with complaints, than in healthy users without complaints, it would be informative to apply objective measures such as various physiological and psychological test batteries to groups of patients with complaints rather than only to groups of healthy drug-using volunteers.

In the past, a large number of cross-sectional studies of cannabis users matched with non-user controls have provided information on the drug's possible toxicity. In view of the difficulties in designing a prospective study, a thorough reassessment of previously studied subjects presents certain advantages, despite the difficulties of tracing some of the individuals involved. The subjects would be older and would have had longer cannabis exposure. Thus they would be more likely to show cannabis-related symptoms. Previously made measurements could be repeated, and recently developed techniques could be employed to provide additional data.

Obviously an ideal approach is that of the controlled study of experimental administration. In this manner, confounding variables such as diet and concomitant use of other drugs can be eliminated. In such settings the subjects can also be treated with dignity and safety. From the animal studies, however, it is apparent that long-term exposure is needed for the production of adverse chronic effects. Experimental administration studies in humans should not be used to determine long-term toxicity. Optimally, methods should be developed for performing both cross-sectional and experimental administration studies without the need for hospitalization.

7. Several types of epidemiological studies are suggested to (a) determine the prevalence and trends of cannabis use in general and special populations throughout the world, and (b) to determine the frequency of adverse reactions, especially those requiring medical treatment among groups of cannabis users. The prevalence-of-use data should include information on the dose (in terms of THC content, route of administration, and frequency of use). This would include world-wide assays of potencies of various illicit cannabis preparations. The surveys of frequency of adverse effects should help to separate the influence of various factors such as frequency of use, experience with other drugs, and pre-existing psychopathology. There is also a special need for studies of the frequency of respiratory, hormonal, cardiovascular, and other non-psychological adverse consequences of cannabis use. Because of the experimentally observed carcinogenic and mutagenic potential of cannabis smoke, possible signs of increased incidence of cancer must be monitored carefully in groups of heavy users. Analysis of ongoing epidemiological data such as hospital and emergency service visits, treatment referrals, etc., is very important and should be continued.

8. Encouragement should be given for prospective studies of potential user groups, including observations of baseline (pre-drug) health status and the occurrence of cannabis-related toxicity during and after periods of heavy use. On a large scale they are difficult to design and expensive to conduct. However, this approach remains the best technique for establishing, in humans, directness of connection between drug use and an observed effect, and for determining the relationship between recorded levels of use and the prevalence of adverse effects. Thus attempts should be made to conduct such studies. Less optimally, efforts could be made to extract pertinent data from prospective studies being conducted for other reasons.

9. The optimal designs of experimental studies of toxicology have been outlined in Section 9. It is recommended that adequate investigations using a variety of species, doses, routes of administration, and lengths of exposure (including full-life studies) be performed to evaluate cannabis effects on all organ systems and to assess potential teratogenicity, mutagenicity, and carcinogenicity. Research on endocrine and reproductive functions should also include serial measurements of trans-placental cannabinoid transfer throughout gestation, and estimations of cannabinoid concentrations in breast milk and nursing pups. Further experiments should be encouraged to elucidate the cellular and molecular mechanisms of action of cannabinoids and to analyze cannabis smoke action in a variety of *in vitro* systems.

10. On the behavioral level, several recommendations have been made. Suggested psychosocial studies include examinations of the influence of legal controls on patterns of cannabis use and on the drug-induced behavioral response of the user. For example, observations of the

user's social interactions, such as peer relationships or family structures and attitudes, may provide data related to reasons for the initiation and maintenance of cannabis self-administration, and may provide independent assessment of the user's behavior while in the intoxicated or non-intoxicated state.

Behavioral studies should include measures of psychomotor and perceptual functions that would be expected to affect one's ability to drive a motor vehicle or otherwise perform safely in the work place. A replication of the reported research on driving on city streets is necessary to confirm earlier results. The hazards of operating complex machinery while intoxicated should be assessed, especially in those countries with newly introduced mechanized farming where rural cannabis use is traditional. Wherever possible, cannabis-induced effects on night driving should be examined, as well as interaction with alcohol and other drugs, and the potential development of tolerance to cannabis-induced driving impairment.

Residual CNS toxicity as a result of long-term cannabis administration must be examined in greater detail. In animal models, the possible contribution of other individual or environmental factors, such as innate intelligence or environmental stimulation, to cannabis-induced learning impairment, EEG changes and histopathology could be assessed. In humans, a careful longitudinal study with verified drug-free periods before testing would help to determine whether or not residual toxicity occurs. The question of an absence or redirection of motivation in heavy users must be examined in greater detail. In addition, an exchange should be set up for autopsy brain bank samples and case-history information relevant to chronic heavy users, to provide material for post-hoc analyses of brain in correlation with recorded levels of use.

11. Additional observations are needed to identify the intervening pharmacological, neurophysiological, and psychopathological factors underlying acute panic and paranoid states and other cannabis-related psychiatric disorders. A comparison between cannabis-related psychiatric disorders and those produced by other drugs, as well as functional disorders, would also be profitable. A controlled study of the intervening etiopathogenic factors underlying spontaneous recurrence reactions ("flashbacks") could be of assistance in the elucidation of the mechanism(s) related to these symptoms.

Specific treatment procedures should be developed to minimize the potentially severe dysphoric states that can occur as a result of the therapeutic use of THC and synthetic cannabinoids. Such studies might not only be of value to patient care, but also shed light on the mechanisms of drug action.

12. Immunological studies should include epidemiological investigations of the prevalence, severity, and duration of selected infectious diseases in populations from which data are readily available and in which use is known to be high (e.g., students, military personnel). For example,

the question of a possible cannabis-related decrease in the immune response to herpes simplex should be studied in a group of cannabis users known to be infected with herpes.

13. Because of the multiple drug intake of many cannabis users, better and broader drug interaction studies (especially regarding behavioral impairment, pulmonary and liver toxicity) are necessary. These should be conducted with both licit and illicit drugs such as caffeine, nicotine, psychotherapeutic agents, and antihistamines. Data from pharmacokinetic experiments will be helpful in the interpretation of drug-interaction phenomena.

14. The development of tolerance to, and dependence on, drug effects, whether they be therapeutic or adverse, is a phenomenon that must be considered in the evaluation of any chronic psychoactive drug effect. More sensitive measures are needed for the identification of dependence, the delineation of time course of acquisition and particularly of the disappearance of tolerance, and its implications with respect to function. The relationship of tolerance, physical dependence and drug-seeking behavior must be established, both for cannabis and for other concurrently used drugs.

Since increasing numbers of cannabis users are now presenting signs of dependence, research must be conducted on methods for treating this problem.

15. Finally, adverse health effects are better prevented than treated. The development of educational programs designed to discourage hazardous cannabis use should be encouraged, and the results of such programs evaluated.

In brief, the obvious need for further cannabis research has been demonstrated. Because of the cannabis-related problems throughout the world, there is an urgent and imperative need for agencies such as the WHO to alert the national governments and other international agencies to the need for research in this field. The benefits of cooperation between developed and developing countries in this area are mutual.

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The Marijuana Health Hazard

By Nicholas A. Pace, M.D.

During the last seven years, a very active organization called NORML (National Organization for the Reform of Marijuana Laws) has been vigorously campaigning state by state for the decriminalization of marijuana. This organization has campaigned nationally to make marijuana appear harmless. They are dedicated to fostering the idea that marijuana should be decriminalized since so many people are using it.

Recently, it has been learned that high on the list of President Carter's priorities in the field of public health is the decriminalization of marijuana. In order for you as law officers to understand the health aspect of this complex issue, we would like to give you the following information.

It is the contention of this author that the public has not been properly informed concerning the harmful medical effects of this drug. If anything, the media tends to portray marijuana as no more harmful than tobacco or alcohol. This comparison is absurd.

As For Tobacco—Tobacco is not a hallucinogenic drug. Smoking tobacco produces no hallucinogenic effects. Smoking marijuana has in reality a hallucinogenic effect on the brain with distortion of time, space and sound. It takes 20 years of heavy tobacco smoking to produce the same type of severe sinusitis, pharyngitis, bronchitis, and/or emphysema that less than one year of daily marijuana smoking produces, proving that marijuana smoke is far more irritating to the respiratory tract than tobacco.

Scientific studies have shown that marijuana smoke mixed with tobacco smoke is far more damaging to lung tissue than tobacco smoke alone.

Even the *Consumer's Report* of March, 1975 acknowledged the lung damage in chronic marijuana users, although one could hardly endorse their suggestion that alternate forms of marijuana consumption such as "drinking marijuana tea" could protect the lung tissues. Medical literature is replete with reports similar to that of Dr. John A. S. Hall's report showing the emphysema-bronchitis syndrome in black male Jamaicans who were regular marijuana users.

Unfortunately, it will take another 20 to 30 years for us to have autopsy reports to show the effects of long term chronic marijuana smoke on not only the lungs but other tissues as well.

Of interest is the fact that lungs of animals exposed to marijuana smoke have shown cellular changes that are similar to those seen in patients who develop lung cancer. Tar from marijuana, painted on the backs of animals, has produced cancers.

As Far As Alcohol Is Concerned—The concept that marijuana is safer than alcohol is definitely erroneous. A person can have one or two drinks a day for 20–30 years and never suffer ill effects from it. Alcohol is water soluble. One ounce is completely metabolized and broken down into water and carbon dioxide within 12 hours. Marijuana, on the other hand, is not water soluble—it is fat soluble, and the active psychotropic (mind altering) ingredient, delta-9 Tetrahydrocannibinol (THC), accumulates (in the

same manner as DDT) in the tissues of the body which are fat laden, including the brain and the sex organs. In animal experiments with radioactive tagged Delta THC, the THC was still detected in the brain, liver, lungs and reproductive organs two weeks after a single injection.

Although alcoholism is a serious drug problem, one does not hallucinate from one or two drinks. In order to hallucinate an alcoholic would have to develop far advanced disease, with brain damage and/or the withdrawal syndrome. On the other hand, the psychotropic effect of marijuana causes hallucinations in small doses, and in some cases, every time the drug is used. The distortion of time, space and sound are examples of the mild hallucinations that occur on a mild marijuana "high" is experienced. Think of what this effect will be on our driving population should marijuana become as popular as cigarette smoking. There are several studies which show that marijuana causes marked distortion of time and space on professional automobile drivers and airline pilots. Dr. H. Klonoff, Professor of the Department of Psychiatry at the University of British Columbia, Canada, in a study, showed the neuro-psychological effects of marijuana on driving.

Marijuana Effects On The Brain—The active psychotropic ingredient has a cumulative effect on the brain which is responsible for the irreversible brain damage that Dr. Robert Heath, Chairman of the Department of Psychiatry and Neurology at Tulane University School of Medicine has shown in his rhesus monkey experiments. The actual irreversible brain atrophy or damage in the rhesus monkeys was produced after three months with the equivalent of one marijuana cigarette (2% THC) a day. The Columbian marijuana currently available in New York City is 3+% THC. Therefore, four to five marijuana joints per week would be at the same dosage that caused brain damage in the rhesus monkey experiment. Dr. Heath has not tried does less than this; therefore, this may not be the minimal level.

It is unfortunate that Dr. Heath's findings have not been properly publicized, especially since it is thought that there are at least two million daily marijuana smokers in this country at the present time.

Loss Of Motivation—In 1972, Dr. Louis J. West described the term amotivational syndrome (loss of motivation). This syndrome is well known to numerous physicians and practicing psychiatrists in this country and elsewhere. Marijuana smokers suffer personality changes that occur gradually over a period of time. These personality changes include diminished drive, lessened ambition, decreased motivation, apathy, shortened attention span, poor judgment, diminished capacity to carry out complex plans or prepare realistically for the future, and a variety of other deleterious changes.

Dr. West suggests that this syndrome is caused by actual organic changes in the tissues of the brain. Dr. William Moore and Dr. Harold Kolansky of the University of Pennsylvania Medical School showed in an excellent study the same distortion of personality among chronic marijuana users. They describe hundreds of patients who have suffered from psychiatric and nuerological symptoms such as impaired judgment, diminished attention and concentration span, a slowing in time sense, and a loss of thought continuity as a result of chronic marijuana use.

Dr. Andrew Malcolm, a Canadian psychiatrist, Dr. D. Harvey Powelson, formerly Chief of the Health Clinic at the University of California at Berkeley, and Dr. Roy Hart, a New York psychiatrist and Editor of the *Journal of the American Academy of Psychiatry and Neurology*, as well as many others, have independently confirmed and extended Dr. West's observations. In a paper that Dr. Hart presented, entitled "A Psychiatric Classification of Cannabis Intoxication," he showed that there were 75 independent studies which revealed the serious effects of marijuana on the mind. Evidence from all over the world has supported the presence of the amotivational syndrome. Dr. John A. S. Hall, a leading psychiatrist in Jamaica, and Dr. Boris Segal, a prominent Soviet psychiatrist—just to name two others—have also reported on this syndrome.

Brain Atrophy (Shrinkage)—The important findings of the English neurologist, the late Dr. A. M. G. Campbell, in his study using air contrast x-rays of the brain on long term marijuana users (all of whom presented severe personality disorders) cannot be refuted. In all ten subjects, there was definite evidence of brain shrinkage as compared to ten control subjects. Dr. Robert Heath, of the Tulane University School of Medicine, studied the brain wave patterns in rhesus monkeys who were exposed to marijuana smoke twice a week and demonstrated that animals exposed this way had irreversible alterations in brain function for about three months after onset of the experiment. These brain wave abnormalities were shown to persist for eight months after the monkeys were no longer exposed to the marijuana smoke.

The regions of the brain where Dr. Heath measured the most pronounced and persistent changes in brain function by the brain wave examination were the same regions where Dr. Campbell noted atrophy or shrinkage in the ten human subjects.

Loss Of Learning Ability—Dr. Harold Kalant of the Department of Pharmacology at the University of Toronto has shown that rats exposed to marijuana smoke for five months suffered an irreversible loss of learning ability as measured by standard psychological tests.

Of special interest are the Soviet studies on dogs who were exposed to marijuana. These dogs showed signs of organic brain damage of the central nervous system including disturbances of various reflexes, impaired motor coordination and muscle movements, and states of depression followed by periods of excitement, aggressive behavior and fears. Autopsies on the brains of these dogs showed large areas of destruction in the cortex (thinking and learning centers) of the brain as well as in the cerebellum (balance section of the brain). These are the same regions of the brain that Dr. Heath reported on in his monkey experiments.

The Seven Day Half-Life—Of interest is the fact that marijuana produces a half-life of seven days. This

means that after one week only 50% of the substance is eliminated. Therefore, anyone who uses marijuana more than once a week cannot be truly drug-free and has a build-up of the drug in his tissues. One might remember the recent headlines of the commuter train crash in Chicago. Although the engineer involved had not used marijuana for the previous 24 hours, the substance was still detected in his system.

Prevention Of Cellular Growth—When marijuana is exposed to cell cultures, there is biochemical interruption of cellular metabolism, with the prevention of the proper formation of the building blocks essential for cell growth. Scientists agree that marijuana interferes with the synthesis of proteins and causes a decrease in the rate of cell division.

Dr. Peter Freed of Ottawa, Canada showed that young rats subjected to marijuana smoke not only suffered from generally reduced body weights, but also had significantly smaller hearts and brains as a percentage of their total body weight. He also got the same results in young suckling rats whose mothers were exposed to marijuana, bringing up the strong possibility that this effect is transmitted through mother's milk.

Reduced Sperm Production—Dr. H. Morishima and Dr. Zeidenberg, at the Columbia College of Physicians and Surgeons, illustrated in a carefully controlled study on 16 marijuana smokers, ages 18 to 23, over a two-year period, a significant and sustained decrease in the sperm concentration occurring after only two weeks of marijuana smoking. The decrease in the sperm concentration was sustained for at least two weeks after marijuana was discontinued. During the experiment, the subjects smoked an average of five to fifteen marijuana cigarettes a day.

Abnormal Sperm Cells—Not only was there a decrease in the sperm count, but there was also a decrease in the motility of the sperm (movement of the sperm). The most potentially damaging effect of marijuana on the sperm was the marked increase in abnormal forms of the sperm cell. This brings forth the genetic possibility of transmitting abnormally viable sperm with decreased genetic information to a fertilized egg.

Genetic Effects—Marijuana not only interferes with cell division but also interferes with the synthesis of the important genetic material of the cells. There is interference with the immune system of the body, too. Studies have shown that marijuana use causes a reduction in the number of chromosomes in the white blood cells, plus abnormal white blood cells. Abnormal embryos have developed in the animals exposed to marijuana and birth defects have been produced in young rhesus monkeys whose parents were exposed to marijuana smoke.

Space does not permit a review in detail of the many other negative health effects that marijuana produces.

I have personally cared for two young people who became psychotic after using marijuana. In one case, psychosis developed after smoking only one joint and in the other case, after smoking five joints a week for a period of six months.

As a student and observer of the drug scene, I sincerely believe that while alcoholism is presently our most dangerous drug problem, marijuana has the potential of becoming an even greater problem since it is being used by an uninformed public. One has to be aware that decriminalization is tantamount to legalization, particularly when so many people are ignorant of the extremely serious risks involved in marijuana usage. No one wants to see young people thrown in jail, but there are other effective alternatives to decriminalization. For example, there is the Sacramento Citation Diversion Program where youths arrested for possession of marijuana are given a chance to take a drug information study course which exposes them to the information that we have written about here. Upon completion of the course, the youth's arrest record is wiped clean.

When someone asks how one can tell if marijuana has had any ill effects on someone, I suggest trying to recall what the individual was like six months prior to the regular use of marijuana and comparing him with what he is like today. If there are marked changes in personality, social attitudes, emotions, etc., coupled with apathy, the chances are that marijuana is having an ill effect on his brain.

With the help of publications like *The Law Officer*, perhaps we can inform the youth of our country of the hazardous medical effects of marijuana.

Listed below are the names of books and publications containing further information on this subject:

SUGGESTED READING MARIJUANA

Russell, George, Marijuana Today, The Myrin Institute Inc., 521 Park Ave., New York; Nahas, G., Keep Off The Grass, Reader's Digest Press, Thomas Y. Corwell Co., 666 Fifth Ave., NY, NY 10019; Berjerot, N., Addiction & Society, Charles C. Thomas; Bloomquist, E., Marijuana, Glencoe Press Beverly Hills, Calif.; Goode, E., The Marijuana Smokers, New York Basic Books; Moreau, J. J., Hashish & Mental Illness, Raven Press, New York; Nahas, G., Marijuana: The Deceptive Weed, Raven Press, New York; Jones, H. B., Sensual Drugs: Deprivation & Rehabilitation Of The Mind, Cambridge University Press, New York; Powelson, D., Marijuana: More Dangerous Than You Know, Readers Digest 12/74 pp 95-99; Drug Information: National Clearing House for Drug Abuse Information, P.O. Box 1635, Rockville, Maryland 20850; American Council on Marijuana, 521 Park Avenue, New York, N.Y. 10002.

Nicholas A. Pace, M.D. is a specialist in Internal Medicine and maintains a private practice in New York City. He is also an Assistant Professor of Medicine at New York University School of Medicine. Dr. Pace is the President of the New York City Affiliate of the National Council on Alcoholism, and is the New York Medical Director of a large corporation.

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NIPPING MARIJUANA IN THE BUD

A Comparison of Paraquat—the Herbicide with Cannabis—Nature's Toxic Plant

By Mary Kohler, Hampshire Informed Parents, Inc.
Amherst, Massachusetts

What is Marijuana?

Cannabis sativa is a broad-leaf plant of which there are two main types. The fiber type, hemp, was used for making rope and homespun, while the drug type is illegally grown for its drug (psychoactive) properties. Strictly speaking, *Cannabis sativa L.* is the botanical name for the plant itself, while "marijuana" is the term applied to a crude drug derivative.

Naive *non*-drug users must understand that chronic pot smokers and the drug culture like to foster the belief that the cannabis plant is no different from other agricultural plants. Slang names for marijuana clearly illustrate this: "grass," "weed," "tea," "Vermont-Manhattan Crossbreed," "Wacky-Tobacey," "Oklahoma Baby Buds," to name a few. Scientific research in the last few years has proven how dangerous and misleading this can be.

To date, 421 different chemicals have been identified in cannabis; of these chemicals, 61 are called cannabinoids and are found in no other plant in nature. Thus, marijuana is not a pure drug but a complex mixture. (In contrast, ethyl alcohol is only 1 chemical.) The most studied cannabinoid is delta-9-tetrahydrocannabinol, or THC. This is the chemical chiefly responsible for the "high."

In order to fully comprehend the health hazards of marijuana use, one must keep in mind this basic fact: THC is *intensely* fat soluble—it is attracted to the fatty tissues of the body and the fatty organs (including the brain and sex glands) and finds its way into mother's milk. It is stored in the same manner as DDT. THC is very slow to leave the body: 25-30% of the THC and its products of metabolism reside in the body for one week—traces of THC can be found up to 30 days after one has smoked a single joint. (In contrast, alcohol is water soluble and leaves the body within a matter of hours.) Thus, any regular use of marijuana leads to a steady accumulation of THC—and other cannabinoids. And, although not all of the cannabinoids are psychoactive (mind-altering), all are biologically active.

Since each cell membrane has fatty sections, the cannabinoids dissolve into these cell membranes. This slows the entrance of necessary building blocks into the cell and interferes with biological processes. Clearly, marijuana is very far from a "harmless weed;" it is a very biochemically active and persistent mind (brain) -altering drug. Further, the THC content of today's high-potency marijuana is as much as 10 times stronger than the street marijuana of a decade ago. The National Academy of Science's Institute of Medicine reported in February, 1982, that marijuana use in our nation today "justifies serious national concern."

THE FOLLOWING ARE JUST A FEW OF THE HEALTH HAZARDS CONNECTED WITH MARIJUANA USE (Some symptoms appear in some users with light to moderate use; other symptoms appear only after heavy use. Heavy use is defined as smoking 4 or 5 marijuana cigarettes per week.)

Interference with Psychological Functioning. Symptoms are lack of goals and motivation, impairment of short-term memory and learning, and retardation of emotional growth. This is affirmed by an increasing body of clinical reports from pediatricians and psychiatrists. Each year, marijuana accounts for the second largest number of admissions into federally-funded drug abuse treatment facilities. Tragically, the chronic user is rarely able to perceive the change that has taken place in himself or herself. A carefully designed study matched marijuana smoking in rhesus monkeys to moderate and heavy smoking by humans over a six-month period. For these monkeys, a pattern of abnormal brain waves appeared within two to three months' exposure, and was found to persist even after three months' exposure, and was found to persist even after eight months of abstinence. Upon autopsy, the limbic area brain cells of these monkeys showed distinct damage. The brain cells of the control monkeys (exposed to the same amount of pot smoke with THC removed) were perfectly normal.

Impairment of Normal Sex and Reproductive Processes. In man, marijuana reduces sperm count and motility and increases the number of abnormal forms of sperm. Disruption of ovulation and disruption of menstrual cycles have been observed in humans and in rhesus monkey studies. Since THC collects in and passes through the placenta, the developing fetus will be at risk if the mother uses marijuana.

Serious Impairment of Driving and Flying Performance. Studies have shown that marijuana is just as driver-impairing as alcohol. Moreover, marijuana *adds* to the driver-impairing effects of alcohol. (Note: alcohol can lead to nausea and vomiting; however, marijuana suppresses the vomiting response setting the stage for a dangerous state of intoxication.)

Impairment of Lung Function. This ranges from subclinical effects (which do not yet "show") to the same serious lung conditions caused by cigarette smoking; but pot smoking brings on these conditions far sooner and with fewer "smokes;" for example, one marijuana cigarette may cause more air flow resistance than 16 tobacco cigarettes. (Air flow determines in large measure how well we get oxygen into the lungs and how well we get carbon dioxide out.)

High Risk Groups: The younger the user, the more deleterious the effects. Because experimentation is too often the first step to personal and social loss and eventual dependence, any use by teens or preteens must be strongly discouraged. Other special high risk groups are pregnant women; those with cardiac problems; diabetics; epileptics; and persons with underlying or present mental disorders.

Although one chemical in marijuana—THC—is being used for suppression of nausea and vomiting in various patients suffering these effects from cancer chemotherapy treatment, this does *not* mean that "pot must be safe"—as many youngsters have been led to believe. The 421 chemicals in the crude drug marijuana are combusted into over 2,000 chemicals when smoked. It is thus a Pandora's Box of unknowns. But what we *do* know about it is bad news.

What is the extent of marijuana use in the U.S.?

"Young people are often at the leading edge of social change; and this has been particularly true in the case of drug use. The surge in illicit drug use during the last decade has proven to be primarily a youth phenomenon, with onset of use most likely to occur during adolescence."

The above quote is from Dr. Lloyd D. Johnston, et al., Highlights from Student Drug Use in America 1975-1981, National Institute on Drug Abuse (NIDA). This document presents findings from a national research and reporting program, *Monitoring the Future: A Continuing Study of the Lifestyles and Values of Youth*, conducted annually since 1975 by the University of Michigan's Institute for Social Research. The data give some important indication of drug use among high school seniors, with some information about starting use in earlier grades. In interpreting the data, one must take into account one fact: the research does *not* include those in the target population who dropped out of high school before the 12th grade—15-20% of each age group. At hearings concerning international narcotics control policy, which were held before the Committee on Foreign Affairs, House of Representatives, April, 1982, Dr. Mel J. Riddile of Fairfax County, Virginia, and representing the National Association of Secondary School Principals testified:

"I would like to say that as we find younger and younger children using illicit drugs, particularly marijuana, we find that they don't make it to their senior year and they don't appear in the NIDA surveys.

One study that we conducted in a local school found that 29 percent of the marijuana users dropped out of school in 1 year. They would not have made it to their senior year for that survey. So I think we have to consider that." (U.S. Congress, Committee on Foreign Affairs, "International Narcotics Control", April, 1982)

According to *Highlights*, among high school seniors of the class of 1981, "marijuana is by far the most widely used illicit drug;" 46% used marijuana during the year; 32% used in the past month; 7% used daily (one in every 14 seniors). Daily use was on a slightly downward trend, which, said the researchers, was apparently due to concern about health consequences and peer disapproval. As for grade of initial use by the class of 1981, *34% first used marijuana prior to high school* and 25% during high school. (The remainder had never used.) See 1982 data, end of article.

As for overall use of marijuana, Dr. William Pollin, Director, National Institute on Drug Abuse stated that at least 22 million Americans use marijuana (previous hearings, U.S. Congress, Committee on Foreign Affairs, *International Narcotics Control*, April, 1982). The 1979 National (Household) Survey on Drug Abuse, ages 12 on up, shows that *one out of every three Americans ages 18 to 25 was a current pot smoker* (defined as using the drug within the past month).

To Sum Up: Since 1964, over 6,000 scientific papers have been published on cannabis, the plant from which marijuana, hashish, and hash oil are "processed." According to Dr. Carlton Turner, the White House Drug Abuse Policy Director, who has read and annotated all these papers for the

two-volume work he co-authored, *Marijuana, An Annotated Bibliography*[1], "*Not one* of those papers gives cannabis a clean bill of health."

