Congress Considers Bill to Control Angel Dust

"It gave me a feeling of importance, you know, kind of like, I felt like I was the whole—the whole world was revolving around me . . . where you feel like you are that important and you find yourself withdrawing from everything that is real, and you live in a type of spiritualistic level, like everything is very symbolic, everything has double meanings and [you] completely lose touch with yourself."—Illicit user of PCP testifying during U.S. Senate hearings on a bill to control sales of the drug's chemical ingredients.

While searching randomly in 1956 for new mind-altering drugs with a therapeutic value, pharmacologist Graham Chen and his colleagues at Parke Davis Laboratories in Detroit stumbled upon a compound with remarkable properties. The result of a serendipitous chemical reaction in another lab, the new compound, when injected into different animal species, prompted a surprising and confusing array of bizarre responses. In rodents, for example, it acted as an amphetamine, or stimulant, but it also produced a drunken or typically depressant condition: lack of muscular coordination. In dogs, it caused yelping and convulsions. At low doses in monkeys, it acted as a barbiturate, or sedative, and at higher doses, as an anesthetic, eliminating sensitivity to touch or pain.

The anesthetic response seemed the most intriguing, not only because of the ease with which the compound produced the effect, but because of the great need at that time for a safe, injectable, commercial anesthetic. Typically, anesthetics act by depressing the body's vital functions to a level that requires close monitoring and great care; at certain doses, this new compound raised both blood pressure and heart rate while inducing insensitivity to pain. Moreover, the new compound could be easily and inexpensively synthesized.

Ultimately, a decision was made to test the compound, which was known by then as phencyclidine, as an anesthetic in human patients. Because the drug produced such beautiful serenity in monkeys, it was named Sernyl or Sernylan by Parke Davis, and permission was secured from the federal Food and Drug Administration (FDA) to begin clinical trials. Throughout the early 1960's, it was tested in several thousand volunteers, mostly at prisons, colleges, or hospitals.

As a result of the tests in humans, it was discovered that phencyclidine shared the characteristics of yet another class of drugs: the hallucinogens, such as LSD or mescaline. Strangely, however, the hallucinations it prompted—unlike the visual distortions produced by LSD—were those of self-perception, particularly body image and the ability to perceive weights. Thus, a common reaction to phencyclidine was a feeling of floating. As one test subject reported, "I didn't know where my feet were, and I didn't feel myself get up." Alarmingly, the drug also prompted behavior that mimicked precisely the symptoms present in cases of schizophrenia: apathy, ambivalence, autism, and an inability to associate thoughts or ideas. Most disturbing of all, however, was the occurrence in some of the volunteers of psychotic behavior, often violent and unpredictable, in a delirium that sometimes lasted for more than a week.

Enters Illegal Drug Market

These side effects added up to a disappointment for Parke Davis—the drug was not safe enough for widespread or commercial use with humans. In 1965, the company abandoned it to all but veterinary purposes, officially canceling all clinical trials. To others, however, it became attractive precisely because of the characteristics that prompted the Parke Davis rejection. Illicit drug manufacturers, which in the middle 1960's were supplying a rapidly growing subculture, found it to be a cheap and easy substitute for the real ingredients of illegal drugs that were more difficult to obtain. Unsuspecting drug-takers were frequently surprised to find that what had been sold to them on the street as LSD, mescaline, amphetamines, or THC, the active ingredient in marijuana, was in fact phencyclidine. Although the drug had much the same effect, in part, as all of those it fraudulently replaced, unexpected additional effects gave it a bad street name. Only rarely was it purchased intentionally.

Since the 1960's, however, taste for the drug has increased dramatically. Its illegal use is now considered to be the fastest growing drug problem in the country. Initially sold only in tablet form, it is now purchased widely as a powder or liquid, and as a drug of choice. Typically, the powder is dusted on parsley or marijuana and rolled into cigarettes, or the cigarettes are dipped in the liquid; each is said to offer the purchaser a controlled, smaller dose, and thus fewer side effects, than in tablet form. Initially sold on the street as the PeaCe Pill, or PCP [for its chemical name, 1-(1-phencyclohexyl) piperidine], it is now also purchased under a variety of names evocative of its form or effect: angel dust, crystal, embalming fluid, killer weed, rocket fuel, or animal tranquilizer.

