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THIS WEEK

Second shuttle mission 324
Quasars: An optical illusion? 325
A 'mechanical' low back pain solution 325
Spotting the legendary bowerbird 326
Blood-filtering cancer treatment 326
Wilderness land leased for oil, gas hunt 327
Research funding analysis 327
More evidence of fungal warfare 327
Hepatitis B vaccine approved 327

RESEARCH NOTES

Biomedicine 333
Earth Sciences 333

ARTICLES

Solar sails prepare to take off 328

DEPARTMENTS

Letters 323

COVER: The dark of space and the clouds of earth are reflected in the vast, mirrored sheet of a solar sail, being propelled by the physical push of sunlight. The half-century-old idea of a solar sail, now perhaps about to achieve reality, has inspired a number of works, such as the song by Space Sciences Editor Jonathan Eberhart. See p. 328. (Painting for SN © by Sally Bensussen. "A Solar Privateer": Words and music © by Jonathan Eberhart 1981.)

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LETTERS

Marijuana-heroin study reappraised

The recent article "Marijuana-heroin link reappraised" (SN: 10/31/81, p. 277) contains sad indications that the ongoing trend of flawed research on drug-related issues will continue. The most disturbing aspect of the SN article is that the results describe *correlation* of marijuana and heroin use, yet one of the authors of the study is willing to assert *causality*. Clayton is quoted as saying that he thinks there is "absolutely clear evidence" yet, at least as far as SN has covered the study, there is no causal model. Without any explanation of cause, the study can give only an interesting hint for investigation. It emphatically does not give any indications for a change in policy.

To see this, consider the hypothesis that the observed correlation is due not to any biological/psychological factor, but that it is due to the fact that marijuana and heroin are both illegal and that the major "step" for a user is the step to committing an illegal act. If this turned out to be the cause of the link, then considering the extent of marijuana use in the U.S., the most appropriate response would be to legalize marijuana as soon as possible, in order to break the link. I seriously doubt that this is what Clayton has in mind, but it's as good a model as any!

The real issue that bothers me is that I see much "research" on drug issues which really boils down to some investigator or agency trying to prove a preconceived idea rather than to determine the truth—and this has been a fault on both sides of drug issues. Although my own work is in a very different field, I am still a scientist. I resent the effect that bad research has on all of us. I don't think that mistaking correlation for causality is a mistake that a responsible researcher would make.

Dick Dunn
Boulder, Colo.

Your article and the report it cited by O'Donnell and Clayton confuse correlation with causality. The results cited do not demonstrate causality at all, merely a correlation. The correlation may well be due to a third factor that causes both marijuana and heroin use. Causality is certainly not a "semantic quibble." Determining the cause of substance abuse is important to combatting it. The attribution of substance abuse to a third factor is more parsimonious than proposing a causal relationship between marijuana abuse and heroin abuse.

Marijuana abuse may be a function of rebellion against general social conventions which may proceed to use of other drugs, such as heroin. In other cases marijuana and heroin use may be an adoption of social expectations within a peer group. As yet, causality has still not been determined.

Patrick Dexheimer
Attleboro, Mass.

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Mr. Pollin, in rather typical bureaucratic gibberish, is I think, trying to add a bit of fuel to the "evils of pot" fire. The only solid evidence of marijuana use leading to heroin abuse lies in the politics of pot. Both of these substances being illegal, it is only natural that they be "dis-tributed" by the same unsavory source.

Of course, billions of dollars would be lost were marijuana legalized. It is much more politically advantageous to be against its legalization. Just as it is much more politically expedient to *not* criminalize tobacco, a substance which has been shown to be *directly* related to lung cancer and heart disease. Mr. Pollin even admits that the pot-heroin connection is not biological, as is the tobacco-lung cancer link. Why isn't his agency doing anything to criminalize tobacco? You guessed it—*politics*—including a large, influential, and rich tobacco lobby.

We surely enjoy your fine magazine. My wife and I look forward to it every week. We haven't been disappointed so far. Keep up the excellent work.

Robert J. Carbon
Thibodaux, La.

Lower rail emission contribution

Regarding your article on the ACE 3000 locomotive design project (SN: 9/26/81, p. 202), we've noted one small error. The emission of sulfur oxides using 1.5 percent sulfur coal is projected at 1.8 lbs. SO_x per million Btu input, not "1.8 pounds per Btu" (p. 203). And perhaps to clarify Prof. John Sharpe's comment on "nitrous oxide" emission, the fuel bed conditions in the gasifier furnace are such that nitrogen oxide (NO_x) output per million Btu input is greatly reduced, for all forms of NO_x compounds.

Emissions for various regulated substances were estimated for us by the Energy Research Center of West Virginia University. A difficulty is that, as you pointed out in the article, there are no federal standards for small mobile furnaces of the type we have designed. We assume there will be standards, and rigorous ones. The 4 lb. sulfur oxide emission cap per million Btu input mentioned on p. 203 is not a standard for large, stationary boilers, but rather a proposed limit suggested by the EPA last year under the Carter administration. The 4 lb. SO_x limit, with possible eventual change to 2 lb., was suggested as a limit to apply to all sources not falling under existing power plant emission regulations. We are assuming similar standards will apply, even though the Reagan administration has adopted a different approach to regulation.

To us, the important point is that the projected emissions of the ACE 3000 in SO_x, NO_x and fine particulates are *less than* present diesel locomotives, which today use a diesel fuel of generally higher sulfur content than in the past. Emissions of NO_x are radically reduced, compared to internal combustion. Hence, we feel the ACE 3000 may help lower the overall emission contribution of the railroad industry in those large sectors where rail line electrification is not feasible.

William L. Withuhn
Akron, Ohio