Indeed, he says, "*The inescapable fact is that unless our current pot-smoking habits are reversed sharply, marijuana will have drastic long-term biological and psychological health effects on our young people, and, therefore on the future of our families and our nation.*" (Peggy Mann, *Pot Safari*, 1982)

Eradication of Marijuana: Use of Paraquat

The use of marijuana is clearly a public health problem of major proportions; the economic and social costs are enormous. Eradicating cannabis, the plant from which marijuana is derived, is one important way to begin to attack this problem. Although various articles we come across in magazines and newspapers might lead some to believe that domestically grown cannabis accounts for a considerable proportion of marijuana in the U.S., actually "domestic commerical cultivation has consistently represented about 7 percent of the total marijuana consumed in the United States." (Attorney General William French Smith, "Drug Traffic Today," *Drug Enforcement*,[2] Summer, 1982, p.5). Increased efforts to eradicate cannabis would certainly lessen the public health problem created by use of the drug. We need to keep in mind that the U.S. is already obligated to participate in ways to control cannabis. According to a recent U.S. State Department document, *Cannabis Eradication in Foreign Western Hemisphere Nations*, November, 1982, the State Department intends

> *"to initiate a cannabis eradication program in foreign Western Hemisphere nations. The proposed action is to support efforts of host governments to eradicate cannabis by aerially applying the herbicide paraquat where appropriate."*

Describing the proposed federal action and evaluating it in terms of domentic environmental impacts, the document also explains that

> *"The U.S. Department of State's Bureau for International Narcotics Matters is mandated by Section 481 of the Foreign Assistance Act of 1961 to establish an international program aimed at reducing the flow of illicit narcotics and dangerous drugs of foreign origin into the United States. In 1978 an Amendment to the Foreign Assistance Act placed restrictions on U.S. support to foreign governments for the eradication of marijuana using paraquat. In December of 1981, these constraints were repealed. With the advent of this development, it is now the intent of the U.S. Department of State to initiate a cannabis eradication program in foreign Western Hemisphere nations."*

Such an action as described in the above State Department document would help to reduce the supply of marijuana coming into the U.S. from abroad. However, it becomes clear that *such a program must ultimately be coordinated with efforts to reduce the domestic production of marijuana in the U.S.* Furthermore, the U.S. is obligated by international commitment to try to reduce this supply: According to the above State Department publication,

> *"The United States is a party to the 1961 Single Convention on Narcotic Drugs, as well as numerous bilateral and multilateral treaties and agreements on the control of dangerous drugs. The United States and other parties assumed the obligation under the treaty to control and prevent trafficking in narcotics, including heroin, cocaine, and marijuana. Any attempt by the United States to abrogate, amend, or withdraw from the Single Convention would have serious repercussions with respect to controls on all other narcotics and dangerous drugs..."*

It has become abundantly clear that marijuana can be controlled most effectively at the initial point of production: this requires eradication of cannabis at its source, for once the illicit crop has been cut and sent on its way to some distant point, the problem of discovering and intercepting it is manifold, and much of it remains undetected. The use of paraquat would be one way to eradicate cannabis before it is harvested and shipped.

What is Paraquat?

According to the 1980 report of the Select Committee on Narcotics Abuse and Control, *The Use of Paraquat to Eradicate Illicit Marijuana Crops and the Health Implications of Paraquat-Contaminated Marijuana on the U.S. Market*, (Congressional committee report, pp. 11-12),

> "The chemical 'paraquat' (1,1'-dimethyl-4,4'-bipyridinium dichloride) is a general contact herbicide manufactured in the United States by Imperial Chemical Indistries, Americas, and distributed by the Chevron Chemical Corporation, under license from the British-based Imperial Chemical Industries, Limited (ICI). The compound was first used as a plant growth regulator beginning in 1959, and *since 1966, paraquat has been registered for a broad spectrum of uses* (Emphasis added):
>
> 1) as a pre-planting herbicide for the control of weeds prior to the establishment of grass seed fields, and in preparation for no-tillage or [minimum] tillage production of crops such as corn and soy-beans;
>
> 2) as a directed spray for the control of weeds in orchards, vineyards, ornamental plantings, and nonerop plant areas;
>
> 3) as a desiccant and defoliant in harvesting such crops as soybeans, sugarcane and sunflowers;
>
> 4) as an aid in pasture renovation.
>
> When paraquat is applied in commercial agricultural settings, precautions are taken to avoid contact with edible portions of the crop undergoing treatment...
>
> *Paraquat is certified by the regulatory agencies of the U.S. Government as a safe and effective chemical when used in accordance with label directions." [Emphasis added.]*

Also, Federal agencies monitor for residues. Testimony quoted in the above report assures us that studies "show no evidence of paraquat residues in our food supply." (Dr. Warren C. Shaw, Staff Scientist, U.S. Department of Agriculture)

Why Use Paraquat?

Studies and experience show use of paraquat to be a viable method of eradicating cannabis.

[1]See Reference List for further information about this work.

[2]A copy of this publication may be obtained from Drug Enforcement Administration, U.S. Department of Justice, 1405 Eye Street, N.W., Washington, D.C. 20537

In July, 1979, a United Nations Narcotics Laboratory (UNNL) Study Group composed of experts from around the world convened in Geneva to consider methods for the eradication of illicit narcotic crops. Following are a few statements from its report, which is reprinted in the above congressional committee report. *The Use of Paraquat to Eradicate Illicit Marijuana Crops and the Health Implications of Paraquat-Contaminated Marijuana on the U.S. Market:*

"Opium poppy, cannabis, and coca bush are the narcotic plants of global concern, being the sources of such principal drugs as heroin, marijuana, and cocaine, respectively...

There are positive ways to control illicit narcotic crops. These include persuading illicit growers to produce other income-generating crops. Unfortunately, this alternative is not always realistic... chemical attack at the present time offers the best overall opportunities to successfully destroy narcotic crops. Mechanical means are, however, also quite viable and fire is feasible.

The variety offered by these three readily available, proven techniques, both individually and in combinations with one another, led the group to conclude that the initial costs to develop the apparently promising approaches of biological controls and genetic alteration would not be cost-effective in the effort to eradicate illicit narcotic crops."

Ultimately, the UN Study Group report states that

"From the approximately 60 herbicidal chemicals that have been evaluated for their effectiveness in controlling cannabis and poppy, the group selected five, as having sufficient merit to receive primary consideration for use in the control of cannabis and poppy."

Of these five, one was paraquat. This chemical was given high marks in terms of effectiveness in cannabis control:

Paraquat

"provides effective control of cannabis and poppy... The effects of paraquat are soon noticeable. It produces the most rapid response of any of the chemicals that have been tested..."

As for environmental impact,

"Drift of paraquat to nearby vegetation may cause visible necrotic spots, but under ordinary circumstances damage would be minimal. Paraquat persists in the soil for long periods, but it is not biologically available because it is tightly absorbed on [bound to the surface of] soil particles. Free paraquat is degraded by soil micro-organisms."

And Chevron Chemical Company, Ortho Division, states in "The Impact of Paraquat on the Environment"[3] that Paraquat

"is rendered inert once it contacts the soil and is not biologically persistent... There is no possibility of residues of paraquat being accumulated in living systems. Thus paraquat soil residues are biologically unavailable to living organisms in the environment... if water did become accidentally contaminated with paraquat, residues in the water would quickly disappear largely due to adsorbtion onto soil particles suspended in the water and in the bottom mud."

[3]Chevron Chemical Company, Ortho Division, Research and Development Department, Richmond, California, "The Impact of Paraquat on the Environment" (summary), March, 1971.

And from the White House Drug Abuse Policy Office *Fact Sheet* (July 19, 1982): "Paraquat is a fast-acting herbicide which is biodegradable, photodegradeable and decomposes upon storage and heating." In other words, paraquat is broken down by soil micro-organisms, sunlight, storage, heating. Toxicity of the break-down products is nominal.

In the application of paraquat, the availability of water is required, for water is the normal carrier.

Are there health hazards for pot smokers?

The UN Report cited above states that—although handling of the concentrate requires care by those applying the chemical, "residues of sprayed formulations on cannabis would not be sufficient to cause toxic effects to the marijuana user." In the White House *Fact Sheet* cited above, we read,

"In 1977, it was confirmed that marijuana containing Paraquat was available on the street in the United States. Analysis by the Center for Disease Control [CDC, Public Health Service, Department of Health and Human Services] in 1978 found that 3.6 percent of their samples of confiscated marijuana contained Paraquat. ***Not a single case of lung damage due to smoking marijuana containing Paraquat was found by CDC despite a follow-up on all reported cases during the 'Paraquat Scare' in 1978."*** *[Emphasis added.]*

Just what was that "paraquat scare?" First, one must understand the climate of the times. Only very recently did the general public begin to learn something about the health hazards of marijuana use; but in the mid-70's, except for scientists and a few others, the general public knew relatively little about these hazards. During that time, Mexico had begun to spray cannabis with paraquat—of course, this would reduce the supply of marijuana into the U.S. Pro-drug forces and various media elements pushed to end spraying programs, implying that paraquat was causing lung damage among marijuana users. And, significantly, research findings describing *marijuana's* effects on lungs were given almost no publicity. Eventually, the U.S. Congress passed an amendment to the Foreign Assistance Act of 1961; this amendment "...placed restrictions on U.S. support to foreign governments for the eradication of marijuana using paraquat." *(Cannabis Eradication in Foreign Western Hemisphere Nations*, State Department, November, 1982) But, when Congress realized the deception in the "paraquat scare," it *repealed* these constraints in December of 1981.

The Public Health Service, Department of Health and Human Services, is supportive of eradicatoin of cannabis using paraquat. A letter published in the State Department publication cited above *(Cannabis Eradicaton in Foreign Western Hemispere Nations*, November, 1982) reads:

"The Public Health Service (PHS) strongly supports a program for eradication of cannabis in the Foreign Westrn Hemisphere Nations... We feel that the proposed cannabis eradication activity can be properly performed by using the herbicide paraquat in accordance with Environmental Protection Agency label instructions and its application requirements and by following sound procedures to monitor the activity."

Success of the Mexican Paraquat Program. Mexico has demonstrated success in its cannabis eradication program. According to the previously mentioned Congressional

report, *The Use of Paraquat to Eradicate Illicit Marijuana Crops and the Health Implications of Paraquat-Contaminated Marijuana on the U.S. Market.*

"In 1975, the Government of Mexico, in a bilateral program agreement with the United States Government, began using chemical eradication agents to destroy opium poppy crops...

The potential of the program impressed the Mexican Government to the extent that it decided to expand the efforts of the aerial poppy eradicatoin program to include what it considers to be its own number one domestic drug abuse problem: Marijuana. The environmentally safe, commercially available herbicide 'paraquat' was chosen by the Mexican Government from a list provided by the U.S. Department of Agriculture of herbicides licenses and evaluated as safe for domestic commercial use as an acceptable agent for the marijuana eradication program. Paraquat's safety record when used in accordance with label directions is excellent."

Some additional statements from the White House Drug Abuse Policy Office *Fact Sheet* (July 19, 1982):

- *"Paraquat has been on the market as a herbicide since 1962 and is one of the most widely used herbicides in the world."*
- *"Paraquat is a legal herbicide for use anywhere in the U.S. as long as the label instructions are followed."*
- *"Paraquat is used to control broad-leaf weeds and cannabis is a broad-leaf weed."*
- *"Approximately 4 million pounds of Paraquat [are] sprayed on over 10.7 million acres in the U.S. each year." (This is for uses such as weed control in orchards and as a harvest aid for such crops as cotton and soybeans).*
- *"The Administration supports the eradication of the cannabis plant as a legitimate activity to reduce the availability and use of marijuana."*

Paraquat Use in the U.S.

In August of 1982, paraquat was used to spray a large cannabis field in Red Bay, Florida. Stringent controls were followed, which prevented the sprayed cannabis from reaching the consumer market; no adverse environmental impacts were noted; stringent controls were followed to protect the health and safety of personnel conducting the spraying. Safety clothing (rubber suits, goggles, respirators, etc.) was worn to protect the personnel involved; there were no problems. A tank-truck was used as far as it could go, and the rest of the spraying was accomplished in the tight places by back-pack sprayers. The paraquat was used as a desiccant, which dried the foliage and allowed the field of cannabis to be burned within 48 hours "at minimal cost to the state." (This information was obtained following a Committees of Correspondence inquiry to the Department of Law Enforcement, State of Florida.)

In using paraquat, one must remember that, like many chemicals in use, including many under the kitchen sink, it is a poison, and like any poison, it must be used with care. Label instructions must be followed and applicable state and federal regulations must be observed. Paraquat should be used only when appropriate and with stringent controls to ensure the health and safety of personnel involved; it is a restricted use herbicide and may be used only by Certified Applicators or persons under their direct supervision."

In conclusion, because the public health hazards involved in *marijuana* use are so great, the use of paraquat as a means to eradicate cannabis is warranted.

What You Can Do

1. Domestic commercial cultivation of cannabis is presently concentrated in seven primary states: California, Hawaii, Oregon, Kentucky, Missouri, Arkansas, Florida. But other states are also involved. Is your state one of these? You can find out from your District Attorney or state Attorney General. At the first national conference of the National Federation of Parents for Drug-Free Youth in Washington, D.C., Dr. Carlton Turner was asked on October 12, 1982:

"Dr. Turner, [we in the midwest have heard] that a growing number of farmers are growing marijuana... What would be your suggestion as to what parent groups might do with the enforcement people in the eradication of cannabis?"

Dr. Turner:

"Talk to the local law enforcement people, who will have contact with the Drug Enforcement Administration, which is giving technical assistance. With these two groups working together, we now have 26 states which are involved in eradication."

2. Parent groups and individuals, write to your elected officials: let them know that you want cannabis to be eradicated—that use of cannabis presents major health hazards. Continue to encourage and support all those who are in a position to take steps to eradicate cannabis, from local law enforcement personnel to your state legislators. Write letters to newspapers expressing this support.

3. If you become aware of a particular place where cannabis is being grown, contact your local law enforcement personnel. (This can be done anonymously.) Also, if you would like more information about Florida's successful use of paraquat on marijuana, you may write to the State of Florida, Department of Law Enforcement, P.O. Box 1489, Tallahassee, Florida 32302.

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The following is a copy of an article that appeared in the Philadelphia *Daily News* on December 9, 1982 by Stuart D. Bykofsky:

Bob Hope recently disclosed that NBC axed a couple of jokes about drug use from one of his routines during a special. One of the Hope's gags said that for selling cocaine "you can get 20 years in prison or two years in Congress."

Hope is far from one of the drug generation's favorite comics. You'd have to guess you wouldn't find any white powder on the old man's nose.

NBC ran a week-long, anti-drug campaign last year and later ordered *no* drug jokes on its air. That comes right from Grant Tinker at the top.

We have a drug epidemic in America, that's for sure.

But is a flat ban the most effective remedy? Would an anti-drug joke, in which the user is portrayed in less than flattering terms be considered a "drug joke?" Even if that's not the case, should the networks be issuing flat bans on material?

This represents a conflict between a socially desirable end (fighting drug use) and a questionable means (network censorship). Freedom of expression is not an absolute—not in society and not on television—but I have trouble with edicts that wipe out an entire area of commentary.

How do you feel? Should the networks ban *all* drug humor, allow *only* anti-drug jokes, or keep its hands off the material entirely? Let me know by writing to me, care of the Daily News, P.O. Box 7788, 400 N. Broad St., Philadelphia, Pa. 19101.

We encourage people to write Grant Tinker to let him know we appreciate his effort and active participation in getting the anti-drug message to the general public via television and radio programming at N.B.C.

We have already had an encouraging reply to our letter to him. You may state that you are a member of the Committees of Correspondence. Please direct your correspondence to:

Mr. Grant Tinker *Chairman of the Board*
National Broadcasting Company
30 Rockefeller Plaza
New York, N. Y. 10112

COMMITTEES OF CORRESPONDENCE INC.
Wine Makes Might

Drug Abuse Newsletter

February, 1983 Issue No. 10

NIPPING MARIJUANA IN THE BUD

A Comparison of Paraquat—the Herbicide with Cannabis—Nature's Toxic Plant

IMPORTANT UPDATE

1. STATE DEPARTMENT DECISION: According to a December 21, 1982 public notice, Bureau for International Narcotics Matters, Dept. of State.

   "The Department of State has decided to support the efforts of foreign Western Hemisphere nations to eradicate cannabis by aerially applying the herbicide paraquat. In emplementing this decision, the Department now intends to engage in formal discussions with cannabis-producing Western Hemisphere nations."

2. The latest national high school senior survey conducted by the University of Michigan's Institute for Social Research indicates that in 1982, daily marijuana use was down to 6 percent (about one in every 16 seniors). However, this news gives us NO reason whatsoever to become complacent.

COMMITTEES OF CORRESPONDENCE INC.
Write Makes Might

Connie & Otto Moulton
P.O. Box 232
Topsfield, MA 01983
(617) 774-2641

Drug Abuse Newsletter

Issue No. 8
January 82

An Important New Way to Finance Drug Enforcement and Prevention Programs for Your State:

Civil Forfeiture of Illicit Drug Profits

The Drug Enforcement Administration has a powerful new model law which can be adopted by any state. This law, if enacted, would allow state law enforcement officials to trace and seize the assets and profits of illegal drug activity. This includes everything from the drugs themselves to the person's home, car, boat, bank account, etc. Once seized, these illegal drug profits could be diverted into state treasuries. Federal drug enforcement agents are already making such seizures under a similar statute, and monies and property from the federal agents' seizures are going into the federal government's treasury. If a state adopts this model law and makes the seizures, the assets so seized and found, by a court of law, to be assets or profits of illegal drug activity, will then belong to the state. Therefore, the proposed Model State Forfeiture Act, in conjunction with existing state laws, will provide important needed support for state drug enforcement efforts.

This Model Forfeiture Act was written by Harry L. Myers, Assistant Chief Counsel of the Drug Enforcement Administration. Mr. Myers is the same attorney who wrote the Model Paraphernalia Act which has now been adopted by so many of the states.

Every year billions of dollars are reaped by organized crime. Much of this money comes from illegal drug activity. The illegal drug industry is estimated to be the third largest industry in the United States, after Exxon and General Motors. The relatively new Federal Forfeiture Statute gives federal law enforcement officers a powerful new weapon with which to fight organized crime in the drug area. This new law allows the government to attach the very motive for illegal drug activities--the criminal's desire for great wealth. It subjects his money, bank accounts, and property to forfeiture if it can be shown that these items were earned from illegal drug trafficking. (Forfeiture is the taking by the government of property illegally used or acquired, without compensating the owner.) The federal statute, Title 21 of the United States Code, Section 881 (a)(6) provides that all monies and other assets acquired from the illegal drug trade shall be subjected to civil forfeiture. This means that law enforcement officers can go beyond merely arresting traffickers and seizing any drug involved. Now, illegally accumulated assets (bank accounts, cars, airplanes and even real estate) are all subject to civil forfeiture.

In order to understand civil forfeiture it is necessary to understand what civil law is. The legal system is broadly divided into two separate areas--civil and criminal. Both areas can be used to punish wrongdoers but only the criminal law--which is used exclusively by the city, county, state or federal government--can involve a jail sentence. Civil law on the other hand is most often used when one person sues another. The legal rules of evidence, as well as the standard of proof, are different in these two areas. For example, in order to find a defendant guilty of drug trafficking it must be shown "beyond a reasonable doubt" that he did, in fact, illegally distribute drugs. Under civil law it is enough to show that it is "more likely than not" that the defendant acquired his property from drug trafficking. The second standard is, of course, a much easier one to meet.

Forfeiture is an ancient concept, traceable to the Old Testament of the Bible (Exodus 21:28) as well as Greek and Roman Law. Today, forfeiture is most often used to protect the public from harmful objects (adulterated foods, sawed-off shot guns) and as a deterent to crime.

The new Federal Forfeiture of Drug Profits Act provides that the civil law with its less strenuous standard of guilt is to be combined with the concept of forfeiture to become Civil Forfeiture. This is important because it means that no criminal conviction is required.

Under this new Civil Forfeiture Law the federal government can now seize the ill-gotten gains of a drug importer if it can be proved in court that it was more likely than not that they were bought with drug profits. Notice that the criminal conviction of the drug dealer is not required.

For example: Mr. X is a drug trafficker. He has money in the bank, a lovely home, jewellery for himself and his wife, and a very expensive car. The money in various bank accounts allows him to continue to initiate and pay for further underground illegal drug activities. If it can be proved in a court of law that all the items listed above were the result of drug trafficking, they will be forfeited even if Mr. X manages, by skillful legal manuevering, to remain free. The reason is that the forfeiture case is separate from the criminal one. They are two different legal actions. Even if the District Attorney does not prosecute the criminal action against Mr. X, he can still file an action against his property as long as he can show the likelihood that the property was acquired from the illegal drug trade. It costs money to traffic in illegal drugs and moreover a business that is subject to such governmental seizures may become a poor business risk with a poor return for the investment dollar.

Before this new law the federal government could seize and subject to forfeiture certain items. These included:

1) illegal drugs,
2) any equipment and materials used to make, deliver or import illegal drugs,
3) containers for illegal drugs,
4) cars, planes and boats for transporting illegal drugs, and
5) books and records connected with drug trafficking.

However, nothing in the federal law dealt with the profits of illegal drug trafficking until Title 21 of the United States Code, Section 881 (a)(6) was enacted. Undercover drug agents have often stated that among the drug traff...ing elements of society, bragging about just what items were bought with drug money is commonplace. Under federal law and in states that enact the model act such profits would be put at high risk of seizure and forfeiture.

How Would This Law Provide the States With Much Needed Revenues?

Drug enforcement costs are enormous. It is estimated that federal enforcement costs at the present time is about $150,000,000 a year. This includes the costs of the Drug Enforcement Administration, the anti-drug activities of the Customs Service, and the anti-drug activities of the Coast Guard. This figures does not include prosecutorial costs (twenty-five percent of all federal cases deal with illegal drugs), prison costs for convicted felons, or drug treatment centers. It also does not include the millions of dollars spent by the states in these areas.

The proposed legislation offers the states substantial potential for recovering significant amounts of money now being spent to combat drug offenses. The Federal Drug Enforcement Administration serves as a good example. During 1979-1980 DEA seized assets totaling nearly one-half of its annual budget. Since many states are looking at less money because of budget cuts, eroding tax structure and growing inflation, such a statute, properly enforced, could help to provide needed revenues, just as the federal law has done.

What Exactly Does the Model Forfeiture Law Provide?

The prefatory note to the model forfeiture of drug profits act states:

> Widespread drug abuse, particularly amoung children, teenagers and young adults, poses a serious threat to the well-being of our society. Drug trafficking organizations which cater to this abuse are composed of three elements: (1) contraband drugs, (2) people, and (3) money and other assets. As long as the assets remain untouched, seized drugs and arrested people can always be quickly replaced. Capital is at the heart of all businesses, both legal and illegal. Depriving drug traffickers of their assets, including their operating tools and their illegally accumulated profits, is an essential step in crippling these organizations.
>
> The intent of the Model Forfeiture of Drug Profits Act is to amend existing state laws to permit all states to seize, civilly forfeit and deposit in their treasuries: (1) all moneys and other assets used to buy contraband drugs, (2) all moneys used to facilitate any drug law violation, and (3) all assets acquired from drug trafficking, regardless of their form. The Model Act consists of amendments to the civil forfeiture section of the Uniform Controlled Substances Act, which has been enacted by forty-seven (47) states.

The Model Forfeiture of Drug Profits Act subjects to civil forfeiture:

> " ( ) Everything of value furnished, or intended to be furnished, in exchange for a controlled substance in violation of this Act (meaning the Controlled Substances Act of this State), all proceeds traceable to such an exchange, and all moneys, negotiable instruments, and securities used, or intended to be used, to facilitate any violation of this act; except that no property shall be forfeited under this paragraph, to the extent of the interest of an owner, by reason of any act or omission established by him to have been committed or omitted without his knowledge or consent.
>
> **Rebuttable Presumption:** All moneys, coin, and currency found in close proximity to forfeitable controlled substances, to forfeitable drug manufacturing of distributing paraphernalia, or to forfeitable records of the importation, manufacturing or distributing of controlled substances, are presumed to be forfeitable under this paragraph. The burden of proof is upon claimants of the property to rebut this presumption.

It can be seen that the Model Forfeiture of Drug Profits Act targets four discreet areas.

1) **Exchange** -all things of value furnished or intended in exchange for drugs. A small number of states already have this provision. Note that this section is not only limited to money or negotiable instruments and securities but includes "anything" of value exchanged (i.e. a diamond ring). Two examples of an exchange:

> 1) Suppose Mr X is observed giving Mr Y $2000 for an ounce of cocaine; that money is forfeitable.
> 2) Suppose Mr. X admits going to Mexico with $10,000 to buy drugs but only manages to buy $3000 worth. The drugs as well as the $7000 are forfeitable because all the money was intended for exchange for illegal drugs.

2) **Proceeds** - all proceeds traceable to such an exchange. The term "proceeds" is that which is received when an object is sold, exchanged or otherwise disposed of. As with the Exchange Section, this need not be money but any item received for the illegal drugs. This is part of the model law because profits from the cash-and-carry trade are eventually hidden by changing their form. It is, after all, the proceeds that allow the drug traffickers to live the good life. They are converted into homes, yachts, planes, cars, stocks bonds, business bank accounts and other property. The power to seize and forfeit cash exchanged for drugs strikes at the operational funds of illicit business. However, the power to seize and forfeit drug "proceeds" poses a much greater threat to the accumulated profits of traffickers. For example:

> 1) Suppose Mr X sells drugs for $10,000. The entire $10,000 is forfeitable because it is the proceed from an exchange
> 2) Suppose Mr. X takes the $10,000 and puts the money in a bank. It is still a proceed and it is still forfeitable.
> 3) Suppose Mr. X buys a car with the $10,000. It is forfeitable under the model law because the money and all that it buys is tainted by a drug exchange.

3) **Facilitation money** - all money used or intended to be used to facilitate any drug violation. This section is limited only to money, negotiable instruments and securities. Examples of money used in these manners would include:

> a) money used to run an illegal PCP laboratory,
> b) money used to pay rental fees for cars, boats or planes to smuggle marijuana
> c) money to pay a drug carrier, or even
> d) Money used by a drug carrier for expenses.

4) **Innocent owner** - This section protects the innocent owner whose property might have been used in a way so as to violate the law. For example:

> Mr. A leases his beachfront property to Mr. X. Mr. X uses this property as a dock for small fishing boats bringing in bales of marijuana from the mother ship at night. Mr. A has no reason to suspect these activities. Therefore, Mr. A's property is not forfeitable.

If enacted in your state, this law would have two major beneficial impacts:

1) The law, in itself, would be a powerful deterrent to drug trafficking.
2) The law would provide much-needed revenues to help support drug enforcement, as well as drug rehabilitation, and drug education and prevention programs throughout your state.

WHAT YOU CAN DO

All of the states should adopt this powerful Model Forfeiture Law as part of their law enforcement arsenal. By using effective political action this proposed legislation can become law in your state. Here's how:

1) Write to:

> Superintendent of Documents
> United States Government Printing Office
> Washington D.C. 20402

to order a guide for the model act called:

> **Drug Agents' Guide to Forfeiture of Assets**
> Stock number 027-004-00031-2

Enclose $8.50 per copy ordered. This price includes postage and handling. Please order two (2) copies--one for yourself and one to give to your sponsoring state legislator. (Or, you may wish to photocopy important sections from a single copy).

2) Choose a state representative who has the ability to get the Model Forfeiture Law enacted. This involves using a legislative sponsor who has an excellent reputation in both state houses, if possible. This person need not necessarily have a strong knowledge of drugs, but should be well respected. Give your chosen representative a copy of the above mentioned guide, as well as a copy of this Drug Abuse Issue.

3) Notify all parent groups, PTA's church and synagogue groups, etc., in your state. Ask them to contact their local state representatives and express their support for the bill.

4) Keep in close contact with your sponsoring legislator so as to be ready to act by gathering more local support should the bill be in trouble.

©Jill Gerstenfield, January 1, 1982

POSSE COMITATUS

Here's some good news for you to share with your group and community.

Posse Comitatus, a limited exception to the doctrine of military non involvement in civilian law enforcement was signed into law December 2, 1981 by President Reagan. This legislation, a positive step forward in the battle against illegal drug trafficking, will permit meaningful cooperation between the military and civilian law enforcement officials. Now public law No. 97-86, Posse Comitatus will allow for the greater loan of equipment, training assistance, and sharing of information on movement of air and sea traffic outside the land areas of the United States. At last, the up to date equipment and expertise of our military will be used against the sophisticated measures taken by illegal traffickers. Already Drug Enforcement Administration officials are working with the Navy in the Carribean to detect smugglers.

Posse Comitatus took a full two years to become a reality and its support and passage can be credited largely to the parents of America. Their message of "NO DRUGS" is being heard everywhere and Congress is responding by initiating tougher laws. Posse Comitatus is certainly a step in the right direction.

How Much Do You Really Know About Marijuana?

by Peggy Mann

Peggy Mann has written more articles on the health hazards of marijuana and on marijuana p ue alcohol and driving, for major newspapers and magazines than any other writer in the world.

Q. What Exactly IS Marijuana?

A. Marijuana, hashish, and hash oil are prepared from a plant called cannabis sativa. Because cannabis grows, pot smokers often refer to "their drug" as a simple, natural weed — the implication being that it's harmless. However, it's far from simple and very far from harmless. Marijuana is the most complex of all the illegal drugs. It contains 421 known chemicals and, when it is smoked or burned, these break down into over 2000 chemicals entering the body. Sixty-one of these chemicals are unique — found only in one place in the world — in the cannabis plant. And they are called cannabinoids.

