

speaker," Weidenbaum said, "that a specific current major technological undertaking [Weidenbaum almost certainly meant the Apollo moon program] would produce great benefits, of which by far the most important would be those that we cannot presently conceive of." Weidenbaum said this particular speaker—an aerospace and military leader—"saved his greatest contempt for what he called the present-day doubters" and "contended that in future periods we all will look back with disdain upon these people as men of little faith."

Weidenbaum said he was not trying to stifle scientific inquiry or inhibit technological innovation. "If a profes-

sor of engineering wants to devote his leisure time to designing a commercial submarine or planning a linear accelerator, he should be entirely free to do so," Weidenbaum said. "However, when he asks for \$100 million of taxpayers' money to start building the gadget, he should have to justify it—and not in the soft, theological terms so often used by the natural scientists in such matters, but in the hard, objective manner of the social scientist."

"He should have to answer questions such as these: Are the expected benefits worth the cost? How well can he measure the benefits? Has he omitted important elements of cost to society, such as polluting the environ-

ment? Finally, and most crucial, are the returns from this use of public funds likely to be greater than from alternative uses?"

Weidenbaum is reliably said to believe that the SST in particular would not fare very well if subjected to the kind of rigorous cost-benefit analysis he has in mind. He is said to have been dubious about the SST while he was still at Boeing, at least partly because he believes the project will yield a relatively poor rate of return on investment.

Weidenbaum said his way of thinking about resource allocation is highly pertinent to current discussions on how to utilize the technical capabilities

## Smoking Dogs: Tobacco Institute Tries to Discount Cancer Studies

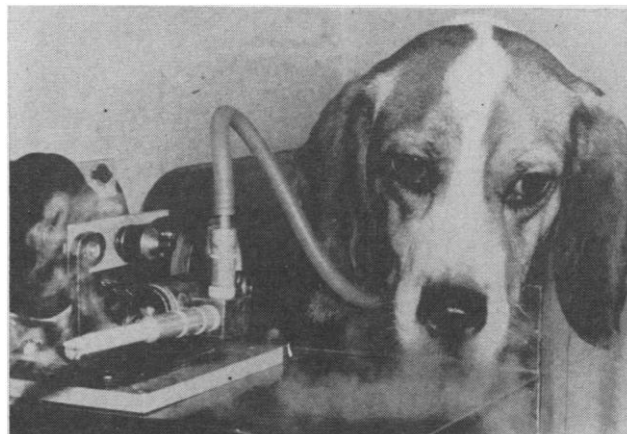
The tobacco industry has routinely countered the statistical and epidemiological evidence linking smoking and lung cancer by proclaiming the fact that no one had been able to induce lung cancer in experimental animals with cigarette smoke.

To silence this objection, two scientists had 86 beagles inhale the smoke from 415,000 cigarettes over a 3-year period. Oscar Auerbach of the Veterans Administration Hospital, East Orange, New Jersey, and E. Cuyler Hammond of the American Cancer Society accomplished this by pumping smoke from a cigarette-smoking machine through the tracheal stroma of the dogs (see photograph). A significant percentage of the dogs developed lung malignancies. That would seem to settle the issue, but it didn't.

The American Cancer Society was jubilant for having finally defeated its old adversary, the Tobacco Institute, the tobacco industry's lobbying and public relations body. ACS asked Auerbach and Hammond to present their results at a press conference during an ACS meeting last February. The Tobacco Institute, however, would not accept defeat that easily.

In a barrage of press releases and newspaper advertisements, the Tobacco Institute questioned the validity of the smoking dog experiments and demanded that ACS submit the data to a panel of independent experts to be designated by the Tobacco Institute. The cancer society refused. After the Tobacco Institute repeated the demand for independent review several times, ACS asked the Surgeon General to appoint a body to review the data. The Surgeon General refused.

Meanwhile, Auerbach and Hammond had submitted their work, in two papers, to the *New England Journal of Medicine*. The journal, however, refused to publish the papers, not for lack of scientific merit, but because the editor of this journal disapproves of prepublication disclosures.\* The papers were then submitted to the *Journal of the American Medical Association*, which



Beagle inhaling smoke from cigarette smoking machine. [Wide World Photos]

sent them out to 18 referees. *JAMA* editor Hugh Hussey claims that this extraordinary number was necessary because of the authors' style and *JAMA*'s difficulties in interpreting the photographs of the lung sections. *JAMA* returned the papers to the authors with the referees' criticisms, but Auerbach and Hammond decided to send the papers to a third journal rather than attempt to satisfy 18 critics.

The Tobacco Institute made an issue of Auerbach and Hammond's difficulties with the journals, suggesting that this showed the experiments to be of questionable validity. Recently the Institute's press releases have stated: "It is likely that none of the dogs developed cancer." This claim is unsubstantiated.

Auerbach and Hammond's papers have now been accepted for publication in the December issue of *Archives of Environmental Health*, an AMA specialty journal. Both men admit that it was a mistake to release their data prior to publication; they are looking forward to their work being judged by the normal processes of scientific evaluation rather than by the mass media.

—ROBERT J. BAZELL

\* *New England Journal of Medicine* editor Franz J. Ingelfinger wrote an article on this problem in the 28 August 1970 issue of *Science*.