In the last 2 years, its use has especially proliferated among students in high school, where the drug is rapidly becoming as available as marijuana. A 1977 survey by the National Institute on Drug Abuse found the number of youths aged 12 to 17 that acknowledged using PCP to have doubled from the previous years, up to 6 percent; the number of those aged 18 to 25 have increased from 9 to 14 percent. Many of the users are white males in suburban schools, but no clear portrait of the PCP consumer has yet emerged. In Los Angeles, which is considered a major center of illicit PCP manufacturing, policemen are confiscating increasing amounts of the drug, which now accounts for 40 percent of the city's narcotics arrests (technically, PCP is not a narcotic, but is classified as one under the law there).

The increasing use of PCP has also been manifested in proliferating reports of toxic and bizarre reactions to the drug. According to David Smith, founder of the Haight-Ashbury Free Medical Clinic, 20 to 30 PCP overdoses are treated daily in the San Francisco area alone. Last year, the Los Angeles county coroner attributed 66 deaths to PCP overdose, up from 20 the previous year. PCP has also been reliably linked to recent suicides, as the result of the severe depression it can induce; drownings, as the result of sedation and estrangement from reality; self-inflicted wounds and defenestrations, as the result of hallucinations; and violence, including murder, as the result of stimulation and psychosis.

In Washington, officials have begun to express concern, first at the National Institute on Drug Abuse, which sponsored

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a recent technical conference on phencyclidine, and now in the Congress, where a bill is pending that will make it more difficult to buy and sell the chemicals from which PCP is made. The bill, which was introduced in March by Senator Lloyd Bentsen (D–Texas) and is cosponsored by 35 other senators, also would increase the criminal penalties for producing and distributing the drug, up to a maximum of 10 years in prison and a $100,000 fine.

Currently, PCP is treated as a controlled substance on Schedule 2 of the federal drug code, where it is identified as a dangerous, abusable drug with some legitimate purpose—its use as a veterinary anesthetic, mostly by researchers that handle primates. Most states also have enacted sanctions against PCP. But the present laws have proved ineffective against the economic facts of illicit PCP production: An investment of about $5000 in chemicals and unsophisticated kitchen equipment is all that is necessary to produce about 50 pounds of PCP, which sells for more than $5000 a pound, according to law enforcement agents. At those figures, substantial numbers of amateur chemists are willing to risk detection as well as hazards in the manufacturing process itself, which involves volatile or dangerous chemicals such as ether, benzene, potassium cyanide, and hydrochloric acid. Recently, two off-duty policemen in the Washington, D.C., area were arrested for setting up a laboratory to manufacture PCP.

Gus Tsavalas, a convicted manufacturer of PCP now serving a 3-year prison sentence in California, recently testified at Senate hearings that it was also relatively simple to obtain the chemicals essential to make PCP. "Naturally, larger quantities are more difficult to obtain," he said, "[but] smaller quantities are available either through the black market or through various chemical houses that deal with universities and colleges. Larger quantities can be gotten through setting up a phony company and going to a chemical house." Tsavalas did not name the supply houses he had purchased from, but he noted that their "only interest was in finding out if I had a company so that they could sell it to me on a wholesale level rather than sending me

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Tailoring Technology to the Third World

Worldwatch Institute of Washington, D.C., is continuing its relentless documentation of the deterioration of the earth's resources and the decline of the human condition with the release of its latest paper, "Soft Technologies, Hard Choices," authored by former *Nature* correspondent Colin Norman.

Norman noted that the introduction of inappropriate technologies in developing countries is aggravating unemployment and increasing social inequities as well as wasting energy and chewing up the environment.

He came up with some grim figures: more than 30 million jobs per annum will have to be created to keep pace with Third World population growth, and to raise the lot of the grossly underemployed, 1 billion new jobs will have to be created by 2000.

The nature of a country's technology determines the availability of jobs. When the World Bank loaned Pakistan money to buy 18,000 tractors it turned out to be a disaster because labor needs dropped by 40 percent, whereas adding draft oxen to the Ivory Coast helped because it stimulated auxiliary industries such as oxcart making.