Q. What is THC?

A. It's short for delta-9-tetrahydrocannabinol — one of the cannabinoids; one most responsible for the "high." THC is impairing to brain cells, lungs, the reproductive organs; indeed, to all body cells. And other cannabinoids are even more impairing than THC to certain organs and organ systems. Thus far, scientists have studied only six of the 61 cannabinoids. All are biologically harmful. As one nationally known expert[1] puts it: "There is no other drug used or abused by man that has the staying power and broad cellular actions on the body that cannabinoids do."

Q. How long does marijuana stay in the body?

A. The most important single — and most dangerous — factor about marijuana is this: the cannabinoids are lipophilic (fat-loving). They seek out and seep into fatty sections of all body cells, and the fatty organs (the brain is one-third fat). Only very slowly do they leak back out into the blood stream to be eliminated. It takes about a month for all the chemicals in a single joint to clear from the body. If one smokes more than that, the cannabinoids accumulate in the cells, and the body is never drug-free. As one researcher put it: "Though the high is gone, the pot is not." When the chronic user stops smoking pot it takes about three months for the accumulation of cannabinoids to clear from the body.

Q. Can marijuana cause dependence?

A. The body cells of the regular pot smoker act like microscopic time-release capsules continually emitting cannabinoids into the bloodstream. Consequently, there are no severe physical withdrawal symptoms. (There may be mild symptoms such as sleeplessness, irritability, upset stomach, etc.). However, chronic users become strongly **psychologically** addicted. As one noted psychiatrist[2] puts it: "If marijuana **doesn't** cause dependence, why is it that it's so difficult for the chronic pot smoker to stop?" The difficulty in stopping is reflected in these statistics: according to the Federal Government's drug abuse patient data system, for the past five years, marijuana has accounted for the second-largest number of admissions into our Federally funded drug-treatment facilities. Furthermore, the percentage of these patients almost doubled between 1976 and 1981. During these years, about one-third of the patients started their pot use **prior to age 14.**

Q. How does pot affect personality?

A. The typical "pot portrait" of the heavy, young pot smoker is defined in countless clinical reports as well as in over 350 studies published in scientific journals since 1975. It includes the following: impaired short-term memory, emotional flatness, and the "dropout syndrome." (This can progress from dropping out of sports to dropping out of school to dropping out of the family.) Also: **diminished** will power, concentration, attention span, ability to deal with abstract or complex problems, and tolerance for frustration. **Increased** confused thinking, impaired judgement, hostility toward authority, self-centeredness. Also, unwarranted suspiciousness (paranoia); caring less about everything and everyone; depression, which often leads to suicidal thoughts. And the denial syndrome: refusal to believe that marijuana is affecting you adversely, and **refusal to believe the hard medical evidence that marijuana is physically and psychologically harmful. This symptom is typical of virtually all chronic pot smokers, youngsters and adults.**

Q. What about driving a car?

A. Over 50 driving studies clearly show that **marijuana is just as impairing to driving as is alcohol.** Furthermore, the driver-impairing effect of a one-ounce shot of whiskey or a 12-ounce can of beer or a glass of wine last one hour. But the driver-impairing effects of one "joint" (marijuana cigarette) last 5 to 6 hours. Marijuana impairs all important components of driving performance, including skills performance, perceptual processes, vision, attention, and tracking behavior. Because pot also impairs perception, many drivers actually believe they "drive better stoned." Studies also show that driving under the influence of marijuana **plus** alcohol means double trouble. And the latest closed course driving study showed the impairing effects of pot and alcohol to be synergistic (1 plus 1 equals 4 or 5).

Q. What does marijuana do to the lungs?

A. Pot smoking is harmful to the entire "pulmonary tree," from the sinus cavities to the tiny air-sacs deep within the lungs. Studies also show that it is even more impairing to the lungs than tobacco smoke, and its symptoms strike faster. There is also subclinical damage (which does not "show"). For example, one study[3] of healthy, adult pot smokers — who averaged 2.2 joints a day for five years — found they had 25 percent more airway resistance than a matched group of tobacco smokers who averaged 16 cigarettes a day for five years. (Airway resistance determines how well we get oxygen into the body and how well we get toxic carbon dioxide out.) Most cannabis smokers (pot and/or hashish) also smoke tobacco cigarettes. A lung biopsy study[4] of young U.S. soldiers showed that 91 per cent of those who'd smoked both had pre-cancerous cells. Those who'd smoked one or the other had a far lower incidence of pre-cancerous cells. Those who used neither had no pre-cancerous cells in their lungs.

Q. Can pot cause cancer?

A. It takes 30 to 40 years for lung cancer to grow. Thus far, in the U.S. people have been smoking pot heavily for only a decade or so. Tobacco is now called the single greatest cause of lung cancer, but marijuana and tobacco contain roughly equal amounts of such irritants and gaseous toxic agents as carbon monoxide, acetone, ammonia, and benzene. And the cancer-causing chemicals benzanthracene and benzopyrene are present in pot smoke in amounts 50 to 70 percent greater than in tobacco smoke. Researchers at the Swiss Institute for Experimental Cancer Research[5] exposed more than 5000 animal and human lung cell cultures to puffs of pot and tobacco smoke. The pot smoke caused cancerous lesions more rapidly than the tobacco smoke.

Q. What about sex and reproduction?

A. In males, human and animal studies have shown that pot reduces sperm numbers and mobility and increases numbers of abnormal sperm. Both conditions probably return to normal when smoking is stopped. In females, animal research has shown that eggs are affected by THC, which accumulates in the ovaries.[7] Rhesus monkey and human research shows that THC interferes with the menstrual cycle and impacts on fertility. In the only reproduction studies ever done on long-term exposure to THC[8], rhesus monkeys (with a 28-day menstrual cycle) were given the monkey THC equivalent of a human smoking one joint a day for 3 to 5 years. Result: 44 percent of the "THC mothers" produced dead or dying offspring, compared to 12 percent (a normal birth loss) among control mothers who received no THC. Although the THC fetuses and dead babies looked normal, microscopic evaluations showed a wide range of subtle developmental abnormalities in each of the THC babies, and in none of the control babies. The THC babies which survived had subtle behavioral abnormalities. Studies of human babies whose mothers smoked pot during pregnancy showed the same type of "dose-related" behavioral abnormalities. The more pot the pregnant mothers had smoked the more symptoms the infants showed. One noted marijuana researcher[9] put it this way: "These—as well as numerous human and animal cell studies—show that pot smokers may be playing genetic roulette with the physical and mental health of the children they may have one day."

Q. Does marijuana lead to other drugs?

A. Not necessarily. However, since chronic pot smokers develop a tolerace to the pot high, they often go on to other drugs to induce the high they once got from marijuana. Also, "pushers" (drug dealers) generally handle a variety of drugs and, like any salesperson, try to interest buyers in additional products. The annual National High School Senior Surveys[10] continue to show that about half the high school seniors who are pot smokers also use one or more additional illegal drugs, whereas virtually none of the non-pot smokers are regular users of any other illegal drugs. Teenage pot users tend to stop short of heroin. However, in the latest study published in 1981 of a national sample of 2510 males ages 20 to 30, it was shown that of the 1382 pot-users, approximately one out of ten also used heroine.[11] But of the 1128 non-pot users only one person had used herion. Furthermore, the large majority of those who used heroin frequently were heavy pot users.

The greater the extent of marijuana use, the greater the chance that one will use other drugs. For example, among these same 1382 pot smokers, 73 percent of those who had used marijuana more than 1000 times graduated to cocaine, and 33 percent went all the way to heroin.[12]

The researchers concluded, "The denial of the 'stepping stone theory' is merely the expression of a political rather than a scientific viewpoint."

[1] Dr. Carlton Turner, former director of the National Institute on Drug Abuse Marijuana Research Project at the University of Mississippi; co-author of the two-volume work, *Marijuana: an Annotated Bibliography*; and currently White House Senior Policy Advisor on Drug Policy.

[2] Dr. Mark Gold, recipient of the American Psychiatric Association's Prize for Research in Psychiatry, and Research Director of Fair Oaks Hospital in Summit, New Jersey—one of the few psychiatric hospitals in the U.S. specializing in the treatment of the marijuanaholic.

[3] Subclinical lung study done by Dr. Donald Tashkin, director of the Lung Function Laboratory of U.C.L.A. Hospital in Los Angeles.

[4] Study done by Dr. Forest S. Tennant, Jr., former director of U.S. drug army program in West Germany; currently director of Community Health Projects, Inc., Los Angeles, CA.

[5] Study done by Drs. Cecile and Rudolph Leuchtenberger.

[6] Study done by Dr. Robert Heath, Chairman of the Department of Neurology and Psychiatry at Tulane University Medical School.

[7] Study done by Dr. Akira Morishima of Columbia University.

[8] Study done by Dr. Ethel Sassenrath, of the California Primate Research Center of the University of California at Davis.

[9] Dr. Gabriel Nahas of Columbia University, pioneer marijuana researcher and author of *Keep Off the Grass* and *Marijuana: Deceptive Weed*.

[10] Surveys done by Dr. Lloyd Johnston, Dr. Jerald Bachman, and Dr. Patrick O'Malley, Institute for Social Research, University of Michigan.

[11] "The Stepping Stone Hypothesis – Marijuana, Heroin, and Causality," by Dr. John A. O'Donnell and Dr. Richard R. Clayton, published in 1981.

[12] Paper presented in 1982 to the National Institute on Drug Abuse National Advisory Council by Dr. Richard Clayton and Dr. Harwin Voss on use of marijuana and other illicit drugs.

About the author...

Peggy Mann has published over 30 books; has written fiction and articles for most of the major U.S. magazines and is a staff writer on *Reader's Digest*.

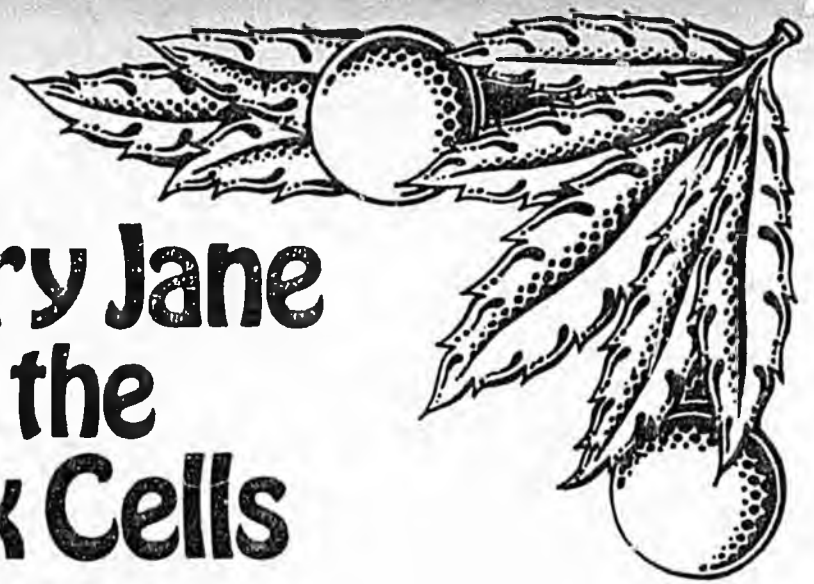
Q. What's the effect on brain cells?

A. No carefully controlled cannabis studies can be done on humans, for if damage was found in brain cells of heavy pot smokers, no one could be certain whether it had been caused by cannabis or alcohol or other drugs or disease. Therefore, in the most important brain cell study done thus far, rhesus monkeys were used. The limbic area was studied. This so-called "old-brain" is so similar in man and the rhesus monkey that, under the microscope, their brain cells look identical. Some monkeys were exposed to THC in the smoke of 2 to 3 monkey-sized joints a day (1/4 the size of a "human joint"). Others (the controls) were exposed to the same amount of pot smoke — with the THC removed. After six months (two years in human terms) there were slight structural brain cell changes in monkeys who'd been exposed to pot smoke with THC two days a week ("weekend smokers"). There were five different and dramatic types of brain cell changes in virtualy all of the brain cells examined in the monkeys exposed to THC 5 days a week. These same types of cell changes are seen in humans with early brain damage. The brain cells of monkeys exposed to the same amounts of pot smoke — but with the THC removed — were perfectly normal.

Q. Does marijuana affect the heart?

A. During "the high" the normal heartbeat increases 50 to 100 percent. Also, blood pressure is increased. Both conditions increase the amount of oxygen needed by the heart. But marijuana also increases the amount of toxic carbon monoxide in the blood, thereby reducing the amount of oxygen which reaches the heart. All research shows that pot should not be used by anyone with heart trouble. It can result in heart attack or death. One problem is that 25 percent of people who die of coronary heart disease never knew they had heart trouble. Their first symptom was — death.

What of the chronic smoker who complains of chest pains? No research has been done in this area. However, in most reported cases when they take no medication — merely cut out pot smoking completely — the chest pains disappear completely within days or weeks.



Mary Jane and the Sex Cells

by Gabriel G. Nahas, M.D., Ph.D.

Seldom in the course of centuries has a plant ever created a controversy as great as has **Cannabis sativa,** better known under the name of marihuana, Indian hemp, or hashish.

Eight centuries ago Moslem scholars from Cairo and Bagdad debated the pros and cons of this magic herb which allows man to dream while still awake. Their discussions had the same alacrity as those of today's American intellectuals. It appears now that this controversy, at least from a medical standpoint, has been partially answered.

One of the greatest uncertainties concerning marihuana, was the lack of evidence of cellular damage related to its use. It was known long ago that marihuana produced marked changes in thinking and behavior. This was brilliantly described by the French physician Moreau, 130 years ago, in his book "Hashish and Mental Illness." He observed that heavy long-term users of marihuana displayed a slowly progressive mental and physical deterioration, but these symptoms were non-specific, vague and had never been directly associated with cellular damage.

Cellular damage from marihuana has now been observed. Long-term marihuana users display an impairment of their cellular controlled immunity. This immunity is a function of T-lymphocytes (white blood cells) which specialize in fighting virus infections and destroying substances foreign to the body, such as cancer cells or tissue transplants.

My colleagues, Dr. J. P. Armand, Dr. N. Suciu-Foca and Dr. A Morishima, of the College of Physicians and Surgeons of Columbia University, and I studied 51 marihuana smokers, 16 to 35 years of age who had smoked an average of 3 joints of marihuana a week for 4 years. (Science Vol. 183, 419-420, 1974) These subjects had used no other drugs, except tobacco and alcoholic beverages.

We sampled blood from the veins of these volunteers and isolated their lymphocytes. The cells were tested with special substances which normally cause them to divide and grow.

Gabriel G. Nahas, M.D., Ph.D., who was decorated by the French and British governments for his work in the French underground during World War II, is now Professor of Anesthesiology at Columbia University College of Physicians and Surgeons in New York City.

The fact that marihuana products are stored in the sex organs, raises the possibility that marihuana might adversely affect the sex cells of men and women.

Such a test, the blast transformation test, measures the strength, or response, of the immunity system of the body.

We compared the immunity response of marihuana smokers with that of control subjects who did not use the weed, but smoked tobacco and drank alcoholic beverages. The immunity response of the marihuana smokers was 40% less than that of the nonsmokers. Furthermore, their immunological response was similar to that of patients with cancer, or kidney transplants (treated with immunosuppressant medicines).

The mechanism of this decrease in the division of lymphocytes was determined in another series of experiments. We were able to show that these lymphocytes from marihuana smokers could not increase the DNA production required for their proper division. DNA (desoxyribonucleic acid) is the basic chemical contained in the core of all cells. It carries the genetic code for heredity.

Similar observations were made on lymphocytes taken from subjects who did not smoke marihuana, but which were exposed in the laboratory to the drug. These cells were incubated in a test tube with very minute amounts of THC (THC is the active ingredient responsible for the effects of marihuana). They presented the same impairment in division and DNA production as those taken from marihuana smokers.

Our results confirmed those of Dr. Stehchver, from the University of Utah Medical School, who observed an increase in chromosome breakage in the lymphocytes of marihuana smokers.

Other scientists have made similar observations on other cells. Dr. Leuchtenberger, from the University of Lausanne, showed that lung cell cultures exposed to marihuana smoke did not grow properly and presented an abnormal DNA production. Dr. Zimmerman, at the University of Toronto, reported that the growth of tetrahymena, a microorganism, was diminished by miniscule amounts of THC which interfered with DNA synthesis.

How is it that the weekly consumption of only 3 to 4 marihuana cigarettes containing 15 to 20 mg. of THC may induce such cellular damage? The answer may lie in the fact that the active ingredients of marihuana, THC, are insoluble in water and are stored in fat tissue. The excretion from the human body of a single dose of marihuana requires more than one week's time. People who smoke marihuana more than once a week will store its by-products in the liver, lungs, brain, spleen, lymphoid tissues and sex organs (testes and ovaries).

The fact that marihuana products are stored in the sex organs, together with the known cellular alterations related to marihuana, raises the possibility that marihuana might adversely affect the sex cells of men and women.

It is most urgent that we learn to what extent frequent use of marihuana will impair the genetic equilibrium of a person's sex cells. The hereditary fate of future generations may rest upon this research.

DID YOU KNOW? 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. A female is born with about 400,000 eggs. If they are injured, there is no way to repair the damage. It has been proven that THC accumulates in the ovaries as well as other organs.

A Reprint
Families
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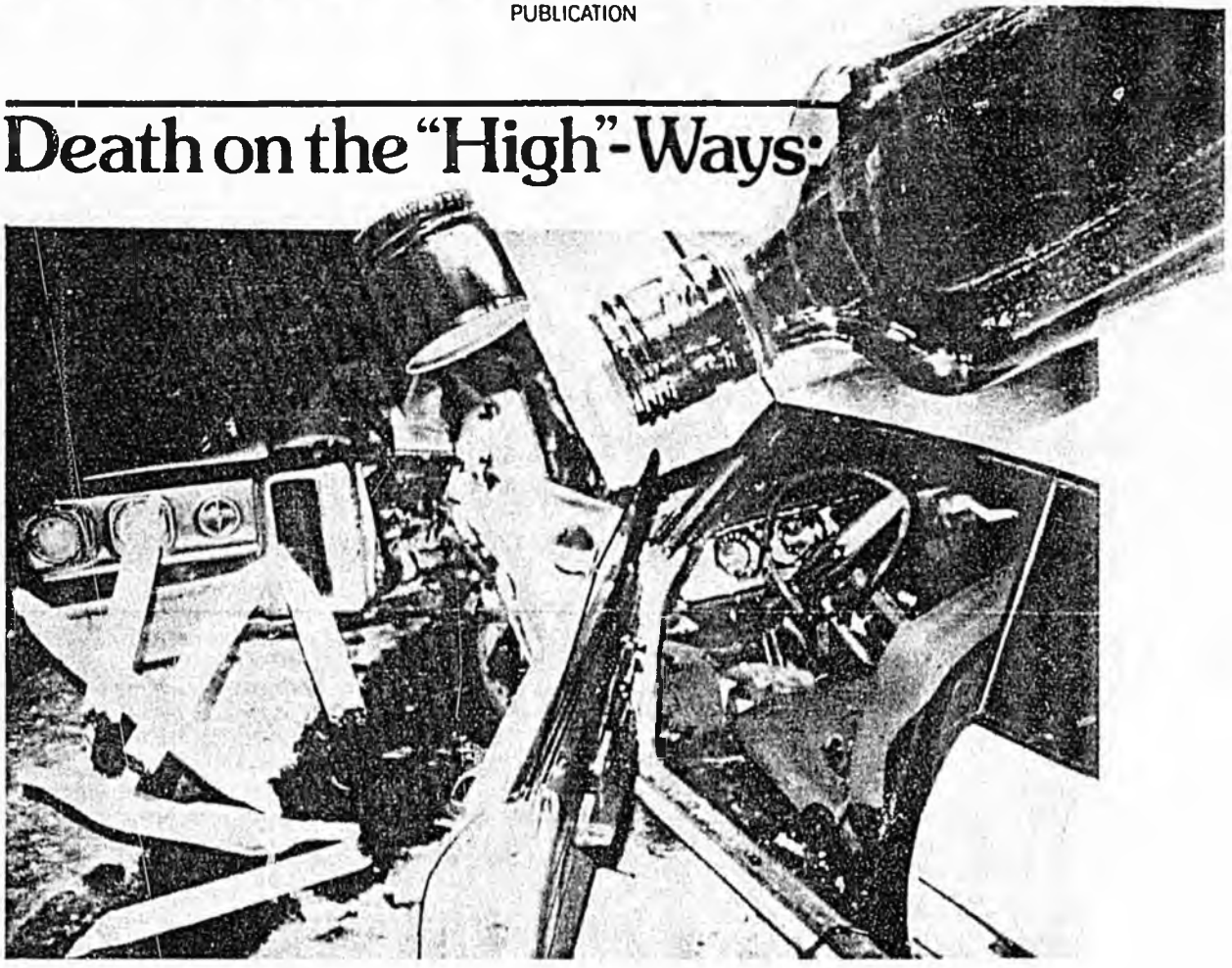
Death on the "High"-Ways:



Driving on Drink and Pot

When you mix liquor and marijuana—and then take the wheel—you compound a lethal peril

Condensed from
THE SATURDAY EVENING POST
PEGGY MANN

THE EVIDENCE is clear that alcohol and driving do not mix. Every year, more than 50,000 people are killed on the nation's roads, and almost two million are seriously injured. According to the National Highway Traffic Safety Administration, "About half of the traffic deaths are related to alcohol abuse."

Eighty percent of fatal accidents are first accidents. This figure underscores one of the most tragic parts of today's grim picture: those at greatest risk are the youth of our nation.

In 1980, the U.S. Surgeon General revealed that although the overall death rate for every other age group dropped in the period between 1960 and 1978, the death rate for 15- to 24-year-olds rose. And the Insurance Institute for Highway Safety reports that nearly half of all teen-age deaths are due to motor-vehicle accidents.

The most common explanation offered by researchers for the consistently high accident involvement of young drivers is the inexperience of this group with driving, and with

drinking and driving. But it is now clear that death on the road has received a considerable transfusion of tragedy via a wave of marijuana users.

America's young people form a generation in which large numbers smoke marijuana. The magnitude of the involvement is shown by the fact that in 1962 only four percent of Americans ages 18 to 25 had ever used marijuana, while by 1979, 35 percent reported "current use" (within the past month). Furthermore, the marijuana available today is stronger than it was ten years ago, when the average Delta-9 THC potency was only about one-half percent. (THC is the chief mind-altering chemical in the drug.) Today, the THC potency of "street pot" is 4.5 percent.

Surveys reveal that "60 to 80 percent of the marijuana users questioned indicated that they sometimes drive while cannabis-intoxicated." (Cannabis is the plant from which marijuana, hashish and the extremely potent hash oil are prepared.)

Highway officials, drug treatment professionals, research scientists and police officers from Maine to California all express profound concern about marijuana's mounting impact on our national highway-death problem. They also worry about the fact that many pot smokers say they often drive high because they *enjoy* doing so.

Hugh Alcott, a California State Department of Corrections probation agent assigned to the special narcotics section, points out a particularly dangerous phenomenon: "A lot of people who've had too much to drink and know their driving skill will be affected smoke a joint 'so they can drive better.' They actually believe that marijuana acts as an antidote to the effects of alcohol. All the pot does, of course, is to make them *feel* that they're driving better. In fact, their driving is far more impaired than if they'd used alcohol alone."

How Does Marijuana Affect Driving?

HERBERT MOSKOWITZ, a research psychologist at the University of California, has done more work than any other U.S. researcher on marijuana and simulated driving studies. In summing up his findings, he said, "The preponderance of evidence indicates that marijuana impairs skills performance, perceptual processes, attention and tracking behavior. All important components of driving are thus clearly affected."

Some of these components are impaired after only a low dose of marijuana—for example, impairment of "search and recognition abilities." After one joint, some drivers may become totally involved with a single facet of driving or with music from the car radio or even with a private reverie. Therefore, they might simply "not notice" a car exiting from a crossroad or a pedestrian who has just stepped into the street.

Other effects of marijuana intoxication on driving skills:

- Impairment of traffic-signal detection.
- Impairment of reaction time. Inability to brake quickly in rush-hour traffic or to move over quickly if another driver cuts in ahead.
- Impairment of short-term memory function and information storage. The driver may forget where to get off the highway or which crossroad to take—on a route he or she knows well.
- Impairment of coordination skills. Difficulty in backing up and turning around.

One test done by Harry Klonoff, professor of psychology at the University of British Columbia, involved 64 psychologically stable students, male and female. All had used marijuana before. Roughly a third of the students received a low-dosage marijuana joint. One-third were given a high-dosage joint. The third group received a placebo (a joint with the THC removed).

All 64 students drove through a closed course with no other traffic, and 38 of the students also drove a 16-mile route from the university campus to the traffic-heavy downtown area and back again. They were rated, before and after, according to the system used by British Columbia's Department of Motor Vehicles in examining drivers for licensing.

Final figures for the street-traffic test showed that those who had received the low-dose joint had a 42-percent decline in driving skills. Those who received the high-dose joint had a 63-percent decline in driving skills.

Even the "careful" pot smoker who "comes down" from his high before driving may well be a menace to himself and others on the highway. One and a half ounces of alcohol (the equivalent of a shot of whiskey) is excreted from the body in several hours. Marijuana, on the other hand, has 61 known cannabinoids (including THC) that appear to be fat soluble. It is speculated that they collect in body tissue—including the brain.

Legal Limbo

THE DRUNK DRIVER usually finds it hard to hide his condition if stopped by the police. But the pot-high driver often has the ability to "hide the high"—to collect himself, "come down" and carry on a normal conversation with a police officer and thus escape detection, making enforcement all the more difficult.

Also, with alcohol, we have the roadside "breath test" as a deterrent. Every state has specific laws so that the drunk driver can be defined and, if warranted, prosecuted. For marijuana intoxication, however, we have no roadside test.

In March 1980, an inexpensive, reliable method was finally perfected for detecting cannabinoids in urine. According to the National Institute on Drug Abuse's Research Technology Branch, "The cannabinoid test can determine in 60 seconds, with 95-percent accuracy, the presence of cannabinoids in the urine for up to 48 hours after a joint has been smoked."

This is a step in the right direction. Many hospitals and private clinical laboratories have the facilities for running the test, and now at least physicians and parents can be alerted about pot problems with youngsters. But until a roadside test is available to highway police, we are in a legal limbo in which no driver can be prosecuted for being marijuana intoxicated.

One mechanism the body uses to rid itself of these cannabinoids is to allow those in fatty tissue to leak slowly back into the bloodstream to be metabolized and excreted. It takes about 2½ days for *half* the cannabinoids in a single joint to leave the body; it takes about two weeks to get rid of all the cannabinoids in a single joint. As one marijuana researcher put it, "Though the high is gone, the pot is not."

Deadly Duo

THE National High School Senior Survey, conducted by the Institute for Social Research at the University of Michigan, is the only national drug-abuse survey conducted annually. The 1980 survey showed that one out of every 11 seniors smoked pot daily, averaging 3½ joints a day. More than half of the 49 percent who had smoked marijuana "usually stayed high" for up to two hours each time they smoked, and 20 percent of those who smoked pot said that they usually drank at the same time.

How much of a driving impairment does such a mix of pot and alcohol really present?

In a study published in June 1980, Moskowitz and Marcelline Burns, a research scientist at the Southern California Research Institute, tested 12 healthy men (average age 26½) who used pot no more than twice a week and who did not take other drugs. The subjects performed a series of laboratory tasks, each related to a specific driving component (tracking, information processing, and so on). Each subject was tested at different times, under four different conditions. (No one knew what he was getting at any one time.) The conditions ranged from low alcohol and placebo marijuana to placebo alcohol (orange juice with a few drops of vodka floating on top) plus one marijuana cigarette.

Following this study, Moskowitz and research scientist Alison Smiley did a related one, but this time the subjects sat in a driving simulator, where they "drove" for 21 miles.

The results of both studies were virtually the same. The "alcohol only" subjects showed the well-recognized alcohol-caused driving impairments in reaction time, coordination, visual perception, attention and information processing. The "pot onlys" had all the same impairments.

