

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

ROBERT L. BOWMAN	EVERETT I. MENDELSON
JOSEPH W. CHAMBERLAIN	NEAL E. MILLER
JOHN T. EPSALL	JOHN R. PIERCE
EMIL HAURY	KENNETH S. PITZER
ALEXANDER HOLLAENDER	ALEXANDER RICH
WILLARD F. LIBBY	DEWITT STETTIN, JR.
GORDON J. F. MACDONALD	CLARENCE M. ZENER

Editorial Staff

Editor

PHILIP H. ABELSON

Publisher

DAEL WOLFE

Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editor: NANCY TEIMOURIAN

News Editor: DANIEL S. GREENBERG

News and Comment: JOHN WALSH*, LUTHER J. CARTER, BRYCE NELSON, ROBERT J. SAMUELSON, PHILIP M. BOFFEY, KATHLEEN SPERRY, GILLIAN PARRILLO. Contributing correspondents: ELINOR LANGER, NIGEL CALDER, VICTOR K. McELHENY

Book Reviews: SYLVIA EBERHART

Editorial Assistants: JOANNE BELK, ISABELLA BOULDIN, ELEANORE BUTZ, BEN CARLIN, GRAYCE FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, KONSLYNNIETTA HUTCHINSON, ELEANOR JOHNSON, PAULA LECKY, KATHERINE LIVINGSTON, HELEN OLNEY, SANDRA RATTLE, LEAH RYAN, BARBARA SHEFFER

*European Office: Lime Tree Farm, East Hagbourne, Berkshire, England. Telephone Didcot 3317

Advertising Staff

Director

EARL J. SCHERAGO

Production Manager

ROSE MARIE ROMAGNOLO

Advertising Sales Manager: RICHARD L. CHARLES

Sales: New York, N.Y., 11 W. 42 St. (212-PE-6-1858): ROBERT S. BUGBEE

Scotch Plains, N.J., 12 Unami Lane (201-889-4873): C. RICHARD CALLIS

Medfield, Mass. 02052, 4 Rolling Lane (617-359-2370): RICHARD M. EZEQUELLE

Chicago, Ill. 60611, 919 N. Michigan Ave., Room 426 (312-DE-7-4973): HERBERT L. BURKLUND

Los Angeles 45, Calif., 8255 Beverly Blvd. (213-653-9817): WINN NANCE

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

A Damaging Source of Air Pollution

Public concern about air pollution has grown rapidly during the past few years. In a recent poll, 80 percent of respondents felt that additional measures should be taken to minimize this problem. Most people, when they consider air pollution, think of the automobile, the smokestack, or the trash burner. Few point to a most damaging source of air pollution—the cigarette.

One of the toxic products of the automobile is carbon monoxide. Exposure for 1 hour to a concentration of this gas of 120 parts per million causes inactivation of about 5 percent of the body's hemoglobin and commonly leads to dizziness, headache, and lassitude. Concentrations of carbon monoxide as high as 100 ppm often occur in garages, in tunnels, and behind automobiles. Such concentrations are tiny in comparison with those (42,000 ppm) found in cigarette smoke. The smoker survives because most of the time he breathes air not so heavily polluted. However, in a poorly ventilated, smoke-filled room, concentrations of carbon monoxide can easily reach several hundred parts per million, thus exposing smokers and nonsmokers present to a toxic hazard.

Another air pollutant issuing from automobiles is nitrogen dioxide. Nitrogen dioxide is an acutely irritating gas; also, it gives rise to nitrite, a potential mutagenic agent. Concentrations of NO₂ as high as 3 ppm have been noted in Los Angeles, and levels of 5 ppm are considered dangerous. Cigarette smoke contains 250 parts of NO₂ per million.

Many of the toxic agents in cigarette smoke do not have counterparts in ordinary air pollution. One of these, hydrogen cyanide, is particularly noteworthy. It is highly active against respiratory enzymes. Long-term exposure to levels above 10 ppm is dangerous. The concentration in cigarette smoke is 1600 ppm.

These inorganic pollutants are three of many noxious substances that have been found in tobacco smoke. Among others are acrolein, aldehydes, phenols, and carcinogens, an important one of which is benzo(a)pyrene. Evidence points to synergistic effects among the toxic agents. The phenols, though not themselves notably carcinogenic, increase markedly the carcinogenic potency of benzo(a)pyrene.

The toxic effects of cigarette smoke are also enhanced by other environmental factors. A recent study of asbestos workers showed a very high incidence of lung cancer among smokers, in contrast to a low incidence among nonsmokers. In a group of 283 asbestos workers who had a history of cigarette smoking, 24 of 78 deaths were due to bronchogenic carcinoma. Of 87 asbestos workers who were nonsmokers, none died of lung cancer during a comparable period. A study of the uranium miners stricken with lung cancer has also revealed an effect related to smoking. The rate of fatalities was much higher among smokers than among nonsmokers.

Another example of a synergistic effect is seen in the smoker who breathes polluted urban air. The incidence of lung cancer among smokers is higher in the city than in rural areas.

The principal effects of smoking are borne by the smokers themselves. They pay for their habit with chronic disease and shortened life. Involved are the individual's decision and his life. However, when the individual smokes in a poorly ventilated space in the presence of others, he infringes the rights of others and becomes a serious contributor to air pollution.—PHILIP H. ABELSON