Norman had other depressing observations: 80 percent of the health budget in developing countries goes to hospitals, although it should be going to public health. So skewed is R & D money to the needs of industrialized nations that 98 percent of published research on sewage disposal is irrelevant to the Third World.

But there are signs of hope: Urban planners in Dodoma, Tanzania, drew up a master plan for the city that says the ratio of bicycles to cars must be 70 : 30.

Yalow Declines *Ladies'* Award

Rosalyn Yalow, who won a Nobel Prize last year for her work on the development of radioimmunoassays, does not accept just any old prize. Early this month she turned down one of the *Ladies' Home Journal* "woman of the year" awards because she does not believe in "ghetto" awards.

In a long letter to the magazine's editor, Lenore Hershey, Yalow explained that she does not believe in women's awards unless the accomplishment in question is gender-related. "There may perhaps be good reason for awards to an outstanding father or mother . . . perhaps even for the best actor or the best actress," wrote Yalow. But it is "inconsistent and unwise to have awards restricted to women or to men in fields of endeavor where excellence is not clearly sex-related." She quoted journalist Susan Jacoby that "Women who have 'made it' are no longer pleased to be told their achievements are remarkable for a woman."

Yalow concluded that "There may remain the need for some among us to accept token jobs or token awards as a temporary expedient on the road upwards. But we must view these aberrations as being temporary, worthy only for self-destruction."

Yalow's stand ruffled quite a few feathers according to a Washington *Post* account of a reception for the ten awardees (whose number included First Lady Rosalynn Carter). "I think she better get her nose out of a test tube," said author Liz Carpenter, former press secretary to Lady Bird Johnson. And editor Hershey's opinion was that "when 51.3 percent of the Nobel Prize winners are women, I will agree that the 'Women of the Year' awards are old-fashioned."

But Yalow is unlikely to change her mind. She almost turned down the Federal Women's Award for the same reasons way back in 1961.

Battered but Afloat Peace Academy Concept

Efforts to get Congress interested in the idea of a national peace academy stumbled again last month. On 31 May the House voted down an amendment to the foreign relations authorization act that would have made $0.5 million available for the creation of a commission to study the feasibility of a peace academy.

Ever since George Washington proposed the establishment of a "peace office" there have been people wanting some sort of high-level department to

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to a retailer to buy the chemicals."

The Senate bill is intended to curb such sales by requiring the registration and reporting of all purchases of piperidine, a chemical essential to phencyclidine. The bill would also require the chemical companies and wholesale supply houses that sell piperidine to verify the purchaser's identification and manufacturing intentions. A similar law is already in effect in California, but all it has led to is an increase in the illicit manufacture of PCP analogs—compounds that use other chemicals in place of piperidine, but have the same mind-altering effects—of which there are about 30.

As a result, the Senate subcommittee on juvenile delinquency is likely to amend the Bentsen bill to extend the reporting and registration requirements to two other chemicals, ethyl amine and pyrollidine, that are essential to the PCP analogs now being detected by law enforcement agents. George Ingle, of the Manufacturing Chemist's Association, has expressed concern about the amendment because of the possibility that Congress will continue to extend the requirements as new ingredients are discovered in the street samples. "We feel that the amendment may only be a foot in the door," he told *Science*. None of the three chemicals is manufactured in great quantity; sales of piperidine amount to only half a million pounds per year, and sales of the others amount to even less. But other chemicals considered essential to PCP production are consumed by the industry in much greater quantities, and the trade association fears that registration of these chemicals would impose a substantial burden.

On the other hand, the industry acknowledges that some form of restriction—either voluntary or legislative—may be necessary to prevent the chemical components of PCP from falling into the wrong hands. Efforts to curb its use by understanding its effects and the motivations of its users have in large part been unsuccessful.

What researchers do know, however, is that an overwhelming number of long-term users considered their first experience with the drug to be pleasant and euphoric, supplying a satisfying escape from anxieties, depression, or external

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balance the government's massive preoccupation with things military.

These efforts have always met with failure; nonetheless, there are a number of social scientists who believe that the relatively new discipline of "conflict studies" has matured to the extent that it can supply new approaches to the resolution of domestic and international conflicts.