But the results of dual use of alcohol and pot were, explained Moskowitz, "essentially additive." (One plus one equals two.) "Driving," he explained, "is obviously a multitask process. You must be able to do two or more things simultaneously. Alcohol impairs this ability in one way, and marijuana impairs it in another way. The alcohol-impaired driver tends to concentrate on one driving element to the exclusion of everything else. By sticking close to the center line for reference, the driver can keep the car from weaving but may be totally unable to attend to any unexpected highway happening. The marijuana-impaired driver, on the other hand, appears to have brief total 'dropouts' in his driving attention. Thus, taken together, alcohol and marijuana undermine the ability of the driver to process the roadway information necessary to control the vehicle safely."

Moskowitz summed up both the studies by saying, "Drivers under the combined influence of alcohol and marijuana have a greatly increased likelihood of initiating an accident."

In August 1980, Lawrence Sutton, executive director of Pittsburgh's Institute for Driver Research and Substance Abuse, tested the effects of marijuana and alcohol in a "closed" driving course. Sutton selected nine students from the University of Pittsburgh. All were experienced drivers, pot smokers and drinkers. Each drove on four successive afternoons, under four different "conditions":

1. pot (one joint) plus alcohol;
2. placebo alcohol plus one joint;
3. placebo joint plus alcohol;
4. placebo alcohol plus placebo joint.

During the 36 driving trials, patrolman Donald Dolfi followed the subjects in his own car, noting their performance, which included executing common procedures for a driver's license examination in Pennsylvania. He "pulled over" those drivers he would have suspected of "DUI" (driving under the influence)—if they had been on the road.

When the test was completed Dolfi said to Sutton, "I guess I spoiled your study. I only pulled over drivers 15 times."

But when the "double blind" code was revealed and Sutton looked at the figures, a chill went through him. Of the 15 incidents in which Dolfi "pulled over" drivers, three students were under the "marijuana only" condition, two were under the "alcohol only" condition, and one bad driver was under the double placebo. But all nine of the rest—100 percent—were under the alcohol plus marijuana condition.

The results of Sutton's study are striking indeed. They show that the impairments caused by pot plus alcohol are *more* than additive. They are synergistic. One drug potentiates ("fires up") the other. One plus one equals three or four on the impairment scale.

A further sobering fact is that *if* they had been on the highway, none of these drivers could have been prosecuted for DUI since they had such a low blood-alcohol-concentration level and since there is, as yet, no viable roadside test for the pot-high driver. All 15 "pulled over" for DUI by Dolfi would, therefore, have been "home free"—unless, of course, they had injured or killed themselves or others.

What Can Be Done?

IN ADDITION to horrendous personal costs in wrecked and lost lives, what are the dollar costs of the ever-mounting highway mayhem?

According to a study published in April 1981, "Only cancer outranks motor-vehicle crash deaths and injuries in dollar costs to the nation. The killing and injuring of people on the highways can be conservatively estimated as costing the United States some $20 *billion* annually in wasteful, unproductive expenditures, including $6.7 billion in medical, rehabilitation and other direct outlay."

William Haddon, Jr., M.D., president of the Insurance Institute for Highway Safety, which sponsored the 420-page report, points out, "With the appearance of this study, public policy makers must face the immensity of this tragedy in terms of its burden on the national economy—and, it is hoped, do

something about it."

At this time, most public policy makers have done very little about it. A few, however, are taking steps, at least along the alcohol/driving route.

Rep. Michael Barnes (D., Md.) and 50 other members of the House of Representatives have introduced a bill (HR 2488) calling for a mandatory sentence of at least ten days' community service, plus fines, participation in alcohol-treatment or traffic-safety programs, and mandatory license suspension for up to one year for first-time drunk-driving offenders—and for repeat offenders, the same, plus mandatory sentencing of at least ten days' imprisonment and suspension of driver's license for at least one year. An identical bill (S 671) has been introduced in the Senate by Sen. Claiborne Pell (D., R.I.).

Candy Lightner of Fair Oaks, Calif., has formed a national organization called MADD—Mothers Against Drunk Drivers. "As it stands now," says Lightner, "drunk-driving manslaughter is a socially acceptable form of homicide. That is why we are MADD!"

The organization has some 32 chapters in seven states. They work to alert the public to the serious consequences of drinking and driving, as well as to educate victims of drunk drivers and other concerned citizens as to what they can do to help resolve the problem in their state and community.

One state that has taken a giant step forward on the marijuana/driving front is Minnesota. In many states an open liquor bottle in the car of a DUI is considered *prima facie* evidence of a crime. In Minnesota, there is also an "open baggie" law. Anyone with any marijuana in the car—whether smoking it or not—is considered to have committed a crime. If involved in an accident or driving recklessly "in a serious way," he or she is treated within the criminal-justice framework. First offenders who have not endangered anyone must attend a mandatory "pot course" on the hazards of marijuana with emphasis on pot-impaired driving.

A second-possession offense usually means a fine of up to $500 and incarceration for a series of weekends in a county jail or work farm. But of the 9000 first-offenders who have gone through the four- to six-hour course, only 22 have been arrested a second time.

For more information on this award-winning "mandatory pot course," write Bruce Bomier, Director, Minnesota Institute, 2829 Verndale Ave., Anoka, Minn. 55303.

THINK OF THIS: each man, woman and child in the United States can expect to be in a car crash once every ten years. Since any of us can be imperiled at any time by the most deadly drug-related disease of all—Death on the "High"-ways—it behooves us to do what we can to halt this menace. ii:

For release Jan 12, 1983 and thereafter

The Gallup Youth Survey

Marijuana Support Fading Among Youths

By GEORGE GALLUP

PRINCETON, N.J. — Although some teen-agers continue to experiment with marijuana, the drug is apparently fading as a symbol of the teen generation, according to the results of the latest Gallup Youth Survey.

The poll also indicates that teen opposition to legalizing marijuana or decriminalizing its possession in even small amounts is solidifying.

For the second year in a row, the survey shows that 74 percent of the country's youth oppose legalizing pot. Youth opposition to decriminalizing marijuana possession rose from 57 percent in 1981 to 60 percent in 1982.

Still, about one teen-ager in three (37 percent) reports having tried marijuana at least once. Marijuana was used by 8 percent of those polled during the week previous to the interview, 5 percent during the previous month, 16 percent between one month and one year ago, and 8 percent over one year ago.

Several key signs in the surveys indicate that marijuana use soon may no longer be the "in" thing to do. Use is declining, while opposition to legal reform favoring its use is growing among students of above average academic standing. Previous high levels of use, and approval from teen-agers on the liberal, trend-setting East and West Coasts are leveling off. Most importantly, long-term trends in use, and approval by those ages 13 through 15 are steadily declining.

Gone is the past rhetoric of youths that urged the nation to "turn off, light up, turn on." In its place are comments opposing marijuana on legal, social, and health grounds.

Teen-agers took surprisingly tough stands on the decriminalization issue, arguing that the amount involved does not matter. The judgment of a 17-year-old boy from Hydro, Okla., was typical: "It doesn't matter whether it's an ounce or a ton -- it's breaking the law."

The flower children of the 1960s would have been shocked had they known that a young woman in Chicago in 1982 probably summarizes the views of many of her generation when she says: "Marijuana is harmful to the human body. It increases the crime rate because an addicted person may often have to steal to support the habit. We should strive to produce healthy and honest citizens, and marijuana is not conducive to that goal. There is no middle ground between right and wrong."

By the time they are 16 through 18, half of the nation's youth (52 pe[illegible]nt) may have tried marijuana. Their opposition to legalization and decriminalization is not as strong as that of younger teens, but those favoring tempering the laws often qualify their remarks by suggesting legalization for medical purposes, or demonstrate concern about conviction of one-time experimenters. More typical, perhaps, are the remarks of two 17-year-olds:

"Legalizing marijuana will make it as available as tobacco, and then we will have even more stoned seventh-grader in school restrooms." (Fairport, N.Y.)

"I enjoy life to the fullest and I am very happy without the help of marijuana or any other drug." (Ayden, N.C.)

Following are the questions asked:

"Have you ever tried marijuana?"

"Do you think the use of marijuana should be made legal?"

"Do you think the possession of small amounts of marijuana should be treated as a criminal offense?"

The findings reported today are based on telephone interviews with a representative national cross section of 1,013 youths, ages 13 through 18 conducted in June 1982.

LEGALIZATION, DECRIMINALIZATION OF MARIJUANA

	Oppose Legalization		Oppose Decriminalization	
	1982	1981	1982	1981
NATIONAL	74%	74%	60%	57%
Boys	72	69	60	51
Girls	75	79	59	62
Both sexes:				
13 to 15 years old	81	81	69	63
16 to 18 years old	66	68	51	50
East	72	69	53	47
Midwest	76	80	63	60
South	74	78	66	63
West	75	67	53	56
Metro areas	66	69	52	49
Suburbs	73	71	58	52
Non-metro areas	79	80	67	65
Have tried marijuana	58	54	37	30
Have not tried marijuana	83	86	73	72

The Gallup Youth Survey

Teens' Views on Marijuana Show Dramatic Change

For release Feb. 8, 1984 and thereafter

By GEORGE GALLUP

PRINCETON, N.J. — Marijuana is apparently becoming passe among America's teens.

In 1978, when the Gallup Youth Survey first began polling teens on their views about marijuana, 27 percent of the respondents admitted to having used the substance during the previous month. This figure declined steadily during subsequent surveys, and in the 1983 poll, only 8 percent made such an admission.

Similar declines were shown in other aspects of teen views on marijuana. For example, in 1978, nearly four teens in 10 admitted that they had tried marijuana at least once. Five years later, the figure has been cut in half.

Teens have been taking an increasingly harder stand against marijuana when the law is concerned. In 1978, over half — 54 percent — believed that marijuana possession should not be treated as a criminal offense. By contrast, the latest survey finds 70 percent of teens calling for criminal penalties for marijuana possession.

Even in 1978, the majority of teens (62 percent) opposed legalization of marijuana. The latest survey, however, reveals that an even greater number of teens — eight in 10 — now share this view.

Over the years it has been the younger teen-agers — 13 to 15 years old — who have been in the vanguard of opposing legalization and avoiding use of marijuana.

In the late 1970s over half of the older teens reported having tried marijuana, as compared to only about 26 percent of the younger teens. Of these younger teens, who are now the 16 to 18 year olds, only 28 percent said in 1983 that they have ever tried marijuana. If this trend continues, even further reductions in use of marijuana may be anticipated, as only 10 percent of today's young teen-agers report having ever tried it.

Only 13 percent of those residing in small towns and rural areas say they have tried marijuana, and 20 percent of

suburban teens give similar reports. Use is highest in central cities at 30 percent. There is no evidence to suggest, however, that higher use in the cities is racially oriented, since white teens are slightly more likely than non-whites to report having tried marijuana, by a margin of 20 percent to 17 percent.

Regionally, after a temporary rise in use in the traditionally conservative South and Midwest, use has dropped to 14 percent in the Midwest and to 18 percent in the South.

Highest levels of use are found in the eastern (22 percent) and western (29 percent) regions of the country.

Although far fewer teenagers appear to approve of or use marijuana themselves, their concern about the substance is unabated. As the survey recently reported, teens continue to name drug abuse as the biggest problem facing their generation. In 1983, 35 percent named it as the leading problem for people their age, compared to 27 percent who named drug abuse in 1977.

These are the questions:

"Have you ever tried marijuana?"

"About how long ago did you last try marijuana?"

"Do you think the use of marijuana should be made legal, or not?"

"Do you think the possession of small amounts of marijuana should or should not be treated as a criminal offense?"

The findings reported today are based on telephone interviews with a representative national cross section of 542 teen-agers, 13 through 18, conducted from July through September 1983.

TRENDS IN ACCEPTANCE AND USE OF MARIJUANA

	1983	1982	1981	1980	1979	1978
Ever used marijuana	19%	37%	37%	40%	41%	39%
Used in past month	8	13	13	20	27	27
Oppose legalization	80	74	74	68	65	62
Oppose decriminalization	70	60	57	54	44	40

HAVE EVER USED MARIJUANA?

	Yes	No
NATIONAL	19%	80%
Male	21	78
Female	18	82
Ages 13 to 15	10	90
Ages 16 to 18	28	71
White	20	80
Non-white	17	83
Above-average students	16	84
Averge or below	23	77
White-collar background	23	77
Blue-collar background	17	82
East	22	76
Midwest	14	86
South	18	82
West	29	71
Central cities	30	70
Suburbs	20	80
Non-metropolitan areas	13	86

(Not sure (1 percent, nationally) omitted.)

SHOULD POSSESSION OF SMALL AMOUNTS BE TREATED AS CRIMINAL OFFENSE?

	Yes	No	Not sure
NATIONAL	70%	27%	3%
Male	73	25	2
Female	67	30	3
Ages 13 to 15	77	21	2
Ages 16 to 18	62	34	4
White	72	26	2
Non-white	64	33	3
Above-average students	72	24	4
Average or below	67	31	2
White-collar background	68	29	3
Blue-collar backgrounbd	71	27	2
East	63	34	3
Midwest	73	22	5
South	73	26	1
West	66	33	1
Central cities	63	35	2
Suburbs	68	28	4
Non-metropolitan areas	75	23	2

For release September 21, 1983 and thereafter.

The Gallup Youth Survey

Drug Abuse Named as Biggest Problem Facing Teen-Agers

By GEORGE GALLUP

PRINCETON, N.J. — Teen-agers, according to the latest Gallup Youth Survey, say drug abuse is the biggest problem facing their generation. Concern about the impact of drugs has risen from 27 percent in 1977, when teen-agers also named it as the biggest problem facing their generation, to 35 percent in 1983.

Since 1977, however, the nature of the problem may have changed. Gallup Youth Surveys have shown a steady decline over the years in teen-age acceptance of proposals to legalize marijuana or to decriminalize its possession in small amounts.

In 1977 teen-agers saw drugs as a part of the generation gap and a symbol of their generation's uncertainty in coping with the world around them.

In the current survey teen-agers name other kinds of problems as being important to their generation. Younger teen-agers, 13 to 15 years old, are particularly concerned about drug abuse, with 42 percent naming it as the biggest problem, in comparison to 28 percent of the older teen-agers. Young women show somewhat greater concern than young men about drug abuse by a margin of 38 percent to 31 percent.

Unemployment, named by 16 percent of the teen-agers, ranks as the No. 2 problem facing the current generation. In 1977, only 6 percent said that poor job prospects were a problem. Those who will soon be entering the job market are particularly concerned about unemployment with 22 percent of the teen-agers, 16 to 18, naming it as the leading problem.

Alcohol abuse is the third leading area of concern and is named by one teen-ager in ten (10 percent). Alcohol abuse also ranked third in 1977 when it was named by seven percent. Peer pressures (8 percent) rank fourth — and often consist of pressures felt by teen-agers from their friends to break the rules and to experiment with drugs or alcohol.

The good news about today's generation may be that teen-agers no longer feel the pressure of alienation from their parents. Only five percent now cite lack of communication or getting along with their parents as their biggest problem.

By contrast, in 1977 one teen-ager in five (20 percent) said a breakdown in parental communications and relations was the major problem facing their generation.

Today's teen-agers still face many problems, but at least now they may not have to deal with parental alienation at the same time. By the same token, citation of problems in growing up or finding one's purpose in life have declined from six percent in 1977 to only one percent in 1983.

Problems in school are cited by only one teen-ager in 20 (five percent) and an additional one percent express concern about school drop-outs.

Fear of war is named by four percent. This fear was cited by less than one percent in 1977.

Economic problems such as inflation were named by only two percent, and one percent cite the specific economic problem of financing their college education.

In 1977 smoking and job boredom were each cited by three percent of the teen-agers, but in 1983 each was mentioned by fewer than one percent of the nation's teen-agers as their generation's leading problem.

The question was asked as follows:

"What do you feel is the biggest problem facing people your age?"

The results reported are based on telephone interviews with a representative national cross-section of 508 teen-agers conducted from April to June 1983.

BIGGEST PROBLEM FACING TEEN-AGERS

	1983	1977
Drug abuse	35%	27%
Unemployment	16	6
Alcohol abuse	10	7
Peer pressures	8	5
Getting along with parents	5	20
School problems	5	3
Fear of war	4	-
Career doubts and uncertainty	3	3
Economic problems	2	3
Financing college	1	-
Problems in growing up/ Finding purpose in life	1	6
School drop-outs	1	-
Miscellaneous	4	12
Don't know	18	14
	113*	110*

* More than 100% due to multiple responses.

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Senate

SENATE DRUG HEARINGS

Mr. GURNEY. Mr. President, on May 9, the Senate Subcommittee on Internal Security embarked on a series of hearings on the marihuana-hashish epidemic and its impact on U.S. security. It was my privilege to preside over the two lengthy hearings on May 17 and 18, at which most of the medical, scientific, and psychiatric testimony was presented.

For the purpose of these hearings, the subcommittee brought together more than a score of top-ranking medical researchers and scientists from six countries. Several of the participants in our hearings, themselves scientists of international eminence, told me afterwards that our witness list constituted the most distinguished panel of experts on marihuana and hashish—cannabis as it is known scientifically—ever assembled at a single gathering.

I am not exaggerating when I say that I consider these hearings to be among the most important ever conducted by a committee of Congress.

They provide a terrifying answer to the question: how harmful is marihuana? In my remarks today, I plan to summarize the basic scientific findings presented to the subcommittee.

The many articles that have been written about the hearings have brought a flood of letters to my office from law enforcement officers, Government officials, educators, clergymen, writers, editors, students, and anxious parents. Already, the hearings are having a measurable impact. It is my conviction that this impact will be enhanced many times over when the printed record of these hearings becomes available sometime next month.

In his opening statement, Senator EASTLAND clearly established the jurisdiction of the Internal Security Subcommittee by pointing out that the cannabis epidemic had created a new complex of security problems for our Military Establishment and that the widespread use of marihuana and hashish had been encouraged by a militant promarihuana propaganda campaign which began at the time of the Berkeley uprising and continues to this day. As pointed out by Prof. Hardin Jones, assistant director of the Donner Laboratory for Medical Research at the University of California in Berkeley, in his testimony of May 20 before the subcommittee, this prodrug propaganda campaign was initiated by members of the radical left movement whose purpose is the revolutionary overtem. In the words of Timothy Leary, guru of the leftist drug cultists:

Drugs are the most efficient way to revolution.

Or, quoting Jerry Rubin:

Pot is central to the revolution. It weakens social conditioning and helps create a whole new state of mind. The slogans of the revolution are going to be pot, freedom, license. The Bolsheviks of the revolution will be long-haired pot smokers.

There is a tendency to dismiss people like Leary and Rubin as eccentrics or kooks—but one must remember that the underground press which featured them was read by a host of young people every week.

The damage done by this leftist promarihuana propaganda was compounded by the many academicians who were disposed to be tolerant about marihuana, because it seemed to be an integral part of the student revolt against the establishment. It was further compounded by a small number of scientists and a somewhat larger number of literary psychiatrists who repeatedly gave marihuana a clean bill of health based on limited short-term observations—without waiting for the findings on the long-term consequences of marihuana. Most of these long-term findings have only started coming in within the last few years—and that is what our recent hearings were all about.

I recall that when the controversy about cigarette smoking and cancer was raging during the late 1950's, there were medical scientists of some eminence who came to the defense of cigarettes. For example, Dr. Ian McDonald, one of California's foremost cancer specialists, and chairman of the Cancer Commission of the California Medical Association, made the sweeping statement before a congressional committee, that not only did cigarette smoking bear no relationship to lung cancer, but that he would venture the assertion that "a pack of cigarettes a day will keep lung cancer away."

Dr. McDonald's assertion was completely demolished within several years by the mounting mass of scientific evidence that there is a relationship between cigarette smoking and lung cancer.

The sweeping defenses of marihuana that are to be found in a number of books written several years ago by men of some reputation, have, in the same manner, been completely outdated by the mass of recent reports from top-ranking cannabis scientists in various parts of the world.

In amplifying the purpose of our recent hearings, Senator EASTLAND said the following at the hearing of May 9:

When a conflict of opinion exists within the scientific community on a question as important as marihuana, the Congress and the American people are entitled to a fair presentation of both sides to this controversy. In fact, however, there has been widespread publicity for writings and research advocating a more tolerant attitude towards marihuana—while there has been little or no publicity for writings or research which point to serious adverse consequences. The writings are there, the research papers by eminent scientists are there, the books are there—but very few people know about them. One witness who will appear before the subcommittee will testify that in campus bookstores in the United States, Canada and England, virtually all of the literature he found on marihuana—and he found a lot of it—took a tolerant attitude towards it or even advocated legalization.

It is because of this strange imbalance in dealing with the question of marihuana that most intelligent people are under the impression that the bulk of the scientific community looks upon marihuana as a relatively innocuous drug. Part of the purpose of the forthcoming hearings will be to inquire into, and document, the extent of this imbalance. In doing this, we shall, in effect, be presenting the "other side," so that the Senate—and the American people—will have a better understanding of the problem.

The first point that has to be made is that our country is now caught up in what is probably the worst cannabis epidemic in history—even worse than the classic epidemics that had so debilitating an effect on the Egyptian people and other Mediterranean peoples. The fact that the Federal law enforcement authorities last year seized 780,000 pounds of marihuana and 54,000 pounds of hashish means that perhaps 10 times as much cannabis—or even more—got into the country and was consumed. These are fantastic quantities when you consider that a pound of marihuana can intoxicate almost 200 people, while a pound of hashish can intoxicate eight times as many.

All strata of our population are involved in the epidemic—our college students, our high school and junior high school students, grade school students, ghetto youth, blue collar workers, and even staid conservative members of the business and professional community. On this last point, I note that the subcommittee has received a letter from an investment counsel in Chicago urging a more tolerant attitude toward marihuana because, he said, the significant majority of his business and professional freinds smoke it.

The amount of marihuana and hashish being seized in this country is enormous. A few months ago there was a single seizure involving 10,000 pounds of hashish; while on June 26, United States and Mexican agents seized 42 tons—84,000 pounds—of marihuana in the vicinity of the Mexican border. Commenting on the tremendous increase in cannabis imports into the United States, Mr. Andrew C. Tartaglino, Acting Deputy Administrator of the Drug Enforcement Administration, told Senator EASTLAND in the opening hearing on May 9 that—

The traffic in, and abuse of, marihuana products has taken a more serious turn in the last two or three years than either the courts, the news media, or the public is aware. The shift is clearly toward the abuse of stronger, more dangerous forms of the drug which renders much of what has been said in the 1960's about the harmlessness of its use obsolete.

As I have pointed out, the epidemic spread of marihuana and hashish use has been made possible, and even encouraged, by widespread publicity given the statements of scientists and lay spokesmen advocting a more tolerant attitude toward marihuana, and by the near blackout—at least until very recently—on scientific writings pointing to serious adverse consequences.

For instance, books like Lester Grinspoon's "Marihuana Reconsidered" and the Consumer Union's "Licit and Illicit Drugs"—both of which took the stand that marihuana was not seriously dangerous and should be legalized—received rave reviews in the New York Times and the Washington Post and other papers, and the authors were invited to appear on numerous talk shows. But when Dr. Gabriel Nahas, a distinguished Columbia University scientist with more than 400 scientific papers to his credit, a year and a half ago published a book entitled "Marihuana—Deceptive Weed," there was no review in the Times or the Washington Post and no invitation to appear on talk shows. When half a dozen Columbia University scientists wrote individually to the New York Times to suggest that Nahas' book had merit and should be reviewed, their letters were ignored. And when 16 professors and scientists at Columbia's College of Physicians and Surgeons signed a joint letter in January of this year to the editor of the Times book review section urging that Nahas' book be reviewed, this letter was also ignored.

This one-sided publicity has succeeded in fostering the almost universal impression that marihuana is a relatively innocuous drug, and that it is so regarded by the scientific community. So widespread is this impression that just over a year ago, in March of 1973, District of Columbia Mayor Walter Washington's Advisory Committee on Narcotics Addiction, a committee consisting of some 40 prominent citizens, filed a report urging the complete legalization of marihuana on the grounds that—

No demonstrable medical evidence is available to support the assertion that marihuana use is hazardous or detrimental to the physical or mental health of the user.

Only a few weeks ago, the Subcommittee on Internal Security received a phone call from a mother in San Diego who had just been compelled to pull her son out of his senior year in high school, because he was constantly intoxicated on marihuana and hashish. She told the subcommittee that when she had taken her problem to one of the local drug counseling programs, the drug counselor told her that marihuana was really nothing to worry about "I smoke pot every day myself," she quoted the counselor as saying.

There have been warnings from some eminent scientists in the past but—perhaps because they spoke individually—their warnings were ignored. In September of 1972, for example, I presided over a hearing of the Senate Subcommittee on Internal Security at which we took the testimony of Dr. Olav J. Braenden, for many years director of the United Nations Narcotics Laboratory in Geneva. Dr. Braenden testified that, among the scientists working in the field, there was a general consensus that marihuana is dangerous. He said:

As progressively more scientific facts are discovered about cannabis, the more one becomes aware of its potential dangers.

He underscoredthe need for more research and, pointing to the example of thalidomide, he told the subcommittee that when it comes to medicine and drug policy it is better to be careful than to be careless.

But the media generally paid shamefully little attention to the testimony given by this eminent European scientist—testimony based not only on his own experience but on the experience of some 26 cooperating laboratories in various parts of the world.

The recent hearings, I am happy to report, have finally succeeded in breaking through the virtual blackout which characterized previous media attention to the adverse scientific evidence on marihuana. There were too many scientists of distinction involved for anyone to be able to dismiss their testimony as the work of scientific mavericks or crackpots. The credibility of their collective testimony was reinforced by the fact that quite a few of them, earlier in time when embarking on their research, leaned toward the tolerant attitude on marihuana that was then prevalent. Adding further reinforcement was the additional fact that this mass of independently conducted scientific investigations came up with results that frequently overlapped and mutually supported one another.

On the basis of the attention our hearings have already received, I believe that these hearings have succeeded in completely shattering the widespread belief that the scientific community looks upon marihuana as a relatively harmless drug.

All of the scientists who testified said that they considered marihuana a very dangerous drug. They further stated that this was the consensus at several recent international conferences of cannabis researchers. Several of the witnesses said that they considered cannabis the most dangerous drug on the market today.

Collectively, their testimony pointed to the following findings: First, that marihuana reduces DNA synthesis thus impeding the process of cellular reproduction; second, that, smoked even in small amounts, it results in broken and malformed chromosomes, thus opening up the possibility of abnormal births or genetic mutations; third, that chronic marihuana smoking results in a severe reduction in male hormone levels and sperm count; fourth, that marihuana alone, or combined with cigarette smoke, damages lung tissues far more rapidly than cigarette smoke alone; fifth, that there is evidence of irreversible brain damage after several years of chronic exposure; and sixth, that even single exposures to large dosages can lead to psychotic episodes, while chronic use leads to paranoid symptoms and serious and persistent deterioration in mental functioning.

I have made the point that this testimony cannot be lightly dismissed, because there are too many internationally distinguished scientists involved. The witnesses included such eminent names as: Prof. W. D. M. Paton of Oxford University, who heads up the British drug research program and who is without question one of the world's leading pharmacologists; Prof. Nils Bejerot of Sweden, perhaps the ranking international expert on the epidemiology of drug abuse; Prof. M. I. Soueif of Egypt, author of the classic study on the consequences of hashish addiction in his country; Prof. Robert Heath, chairman

Neurology at Tulane University Medical School; Prof. Morton Stenchever, chairman of the Department of Obstetrics and Gynecology at the University of Utah Medical School; Dr. Julius Axelrod, Nobel Prize winning researcher of the National Institute of Mental Health; and, at a previous hearing, Dr. Henry Brill, senior psychiatric member of the Shafer Commission and president of the American Psychopathological Association.

Let me recapitulate some of the major findings that were presented to the subcommittee by the scientists who testified.

1. TOXICITY AND ACCUMULATION IN THE BRAIN

Marihuana is a complex toxic substance, whose principal psychoactive component is THC—tetrahydrocannabinol. This substance is intensely soluble in fat, which gives it the ability to penetrate into all parts of the body, including the brain, the ovary, the testes, and the fetus. This characteristic means that it tends to persist in the human body for long periods of time after exposure, and to accumulate with repeated exposures.

One of the principal areas of accumulation is the human brain. This has been established with radioactively tagged THC.

Experiments with animals have demonstrated that the toxicity also tends to be cumulative; thus, it requires one-tenth as much marihuana to kill a mouse if given in repeated daily doses as if given in a single dose.

