

gram would be shut down, at least as far as civilian funding is concerned. (Some parts of it have military funding because of weapons applications.)

One of the people involved in inertial-confinement fusion from the beginning, John H. Nuckolls of the Lawrence Livermore Laboratory, took the occasion of winning the American Physical Society's James Clerk Maxwell Prize (given for achievement in this field at the recent meeting of the APS Division of Plasma Physics in New York) to pronounce a vigorous defense of inertial-confinement fusion as a prospective energy source. □

...and holes in the drilling budget

Enthusiasm for the new Ocean Margin Drilling Program, a government-industry collaboration intended to produce geophysical information related to the ocean margins, gave way to disappointment last week when the 10 oil companies that had agreed to pay for half of the OMDP pulled out.

"This clearly means the OMDP will have to be delayed more or less indefinitely," said Allen Shinn, director of the National Science Foundation's Office of Scientific Ocean Drilling.

Industry support hinged upon NSF's promise that more oil companies could be persuaded to share the costs of the program. With only 10 participants, annual costs in 1980 dollars were at least \$1 million per company. "Many companies felt it just wasn't cost-effective science," said George Pichel of Union Oil Co. in Los Angeles. Industry's primary interest in the program, he said, was the development of a riser system able to drill to 13,000 feet.

Both Shinn and representatives of the oil companies say that industry withdrawal is only "superficially" related to the recent NSF proposal to combine the Deep Sea Drilling Project and the OMDP. In August, NSF outlined a plan for replacing the *Glomar Challenger*, now used for the Deep Sea Drilling Project, with the *Glomar Explorer*, which would be converted to a drillship capable of riser and nonriser drilling. Under the revised program, development of the riser would be delayed several years and because fewer holes would be drilled on the ocean margins, the cost per hole would rise.

Shinn said that both houses of Congress had appropriated the full request for the government's fiscal year 1982 share of the OMDP costs, covering enough design work on the *Explorer* to learn the costs of conversion. In the next few weeks NSF will consider options for continuing the program. Alternatives include converting the *Explorer* without adding the riser and substituting the ship for the *Challenger* at the end of 1983, or rehabilitating the aging *Challenger*. □

Marijuana-heroin link reappraised



Discarded in the 1970s, the "stepping stone hypothesis" that smoking marijuana leads to abuse of harder drugs was "rejected prematurely and now needs serious reevaluation," says William Pollin, director of the National Institute on Drug Abuse.

The government-funded study that prompted Pollin's October 21 comment in testimony to the Senate Subcommittee on Alcoholism and Drug Abuse calls marijuana use "a cause of heroin use." But Pollin qualified that conclusion in an interview with *SCIENCE NEWS*. "We never said we're convinced that it [the stepping stone hypothesis] is true," Pollin says, "just that it's in need of reevaluation." He cites the survey — performed by University of Kentucky researchers and to be published in the fall issue of *CHEMICAL DEPENDENCIES* (Volume 4) — as useful in documenting the link between marijuana use and the use of heroin and cocaine.

The nationwide survey of 2,510 men 20 to 30 years of age showed that 73 percent of those who said they had used marijuana 1,000 times or more went on to try cocaine, while 33 percent graduated to heroin use. In contrast, less than one percent of the nonsmokers surveyed used the harder drugs, according to the report by sociologists John A. O'Donnell and Richard R. Clayton.

When equated with daily use of marijuana for three years, smoking the substance 1,000 times or more is "not that unusual for heavy users of marijuana," Pollin asserts. Of those who had used marijuana fewer than 100 times, only seven percent later tried cocaine, while four percent went on to take heroin. Although only one in ten of the 1,382 marijuana users in the study also used heroin, a causal relationship was clearly discernible, Clayton asserts.

"I'm not saying that marijuana use invariably leads to heroin use or to cocaine use — that's not what causality means," Clayton told *SCIENCE NEWS*. He draws an analogy between the marijuana-heroin link and tobacco smoke's role in causing lung cancer, though he admits that the marijuana-heroin link is not biological. Only a minority of smokers develop lung cancer, he points out, but few researchers doubt tobacco's role in triggering the disease.



"I think that there's absolutely clear evidence that marijuana use is a stepping stone to other illicit drug use," Clayton says. "Why is it that we have such a problem saying one thing causes another thing unless the end result is a biopsy report?" By "throwing subjects into a subculture that elicits heroin use," even moderate marijuana use can weld the first link of a causal chain leading to heroin, Clayton asserts.

Other researchers have reported an association between marijuana and heroin use, but stop short of labeling the relationship "causal" — a word pregnant with policy implications. "I think it's really more a semantic quibble about what cause is than it is about the results," says Bruce Johnson of New York State Substance Abuse Services in New York City.

"The fact is, the majority of kids who use marijuana do not go on to other drug use," says Denise Kandal of the Columbia U. School of Public Health and New York State Psychiatric Institute. "All we can say safely at this point is that marijuana is a necessary but not sufficient condition for the progression to the use of other drugs," she says. "There is a subgroup of marijuana smokers who are more at risk for the use of other illicit drugs, and we should identify this group both in terms of personality characteristics, and in terms of social environment," says Kandal, whose research has included the study of marijuana use among young adults. □