For the past 2 years a small lobbying effort called the National Peace Academy Campaign has been struggling to make its voice heard in Washington. Founded by social psychiatrist Bryant Wedge and James H. Laue, who is director of the Center for Metropolitan Studies at the University of St. Louis, the group wants a federally funded national peace academy that would train people as impartial mediators whose skills would be applicable in every kind of conflict ranging from urban strife to negotiations with terrorists. Wedge says the discipline underwent significant practical development during the civil strife of the 1960's.

There is a good deal of public apathy and skepticism toward the idea of making an applied science out of peace research. Economist Kenneth Boulding, a strong supporter of the cause, attributes it partly to post-Vietnam "peace weariness." David Singer, a political scientist at the University of Michigan, says people just don't buy the idea that conflict research could supply any more insights than those possessed by the average skilled negotiator with a lifetime's experience under his belt. Yet, he says, the findings of various disciplines—those within social psychology on collective behavior and decision-making, for example—can contribute to the development of skills that are not in the repertoire of the average diplomat.

Private individuals have long played an important role in stepping into conflicts where officialdom is deadlocked. A relatively recent example was the excursion of psychiatrist David Hamburg (now president of the Institute of Medicine) into Tanzania to negotiate the release of some kidnapped Stanford students.

Many people think the idea of a peace academy, particularly if it is a federal entity, is naive at best. The State Department does not like it at all. According to Carlton Coon, deputy director of the Foreign Service Institute, the government already has ample access to the developing knowledge from peace research, and the training of foreign service officers is fine the way it is. He found it hard to imagine that a couple of bright young things from the peace academy shipped over to, say, Cyprus, could handle the situation better than officials with extensive training in the language, culture, and politics of the area.

Nonetheless, the campaigners believe that Congress is closer than it ever has been to taking the idea seriously. Last year the Senate passed a bill to set up a study commission (sponsored by Jennings Randolph, D–W.Va. and Mark Hatfield, R–Ore.). A Randolph aide says the wording of that bill will be introduced as a floor amendment to the upcoming Foreign Relations Authorization Act. If that is accepted, it stands a chance of sticking when the bill goes into conference with the House Foreign Relations Committee (which approved it before the full House voted it down).

If the country ever decides to have a peace academy, it will be one of a tiny handful of countries (others being England and Sweden) with national institutes on conflict research or training. "A school would be important as a symbol," says Boulding. "At worst it would do no harm, and at best a lot of good."

A Bio-Energy Catalog

A survey of research in bio-energy described as "the best available box score of things going on in the field," is now available from the Bio-Energy Council in Washington, D.C. Called the *Bio-Energy Directory*,* it contains over 200 abstracts of research on the production and conversion of biomass (wood, manure, seaweed, etc.).

The directory is part of a continuing effort and so far represents about one-third of the research going on in the field, or about $600 million worth of work, says the council's acting director William D. Carey (who is also executive director of the AAAS). Less than half of it is federally funded.

The Bio-Energy Council was set up in 1976 to coordinate and monitor bio-energy research activities. It plans to make information available through various means such as a newsletter, tapes, and a lecture service. It is also helping plan an international conference and exposition to be held in Georgia in April 1980.

*The directory is available for $24 from the Bio-Energy Council, Suite 204, 1337 Connecticut Ave., NW, Washington, D.C. 20036.

Constance Holden

Geneticists Boycott Moscow Congress

The harsh sentence recently imposed on Russian physicist and human rights advocate Yuriy Orlov by a Soviet court has strained U.S.-Soviet relations in measurable ways. Almost immediately following the 19 May sentencing, National Academy of Sciences (NAS) president Philip Handler issued a strong public protest (*Science*, 2 June), and within days an NAS delegation of 19 physicists canceled plans to travel to Russia for a symposium on the theoretical physics of condensed matter.

Now, American geneticists are struggling with their consciences as they decide whether to offer their weight to the protest by boycotting the 14th International Congress of Genetics, which is to be held in Moscow on 20–31 August—the first in the Soviet Union since Lysenko. The decision is made difficult by conflicting feelings about the importance of protest versus the value of maintaining contact with individual Soviet scientists.