2. EVIDENCE OF IRREVERSIBLE BRAIN DAMAGE

Related to its toxicity and its tendency to accumulate in the brain, is a growing body of evidence that regular marihuana use for a year or 2 may result in irreversible brain damage. This also ties in with the evidence developed by a number of researchers that marihuana use reduces DNA synthesis and, in so doing, reduces the mitotic index, or the rate at which the body produces new cells to replace the cells that are constantly dying off.

Several of the psychiatrists who testified before the subcommittee said that a hypothesis of irreversible brain damage tied in with their own clinical observations that brilliant young people who went on prolonged marihuana binges were simply not able to recapture the same level of mental competence they had displayed before becoming chronic marihuana users, even after abstaining from marihuana for several years.

Dr. Robert Heath of Tulane University, working with brain wave patterns in rhesus monkeys, demonstrated that after posure there was a persisting abnormality in the brain wave patterns of the monkeys, even when the marihuana was removed.

Professor Paton referred to animal experiments which demonstrated that rats exposed to marihuana smoke had significantly smaller brains and hearts than rats not so exposed. In the light of the cumulative evidence, he felt that serious attention had to be paid to the research of Dr. Campbell and his colleagues at the Royal Bristol Hospital, demonstrating that chronic young marihuana smokers aged 18 to 26 had suffered as much brain atrophy as is normally encountered in people aged 70, 80 and 90.

3. DAMAGE TO THE CELLULAR SYSTEM

New scientific research pointing to radically new findings, is traditionally not accepted by the scientific community unless there is confirming or converging evidence from other independent researchers. What was truly remarkable about the body of evidence presented to the subcommittee was the fact that the main reports on new marihuana research converged from four or five or six directions on several central conclusions.

There was, for example, converging evidence from a substantial number of the scientists whose research pointed to damage to the cellular system, primarily through reduced DNA and RNA synthesis.

Dr. Akira Morishima of Columbia University, told the subcommittee that—

When the specimens of three marihuana smokers were compared with those of age and sex matched non-smokers, the mitotic index, or the proportion of those cells in process of cell division, was noted to be only 2.3 percent in marihuana users, compared with 5.9 percent for the controls.

Dr. Morishima also found that a large proportion of the cell nuclei in marihuana smokers contained a significantly decreased number of chromosomes—from 33 to 8—instead of the 46 chromosomes found in normal cells.

Dr. Gabriel Nahas and a team of three other Columbia University scientists found that in 51 marihuana smokers who had averaged three marihuana cigarettes a week for 4 years, the production of the immune cells—the T-lymphocytes—in the blood was 41 percent less than in nonsmokers. He made the point that the immunity response of the smokers "was similar to that of patients with cancer, or kidney grafts—treated with immunosuppressants—who were tested and who presented documented evidence of an impairment of their immunity system."

Professor Cecile Leuchtenberger, head of the Department of Cytochemistry at the Swiss Institute for Experimental Cancer Research, also found evidence of serious damage to the cellular process, involving the possibility of lung cancer and genetic damage. This is what she told the subcommittee:

Smoke of marihuana cigarettes has harmful effects on the tissues and cells of animals and of humans. The observations that marihuana cigarette smoke stimulates irregular growth in the respiratory system, that it interferes with DNA stability of cells and chromosomes, that is it disturbs the genetic equilibrium, strongly suggests that marihuana cigarette smoke is a health hazard which may not only be implicated in lung carcinogenesis, but may also have mutagenic potentialities.

Prof. Arthur M. Zimmerman, of the University of Toronto, in a statement subsequently submitted to the subcommittee, reported on recent research dealing with the effects of marihuana on a culture of unicellular organisms.

His studies, he said:

Clearly demonstrate that THC at a modest dosage reduces the growth and delays cell division of a uni-cellular protozoan, tetrahymena. These effects on cell growth are related to a depression of cell metabolism, i.e., a reduction of DNA, RNA and protein synthesis. The effects of THC are reflected in a reduction in the cell's ability to synthesize and assemble RNA, which is an essential components of the protein synthesis system. The reduced cell synthesis, in the presence of THC, may be attributable to the reduction of DNA synthesis which is known to direct cell metabolism.

Professor Paton, who has monitored some 800 cannabis research papers in connection with his duties as director of the British drug research program, told the subcommittee that there were many more papers dealing with other aspects of the damage done by marihuana to both cell metabolism and cell division. Said Professor Paton:

Numerous such effects have now been described, including actions on microsomes, on mitochondria, on neurones, fibroblasts, white blood cells, and on dividing cells, affecting metabolism, energy utilization, synthesis of cellular constituents, and immunological responses.

Professor Paton and several of the other scientists who testified expressed grave concern that grade school children exposed to marihuana—an increasing phenomenon over the past 2 or 3 years—might damage themselves in a manner which would make impossible the physical and mental maturation. The years on either side of the advent of puberty normally constitute a period of explosive physical development, when new cells are being produced more rapidly than at any other period in the lifespan. A serious impairment in DNA synthesis and cell division during this period could conceivably have catastrophic effects. To paraphrase what Professor Paton told the subcommittee, we might, a number of years hence, find ourselves saddled with a partial generation of teenagers who have begun to grow old before they have even matured.

4. DAMAGE TO THE REPRODUCTIVE SYSTEM

The subcommittee also heard impressive evidence dealing with the damage—or potential damage—of marihuana to the reproductive system. Dr. Robert C. Kolodny, who heads up the Endocrine Research Section at the Masters and Johnson Research Foundation, reported that in a group of 20 males aged 18 to 28 who had used marihuana at least 4 days a week for a minimum of 6 months, the principal male sex hormone, testosterone, was found to be approximately 44 percent lower than for the control group of men who had never used this drug. He said that the reduction in testosterone level appeared to be related to the amount of marihuana used, so that men who averaged 10 or more joints per week had significantly lower levels than men who used fewer than 10 marihuana cigarettes weekly. He also found subnormal sperm counts in six of the men tested. In a few cases involving very heavy use, the sperm count was so low that the men had to be considered clinically sterile. Finally, he reported on several instances where intermittent impotence, apparently associated with marihuana use, disappeared after the use of marihuana was discontinued.

Although making the point that the Masters and Johnson results will have to be confirmed by further research, Dr. Kolodny warned against the possible dangers in these terms:

Since at least some of the active constituents of marihuana have been shown to cross the placenta, there may be a significant risk of depressed testosterone levels within the developing fetus when this drug is used by a pregnant woman. Since normal sexual differentiation of the male depends on adequate testosterone stimulation during critical stages of development, it is possible that such development might be disrupted. Theoretically, there is also the possibility that marihuana use by the prepubertal male may delay the onset or completion of puberty or may interfere with bone growth, if a suppression of pituitary or hypothalamic function occurs. Neither of these possibilities have been investigated.

Although Dr. Kolodny said that he was not aware of any confirmatory research that had yet been conducted on the spe-

togenesis, Dr. Cecile Leuchtenberger told the committee that she has found a marked disturbance in spermatogenesis in male mice which had inhaled marihuana smoke for several months. Not only were there fewer mature sperm cells than in the controls, but many of the spermatids—the precursors of the sperm cells—carried a faulty and reduced amount of DNA. This, she said, would indicate that marihuana smoke interferes with male fertility.

Dr. Morton Stenchever, of the University of Utah, reported on research which he and two other University of Utah scientists had conducted over 1971 and 1972 on chromosome damage in chronic marihuana users. They found that the chronic users displayed roughly three times as many broken chromosomes as nonusers, and that smoking was also accompanied in some cases by abnormal chromosone formations. The much higher rate of broken chromosones held true for light users who had averaged only one marihuana joint per week.

In summarizing his studies, Dr. Stenchever said:

The study did not shed any light on the question of whether or not this chromosome breaking agent or any other chromosome breaking agent is capable of causing abnormalities of unborn children, an increased mutation rate, or an increased incidence of cancer. However, all of these possibilities are potentially there and only further studies of a more detailed nature will be able to answer these questions.

Dr. Paton, in his testimony, reported on a number of experiments with animals that pointed to a series of adverse effects from marihuana on the birth process. Said Dr. Paton:

Administration of cannabis during the vulnerable period of pregnancy has been found to cause fetal death and fetal abnormalities in three species of animals. The deformity includes lack of limbs (reduction-deformity). The factor responsible has not been identified, but does not appear to be THC, although new work is showing that THC kills a majority of fetuses and in the remainder produces an increased incidence of still births and stunting. The effect is dose-related, an important thing to establish if cause and effect are considered.

One must notice that general anesthetics as a class can also produce fetal abnormality. A provisional hypothesis for teratogenicity, therefore, is that this action of cannabis reflects its fat-solubility and relation to anesthetics, and constitutes a sort of anesthesia, for instance, of limb buds developing in the fetus at critical periods—hence the reduction-deformity. It must be stressed that all I have said refers simply to the development of the fetus. There is also the question whether the genetic material, perhaps as a result of interference with cell-division, is altered—giving life to heritable defects.

In one of the animal experiments to which Professor Paton referred, the teratogenic effects carried over for another two generations without further exposure to marihuana.

In the light of all of this converging research, I do not think it premature to warn the public that the use of marihuana during pregnancy, or its chronic use prior to pregnancy, may result in birth defects or even in genetic mutation. Although his research would have to be duplicated by other scientists before it could be considered definitive, Dr. Kolodny made the point that the evidence already on hand was strong enough to warrant a public warning. Professor Paton went one step further. In response to a question, he stated flatly that those indulging in chronic abuse ran a serious risk of giving birth to abnormal or defective offspring.

CANNABIS AND CANCER

There is a growing body of evidence that marihuana smoke has a far greater potential for bringing about cancerous alterations in tissues than does tobacco smoke. Dr. Cecile Leuchtenberger reported that her experiments have demonstrated that addition of marihuana to tobacco cigarettes produced a smoke which was much more harmful to mouse lung cultures than was the smoke from tobacco cigarettes without marihuana.

Drs. Kolansky and Moore, two Philadelphia psychiatrists, told the committee that emphysema and other disorders of the respiratory track were the general rule among chronic marihuana smokers.

Dr. Forest S. Tennant, Jr. ,who headed up the U.S. Army drug program in Europe from 1968 until 1972, told the committee that among chronic hashish smokers in the Armed Forces, bronchitis and sinusitis were very commonplace and that he had been surprised to find in young men of 20 the kind of acute bronchitis ordinarily found in cigarette smokers who had smoked heavily for many years. He said that—

The abnormalities found in the bronchial biopsies were the same that are associated with heavy cigarette smoking and cancer on the lung.

What makes these findings all the more alarming is that, because of the time limitations of an Army tour of duty, the young men examined by Dr. Tennant had been chronic cannabis abusers for very brief periods of time—several months to a year at the most.

Dr. Paton pointed out that one of the major differences between cigarette smoking and marihuana is that the inhalation and retention of the smoke is much deeper and more efficient with marihuana than it is with cigarettes. Calling for medical studies on a wide scale to determine the effects, Professor Paton said that emphysema which is normally a disease of later life is now cropping up with increasing frequency in young people, opening up the prospect "of a new crop of respiratory cripples" early in life.

It will take some years before scientists can report in an epidemiological manner the precise impact of marihuana on cancer. Hopefully, now that we are alerted, it should not take us long to get this information as it took us to find out about the relationship between cigarette smoking and cancer.

THE PSYCHIATRIC EFFECTS OF MARIHUANA

There was also a remarkable convergence of findings between the psychiatrists who testified before the subcommittee on the spectrum of major damage resulting from chronic marihuana usage. The psychiatrists included Dr. Harvey Powelson, for 8 years—1964-72—the head of the psychiatric division of the student health service at Berkeley; Dr. Henry Brill, senior psychiatric member of the Shafer Commission and the president of the American Psychopathological Association; Dr. N. I. Soueif, of the university of Cairo, recognized as the foremost expert on hashish addiction in Egypt; Dr. Philip Zeidenberg, senior research psychiatrist at the New York Psychiatric Institute; Dr. Andrew I. Malcolm of Toronto, until recently staff psychiatrist with the Addiction Research Center of Ontario; Prof. Nils Bejerot of Stockolm, an internationally recognized expert on drug epidemiology; Dr. Conrad Schwartz of Vancouver, chairman of the drug habituation committee of the British Columbia Medical Association; and Drs. Harold Kolansky and William T. Moore, two Philadelphia psychiatrists with wide experience in marihuana-related cases.

Drs. Kolansky and Moore told the subcommittee:

Marihuana and hashish have a chemical effect that produces a brain syndrome marked by distortion of preceptions and reality. This leads to an early impairment of judgment, a diminished attention and concentration span, a slowing of time sense, difficulty with verbalization, and a loss of thought continuity characterized by a flow of speech punctuated with non sequitura which leaves the listener puzzled. In time, the chronic smoker develops a detached look as decompensation of his ego occurs.

Dr. Harvey Powelson, whose extensive exposure at Berkeley over 8 years probably made him the most experienced campus psychiatrist in the country, told the subcommittee that in 1965 and 1966, when the marihuana epidemic first broke, he had had a tolerant attitude toward it, based on the then almost universal assumption that marihuana was not seriously harmful. As a result of his experience, he said, his attitude toward marihuana was changed to the point where he now considers it the most dangerous drug we must contend with. He gave the following reasons for his change in attitude toward marihuana:

1. Its early use is beguiling. It gives the illusion of feeling good. The user is not aware of the beginning loss of mental functioning. I have never seen an exception to the observation that marihuana impairs the user's ability to judge the loss of his own mental functioning.

2. After one to three years of continuous use the ability to think has become so impaired that pathological forms of thinking begin to take over the entire thought process.

3. Chronic heavy use leads to paranoid thinking.

4. Chronic heavy use leads to deterioration in body and mental functioning which is difficult and perhaps impossible to reverse.

5. For reasons which I can't elucidate here, its use leads to a delusional system of thinking which has inherent in it the strong need to seduce and proselytise others. I have rarely seen a regular marihuana user who wasn't "pushing". As these people move into Government, the professions, and the media, it is not surprising that they continue as "pushers," thus continuously adding to the confusion that this committee is committed to ameliorate.

Dr. Philip Zeidenberg, a biologist as well as a psychiatrist, told the subcommittee that—

There is no doubt that a single dose of tetrahydrocannabinol can cause an acute psychotic reaction in mentally healthy individuals, and that marihuana use is also associated with longer-lasting and even chronic psychoses.

All the psychiatrists who testified agreed on the point that chronic marihuana abuse results in a serious loss of motivation—the so-called "amotivational syndrome." Commenting on this point, Dr. Nils Bejerot told the subcommittee that the syndrome is characterized by "a massive and chronic passivity brought about by prolonged and intensive abuse of cannabis. In these cases there is a basically altered sense of reality, and a tendency to magical thinking. Intellectual deterioration, which may be irreversible, and vagabondism commonly develop." Dr. Bejerot expressed the belief that marihuana is an addictive drug and that a strict concept of addiction does not necessarily involve the kind of agonizing withdrawal symptoms that

that—

If cannabis were legalized in the United States this would probably be an irreversible process, not only for this country and this generation, but perhaps for the whole of western civilization. As far as I can see, another result would be a breakdown of the international control system regarding narcotics and dangerous drugs.

THE DANGER OF EPIDEMIOLOGICAL SPREAD

The spreading use of marihuana throughout our society has been made possible in part by the tolerant attitude of the media and the academic community. But another major factor that accounts for the dramatic escalation of marihuana use is the ease with which it can be transported and concealed and used and the relative cheapness of the drug.

As dangerous as alcohol can be when chronically used, the bulky nature of alcohol places certain limits on its use—and these limits are further reinforced by the familiar drunken stagger and by the unmistakable smell of alcohol on an inebriate's breath.

None of these considerations apply to marihuana.

A high school student or a grade school child or a blue-collar worker or an office worker would have difficulty smuggling a bottle of alcohol into his school or his place of work without being discovered. And if he was able to conceal the bottle, he is likely to give himself away by his drunken stagger or his alcoholic breath. With marihuana, however, the concealment of several joints presents no problem ever to the unsophisticated grade schooler—nor is there any drunken stagger or telltale odor.

Cost is another factor contributing to marihuana's tremendous danger of epidemiological spread. Even though the sale of marihuana is illegal, students are able to purchase it—the rate will vary from time to time and from place to place—at approximately $1 per joint. And a joint of good marihuana is quite enough to produce intoxication. If marihuana were ever legalized, an entire pack of joints could theoretically be sold for the same price as a pack of cigarettes or less.

Because of these factors, the marihuana-hashish epidemic, which began in 1965, rapidly spread down into the high schools and junior high schools and then into the grade schools, and more recently into the ranks of the blue-collar workers and businessmen. Beyond its demonstrated ability to involve a very large number of people in a very short time, marihuana use in moderate amounts accelerates rapidly to use in large amounts and more potent forms.

up the Army drug program in Europe, found that young soldiers arriving in Germany could escalate from a few marihuana joints a week prior to arrival, to anywhere from 50 to 600 grams of hashish a month only 1 month later. I want to point out here that it takes only a quarter of a gram of hashish to produce intoxication in the average person.

Dr. Tennant also found that, because of the easy availability of hashish in West Germany, 10 percent of our servicemen rapidly reached the hashaholic stage, while a total of 10 percent consumed hashish in excess of three time a week.

These are facts we have to keep in mind when people talk about the legalization of marihuana in the United States.

Several of the scientists who testified stated that they considered marihuana far more dangerous than alcohol, in terms of its potential for damage to the individual and to society. Summarizing the important differences between alcohol and marihuana, Professor Paton said the following:

Alcohol is taken, often diluted with food, and often for taste or to quench thirst rather than for psychic effect; it is eliminated in a few hours; there is little or no evidence for carcinogenicity or teratogenicity, particularly if nutritional defect and correlation with smoking are allowed for; psychotic phenomena only occur after heavy and prolonged dosage; it occurs naturally in the body of animals, and probably also in man; it has valid medical uses for nutrition and as a vasodilator; it "escalates" only to itself; the price paid for overuse is paid in later life.

Cannabis is taken specifically, and usually by itself (sometimes with other drugs), for its psychic action; it is cumulative and persistent; its tar is carcinogenic and failure to inhale reduces its effect considerably; experimentally it is teratogenic; psychotic phenomena may occur with a single dose; it is not a natural constituent; prolonged trials in medicine from the 1840's led to its abandonment from pharmacopoeias; it can predispose to the use of other drugs; the price for its overuse is paid in adolescence.

One could say that cannabis shares the disadvantages of alcohol and tobacco, together with its own psychotogenic and biochemical actions, its chronic effects being accentuated by its cumulative tendency, giving it much earlier adverse action.

To what Professor Paton said, one has to add the much greater potential of marihuana for epidemic spread, about which I have already spoken.

MARIHUANA AND THE LAW

What I have said about the physical and psychological effects of marihuana should not be construed as meaning that I favor tougher penalties for those who smoke it occasionally and who are caught in the possession of small quantities.

In his opening statement, Senator EASTLAND made it clear that the subcommittee was opposed to sending young people to prison for the possession of small quantities of marihuana for personal use. I strongly support this position. The fact is that at the present time very few young people are sent to prison for simple possession, either under Federal law or under State law. But the State laws are uneven on this point, and Federal law still leaves much to be desired.

We have come a long way in recent years. Up until 1970, under the Marihuana Tax Act and the Harrison Act, simple possession of marihuana called for a mandatory minimum sentence of 2 years in prison and a maximum of 10 years; and it is appalling to think that many young people actually did receive sentences of this magnitude. Both of these acts were removed from the books by Public Law 93-513, which was passed in October 1970. The provisions of this law, which are now incorporated in the United States Code—title 21, sections 841-844—converted simple possession of marihuana from a felony to a misdemeanor. While there is no mandatory minimum penalty, the law does permit a maximum penalty of 1 year and/or $5,000 for first offenders. Second offenders are still considered felons, and for them the maximum penalty is 2 years in prison and/or $10,000. First offenders convicted under this law can have their convictions set aside and records cleared if probation is successfully completed.

My personal opinion is that it would make more sense to rewrite this portion of the law to make simple possession, on a first offense, a misdemeanor punishable by a fine of up to $100. Having laws which permit penalties of 1 year in prison and a $5,000 fine for a first offender caught in possession of an ounce of marihuana is actually counterproductive because by far the majority of our judges recoil from such excessive penalties—and, in the act of recoiling, they frequently are disposed to impose no penalty at all.

The same situation applies, but in an even more dramatic manner, to the laws governing the smuggling of marihuana. Smuggling of any quantity of a drug is a felony. In the case of marihuana, any person caught in the act of smuggling even 1 ounce could, theoretically, be imprisoned for 5 years. In practice, as a customs officer stationed on the Mexican border recently informed the subcommittee, hundreds of young people are caught every week trying to smuggle in small quantities of marihuana. Those caught smuggling bottles of whisky frequently have administrative fines of $5 or $10 slapped on them—in addition to suffering the pain of watching their whisky flushed down the toilet. But in the case of minor marihuana smugglers—anything under an ounce and a half or 2 ounces—our customs officers simply flush the pot down the drain and there is no penalty of any kind.

Laws that are never enforced are worse than no laws at all. In the case of the laws governing the smuggling of marihuana, I really do think that the present penalties for first offenders should be replaced by a mandatory fine similar to what I have recommended for simple possession; perhaps the second offense for both possession and smuggling should constitute a felony punishable by fine and imprisonment.

There are those who recommend the abolition of all penalties for possession of marihuana. This was the position of the Shafer Commission, and it is also the position of NORML, the most prominent of the national promarihuana lobbies. All of the scientists who testified on this point were inclined to favor some kind of penalty for simple possession. As one psychiatrist pointed out, by penalizing traffickers but letting users go scot free, we would, in effect, be sending contradictory signals to our young people—which would make it more difficult to get across the basic message that marihuana is a very dangerous drug against which society has to protect itself. Dr. Brill, who had served as senior psychiatrist on the Shafer Commission, told the subcommittee that although he had originally supported the proposal that there be no penalty of any kind for simple possession, he now felt that this position had to be reconsidered.

If those portions of our law which govern simple possession are still too stringent, the statutes covering the big smugglers and the big pushers are far too lenient—and, even worse, they are far too leniently enforced. Over and over and over again, traffickers caught with hundreds or even several thousand pounds of marihuana go scot-free, with a 6-month or 1-year suspended sentence. This portion of our law, in my opinion, has to be amended and amended promptly. The large traffickers and the pushers must not be permitted to get off so lightly. For them, I would like to see mandatory minimum sentences of several years in prison.

I have instructed my staff to study the existing legislation and ways of improv-

ing it, and after these hearings have been made public, I may want to submit some concrete proposals for the revision of existing laws.

THE NEED FOR A NATIONAL EDUCATIONAL PROGRAM

I believe that, with the evidence we have brought together at these recent hearings, we can now mount a national educational program on marihuana and hashish that will be effective in persuading young people to abstain from the drug.

No young person wants to run the danger of permanent brain damage.

No young male wants his male hormone level reduced by almost 50 percent or his sperm count reduced to zero.

No young person wants to damage their cellular processes and chromosomes, thus opening the way to abnormal offspring or genetic mutations.

Up until recently, those scientists who mistakenly believed that marihuana was a relatively benign drug have had the ear of our press and of our networks. I have the impression that we are now witnessing the beginning of a change in attitude. It is my conviction that we can reverse the massive marihuana-hashish epidemic which engulfs our country—just as we have already succeeded in reversing the relentless upward trend of the heroin epidemic and the LSD epidemic which preceded it—if our various Government agencies and our media and our schools embark on a united educational effort.

It is my hope that our recent hearings will serve to encourage and facilitate the launching of such a nationwide program.

Mr. President, I ask unanimous consent to print in the RECORD at this point the text of the testimony given to the Subcommittee on Internal Security by Prof. W. D. M. Paton of Oxford University, and the text of the testimony of Dr. Harvey Powelson, formerly of the University of California at Berkeley.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

STATEMENT BY W. D. M. PATON

I am Professor of Pharmacology in the University of Oxford. My interest in cannabis was aroused by a conference on adolescent drug-dependence in 1968. Since it subsequently appeared that there was little known about it in modern terms, and that little but sociological or psychological work was being initiated, I began pharmacological studies in 1969. Some of my earlier work has been relevant; on anaesthetics (dating back to 1944 in connection with narcosis in diving and submarine escape), and on opiates (from 1949). The statement that follows rests partly on this work, partly on my own informal contacts with drug users, and partly on a review of the recent research on the effects in animals and man (written together with Dr. R. G. Pertwee and Dr. Elisabeth Tylden) which forms three chapters in "Marihuana" ed. R. Mechoulam, Academic Press, recently published. Of this work (400-500 papers), usually only a small fraction is referred to in official reports and other writings; something like 100 further scientific papers have appeared since our final manuscript was sent in. I will try to bring out what appear to me the salient points of all this work, interpreted from my pharmacological experience, and taking for the most part the point of view of preventive medicine.

I shall use the term cannabis rather than marihuana, since the use of the latter word may suggest a sharper distinction from hashish than in fact exists (both are mixtures of cannabis resin with other material from the plant), and perhaps also begs the question whether or not it would be possible to legislate differently for them.

It is sometimes said that cigarettes and alcohol are as bad as, or worse than cannabis, yet they are "legal"—why should not cannabis be too? I shall try to compare these three later; but it is necessary to review the actions of cannabis first, particularly because very little publicity indeed has hitherto been given to many of its actions.

The first point to stress is that cannabis is a complex mixture of chemicals, of which *at least* the following are known to have a biological action: tetrahydrocannabinol (THC), propyl-THC, cannabidiol, cannabinol, and a group of water soluble materials giving alkaloidal reactions. This affects, inter alia, the suggestion that one might permit a preparation containing up to 1 or 2% THC to be marketed: this would only be feasible if THC were the only active principle. It also means that pharmacological or other studies which are limited to THC have only a restricted relevance to problems of human usage of cannabis.

FAT-SOLUBILITY

Second, and possibly the most important single fact about cannabis, apart from the fact of its psychic action, is that THC, the main psychically active principle, is intensely soluble in fat, as we pointed out in 1970. It has an octanol/water partition coefficient of about 6000 to one, over 10,000 times that of alcohol. Corresponding to this is a low solubility in water. Its fat solubility is greater than that of industrial solvents, and is exceeded only by substances like DDT. The other cannabinoids share these properties. This solubility gives it an affinity for, and ability to transverse, the fatty material in cell-membranes.

From this physical property follows: (a) the activity of cannabis by all routes of administration; (b) its cumulative effect, and the persistence of effect when drug is withdrawn; (c) its passage into all parts of the body, including brain, adrenal gland, ovary, testis, and foetus; (d) the diffuseness of its effects because it is able to reach every cell in the body; (e) the overlap in its effects with those of one important group of fat-soluble materials, the general anaesthetics such as chloroform.

Perhaps I should say a special word about the brain, where perhaps the most important fatty material in our bodies is located, though in much smaller percentage than (say) in adipose tissue. Here, too, cumulation of THC and its first two metabolites has been found.

TOXICITY

(a) Fat affinity and cumulation in the body in themselves are not necessarily harmful, even if cumulation is undesirable in principle. The fundamental test is a biological one, whether *toxicity* is cumulative. This has been found to be the case; for a mouse, it require one-tenth as much cannabis to kill if given in repeated daily doses as if given in a single dose. Similar cumulative toxicity has been found for THC an din other animals. Inferences must not be drawn, therefore, from responses to single exposures to the likely effect of repeated doses.

(b) We have found that toxicity, as judged by loss of weight and lethality, is associated with the fat-soluble fraction of cannabis; THC appears to be the main, but not the only substance responsible. It appears impracticable, therefore, to dissociate the psychic and the toxic effects.

(c) The question of lethality in man is important. Since few practitioners would know how to diagnose a death caused, or contributed to, by cannabis, and since it could not at present be proved by forensic analysis, only scanty information can be expected in any case. The case reported by Heyndrickx et al, in the light of this, is rather convincing.

Possibly more important is to point to three ways in which cannabis could indeed cause or facilitate death. (a) It produces a considerable tachycardia, and this may be associated with electrocardiographic changes and ventricular extra-systoles. It is not at all impossible that this, in unfavorable circumstance in a chronic user, could progress to ventricular fibrillation and death. (b) It causes a dilatation of peripheral blood vessels, corresponding to the hypotensive action in animals. This probably underlies the "fainting attacks" reported, causing postural hypotension. As with other hypotensive drugs, if the subject could not become horizontal, either deliberately or by falling (e.g., because he was in a chair), blood supply to the brain might fail. (c) Cannabis, chiefly because of its cannabidiol content, can potentiate and prolong the action of barbiturates (as well as other drugs used in medical treatment). This could mean that a non-lethal dose of barbiturate became lethal.

Regarding decisions about the law, one wishes that all cannabis users were aware of these possibilities.

TERATOGENICITY

Administration of cannabis during the vulnerable period of pregnancy has been found to cause fetal death and fetal abnormality in three species of animals. The deformity includes lack of limbs (reduction-deformity). The factor responsible has not been identified but does not appear to be THC although new work is showing that THC kills a majority of foetuses and in the remainder produces an increased incidence of stillbirth and stunting. The effect is dose-related, an important thing to establish if cause and effect are considered.

These results are sometimes dismissed on the grounds that any drug in sufficient dose will be teratogenic. While this is not quite accurate, there is evidence that serious disturbance of the mother can have such an effect. This gives an added importance to the criterion suggested by Robson & Sullivan which I would adopt; that a result should be taken as significant when the teratogenic dose is a small fraction of the dose lethal to the mother. This is the case with cannabis, and is in contrast to other drugs, including nicotine and aspirin.

A very important question is whether cannabis directly affects the genetic material, i.e., nucleic acid. Early reports of interference with cell-division indicated this. These have been confirmed. Dr. Nqhas' report here has clinched the issue. One must notice that general anaesthetics as a class can also produce fetal abnormality. A provisional hypothesis for teratogenicity, therefore, is that this action of cannabis reflects its fat solubility and relation to anaesthetics, and constitutes a sort of anaesthesia, for instance, of limbbuds developing in the fetus at critical periods—hence the reduction-deformity. It must be stressed that all I have said refers simply to the development of the fetus. There is also the question whether the genetic material, perhaps as a result of interference with cell-division is *altered*—giving life to heritable defect.

CARCINOGENICITY AND LUNG PATHOLOGY

Like the tar from cigarettes, reefer tar is carcinogenic when painted on mouse skin. Cannabis smoke produces changes in cultures of lung tissue, including loss of contact-inhibition between cells. THC in low concentration resembles the carcinogen methyl-cholanthrene in generating malignancy in rat embryo cells incubated with a murine leucemia virus, but is slower in action. The irritant effect of the smoke on the respiratory tract is well-known to users, and is associated with bronchial pathology.

These effects are becoming very important. Originally, one was uncertain about their significance, and what the balance would be between the facts that more cigarettes than reefers will normally be smoked in any one day, whereas inhalation and retention of the smoke is much deeper and more efficient with the reefer. But now lung damage, in the form of emphysema, is being repeatedly recorded. Emphysema is normally a disease of much later life; but now the quite unexpected (to me, at least) prospect of a new crop of respiratory cripples early in life, is opening up. Originally, I thought the cancer risk was the main problem; cannabis has never been used extensively in a society with an expectation of life long enough to show a carcinogenic effect in man, until recent years. In effect, a new experiment in cancer epidemiology started 5-10 years ago. To this I would now add respiratory pathology generally; and because, just as with bronchitis and cigarette-smoking, it shows itself early, I believe medical studies on this, on a wide scale, are now urgent.

CELLULAR EFFECTS OF CANNABIS AND THC

Numerous such effects have now been described, including actions on microsomes,

on mitochondria, on neurones, fibroblasts, white blood cells, and on dividing cells, affecting metabolism, energy utilization, synthesis of cellular constituents, and immunological responses. To this we must add the recent observation that chronic administration of THC to young rats leads to a reduction in brain and heart weight. Such effects are to be expected, rather than a matter of surprise, from a drug with a high affinity for lipid in a cell-membrance. It should be noted that the local concentrations of THC or its metabolite in the cell-membranes will be far higher than those in the blood; theoretically, one would expect a concentration factor of several hundred; experimentally, concentrations of 600-fold with brain and 380 with red cell membranes.

An important aspect of these effects is what they imply for *maturation* of an individual; we are concerned not only with the effect of a drug on a mature adult, but also what it does to school-children, still developing in many ways. The interference by cannabis with both cell-metabolism and cell-division is very worrying.

THE RELEVANCE OF ANIMAL WORK

It may be argued that actions in animals are of little relevance to man. However, the pharmaceutical industry, and the bodies which supervise it, do not operate on this principle. Difficulties chiefly arise when an inordinately high safety factor has been stipulated. But there is also misunderstanding over rates of dosage. It is to be expected that small animals will require proportionately larger doses (per unit body weight) than man, just as they need proportionately more food, because of their faster metabolic rate. One can estimate a mouse dose on this basis as ten times that of man, taking this together with the rates of human use reported in WHO Special Report No. 478 (up to or exceeding 10 mg/Kg THC per day) it appears that almost all the experimental work reported in animals is relevant to man. The conclusion is reinforced by the NIMH-sponsored toxicity studies on monkeys. A daily dose of 50 mg/Kg orally of THC killed 1 of 6 monkeys; damage to the pancreas, ulcerative colitis, and myeloid hyperplasia were noted. This result, at doses only 10 times some rates of human consumption makes no allowance for contribution by other toxic materials in cannabis.

TOLERANCE

I mentioned high rates of human use. People have expressed incredulity at this, yet it is well-established. I would like to deposit a table of consumption in a group of English students (subject to the approval of the authors)—perhaps the best evidence yet, since the composition of the actual reefers being used was measured; uses ranged up to 109 mg THC per day, around 20 times the ordinary dose for a "high." By itself it shows the degree of tolerance that is achieved, with the resulting need to take high doses for an effect. By the same token, toxicity and accumulation *at these levels* must be considered.

DIFFICULTIES IN THE EXTENSION OF ANALYTIC WORK TO MAN

Although there are a number of human studies on the effects of single small doses, there is still no systematic modern study of the bodily effects of continued cannabis administration. One reason is that while limited dosage is acceptable for volunteers, dosage over a prolonged period at the higher rates of use is not. It would be possible to study users themselves, if a method of urine and blood analysis existed capable of verifying their actual consumption. This, however, is at present not practicable; as a result only the subject's testimony as to his rate of consumption of a substance of unknown composition is available, and this is hardly sufficient. Once methods of analysis of body fluids are adequate, the position should improve considerably.

PSYCHOLOGICAL EFFECTS IN MAN

It may be useful to bring a number of findings together:

(a) The neurophysiological observations, in man and animals, of hypersynchronous discharges from the deeper parts of the brain (not the cortex) as a result of giving cannabis or THC. These discharges have been termed "epileptiform."

(b) The observation by Campbell and his colleagues of an apparent loss of brain substance in the deeper regions, in a group of young chronic cannabis users. This needs further exploration, and it is likely that it is now possible with new non-invasive radiographic techniques.

(c) The cumulative property of THC, and its affinity for fat and hence for cell-membranes.

(d) The numerous psychiatric reports of gradual psychological change, which becomes less and less readily reversible, the longer the cannabis exposure. (This delayed recovery may well have been known in the Moslem community in medieval times; see Schwarz, J. Amer. Med. Ass. 223, p. 105, 1973.)

(e) The fact that most of the elements of this psychological change (paranoid feelings; change in mood, cognitive impairment, loss of memory, loss of concentration, a motivational state, introspective preoccupation with internal imagery, hallucination) can be reversibly produced by single doses of THC or cannabis in normal volunteers.

(f) The ability of cannabis to affect cellular metabolism and cell division.

These findings converge to a remarkable extent in supporting a prima facie view that repeated cannabis use acts on the deeper parts of the brain (where sensory information is processed and mood controlled); that this is at first reversible, but becomes more persistent as cumulation occurs, and that later irreversible changes occur with loss of brain substance, due either to interference with the capacity of brain cells to synthesise their requirements or to interference with cell division.

It is quite likely that all this would be accepted and acted upon, by the cannabis user, were it not for the visual imagery, and (here cannabis is very like nitrous oxide) the euphoria and the conviction of insight and cosmic significance.

COMPARISON WITH ALCOHOL AND TOBACCO

One may summarize this as follows: (1) alcohol is taken, often diluted with food, and often for taste or to quench thirst rather than for psychic effect; it is eliminated in a few hours; there is little or no evidence for carcinogenicity or teratogenicity particularly if nutritional defect and correlation with smoking are allowed for; psychotic phenomena only occur after heavy and prolonged dosage; it occurs naturally in the body of animals, and probably also in man; it has valid medical uses for nutrition and as a vasodilator; it "escalates" only to itself; the price paid for overuse is paid in later life.

(2) tobacco is taken partly for relaxation, partly to assist work, and there is some evidence of an improvement in mental function; the nicotine in it is rapidly metabolised and non-cumulative; the evidence suggests that it is the tar that is carcinogenic, and the risk can be reduced if inhalation is avoided, nicotine being absorbed through the mouth; it is not teratogenic; no psychotic phenomena occur; it is not a natural constituent; it has no medical use; it does not "escalate"; the price paid for overuse is paid in later life—reducing life expectancy from about 75 years to 70 years.

(3) cannabis is taken specifically, and usually by itself (sometimes with other drugs), for its psychic action; it is cumulative and persistent; its tar is carcinogenic and failure to inhale reduces its effect considerably; experimentally it is teratogenic; psychotic phenomena may occur with a single dose; it is not a natural constituent; prolonged trial in medicine from the 1840's led to its abandonment from pharmacopoeias; it can predispose to the use of other drugs; the price for its overuse is paid in adolescence.

One could say that cannabis shares the disadvantages of alcohol and tobacco, together with its own psychotogenic and biochemical actions, its chronic effects being accentuated by its cumulative tendency, giving it much earlier adverse action.

THE QUESTION OF LEGALIZATION

(a) Viewing cannabis as if it were a new pharmaceutical product, I could not agree to approval being given to the introduction, for general and repeated consumption, of a substance shown experimentally to be carcinogenic, teratogenic, and cumulative, and able to interfere with a variety of cellular processes, until it had been shown, quite unequivocally, that, for some reason, humans were exempt from the actions concerned.

(b) There is no rational dividing line between cannabis and other drugs such as LSD or some opiates. A high dose of cannabis overlaps with a low dose of LSD (in its hallucinatory and psychotomimetic action) and with the less active opiates (in respect of analgesia, euphoria, and "day-dreaming" state). In fact, since cannabis is unique among these drugs for its cumulative action, I would put it lower in the list for legalization than some others. One needs to ask, what other drugs can produce prolonged cognitive impairment in a young person?

(c) In a similar way, it does not seem feasible to me to propose legalization of cannabis of limited potency. There is in fact an analogy with alcohol here: we have marihuana (1–2% THC), and weak beers (3% alcohol); hashish (say 8% THC) wines (8–15% alcohol); red oil, on the illicit market (up to 30–40% THC), hard liquor (35–60% alcohol). To suggest one could legislate for 1 or 2% THC is like suggesting one could legislate for weak beer. It would remove none of the present objections to cannabis legislation, while yet allowing the drug to be used.

(d) The significance of progression from cannabis to other drugs has been much discussed, and my own (1968) paper severely, but fallaciously, criticised. (The fallacy was exposed, inter alia, by R. C. Pillard in the New England Journal of Medicine (197) 285, 416–7). The final report of the Le Dain Commission concluded as regards LSD that "the use of cannabis definitely facilitates the use of LSD or predisposes a certain number of individuals to experiment with it." The argument they give (including the relationship between the nature of the two drugs and the finding that over 95% of those who had used LSD had used cannabis) were the same as those I had advanced in respect of heroin and cannabis. My argument also cited the remarkable temporal coincidence between cannabis convictions and heroin addiction in the U.K.; evidence of this sort has not been provided in respect of LSD.

Today, with the further evolution of drug use, it seems clear that, depending on availability of drug, various patterns of progression are possible, in which one would include cannabis to opiates, cannabis to LSD, and cannabis (low potency) to cannabis (high potency). Simple reasons can now be seen; that cannabis increases suggestibility and impairs memory; and that it overlaps in pharmacological actions with opiates (euphoria, analgesia, daydreaming state) and with LSD (visual imagery). It is therefore well-suited to providing a halfway house, converting one major step directly to use of opiates, LSD or hashish, into two smaller and more easily accepted steps.

The growth of poly-drug use may now have made it impossible to define patterns of progression accurately. But one may hazard the opinion that no programme to get rid of opiate addiction or LSD use will really succeed until cannabis use declines. Cannabis can serve as well to cause relapse, as to initiate drug use.

(d) The last point concerns the age of those involved. If someone dies of alcoholism or lung cancer at the age of 50 onwards, that is a loss; but the individual has had 30 years of adult life, and the chance to make his own contribution. But the adolescent, dead or socially inactivated by 20 years old, has never even had a start on mature life; the loss, both for him or her, and for society, is incalculably greater.

THE DIFFICULTY OF FRAMING A POLICY

My own opinion is that it would be disastrous to make it legal even to possess cannabis. If one talks, not to lawyers or sociologists but to schoolchildren and students, at least in the U.K., it is not at all clear that a majority would even wish for this to happen. But nevertheless, there would be for the foreseeable future a large number of people breaking the law, just as they do over speed limits, customs-regulations, and income-tax

return. It seems that one would have to treat a cannabis-possession similarly, accepting that the majority of offences would not be recognized, yet maintaining the legal position about it. Viewing it in this way might, indeed, help to deglamourize it.

But something more is needed. It would be quite right for the debate to sharpen our criticism of alcohol and tobacco. Further, for a significant number of youngsters, who have found consolation in cannabis, there is the question, "If not pot, what?" It is for the framing of an answer to this question that new creative thinking is urgently needed.

STATEMENT BY DAVID HARVEY POWELSON, M.D.

In 1965, I was chief of the Department of Psychiatry in the Student Health Service at the University of California in Berkeley. It was the first year of the student riots. It was also the first year that hallucinogens were becoming widely used and I, as the person responsible for mental health on that campus, was vigorously involved in the debate about psilocibin, LSD and mescaline.[1]

In the spring of that year a reporter for the Daily Californian, the student newspaper, asked for my opinion on marihuana. At that time I lacked any direct experience as a physician with marihuana users. The medical literature was sparse, but in general seemed to be saying that there was no proof of long term harmful effects from marihuana. I summarized this for the reporter and said there was no proof of harm and that it probably should be legalized and controlled. In general, this view met with approval from most of the students and most of my professional colleagues.

In 1965, the use of marihuana spread throughout the Berkeley Campus. Simultaneously its use was spreading to all the colleges and universities across the country. From the campus communities it spread at an accelerating rate through the surrounding communities. By now its use is subject to no age, social or geographic barriers.

My place of observation was unique. I was there at the beginning and in my work I was actively involved with students not only as a psychiatrist but as a teacher, and as a participant in a four year research project studying maturation and growth, in college students. In addition, I was routinely meeting with deans and administrators who were dealing with the drug problem and the students who were in academic and/or disciplinary difficulties as a consequence of the use of marihuana and its derivatives.

Most importantly, I was in daily contact with the constant flow of students through the student health service and the psychiatric clinic and hospital.

During the period I am speaking of (from 1966-72) the clinic saw approximately 2000-3000 students a year as outpatients and about 150-200 students a year who were mentally ill enough to be hospitalized. Naturally, I didn't see all these students but the people who ministered to them were all under my supervision. I personally interviewed about 200 students a year; many were seen for a single hour, others were seen as intensively as 2-3 times a week for varying lengths of time up to and including 5 years. A legitimate question which is often raised is that of sampling: i.e., "how typical are these patients when compared with the general population of U. C. students?"

(I am convinced that aside from the obvious fact that they have come to the clinic, they vary in no significant way from the population of the University of California, Berkeley, as a whole. For a systematic study of this point, c. f., Katz, Joseph, Ph. D., *Growth and Constraint in College Students*, Institute for the Study of Human Problems, Stanford University, Stanford, California, 1967, pp. 510-68. This study was done at Berkeley on the same group of students I am discussing. Comparisons were made on all sorts of variables: psychological; psychiatric; and so on. No significant difference between the clinic and general population were found.)

During this time (from 1965–72) an increasing number of patients were using marihuana. My best guess, based on surveys and impressions, is that more than 90% used it at one time or another in college. More than 50% used it "socially" (approx. 1-2 times per week) and about 10% were heavy users (at least 1 time daily).

My first important shift in thinking occurred as a result of observations made during psychotherapy with a young man, S., who was bright enough to be getting his law degree and Ph. D. simultaneously and competent enough to be learning to fly and deal in real estate at the same time. As we proceeded in our work together, I came to know S.'s way of thinking; i.e., *how* he thought. Most of us do this without thinking about it. All of us come to know to some degree the way our friends and colleagues think. In therapy, the opportunity to hear someone think out loud about a problem important to him maximizes the opportunity to come to know how he uses or manipulates logic, remember clearly or not at all, thinks or does not exercise good judgment about his own thinking, and whether or not he is able to know his own feelings. We had made enough headway so that S. had begun to be able to observe and understand his own thinking. Periodically, we had hours (I was seeing him twice weekly) when his thinking became mushy. If I tried to follow him, my head began to spin. When I protested that he'd become impossible to listen to, he'd argue that his own experience was that he was thinking more clearly, more insightfully, than ever. On one such occasion, he mentioned that he'd been to a party two nights before where he'd had particularly good "grass." In Berkeley, 1968, that was not a particularly memorable remark, but we thought there might be some connection with his thinking. This same series of events recurred often enough so that I finally was able at times to post dict that S. had had some "mind-expanding drug," usually marihuana.

S., because he was a good observer, helped show me another aspect of the thinking disorder I'm describing. Central to his difficulties was a paranoid stance toward the world. By this, I mean a style of thinking characterized by a constant suspicion that one is being controlled; e.g., by the establishment, the system, etc.; and simultaneously a constant unwitting search for people and situations which will do just that; e.g., drugs, demagogues. If this manner of thinking is carried further, it blends into the condition usually called paranoia. Here the subject is controlled by voices, God, or whatever, and at the same time, he is very often "against his will" being controlled by a state hospital or jail. S. was forever talking about his search for something or someone he could trust.

When he had used marihuana, his thinking became more paranoid, i.e., he became more mistrustful of me, for instance, and at the same time, he became more wily so that he talked glibly, using cliches, theories, and "insights," all to avoid noticing concretely and immediately whatever he was really doing and feeling in his relationship with me, as well as his relationships outside. In short, the pathological part of his thinking was exaggerated in two ways: (1) he was more suspicious, etc. and (2) he was more adept at fooling himself about what he was up to, while simultaneously maintaining how "aware," "in touch," and "loving" he was.

S. continued in therapy but also continued to use marihuana and hashish. (Hashish is merely another more concentrated source of the active principals contained in marihuana). Toward the end of his therapy, I had decided that so long as he muddled his thinking in this way, there was no use continuing. He, however, suffered a fatal accident (as a result of an error in judgment) before his therapy actually terminated.

As I was becoming familiar with these effects of marihuana on S., I gradually learned to pick up signs when they were more subtle. I came to observe the same changes in others, i.e., that marihuana exacerbated the pathological aspects of their thinking.

These observations were made before controlled studies began to give clues as to the nature of the mental changes taking place which could explain these phenomena. The committee has undoubtedly heard or will hear of the studies by the Hollister[2] group at Stanford on what they call "temporal disintegration" which seem to be changes secondary to the loss of immediate memory and the loss of an accurate time sense. There are also corroborating studies from Utah[3], clinical studies by Kolansky and Moore[4], x-ray studies by Campbell in England[5], and a study on students by Schwarz[6] at the Uni- Judgment, memory and logic are necessary.

As this happens, he depends more and more on pathological patterns of thinking. Ultimately all heavy users (i.e., daily users) develop a paranoid way of thinking.

versity of British Columbia to cite a few of the most relevant studies made on subjects comparable to the ones I'm describing.

Following the above described observations, I saw the same picture more and more frequently. The essence of the pattern is that with small amounts of marihuana (approximately three joints of street grade), memory and time sense are interfered with. With regular usage the active principals cause more and more distorted thinking. The user's field of interest gets narrower and narrower as he focuses his attention on immediate sensation. At the same time his dependence and tolerance is growing. As he uses more of the drug, his ability to think sequentially diminishes. Without his awareness, he becomes less and less adequate in areas where

After I had become aware of the generality of this sequence another reporter from the *Daily Californian* interviewed me to see if my opinions had changed in the interim. In the course of that interview, I realized in a concrete and explicit way that they had. The headline read, "Psychiatrist says pot smokers can't think straight." This time the response of the community and colleagues was not so approving. It is an interesting fact that questioning the claims or marihuana users leads to much more anger, vilification, and character assassination than does the opposite stance.

In subsequent years in Berkeley, both at the clinic and in my private practice, I have observed the long term effects of cannabis. Originally, my observation was that students who had "dropped out" into the "drug scene" and were attempting to return, were finding it difficult if not impossible. A frequent story is that the young person has become aware that the life he's been leading is unsatisfactory and unproductive. He then stops drugs for six months or so and reenters the university. When he returns to school, however, he finds that he can't think clearly and that, in ways he finds difficult to describe, he can't use his mind in the way he did before. Such people also seem to be aware that they've lost their will someplace, that to do something, to do anything, requires a gigantic effort—in short, they have become will-less—what we call anomic. An irony here is that they have now achieved the freedom they sought. They need an external director. They are ripe for a demagogue.

The changes in the capacity to think in some subjects are long lasting if not permanent. One of my original (1967) subjects was a member of the junior faculty. He "dropped out" and used hashish exclusively for 18 months in daily doses. When he realized that it was interfering with his physical coordination he stopped all drugs. Two years subsequent to this he returned to the University. He found that he could not do mathematics at a level which he had found possible before. Three and one-half years later, his conviction was that the change was permanent. My own observations of him and other such gifted people

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[1] M. Friedman and D. H. Powelson, "Drugs on Campus," *The Nation*, January 31, 1966.

[2] Hollister, T. F., *Science*, 2 Apr. 71.

Clark, J., Hughes, R., and Nakashima, E., *Arch. Gen. Psychiat.*, Vol. 23, 1970.

[4] Kolansky, H. and Moore, W. T., *JAMA*, Apr. 19, 1971.

[5] Campbell, H. H. G., Evans, M. Thomson, J. L. G., *et al.*, *Lancet*, 2:1219-1224, 1971.

[6] Schwarz, Conrad J., *Consul Psychiat. Ass. Jour.*, Vol. 14, 1969.

have led me to the same conclusion, i.e., that the damage may be permanent.

My stance toward marihuana has shifted to the extent that I now think it is the most dangerous drug we must contend with for the following reasons:

1. Its early use is beguiling. It gives the illusion of feeling good. The user is not aware of the beginning loss of mental functioning. I have never seen an exception to the observation that marihuana impairs the user's ability to judge the loss of his own mental functioning.

2. After one to three years of continuous use the ability to think has become so impaired that pathological forms of thinking begin to take over the entire thought processes.

3. Chronic heavy use leads to paranoid thinking.

4. Chronic heavy use leads to deterioration in body and mental functioning which is difficult and perhaps impossible to reverse.

5. For reasons which I can't elucidate here, its use leads to a delusional system of thinking which has inherent in it the strong need to seduce and proselytize others. I have rarely seen a regular marihuana user who wasn't actively "pushing."

As these people move into government, the professions, and the media, it is not surprising that they continue as "pushers," thus continuously adding to the confusion that this committee is committed to ameliorate.

Mr. GURNEY. Mr. President, I also ask unanimous consent to print in the RECORD a number of editorials that have resulted from our hearings; an article that appeared in U.S. News & World Report; a column by syndicated Columnist John Chamberlain; and a major article which appeared in the Washington Post. Although this last article did not mention our hearings, the author systematically interviewd many of the scientists who testified before the subcommittee, and there is no doubt that the inspiration for the article was provided by our hearings.

There being no objection, the material was ordered to be printed in the RECORD as follows:

SO, YOU THINK POT IS HARMLESS

(By John Chamberlain)

John Stacks, the news editor of Time's Washington Bureau and the co-ordinator of its Watergate coverage, remarks, in an article in the Overseas Press Club of America's "Dateline 1974," that "the success of the Watergate investigators in ferreting out hard facts from reluctant sources was a tonic to Washington journalism."

What Stacks says is true about one type of Washington journalism, the "get the guy" type. I applaud "getting the guy" if he is really a crook or a liar, but when the press corps of a great capital is encouraged to think of journalism primarily as an adventure in the cultivation of stool pigeons it is not a tonic generally. The trouble with Washington journalism at the moment is that whole areas of government activity get very little coverage. All the hounds are on one scent.

Information that might have a great effect on a nation's life is left to smoulder. For example, how many stories have you seen devoted to the remarkable marijuana investigation conducted by the US Senate Subcommittee on Internal Security?

The glib cliche about marijuana, endorsed, by the way, by some conservatives as well as by the liberals, is that marijuana, or pot, when smoked in moderation, is really no worse than a few glasses of beer. This view has been periodically challenged, mainly in Europe, but there has been little published on the subject that has had a cumulative impact.

The Senate Subcommittee on Internal Security, the Eastland Committee, has really dug into the question of marijuana toxicity, rolling up a vast body of testimony that should be the subject of debate on campuses from Berkeley, Calif., to Cambridge, Mass. Since I am not a doctor, and my paraphrases of medical testimony might not be trusted by the marijuana cultists, let me quote a few authorities directly.

Item, from a statement by Drs. Harold Kolansky and William T. Moore on the results of a clinical study: "In the last nine years we have seen hundreds of patients who have suffered psychiatric and neurological symptoms . . . and have described the findings in almost 60 of these patients. . . . Many of those we examined . . . appeared older than their chronological age. . . . The incapability of completing thoughts during verbal communication that resulted in confused responses seemed to imply some form of organicity either of an acute biochemical nature . . . or, one might hypothesize, structural encephalopathy." (I looked up "encephalopathy" in the dictionary: It means sickness or derangement of the brain.)

Item, from Dr. W. D. Paton, professor of pharmacology at Oxford: "Administration of cannabis during the vulnerable period of pregnancy has been found to cause fetal death and fetal abnormality in three species of animals. The deformity includes lack of limbs (reduction-deformity) . . . a very important question is whether cannabis directly affects the genetic material, i.e., nucleic acid . . . Dr. Nahas' report here has clinched the issue . . . lung damage, in the form of emphysema, is being repeatedly recorded. Emphysema is normally a disease of later life; but now the quite unexpected (to me, at least) prospect of a new crop of respiratory cripples early in life is opening up . . ."

(So you can give birth to congenital cripples and die in your 40s or 50s of wrecked lungs. Go right ahead.)

Item, from Dr. Robert G. Heath's description of his studies of the effect of cannabis on rhesus monkeys: When the monkeys were regularly exposed to these drugs . . . persistent — perhaps irreversible — alterations developed in brain function at specific deep sites where recording activity has been correlated with emotional responsivity, alerting and sensory perception.

(Warning: you may be more like a rhesus monkey than you think.)

Item, from Dr. Robert C. Kolodny, endocrine research director, Reproductive Biology Research Foundation, St. Louis, Missouri: "Cannabis resin . . . injected into pregnant rats . . . had a variety of effects. These effects included syndactyly (webbing between the digits) . . . encephalocele (hernia of the brain). . . . Phycomelia (abnormal development of the limbs, with the 'seal-flipper' appearance also encountered with thalidomide . . . complete absence of limbs . . .").

(Well, they're only rats. The trouble is that rats react to drugs in a very human way.)

I could go on quoting from other medicos. If you want more evidence, write to the Eastland subcommittee, care of the U.S. Senate.

RESEARCH REPORT—THE PERILS OF "POT" START SHOWING UP

At a time when demands are growing for reduced penalties on use of marijuana and hashish, new evidence is coming out linking the drugs to both mental and physical disorders.

As described in official testimony, research by U.S. and foreign experts indicates that marijuana and hashish may cause birth defects, psychological addiction, and sexual and other troubles.

The experts presented their findings before the Senate Internal Security Subcommittee investigating what it terms a "cannabis epidemic" in the U.S.

Cannabis is the dried parts of the hemp plant from which marijuana—called "pot"—and hashish—or "hash"—are derived. Hashish is more potent than marijuana, but is used less.

THE RISK FACTOR

The researchers emphasized that much more work is needed to substantiate their findings, but they agreed that the claim that cannabis is an innocuous drug is ill-founded.