At the annual meeting of the Genetics Society of America participants, responding in part to unofficial advice from individuals at the NAS and the State Department, came up with a genetically heterogeneous position condemning Orlov's sentence "as a violation of the basic right of free speech," while leaving it to individuals to decide whether or not to go for the congress. The Genetics Society's statement reads in part:

> We reaffirm the commitment of the Genetics Society to the position of the International Council of Scientific Unions that international scientific meetings be free of political activity.
>
> We believe that attendance . . . is a matter for each individual to decide. . . .
>
> We recognize the importance, especially for Soviet scientists, to have an opportunity to interact with geneticists from other countries in an atmosphere favoring free exchange of ideas. Attendance would also affirm the importance of openness of international scientific meetings to participants from all countries.
>
> We emphasize that attendance by U.S. geneticists in no way signifies approval of measures taken by the Soviet government against scientists such as Orlov and Sergei Kovalev. We also understand and sympathize with any geneticist who, in protest, now chooses not to participate in the Moscow Genetics Congress.

More than 200 American geneticists have registered for the congress. It is too early to know how many of them will decide to stay home, but there are signs that a number will do so.

One of the first to resign from the congress was James F. Crow, of the University of Wisconsin at Madison. Because Crow was the American vice president of the meeting, his decision to stay away is expected to influence other U.S. participants. Crow wrote the president of the congress, saying "You understand, of course, that my objection is to the action of your government and does not alter my regard for individual Soviet scientists." He added that he hopes "for an early indication of a changed policy" by the Soviet government with respect to elementary human rights.

Another among the first to withdraw was Kenneth Paigen, of the Roswell Park Memorial Institute in Buffalo, New York. Paigen, who was to co-chair a session on genetic fine structure, wrote the chairman of the organizing committee to say, ". . . there are times when our actions as scientists affect the course of human life in controversial ways, and at such times we are compelled to follow our sense of moral principles. Reluctantly, for I believe deeply in the importance of scientific exchange, that moment has come for me. . . . I can only protest and hope that in some small measure my act will strengthen the commitment to human rights and open debate in both our countries."

Other prominent geneticists who can be counted among those who will stay away from the Moscow Congress are: William K. Baker of the University of Utah and Gerald R. Fink of Cornell University, respectively president-elect and secretary of the Genetics Society; Peter Geiduschek of the University of California at San Diego; Alfred Kundson of the Institute for Cancer Research in Philadelphia and president of the American Society of Human Genetics; E. B. Lewis of the California Institute of Technology; Mark Ptashne of Harvard Medical School; and Norton Zinder of Rockefeller University. They hope many of their colleagues will join them.

—BARBARA J. CULLITON

pressure through delusions of superior strength and endurance. Studies have shown that after a short period of use, however, a tolerance is developed, and the use of large doses is likely to become chronic. For example, Robert Balster of the Medical College of Virginia found in one study that monkeys who were able to self-administer PCP gradually increased their doses over a period of several weeks. Eventually, they administered such high doses, he reported, that "frequently the animals could be found lying on the floor of the cage in awkward positions, briefly raising themselves to press the lever only to fall back down to the floor after the subsequent injection."

As dosages are increased, the toxic effects become more severe; thus, the occasional user has become trapped in a hazardous spiral. One researcher told the Senate subcommittee that "chronic users reported persistent problems with memory and speech and difficulty with thinking processes." Several scientists have hypothesized that it is the amnesia that makes the drug's more unpleasant effects bearable. In about one-third of the PCP users, the effects are extended and particularly severe, which has suggested to some that certain personality types are more vulnerable to the toxic effects; PCP is known to exacerbate the problems of psychiatric patients to a greater degree even than LSD or other hallucinogens.

May Lead to Violence

In some, the psychosis is manifested in extreme paranoia and defensiveness, particularly during the period of emergence from the drug's effect. Tsavalas, testifying before the Senate, said that "You get some strange ideas about what reality is. For instance, I was definitely convinced once that someone had changed the steering wheel on my car, and I couldn't get convinced that that wasn't the case." Occasionally, the paranoia, combined with delusions of superhuman strength, breaks out into violence. The National Institute on Drug Abuse has advised physicians who treat PCP overdoses to ensure their own safety, when necessary, through the use of physical restraints and induced sensory deprivation with those who seem likely to feel threatened during emergence.

What remains a mystery is precisely why the effects of PCP vary so greatly from one user to the next. Additional research may determine whether the varying tolerances for it are physical or psychological.

—R. JEFFREY SMITH

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