Over and over in the testimony, the scientists made clear their studies suggest that marijuana and hashish users run considerable risks. For example:

Marijuana and hashish use among children may result in a generation of young "old people," according to Prof. W. D. M. Paton, professor of pharmacology at Oxford. He said cannabis interferes with cell division and cell metabolism and may affect adolescent development.

Professor Paton reported that studies done in England found a shrinkage, due to reduced cell production, of the brains of cannabis users. This shrinkage, he said, is comparable to that found in people late in life.

HARDER TO GET "HIGH"

Regular users of cannabis develop a tolerance for the drug, thus requiring greater levels of its use to get a "high," Professor Paton said. "This increased intake may be a serious factor," he added, since preliminary tests on animals indicate that as the drug is used regularly, less of it is needed to produce a dangerous toxic effect.

Dr. Gabriel Nahas, physiologist and pharmacologist at Columbia University, said his

body's immunity system.

Results showed that marijuana smokers had a 40 per cent lower production of white blood cells than nonsmokers of marijuana. He said he suspects that this lowered response lessens the body's ability to combat disease.

Findings by another researcher raise suspicions that cancer, genetic mutation and birth defects may result.

According to Dr. Akira Morishima, of the department of pediatrics, Columbia University, such problems may occur in marijuana smokers because of a substantial decrease in the number of chromosomes—specks of matter that carry hereditary characteristics—in each cell. This shortage often leaves the "pot" smoker with less than the normal complement of 46 chromosomes.

STERILITY PERIL

The potential danger of sterility in men was also raised.

Testosterone, the principal male sex hormone, has been found to be at a significantly lower level of production in marijuana smokers than in those who do not use marijuana, Dr. Robert C. Kolodny, research director at the Reproductive Biology Research Foundation in St. Louis, testified further: "It is apparent that there is a potential risk in cannabis use during pregnancy."

Dr. Kolodny indicated that birth defects and miscarriages were possible side effects of usage.

Despite what many believe, long-time users of the drugs can get "hooked" by developing "psychic dependence" on them, one authority testified.

Dr. M. I. Soueif, of the department of psychology at Cairo University in Egypt, said withdrawal after long-term use results in the individual's becoming "quarrelsome, anxious, impulsive, easily upset and difficult to please."

Although the findings unveiled in the hearings are relatively new, they are already being reviewed by drug-study organizations. E. M. Steindler, secretary of the Committee on Drug Abuse of the American Medical Association, told "U.S. News & World Report":

"It [cannabis] is definitely not an innocuous drug. We have looked at those reports on marijuana and hashish. . . . These are interesting studies, and we feel that more needs to be done along those lines."

Dr. Robert L. DuPont, director of the National Institute on Drug Abuse, takes an even stronger position on the findings.

"These are valid concerns, and all of these problems are being investigated further," he said. "I have no doubt that we will find problems with the use of marijuana and hashish.

"Some of the pressing concerns that I have with cannabis usage have to do with possible chromosome breakage, respiratory-system damage, reduction of testosterone levels and the hampering of the body's immunity system. . . . It's going to take some time to confirm these things and to build a firm base around these findings."

A SENSE OF URGENCY

Exactly what to do about the medical problems remains a matter of debate. Subcommittee officials contend that increased

use of "pot" and "hash," as indicated in the chart at left, adds urgency to this issue.

One thing that seems certain: How to handle this increased usage in the light of recent medical findings is going to present the nation with big problems for years to come.

All told: An estimated 835,366 pounds of marijuana and hashish—a more potent form of marijuana—were seized last year.

Officials say that roughly 8 pounds of drugs reach users for every 1 pound seized. Thus, close to 7 million pounds of marijuana and hashish were consumed in the U.S. last year—enough "pot" and "hash" to make more than 2 billion cigarettes.

Source: Senate Internal Security Subcommittee; U.S. Drug Enforcement Administration.

[From the Indianapolis (Ind.) News, June 10, 1974]

Pot Perils

Advocates of legalizing marijuana have long contended that it's non-addictive and no more harmful to one's health than cigarettes or liquor.

They've got away with this because, until quite recently, no one had done any research on how marijuana affects the body and the mind.

The spreading use of marijuana has caused scientists to look into the question, and the results are now coming in.

Dr. David H. Powelson, former director of the student health services psychiatry department at the University of California at Berkeley, who once called marijuana harmless and urged its legalization, recently told a Senate Internal Security subcommittee that seven years of research have convinced him that he was completely wrong.

He has found evidence, he said, that chronic use of marijuana permanently impairs the ability to "think clearly."

Appearing before the same Senate subcommittee, Dr. Nils Bejerot, acting professor in social medicine at the Karolinska Institute in Stockholm, reported on the work of a team of German scientists.

"A serious complication of cannabis (marijuana) abuse is chronic psychosis," he said. He added that acute marijuana intoxication can cause an altered sense of reality and "a tendency to magical thinking."

At the same time, Dr. William T. Moore declared that he and a colleague, Dr. Harold Kolansky, had conducted studies which showed that "marijuana smoking carries enormous risks of physical and mental damage."

In the current New England Journal of Medicine, a group of researchers at the Reproductive Biology Research Foundation in St. Louis tell of a study they made on the relation between marijuana and sexuality.

Pot, they found, may cause temporary sterility—possibly even impotence—in males. In a prepubescent boy, it may severely disturb the normal course of puberty.

A pregnant woman carrying a male fetus might seriously inhibit his sexual development by smoking grass.

... recent survey by the Phoenix Newspapers, Inc., showed that 57 per cent of students in one Phoenix high school believe that marijuana usage by teen agers is increasing.

If the students are right—and they should know—it's about time the schools told them of these recent findings.

[From the Memphis (Tenn.) Commercial Appeal, May 10, 1974]

The Most Dangerous Drug

For several years, a movement to legalize marijuana has been gaining ground in the United States. Both the Consumers Union and the National Commission on Marijuana and Drug Abuse have urged softer laws. But Congress has reacted cautiously—and with good reason. Research reports on the long-term effects of marijuana use have not been conclusive. The possibility of the drug's becoming a more dangerous and pervasive problem than alcohol has been a strong barrier to its legal acceptance.

Now a new and most persuasive opponent has come forth. In 1965, Dr. David H. Powelson, a California psychiatrist, publicly endorsed the open sale of marijuana. He has changed his mind, he told the Senate Internal Security subcommittee recently. After seven years of research with students at University of California at Berkeley, where he was director of the student health service psychiatry department, Powelson said he is convinced marijuana is "the most dangerous drug" sold illegally in this country.

His studies indicate that chronic use for from one to three years permanently impairs the ability to think clearly. He described this pattern of deterioration: Loss of ability to think sequentially, partial loss of memory, inability to reason and, finally, a paranoid mental state in which the user thinks he's being persecuted.

Marijuana supporters, of course, will cite other studies that don't reach the same conclusion. Authorities can be quoted that pot smoking is relatively harmless fun. People who like marijuana, it is often argued, should have as much right to indulge their habit as those who like alcohol.

But what is "harmless" about the cases like Powelson documents. They exist. Even if some people are more severely affected than others, there is apparently no way to determine who is likely to be mentally and physically impaired and who isn't. Why should the government, through legalization, encourage anyone to take such a chance? And just because alcohol [illegible] doesn't mean that society should approve the abuse of another drug. To the contrary, the alcohol problem should make society determined that additional abuses must be prevented as much as possible. Making marijuana easier to get and smoke would be a major cop-out.

Powelson's change of heart and mind underlines the danger.

[From the Boston Evening Globe, May 16, 1974]

Press, TV Accused of Pro-Pot Bias

Washington.—The United States is in the midst of a marijuana and hashish epidemic, but the media have reacted by blacking out news of evidence that might be adverse to legalizing the drugs, Sen. Edward J. Gurney said today.

In a statement prepared for delivery to a Senate Panel's headings on the dangers of marijuana, the Florida Republican said that based in the amount of seizures, it is estimated that Americans consumed 7.82 million pounds of marijuane and 265,000 pounds of hashish last year.

"These are truly staggering figures—figures which suggest that the United States may today be caught up in the worst cannabis epidemic in history," Gurney said.

Gurney said he is convinced from evidence he has seen that "our media have observed a near total blackout on news or scientific evidence that might be considered inimical to the cause of legalizing marijuana."

In testimony last Thursday before the Senate internal security subcommittee Dr. Henry Brill, one of the senior psychiatric members of the President's Commission on Marijuana and Drug Abuse, said the media seized on passages in the report which suggested a tolerant attitude—"and ignored a number of strongly worded passages warning against the dangers of marijuana," Gurney said.

He added that many television talk programs and news panel shows "have run literally scores of discussions on marijuana, featuring pro-marijuana authors . . ." But he said letters which accompanied a book critical of marijuana and written by "a highly distinguished scientist" were not acknowledged by the television stations.

The senator added that "The New York Times book review section had favorably reviewed some half-dozen books on marijuana . . . the same book was ignored. When six or seven Columbia University scientists who thought the book had merit wrote individually to The New York Times urging that the book be reviewed; their letters were not accorded the courtesy of a routine acknowledgement."

[From the St. Paul (Minn.) Pioneer Press, May 21, 1974]

Result of Smoking Grass Compared to Radiation

Washington.—Marijuana smoking can have the same result as radiation poisoning and some of the blame for leading people to think it's harmless lies with the federal government, a Senate panel was told Monday.

Appearing before the Senate Internal Security subcommittee, Dr. Hardin Jones, a professor of medical physics and physiology at the University of California, said the United States is in a marijuana epidemic caused by a propaganda campaign "involving a small but influential number of academic propagandists, the media, the entertainment industry and the new left."

Jones said efforts to use marijuana at a moderate level or to legalize it "have prevented sensible acts to reduce use of this drug . . . we find no 'safe' level of the use of cannabis."

Smoking marijuana affects the body the same way radiation does, Jones said.

"As an expert in human radiation effect . . . chromosome damage . . . even in thos who use cannabis 'moderately,' is roughl the same type and degree of damage as i persons surviving atom bombing with a heavy level of radiation exposure (approxi mately 150 roentgens). The implications ar the same," he said.

As for misformation about marijuana Jones said the federal government, throug its agencies, "has been one of the worst offenders in spreading the impression that cannabis is a harmless drug.

"Reports of the Department of Health, Education and Welfare are inadequate scientifically, do not touch accurately on the principal matters needing clarification and, in many instances, are likely to lead the public to believe that science has proven marijuana harmless," Jones said.

Jones also said the networks have given so much time to people like LSD advocate Timothy Leary that if the equal time principle were invoked, "some hundreds of hours, at least, to scientists" who have found marijuana harmful would be required for broadcast.

"In placing their facilities at the disposal of this one-sided propaganda campaign, they may have succeeded in brainwashing themselves, in addition to the brainwashing of a substantial portion of the American public.

"At least one cannot escape the impression that many people in the media now seem to have convinced themselves that marijuana is perfectly safe and that the public interest demands its legalization," Jones told the panel.

[From the Jacksonville (Fla.) Times-Union, May 23, 1974]

Marijuana and the Atom Bomb

The horrors of possible genetic mutations resulting from atomic fallout have been widely accepted and rightly so.

At the same time, marijuana has been pushed in many quarters as a pleasant relaxant that should be legalized.

What do the two things have in common?

Plenty, if the testimony of Dr. Hardin B. Jones, a professor of medical physics and physiology at the University of California, is to be believed.

Dr. Jones told the Internal Security subcommittee of the United States Senate:

"As an expert in human radiation effects . . . chromosome damage . . . even in those who use cannabis (marijuana) 'moderately,' is roughly the same type and degree of damage as in persons surviving atom bombing with a heavy level of radiation exposure—approximately 150 roentgens. The implications are the same."

We don't know whether Dr. Jones is a conservative or a liberal in his political views and it should not matter. Scientific research, not ideologies, should be the determinant as to whether marijuana is harmless or dangerous.

Unfortunately, much of the debate so far has been ideological rather than scientific.

That is a ridiculous situation but ridiculous situations are commonplace these days.

The push to make marijuana socially and legally acceptable has come from some very high places and some of these voices have told many people, mostly young people, exactly what they want to hear.

This is true to the extent that evidence indicates that enough marijuana or hashish for five billion "joints" entered the United States last year.

What kind of responsibility do the marijuana "pushers"—both those who sell and those who advocate its use—bear if Dr. Jones or Dr. Olav Braenden, director of the United Nations Narcotic Laboratory in Geneva, Switzerland, are right?

Dr. Braenden's report indicates from research that "cannabis accumulates in the brains and gonads in the manner of DDT, that it produces fetal deformities in animals, in addition to abortions and stillbirths in a manner that resembles the damage done by thalidomide. . . .

"That it results in breakage and serious damage to human chromosomes, and that it seriously reduces the body's ability to produce DNA, a critical component of all cells, including reproductive cells. . . ."

If this is true, what will be the effect of marijuana on a generation yet unborn? How can it be justified on any moral, social or ethical basis?

Public outcry, based on much thinner evidence than is piling up against marijuana has relegated several substances or products into a virtual leper colony status.

Unless the scientific testimony can be refuted by believable scientific research, the case against marijuana calls for a verdict of guilty and a change in the climate of thought that regards it as merely a pleasant relaxant.

Such a change in attitude is needed to counter what Dr. Jones describes as efforts to use marijuana at a moderate level or legalize it. These efforts, he says, "have prevented sensible acts to reduce use of this drug . . . we find no 'safe' level use of cannabis."

His testimony won't make a popular man on campus and it is more believable for this reason. He is risking the treatment accorded others who have debunked some of the modern myths that have become dogma in some academic circles.

What a frightening prospect to have all the radiation monitoring equipment and worldwide efforts to curb atomic fallout only to have the same effects from the already epidemic use of marijuana.

[From the Florida Times-Union, Jan. 9, 1974]

"Pot" Accumulates—Like DDT

A striking reminder that the public fight against drug abuse is a continuous battle comes in a report recently released by the U.S. Senate Internal Security subcommittee.

In the words of Chairman James Eastland, D-Miss., "We have been concentrating on the heroin epidemic for the past two years, and there seems to be some solid evidence of progress. . . .

"But it is impossible to escape the conclusion that, while our attention was focused on heroin, there has been a runaway escalation of the use of other drugs, primarily marijuana and hashish (milder and stronger forms, respectively, of cannabis). . . ."

For perspective, it should first be recognized that throwing the nation's major attention against heroin, instead of milder drugs, was no oversight, but a soundly reasoned decision. Heroin kills; heroin destroys lives; the need of heroin addicts to support a $150 or so a day "habit" has driven many—daily—into the streets to steal and rob and kill.

It would, indeed, have been a distorted sense of priorities which did not attack the greatest evil first.

And there is evidence that the massive effort is paying off: as early as a year ago Dr. Robert Dupont, chief of the Washington Narcotics Treatment Administration, termed heroin addiction "more than cut in half" in the nation's capital; Dr. Jerome Jaffe, head of the Federal Special Action Office for Drug Abuse Prevention, told a congressional subcommittee that heroin addiction was "leveling off;" and John Ingersoll, director of the U.S. Bureau of Narcotics and Dangerous Drugs stated that a "turning point" seemed to have been reached in the battle against "H."

But, without any thought to diminishing the efforts which have curtailed the greater drug abuse, there indeed seems urgency to turn to the lesser, though still pronounced, evil.

Evidence indicates that more than five billion marijuana and hashish "joints" (or 20 for every man, woman and child in the country) entered the U.S. last year.

"The pandemic use of marijuana and hashish has been brought about, in part," Eastland said, "by a militant pro-marijuana propaganda campaign conducted by many New Left organizations and by the entire underground press . . .

"And it has been stimulated perhaps in major degree, by a number of highly publicized reports, written by persons (many entirely well meaning) who did not have available to them, at the time, most of the highly significant scientific research conducted over the past few years that puts a danger sign on cannabis use. . . ."

Among the most recent reports cited by Sen. Eastland was one by Dr. Olav Braenden, director of the United Nations Narcotics Laboratory in Geneva, which "points strongly to the conclusion that marijuana may be even more dangerous than had previously been believed. . . .

"(Researchers have found that) cannabis accumulates in the brains and gonads in the manner of DDT, that it produces fetal deformities in animals, in addition to abortions and stillbirths, in a manner that resembles the damage done by thalidomide . . .

"That it results in breakage and serious damage to human chromosomes, and that it seriously reduces the body's ability to produce DNA, a critical component of all cells including the reproductive cells. . . ."

The subcommittee's report should receive priority attention from the full Congress, and, even more important, from the public, when the new session begins Jan. 21.

The prevalent impression that "pot" is harmless—"people smoke it every day and it doesn't bother them"—is increasingly being contradicted by many studies (of which the UN report is only the latest) which show persuasive evidence of serious, long-range effects. It is a matter too important to remain clouded, confused.

[From the Washington Post, June 24, 1974]

New Findings Show Harm—Views on Marijuana Shifting

(By Robert Joffee)

Los Angeles.—Marijuana may turn out to be more harmful than many scientists had previously thought.

Only a year ago most researchers studying the drug thought it probably was relatively harmless—at least when compared with alcohol and other commonly abused drugs.

Since then, however, new findings have raised the possibility that long-term use of "grass" might be linked to damaged chromosomes, lower production of sex hormones, and greater vulnerability to diseases.

The new findings are preliminary and as yet unsubstantiated, but they have appeared in prestigious scientific and medical journals—publications which previously paid scant attention to the perils of "pot."

The findings are significant politically as well. At a time when respectable voices are calling for laws making personal possession and use of the drug a misdemeanor or no crime at all instead of a felony, the findings already have provided ammunition for those who oppose such moves.

Last week the Illinois Bar Association passed a resolution urging repeal of all laws banning personal possession and use. IBA President William P. Sutter explained, "We aren't endorsing its use; we are recognizing that the majority of medical opinion is that casual use is not harmful . . ." Critics can now argue that medical opinion may be changing, though many researchers still favor removal of criminal penalties for marijuana use despite the new findings.

About $4 million in federal grants and contracts insure that the research will continue during the coming fiscal year.

"I couldn't give a hoot about social policy," says Dr. Morton A. Stenchever, an obstetrician at the University of Utah Medical Center in Salt Lake City, "but I'll have to say there are quite a few problems with marijuana."

He compared chromosome damage in a group of 49 marijuana users to that in a control group of nonusers. His findings, published last January in the Journal of Obstetrics and Gynecology, were that users averaged 3.4 chromosome breaks per 100 white blood cells while non-users averaged only 1.2 breaks.

Dr. Stenchever explained that increased chromosome breaks might raise the likelihood of eventually getting cancer or becoming the parent of a child with birth defects.

Dr. Akira Morishima of the Department of Pediatrics, Columbia University, N.Y., has reported findings similar to Stenchever's.

The Stenchever and Morishima findings led the National Institute on Drug Abuse (NIDA)—the federal agency which bankrolls much of the nation's marijuana research—to fund several projects in which other researchers will attempt to reproduce the Stenchever and Morishima research processes to determine whether similar findings can be obtained.

Controversy over the findings persists. "Genetic damage is an extremely nebulous field," said Dr. Lissy Jarvik, a pediatrician-psychiatrist doing genetic research at the University of California Medical Center in Los Angeles.

"I don't see how Stenchever's work can be replicated," she said. "He's had some 50 students on a number of drugs, and marijuana was simply the only drug they had in common." She contended that Dr. Morishima's work would be easier to recreate.

Dr. Jarvik pointed out that "the body has repair mechanisms. Depending on the type of break, chromosome damage may have no effect. Also, cells in which breaks have occurred may die; and then again, there's no harm."

The danger, she said, is that cells with abnormal chromosomes might multiply and produce identical, also damaged, cells. "Then, in 10 or 15 years, such cells might be responsible for causing cancer."

"Whenever I present data I'm immediately attacked by the other side," Dr. Stenchever retorts. "Maybe she didn't read my article." He insists the increase in breakage alone is enough to cause serious concern, and he notes that half the drug users he studied took no other drugs except alcohol.

The Utah researcher noted that, when it comes to chromosome breaks, other widely used drugs are probably as dangerous as marijuana. "I think the same rate of breakage probably occurred in Valium," he said. Valium, a tranquilizer, is one of the most common prescription drugs in the country.

Few researchers are more cautious about the implications of their findings than Dr. Robert C. Kolodny, director of the infertility program at the Reproductive Biology Research Foundation in St. Louis. He has been checking levels of testosterone, the principal male sex hormone, in marijuana.

Dr. Kolodny, 30, has been working with Dr. William Masters, famed for his pioneer research in human sexual response, and Drs. Robert Kolodner and Gelson Toro.

In a recent article in the New England Journal of Medicine, Dr. Kolodny told how his group compared 20 men who used marijuana four days a week for a minimum of 6 months with 20 men who were non-users; testosterone levels in the users averaged a striking 40 per cent lower than in non-users.

Dr. Kolodny speculated—and he stresses the word "speculate"—that "there may be a decrease in fertility as a result of chronic, intensive marijuana use"; that heavy users may encounter potency problems; that pregnant female users "may disrupt sexual differentiation in male fetuses" during the second, third and fourth month of pregnancy; and that preteenage boys who smoke marijuana "may somehow disrupt completion of puberty," impairing normal sexual development.

He noted that his study has not yet been replicated. "So what you're dealing with is speculation based on preliminary findings."

Other researchers praised Dr. Kolodny's objectivity; and some said they believe his work is more important—and more frightening—than even he thinks it is.

Others noted that the exact function of testosterone is not completely understood, and thus the effect of the shortage is unpredictable.

Dr. Kolodny is beginning to receive testosterone samples from other laboratories throughout the country.

Even fellow researchers who respect his work call Dr. Gabriel Nahas a "crusader" against decriminalization. Others call him "a fanatic." Almost all agree, however, that efforts to duplicate the Columbia University pharmacologist's research should be made as soon as possible.

Dr. Nahas, who announced his findings at a highly publicized press conference two weeks before they appeared in Science magazine last February, studied white blood cell production in 51 marijuana users. All the subjects reported having smoked at least three times a week for four or more years.

He found that cell production in users averaged 40 per cent less than in a control group of nonusers.

Since white blood cell production is considered vital to the body's ability to fight disease, he speculates that marijuana use impairs the immunity system.

The Nahas findings are viewed as significant because they show exactly the same low level of production in white cells taken from users that he found in cells taken from nonusers and subsequently exposed to a marijuana agent in the test tube.

"We'd all be surprised if Nahas' findings are replicated," said UCLA's Dr. Jarvik. "I've spoken with a number of people in immunology and they're all extremely skeptical."

Sources at NIDA, which is funding attempts to replicate the immunity-system research, said two papers prepared for publication this summer confirm the Nahas findings while a third, using different techniques fails to do so.

Drs. Stenchever, Morishima, Kolodny and Nahas all learned about the drug-use background of their test subjects through interviews with them. Critics argue, with some justification, that interview data are not sufficiently reliable.

Ideally, say the critics, a test subject should be confined to"a closely supervised hospital ward where researchers can make certain that he is under the influence only of the drug being tested—and feeling only the effect of a prescribed dose.

Until recently, prescribed doses of marijuana were unavailable—and street doses varied enormously from cigarette to cigarette.

But now, because pharmacologists have isolated tetrahydrocannabinol (THC), the main intoxicating agent in marijuana, researchers can choose from a pot smoker's pipe dream of doses. The government provides low-, medium-, and high-dose cigarettes—and even cigarettes with no dose at all. In addition, researchers can obtain THC pills, so that marijuana can be administered orally.

Long-term controlled-dosage research is expensive, because hospital beds and supervising nurses are expensive. But such research is said to be especially rewarding for detailed study of the psychological aspects of the drug.

A bearded young man named Craig sat smoking a "joint" in a dimly lit room filled with stereophonic rock and roll. A nurse sat beside him to make sure he smoked the whole cigarette.

The smoking room was on the third floor of UCLA's Neuro-Psychiatric Institute (NPI)—and except for occasional supervised excursions to movie theaters and restaurants, Craig had been on that floor for almost 90 days, receiving $25 a day for his work.

That work involves submitting to, and participating in, a daily battery of tests: being wired to brain-wave machines, pressing buttons when images appear on a screen, answering questions in almost incessant interviews, and taking written tests not unlike school admission exams.

Would Craig continue smoking after his release? "Yeah, probably," he said, "but if anyone tries to take my pulse or ask how high I am, I'll kick 'em."

Dr. Sidney Cohen, a psychiatrist, and Phyllis Lessin, an anthropologist, supervise the NPI study.

"We've pretty well disproved the old notion that marijuana produces a 'reverse tolerance,'" Lessin said. Reverse tolerance is a technical term for the old pot smoker's notion that it takes less and less marijuana for an experienced user to get high. Dr. Cohen said NPI researches have found that the drug produces real tolerance, that one becomes inured to the effects of the same dosage if it is received day after day.

Lessin said NPI researchers also had disproved other myths about the drug. "We're learning that in many ways, it's a drug just like other drugs," she said.

Dr. Cohen provided two examples: "A lot of cops believe grass dilates the pupils of the eye; when, in fact, if a suspect's pupils are dilated, it's probably because of anxiety. As for the notion that pot excites sexual desire, well, we found that—like alcohol—it's sexually debilitating."

NPI researchers were not seeking the therapeutic applications for marijuana, Dr. Cohen said, but two therapeutic possibilities were discovered there because specialists from the enormous UCLA medical center next door also ran tests on NPI subjects.

For example, eye specialists discovered that marijuana reduces pressure within the eyeball, and thus might prove to be effective in treating glaucoma—a condition of excess pressure inside the eye which often afflicts older people. "The standard drugs for treating glaucoma don't help some people, but maybe THC will," Dr. Cohen explained.

Lessin said she occasionally goes over to the Jules Stein Eye Institute to help administer tests to middleaged glaucoma victims. "In other words, I have to teach them how to smoke pot," she said.

And while marijuana fails to dilate pupils, it does dilate bronchial tubes. "Asthma victims suffer from constricted bronchials," Dr. Cohen said. "It's possible THC will prove to be a useful supplemental drug for them, too." He said doctors at the medical center already are working to develop an experimental THC aerosol can.

Of course, the problem with THC as a therapeutic drug is its side effect—the high. Dr. Cohen said pharmacologists are hoping to isolate other cannabinoids which are not intoxicating because they may prove to have the same therapeutic effect.

At the Langley-Porter Institute (LPI) in San Francisco, another University of California facility, one strong joint a day is considered an extremely low dose. Test subjects there receive the equivalent of a pack of such cigarettes each day.

"Of course we administer it orally," said Dr. Reese Jones, a psychiatrist who has conducted marijuana research at LPI for more than five years. "Our subjects would be hoarse if they had to take that dose in smoke."

Dr. Jones' subjects—like their counterparts in Los Angeles—are confined to a psychiatric ward where they undergo constant testing. "We've been learning that little doses do one thing and big doses another," Dr. Jones said, stressing that big doses have much stronger physical effects.

"Our subjects are pretty sedated when they first get started on the high dose," he said. "Then, after six or seven days, what looks like a tolerance develops, and they become more alert and active, both psychologically and physically. You could say they return to normal.

"After two or three weeks, we substitute a placebo (a pill with no TCH); and suddenly the subjects become irritable and restless, and have trouble sleeping. They are probably suffering the symptoms of withdrawal from a physical dependence."

At such high doses, not presently available to ordinary users in this country, Dr. Jones is convinced THC closely resembles "sedatives—hypnotic-type drugs like alcohol and phenobarbital."

The "good news," he said, is that test subjects tolerate high doses "extremely well." But the "bad news" is the similarity between THC and "drugs that cause serious problems for some people in our society who use them."

Unless U.S. customs agents can prevent increasing importation of hashish and hashish oil (concentrated marijuana derivatives), Dr. Jones said he fears this country may face an epidemic of heavy-dosage use not unlike that in his laboratory.

About 40 miles south of San Francisco, at the Veterans Administration Research Hospital in Palo Alto, Dr. Leo Hollister, a pharmacologist, began some of the first U.S. government-sponsored marijuana research on human test subjects almost seven years ago.

Today he and psychiatrist Jared Tinklenberg are comparing the effects of single, normal doses of marijuana with similar doses of other drugs.

"The social aspects of this drug have been described ad nauseum," Dr. Hollister remarked. "When it comes to short-term effects, I don't think we've learned anything really significant in the last couple years.

"Now the issue that remains to be settled is how the drug achieves its effects."

The two men observed that marijuana seems to disrupt the transfer of information in the brain from short-term to long-term memory so that information acquired while under its influence is forgotten more easily than if it were acquired sober.

"It's possible that marijuana allows the brain to be flooded with irrelevant information," Dr. Tinkleberg speculates. "The subject then fails to distinguish between important and unimportant facts.

"Now we're trying to see if marijuana shares this quality with alcohol."

Feb.6,1984

Editor
Ketchikan Daily News
501 Dock Street
Ketchikan, Alaska 99901

Dear Sir,

It was with great interest and agreement that I read the editorial from the Anchorage Times printed in your Feb.3rd edition entitled "An embarrasment". His conclusion bears repeating: "Elimination of hallucinatory drugs in the world is a commendable goal for mankind. Americans everywhere, including Alaska, can be proud of the role of their government in that effort. The revelation that this state is undermining the program is shameful and should shock its people."

It is Alaska's liberal marijuana laws that are responsible for his editorial and I couldn't agree more. Having grown up on the East Coast in an affluent community in New Jersey I had lots going for me materially. My experience with drug abuse started with occasional sips of someone's drink or sneaking a beer out of our fridge to drink in the woods behind our house. This started at about age 10 but by age 12 it wasn't occasional anymore and I found that I liked the feeling alcohol induced better than anything else.

My abuse of alcohol brought me into conflict with my family and the law. I spent 5 years, from 13 to 18 years of age, on probation and my junior and senior year of high school spending an hour per week at a court appointed psychiatrist's office. After graduation I was drafted into the Army the same year, and in 1966 that meant going to Viet Nam. My problem with alcohol was so bad by that time that I never even completed basic training and 11 months after my induction I was back on the streets with an Undesirable Discharge and a criminal record as an adult.

1968 was the year I remember for my introduction to drugs. When I returned home, the whole atmosphere of partying had shifted from alcohol to marijuana, hash, LSD, various other prescription medicines for ups or downs, and in a few cases herion. I tried most of these and marijuana became a regular part of my life at that time. I am fully aware of the effect that drugs had on my life and also of that these were all considered illegal there and then. There is no way that anyone can say that marijuana should be thought of as being in the same category as alcohol.

In the early seventies marijuana research was in its infancy and testing was limited to low-grade pot under short-term exposure. Many of my friends served in Viet Nam and quite a few came back with drug habits which led them to self-destructive experiments in their search for greater highs. Today there are strains of marijuana that contain more than 10 times the stupifying agent delta-9-THC than that used in those first tests. If that is what the kids today are starting with it's sure to be that much more damaging for those who fall victim to dependence on it. Just because there are some who seem to be able to handle occasional "recreational" use, don't kid yourself about the fact that there are inescapable physical and psychological effects.

Research has shown marijuana to be a complex substance with definite harmful effects, especially for adolescents. It's time that the people and their representatives take a close look at the facts and then get in step with the rest of the world.

Sincerely Yours,

Bob Konet

Bob Konet, P.O. Box 1021, Ward Cove, Alaska 99928

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From Other Editors

An embarrassment

The effect of Alaska's liberal marijuana laws is reverberating outside the state's borders and, indeed, around the world, according to a U.S. State Department specialist in international narcotics traffic.

During a visit here, the assistant secretary of state said the permissive attitude in Alaska is impeding federal programs in foreign countries. Other nations ask whether the United States seeks to protect its own growers from foreign competition.

It is understandable that American diplomats squirm when it is asked. Perhaps Alaskans should squirm, too.

Nine years ago, marijuana made headlines in Alaska. A group of young, liberal legislators in 1975 pushed through a bill to decriminalize marijuana because, they said, it reflected the times, it was the "thing to do." The only controls left were civil penalties that had the force of a feather in a windstorm.

The Supreme Court went even further when it ruled that possession of marijuana in a person's home for personal use was legal.

The court said, "The state cannot impose its own notions of morality, propriety or fashion on individuals when the public has no legitimate interest in the affairs of those individuals."

We said then—and we haven't changed our mind—that the state does, indeed, have an interest in what goes on in the privacy of a home, such as child abuse and health standards and anything else that has an effect upon society at large.

Last week's visitor said the Alaska tolerance of marijunana is undermining worldwide efforts to stop illicit drug production in other countries. The Alaska law allows an individual to raise up to four ounces for personal use. The U.S. is trying to convince growers in other nations to spray their fields with chemicals to kill the plant.

Elimination of hallucinatory drugs in the world is a commendable goal for mankind. Americans everywhere, including Alaska, can be proud of the role of their government in that effort.

The revelation that this state is undermining the program is shameful and should shock its people.

—Anchorage Times

FISCAL NOTE

Revision Date: April 19, 1984

REQUEST

Bill/Resolution No.: HB 698
Title: "An Act relating to marijuana..."
Sponsor: House Judiciary
Requestor:
Date of Request:

FISCAL DETAIL

Agency Affected: Department of Law
Program Category Affected: Administration of Justice
BRU, Program or Subprogram(s) Affected: Prosecution

EXPENDITURES/REVENUES: (Thousands of Dollars)

	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89
OPERATING						
100 PERSONAL SERVICES		142.9	151.5	160.6	170.2	180.4
200 TRAVEL		6.5	6.9	7.3	7.7	8.2
300 CONTRACTUAL		61.5	63.8	41.2	43.7	46.3
400 SUPPLIES		17.4	12.1	12.8	13.6	14.4
500 EQUIPMENT		7.5				
600 LAND & STRUCTURES						
700 GRANTS, CLAIMS						
800 MISCELLANEOUS						
TOTAL OPERATING		235.8	234.3	221.9	235.2	249.3
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND		235.8	234.3	221.9	235.2	249.3
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME		1	1	1	1	1
PART-TIME		4	4	4	4	4
TEMPORARY						

SOURCE OF FUNDS TO OFFSET FISCAL IMPACT OF BILL:

ANALYSIS: Attach a separate page for analysis

Prepared By: Richard I. Pegues / Director — Phone: 465-3672
Division: Administrative Services — Date: 4/19/84

Approved by Commissioner: Richard L. Pegues for Norman C. Gorsuch — Date: 4/19/84
Agency: Department of Law

Distribution (by Agency preparing fiscal note):
- Legislative Finance
- Legislative Sponsor
- Requestor
- Office of Management and Budget
- Impacted Agency(ies)

12/1/83

Fiscal Note
Analysis
HB 698

April 19, 1984

HB 698 is a blanket provision which would make possession or use of less than one-half pound of marijuana by anyone a class B misdemeanor. Some of the conduct which this bill would cover (such as use or display of any amount in a public place, possession of any amount while operating a motor vehicle, or possession of more than four ounces of marijuana anywhere) is a class B misdemeanor under existing law. See AS 11.71.060. Some of the conduct which this bill would make a crime (such as delivery of less than one-half ounce or possession of less than one ounce in public) is classified under current law as a "violation", punishable by a fine. See AS 11.71.070. The penalties under current law for other conduct such as delivery of one-half ounce or more, delivery to a minor, or possession of any amount on school grounds would not be altered. Penalties under existing law for these offenses range from A misdemeanor to B felony level. See AS 11.71.030, .040, and .050.

The passage of HB 698 would have fiscal impact on the Department of Law in three general areas: (1) the cost of defending the new law against constitutional challenge; (2) the cost of processing the resulting additional criminal cases; and (3) the cost of educating the public about the new law. These three areas are discussed separately below.

1. Defending the New Law

In 1975 the Alaska Supreme Court in the case of Ravin v. State, 537 P.2d 497 (Alaska 1975), ruled that under Art. I, Sec. 22 of the Alaska Constitution the state could not prohibit possession of marijuana by adults in their own homes for personal use. The court held that the state had not demonstrated the existence of a legitimate state interest which was strong enough to justify the regulation of this conduct.

Since passage of HB 698 would make it a crime for an adult to possess any amount of marijuana anywhere, including in his or her own home, the constitutionality of the new law is certain to be challenged. An appellate court will have to decide whether the state has proved that there is a "compelling state interest" in the prohibition of the use of marijuana which is sufficient to outweigh an individual's right to privacy under the state constitution. It is extremely important, therefore, that the legislature's consideration of this bill include extensive public hearings, debate on the social policy merits of the proposal, and the collection of the results of the most recent scientific, medical, and pharmacological studies regarding the physical, emotional, and social effects of marijuana usage.

In addition to the necessary legislative hearings, evidentiary hearings at the trial court level can be expected when a challenge to the new law is filed. Challenges to the new law will most likely arise in the context of a defendant's pretrial motion to dismiss a criminal prosecution. When responding to such a defense motion, the prosecutor would, in essence, have to convince a court to reverse the ruling in the Ravin case. In order to demonstrate that the result in Ravin is no longer correct, the prosecutor would have to present convincing, scientifically accurate, evidence that the effects of marijuana usage are so injurious to a person's mental and physical health as to justify the legislative decision to totally prohibit use of marijuana by anyone at any time (as opposed to use by minors or use by a person who is operating a motor vehicle--both of which are already prohibited under current law).

The presentation of this convincing evidence will require the prosecution to present expert testimony from authorities who have conducted recent research in this area. Out-of-state witnesses in medical and scientific fields charge a fee for their services. These fees will vary from individual to indivudal, but are expected to average at least $100 per hour. This would include services for consultation, witness preparation and actual testimony. Costs will be incurred for expert witness

transportation, food and lodging, and other incidental expenses. Additionally, there will be some costs for preparation of exhibits and written reports. To the extent possible, the Department of Law would attempt to present written testimony in situations where it is not feasible to fly a person to Alaska to testify in person. We estimate that a minimum of six expert witnesses will be required to attempt to successfully defend the new law at the trial court level.

Hearings at the trial court level can reasonably be expected to take several days. A substantial commitment of attorney time will be required for scientific and legal research in preparation for the hearings, actual court time, legal briefing, and the preparation of proposed findings of fact. Since prosecutions under the new law will occur statewide, defense challenges may be raised at the same time in different parts of the state. The extensive hearings described above may have to be held in more than one judicial district in the state.

Regardless of which side prevails at the trial court level, the lower court ruling would almost certainly be followed by an appeal. At a minimum, such an appeal (or appeals) would required additional legal research, a thorough review of the record, the drafting of briefs, and oral argument before the

appellate court. Although these appeals would present an increased workload for the criminal division attorneys assigned to appellate work, no additional funding is requested for this aspect of HB 698's fiscal impact.

2. New Criminal Cases

Although some of the conduct included within the scope of HB 698 is already against the law, much behavior which is now classified as a "violation" or which is not now an offense of any sort will become a misdemeanor crime. It is difficult to accurately predict in advance the impact which the passage of HB 698 will have on the criminal justice system.

Some law enforcement officers who work primarily in the drug enforcement area believe that the new law could potentially result in "thousands" of new misdemeanor cases a year. They believe that the bill would cause an increased enforcement effort both in the areas not now covered by existing law and against persons who commit minor offenses which are already against the law. A great number of the new cases would arise from situations where law enforcement officers now commonly discover small amounts of marijuana (as when an officer responds to a domestic disturbance call and sees some marijuana plants in a person's

home, or when a person is arrested for a minor offense and a routine search for weapons reveals some marijuana cigarettes in the person's pocket, for example). Incidents of this sort occur frequently now, but do not generally result in any criminal prosecution for the marijuana possession. Many of these cases are likely to be referred for criminal prosecution if HB 698 becomes law.

Prosecutors generally predict a lesser number of new potential criminal cases under HB 698 than do police. Once the public becomes aware of the new law, people are likely to be more careful about not allowing marijuana or smoking paraphernalia to be exposed in plain view in their homes, for example. Judging from the number of minor marijuana offenses prosecuted prior to the Ravin decision in 1975 prosecutors expect a "few hundred" new criminal cases a year.

Cases which are accepted for prosecution will require attorney time both at trial and in preparation for trial (i.e., preparation of search warrants, response to defense motions, evaluation of results of laboratory analysis, pretrial witness preparation, etc.). To handle screening of the expected case referrals, and to prosecute the additional cases, the criminal division will require the addition of at least one Attorney III

position. It is anticipated that this additional position will be used to add one half-time attorney in both the Anchorage and Fairbanks District Attorney's offices.

It is anticipated that a large percentage (perhaps 50-75%) of the defendants in the new cases will be first time offenders who will be eligible for pretrial diversion. Given the light sentences which these persons are likely to receive if convicted, pretrial diversion (including required community work service) appears to be a well justified use of criminal justice system resources. Even if a case is diverted however, attorney time is required to screen the case and make the diversion arrangements. New pretrial diversion personnel will be needed to supervise the new cases. Existing pretrial diversion offices are now working at full capacity. The addition of hundreds of new cases to an already full caseload will require, at a minimum, the addition of two new full-time positions. This fiscal note therefore includes funding for a paralegal II position for the Anchorage office. (This person would also be responsible for new cases in Palmer.) Funding of one additional community counselor is also required. This position will be divided into two half-time positions, one assigned to the Northern region (Fairbanks), and one in the Southeast region.

3. Public Education

In order to inform the public of the changes in the law, the Departmen. of Law will develop and disseminate public notices explaining the new law. These notices will include newspaper ads and brochures, and will be modeled upon the public education not.ces which were distributed statewide in connection with the new drug law in 1982 and the new DWI and drinking age laws in 1983. Based upon experience with these earlier notices, approximately $15,000 will be needed to cover the costs of writing, layout, typesetting, publication, and distribution.

In addition to the costs explained above, it is anticipated that the passage of this bill will result in increased costs to other components of the criminal justice system, including law enforcement, the courts, the public defender agency, and corrections.

4/19/84

Fiscal Analysis
HB 698

1. Defending the New Law

Admin. & Support Component/Prosc. - BRU

Object	Total
Contractual Services - Professional fees scientific experts 120 hrs. X $100 = $12,000	$12,000
Experts' staff support, preparation of exhibits, written testimony 50 hrs. X $40 = $2,000	2,000
Experts' travel to attend hearings and offer testimony 6 trips X 4 days X $80 = $1,920 subsistence	1,920
6 trips X $1,500 = $9,000 travel	9,000
	$24,920

This amount will be required for both FY 85 and FY 86, to cover both trials and appeals.

2. New Criminal Cases

Third Judicial District - Anchorage

	Atty. III (PPT)	Total
Personal Services	30.0	30.0
Travel - Witness travel subsistence, atty. travel	1.5	1.5
Contractual Services		
office commo. equip. repairs	2.4	2.4
copy - postage	1.2	1.2
		3.6
Commodities - Ongoing		
office consumables	1.8	1.8
Law library	1.2	1.2
Commodities - one time		
New position materials	1.2	1.2
		4.2
Equipment - one time		
New position equipment	1.5	1.5
		40.8

Fourth Judicial District - Fairbanks

	Atty. III (PPT)	Total
Personal Services	34.1	34.1
Travel - Witness travel subsistence, Atty. travel	1.5	1.5
Contractual Services		
office commo., equip. repair	2.4	2.4
copy - postage	1.2	1.2
		3.6
Commodities - Ongoing		
office consumables	1.8	1.8
Law library	1.2	1.2
Commodities - one time		
New position materials	1.2	1.2
		4.2
Equipment - one time		
New position equipment	1.5	1.5
		44.9

Pretrial Diversion

	Paralegal Asst. ANC-PFT	Comm. Couns. FAI-PPT	Comm. Couns. JNU-PPT	Total
Personal Services	40.6	20.3	17.9	78.8
Travel - Staff travel/subsistence to outlying areas	1.5	1.0	1.0	3.5
Contractual Services				
Office commo./equip repair	4.8	2.4	2.4	9.6
copy - postage	2.4	1.2	1.2	4.8
				14.4
Commodities - Ongoing office consumables	1.8	1.8	1.8	5.4
Commodities - one time				
New position materials	1.2	1.2	1.2	3.6
				9.0
Equipment - one time	1.5	1.5	1.5	4.5
	53.8	29.4	27.0	110.2

3. Public Education

Admin. & Support Component/Prosc. BRU

Object		Total
Contractual Services - one time writing, layout, typesetting, publication and distribution of public notices and information brochures describing the changes in the law.	15.0	15.0
		15.0

Summary of Expenses

	Defending the new law	New Criminal Cases	Public Education	Total
Personal Services		142.9		142.9
Travel		6.5		6.5
Contractual	24.9	21.6	15.0	61.5
Commodities		17.4		17.4
Equipment		7.5		7.5
	24.9	195.9	15.0	235.8

Costs beyond FY 85 include a 6% inflation factor, less one-time items. The costs for defending the new law will occur in both FY 85 and FY 86 and they will be eliminated thereafter.

1.	POSITION TITLE ATTORNEY III				RANGE/STEP 22A	ORG. UNIT PX	FORM 12 PAGE/LINE	GOV.	APPROV.	DISA
2.	TYPE OF POSITION PPT	STAFF MONTHS 12	RP NUMBER	PCN NUMBER	BRU PRIORITY	LOCATION Anchorage	ELECTION DISTRICT 8	LEG.		
3.	CONTINUATION LEVEL		ADDITION							

	4. TYPE OF EXPENDITURE		AMOUNT
	1	2	3
	PERSONAL SERVICES		
5.	Salary 1,950 X 12	23,400	
6.	Benefits	3,838	
7.	Supplemental Benefits	1,434	
8.	Fixed Benefits	1,320	
9.	TOTAL PERSONAL SERVICES	01	29,992
0.	Travel	02	1,500
1.	Contractual	03	3,600
2.	Commodities	04	4,200
3.	Equipment	05	1,500
4.	Other		
15.	TOTAL COST		40,792

	RECEIPT CODE	FUNDING SOURCE		
16.		Federal Receipts	1002	
17.		G.F. Match	1003	
18.		General Funds	1004	40,792
19.		I-A Receipts	1005	
20.		Program Receipts	1020	
21.		Other		

FOR OMB USE ONLY
OMB KEY NUMBER __ __ - __ __ - __ __ - __ __ - __ __

JUSTIFICATION

This permanent part-time position is required to handle the influx of new cases that will result when marijuana violations, or any use of marijuana, which is not now a violation, become misdemeanor offenses. Prosecutors expect that at least a few hundred such offenses will occur each year as a result of the enactment of HB 698. This position will be responsible for prosecuting those new cases that are brought in the Third Judicial District. Because these new cases will be classed as misdemeanor offenses, allocation of the position to the Attorney III level is appropriate.

3 REQUEST FOR NEW POSITION

AGENCY DEPARTMENT OF LAW

PROGRAM DUE PROCESS

BRU PROSECUTION

THIRD JUDICIAL DISTRICT

FY.8

1.	POSITION TITLE ATTORNEY III				RANGE/STEP 22A	BARG. UNIT PX	FORM 12 PAGE/LINE	GOV.	APPROV.	DISAPP
2.	TYPE OF POSITION PPT	STAFF MONTHS 12	RP NUMBER	PCN NUMBER	BRU PRIORITY	LOCATION Fairbanks	ELECTION DISTRICT 16	LEG.		
3.	CONTINUATION LEVEL		ADDITION							

	TYPE OF EXPENDITURE		AMOUNT
	1	2	3
	PERSONAL SERVICES		
5.	Salary 2,232 X 12	26,784	
6.	Benefits	4,393	
7.	Supplemental Benefits	1,642	
8.	Fixed Benefits	1,320	
9.	TOTAL PERSONAL SERVICES	01	34,139
10.	Travel	02	1,500
11.	Contractual	03	3,600
12.	Commodities	04	4,200
13.	Equipment	05	1,500
14.	Other		
15.	TOTAL COST		44,939

	RECEIPT CODE	FUNDING SOURCE		
16.		Federal Receipts	1002	
17.		G.F. Match	1003	
18.		General Funds	1004	44,939
19.		I-A Receipts	1005	
20.		Program Receipts	1020	
21.		Other		

FOR D&H USE ONLY
4A KEY NUMBER __ __ - __ __ - __ __ - __ __ - __ __

JUSTIFICATION

This permanent part-time position is required to handle the influx of new cases that will result when marijuana violations, or any use of marijuana, which is not now a violation, become misdemeanor offenses. Prosecutors expect that at least a few hundred offenses will occur each year as a result of the enactment of HB 698. This position will be responsible for prosecuting those new cases that are brought in the Fourth Judicial District. Because these new cases will be classed as misdemeanor offenses, allocation of the position to the Attorney III level is appropriate.

13 REQUEST FOR NEW POSITION

AGENCY DEPARTMENT OF LAW

PROGRAM DUE PROCESS

BRU PROSECUTION

FOURTH JUDICIAL DISTRICT

Revised Date

FY 85

1.	POSITION TITLE: PARALEGAL ASSISTANT II				RANGE/STEP: 16A	BARG. UNIT: GGU	FORM 12 PAGE/LINE	GOV.	APPROV.	DISA
2.	TYPE OF POSITION: PFT	STAFF MONTHS: 12	RP NUMBER	PCN NUMBER	BRU PRIORITY	LOCATION: Anchorage	ELECTION DISTRICT: 8	LEG.		
3.	CONTINUATION LEVEL		ADDITION		JUSTIFICATION					

4.	TYPE OF EXPENDITURE		AMOUNT
	1	2	3
	PERSONAL SERVICES		
5.	Salary 2,573 X 12	30,876	
6.	Benefits	5,064	
7.	Supplemental Benefits	1,893	
8.	Fixed Benefits	2,736	
9.	TOTAL PERSONAL SERVICES	01	40,569
0.	Travel	02	1,500
1.	Contractual	03	7,200
2.	Commodities	04	3,000
3.	Equipment	05	1,500
4.	Other		
5.	TOTAL COST		53,769

	RECEIPT CODE	FUNDING SOURCE		
6.		Federal Receipts	1002	
7.		G.F. Match	1003	
8.		General Funds	1004	53,769
9.		I-A Receipts	1005	
0.		Program Receipts	1020	
1.		Other		

FOR OMB USE ONLY
4A KEY NUMBER ___ - ___ - ___ - ___ - ___

This full-time position is required to oversee community work service assignments for those misdemeanant offenders who are screened into the state's Pretrial Diversion Program. Because a large percentage of defendants in the new cases that will result from enactment of HB 698 will be first-time offenders, as many as 50% of these defendants may be eligible for pretrial diversion. This position will be responsible for providing pretrial diversion services in the Anchorage and Palmer area.

3 REQUEST FOR NEW POSITION

AGENCY DEPARTMENT OF LAW

PROGRAM DUE PROCESS

BRU PROSECUTION

PRETRIAL DIVERSION

Revised Date

FY 85

1.	POSITION TITLE COMMUNITY COUNSELOR			RANGE/STEP 14A	BARG. UNIT GGU	FORM 12 PAGE/LINE	GOV.	APPROV.	DISAP
2.	TYPE OF POSITION PPT	STAFF MONTHS 12	RP NUMBER	PCN NUMBER	BRU PRIORITY	LOCATION Juneau	ELECTION DISTRICT 4	LEG.		
3.	CONTINUATION LEVEL		ADDITION						

	TYPE OF EXPENDITURE		AMOUNT
	1	2	3
	PERSONAL SERVICES		
5.	Salary 1,121 X 12	13,452	
6.	Benefits	2,206	
7.	Supplemental Benefits	825	
8.	Fixed Benefits	1,368	
9.	TOTAL PERSONAL SERVICES	01	17,851
0.	Travel	02	1,000
1.	Contractual	03	3,600
2.	Commodities	04	3,000
3.	Equipment	05	1,500
4.	Other		
5.	TOTAL COST		26,951

	RECEIPT CODE	FUNDING SOURCE	
6.		Federal Receipts 1002	
7.		G.F. Match 1003	
8.		General Funds 1004	26,951
9.		I-A Receipts 1005	
0.		Program Receipts 1020	
1.		Other	

FOR O&M USE ONLY
4A KEY NUMBER __ __ - __ __ - __ __ - __ __ - __ __

JUSTIFICATION

This permanent part-time position is required to oversee community work service assignments for those misdemeanant offenders who are screened into the state's Pretrial Diversion Program. Because a large percentage of defendants in the new cases that will result from enactment of HB 698 will be first-time offenders, as many as 50% of these defendants may be eligible for pretrial diversion. This position will be responsible for providing pretrial diversion services in the Southeast Region, centered at Juneau.

3 REQUEST FOR NEW POSITION

AGENCY DEPARTMENT OF LAW

PROGRAM DUE PROCESS

BRU PROSECUTION

PRETRIAL DIVERSION

Revised Date

FY.85

1.	POSITION TITLE COMMUNITY COUNSELOR			RANGE/STEP 14A	DARG. UNIT GGU	FORM 12 PAGE/LINE	GOV.	APPROV.	DISA
2.	TYPE OF POSITION PPT	STAFF MONTHS 12	RP NUMBER	PCN NUMBER	ORU PRIORITY	LOCATION Fairbanks	ELECTION DISTRICT 16	LEG.		
3.	CONTINUATION LEVEL		ADDITION						

	TYPE OF EXPENDITURE		AMOUNT
	1	2	3
	PERSONAL SERVICES		
5.	Salary 1,287 X 12	15,444	
6.	Benefits	2,533	
7.	Supplemental Benefits	947	
8.	Fixed Benefits	1,368	
9.	TOTAL PERSONAL SERVICES 01		20,292
0.	Travel 02		1,000
1.	Contractual 03		3,600
2.	Commodities 04		3,000
3.	Equipment 05		1,500
4.	Other		
5.	TOTAL COST		29,392

	RECEIPT CODE	FUNDING SOURCE	
6.		Federal Receipts 1002	
7.		G.F. Match 1003	
8.		General Funds 1004	29,392
9.		I-A Receipts 1005	
0.		Program Receipts 1020	
1.		Other	

FOR D&N USE ONLY
4A KEY NUMBER __ __ - __ __ - __ __ - __ __ - __ __

JUSTIFICATION

This permanent part-time position is required to oversee community work service assignments for those misdemeanant offenders who are screened into the state's Pretrial Diversion Program. Because a large percentage of defendants in the new cases that will result from enactment of HB 698 will be first-time offenders, as many as 50% of these defendants may be eligible for pretrial diversion. This position will be responsible for providing pretrial diversion services in the Northern Region, centered at Fairbanks.

3 REQUEST FOR NEW POSITION

AGENCY DEPARTMENT OF LAW

PROGRAM DUE PROCESS

ORU PROSECUTION

PRETRIAL DIVERSION

Revised Date

FY.8

Other than hearing considerable testimony from witnesses including that of Dr. Reese T. Jones, Professor of Psychiatry, University of California, San Francisco and that of Dr. Gabriel G. Nahas, M.D., Ph. D., Professor of Anesthesiology, Columbia University, New York City,

the Committee also considered the report, "Marijuana and Health," by the Institute of Medicine, U. of California;

the books/or excerpts from them, "Keep Off the Grass" and "Marijuana: Biological Effects," both authored by Dr. Nahas;

"Health Consequences of Marijuana Use," by William Pollin, M.D., Director, National Institute of Drug Abuse (written 1980);

a printed interview with Dr. D. Harvey Powelson, of the mental health program of Calaveras County, California, who once termed marijuana "harmless" but who now calls it "Our Most Dangerous Drug," the title of the printed interview;

a pamphlet called "Marijuana - What Parents Need to Know" from the Alaska Council on Prevention of Alcohol and Drug Abuse;

a pamphlet, "Marijuana" by Charlotte Drug Education Center, Inc., Charlotte, North Carolina;

pamphlet, "Marijuana Update," a Readers' Digest reprint of May, 1980;

article, "Marijuana: The Myth of Harmlessness Goes Up in Smoke," by Peggy Mann, a Saturday Evening Post feature, 1980;

article, "The Marijuana Epidemic," by Stuart M. Butler, analyst, The Heritage Foundation, Washinton, D.C.;

booklet, "Report on Adverse Health and Behavioral Consequences of Cannabis Use," World Health Organization, 1981;

an assortment of Drug Abuse Newsletters of 1982, 1983;

article printed in the Congressional Record entitled "Marijuana and Health," the ninth report to the U.S. Congress, by the Secretary, Health and Human Services, (1982);

booklet, "Marijuana Today" by George K. Russell, (1983), and article, "Marijuana Smoking and Its Effects on the Lungs," by Donald P. Tashkin, M.D. and Sidney Cohen, M.D., of the Departments of Medicine and Psychiatry, U.C.L.A. School of Medicine, Los Angeles, California.