

CONTENTS

EDITOR
Sheldon Novick

CONSULTING EDITOR
Virginia Brodine

SCIENTIFIC DIRECTOR
Kevin P. Shea

ASSOCIATE EDITOR
Julian McCaull

ASSISTANT EDITOR
Judith G. Meyer

BUSINESS MANAGER
Nancy Shea

ART DIRECTOR
Robert Charles Smith

NEWS EDITOR
Terri Aaronson

PHOTOGRAPH RESEARCH
Dianne Hoener

STAFF PHOTOGRAPHER
Daniel T. Magidson

ENVIRONMENT is published monthly except bimonthly January/February and July/August by the Committee for Environmental Information, 438 N. Skinker Boulevard, St. Louis, Missouri 63130.

An official publication of Scientists' Institute for Public Information.

Subscription rates are as follows: 1 year \$8.50, 2 years \$14.50, 3 years \$20.00, student \$6.00, foreign subscriptions \$1.50 per year additional. Additional information regarding bulk rates and overseas and air mail rates may be obtained from the Circulation Manager. Contributions are tax deductible. Checks may be made payable to ENVIRONMENT or Committee for Environmental Information. Subscription and change-of-address information should be addressed to Circulation Department, ENVIRONMENT, Post Office Box 755, Bridgeton, Missouri 63044. Allow two months for changes of address.

Indexed in Readers' Guide to Periodical Literature beginning January 1968. Entitled SCIENTIST AND CITIZEN previous to the January/February 1969 issue. Microfilm copies available from Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106. Back volumes (\$15.00 each) and back issues are available from Maxwell Reprint Company, Fairview Park, Elmsford, New York 10523.

Copyright 1971 Committee for Environmental Information. No portion of this magazine may be reproduced in any form without the express permission of the publishers. Editorial correspondence and manuscripts should be addressed to The Editor, ENVIRONMENT, 438 N. Skinker Blvd., St. Louis, Missouri 63130. Second-class postage paid at St. Louis, Missouri.

THE NEW-CAR SMELL

2

By Kevin P. Shea

Phthalates, a class of chemicals generically related to thalidomide, are used to make common plastics soft and flexible. These "plasticizers" evaporate from the plastic interiors of cars, creating the familiar "new-car smell." They and other plastic components have been implicated in the sometimes fatal shock-lung syndrome that follows massive blood transfusions; in laboratory experiments they have affected the nervous system and fetal development of animals; and, as usual, no one knows the effects of exposing millions of people to their vapors.

THE POLLUTION OF ASIA

10

By M. Taghi Farvar, Margaret L. Thomas, Howard Boksenbaum, and Theodore N. Soule

Asian students recently met with Western scientists and found serious disagreements over environmental problems and their causes in Asia. Westerners recommend slowing population and even economic growth, while Asian students and officials emphasize the need for development; a few question the Western technology which lies at the crux of the dilemma.

METALS IN THE AIR

18

By Henry A. Schroeder

Twenty-two metals found in the air are derived principally from the burning of coal and oil; cadmium, nickel, and lead present real public health hazards. Nickel is present in coal, but is also added to gasoline, a practice which substantially increases the hazard from this toxic metal, which has been implicated in cancer of the lungs and respiratory tract.

ALDRIN AND DIELDRIN

33

By Charles F. Wurster

Two closely related pesticides which present a greater hazard to man and animals than DDT, which they resemble, are under consideration for removal from the market. They are highly resistant to breakdown, are distributed throughout the world, and are increasingly concentrated in food chains. Their effects range from the inhibition of photosynthesis at extremely low concentrations to induction of cancer in experimental animals.

DEPARTMENTS

SPECTRUM

25

LETTERS

46

REVIEWS

50

THE JAUNDICED EYE

53

THE NEW-CAR

By Kevin P. Shea

THE PLEASANT SMELL of the new car; the annoying oily film that appears on the inner surface of its windshield; the slightly slick texture the steering-wheel acquires when the car has been parked in the hot sun with windows closed; these are minor signs that a variety of chemicals are evaporating from the plastics with which the interiors of new cars are lined. Sitting in a new car on a hot day may provide the most intensive exposure to the vapors of plasticizers, stabilizers, and other components of plastics that the ordinary citizen is likely to encounter, but so nearly ubiquitous are these materials that their effects have begun to come under question in situations varying from battlefield blood-transfusions to outer-space probes.

The assumption that plastics, particularly polyvinyl chloride (PVC) plastics, are inert is so widespread that they are routinely used in the storage of blood, in various medical appliances, in scientific instruments, and, of course, in hundreds of thousands of consumer products.

Recent discoveries, however, have shown evidence that components of the plastics may be the cause of an increasingly common and sometimes fatal syndrome, called "shock lung," which follows massive blood-transfusions. Laboratory experiments have identified a number of other possible toxic effects of PVC plastic components, including effects on the nervous systems of laboratory animals and on developing chick and rat embryos. Most frequently implicated are compounds called phthalates, generically related to thalidomide, which are used as plasticizers.

The first widely publicized indication that polyvinyl chloride plastics were not completely inactive began with some unusual observations made by Dr. Rudolf J. Jaeger and Dr. Robert J. Rubin at Johns Hopkins School of Hygiene and Public Health.¹ The two scientists were studying isolated rat livers in an apparatus in which the blood being passed through the livers was delivered via polyvinyl plastic tubing. Dr. Jaeger and Dr. Rubin found three ultraviolet absorbing materials accumulating in the plasma of the blood. One of the materials was found in the plasma when the blood was circulated through the apparatus regardless of whether the liver was absent or present. This compound was soon identified as uric acid. The other two compounds were found only when the livers were present. Of the latter two, one is yet to be identified,

but the other was quickly identified as glycolyl phthalate (GP). Further work showed that GP arose as a metabolite (a material formed by the chemical breakdown of another compound) of a phthalate plasticizer leached from the plastic tubing used to deliver the blood to the isolated rat livers. Further testing, in which Dr. Jaeger and Dr. Rubin deliberately introduced the plasticizer into the apparatus, confirmed the conversion of the plasticizer in the rat livers to its metabolite, GP.

Dr. Jaeger and Dr. Rubin then tested another formulation of polyvinyl tubing containing a different plasticizer. This one, di (2-ethylhexyl) phthalate (DEHP) was also found in the plasma after it had circulated through the tubing alone, but it was not found when circulated through the livers. Furthermore, no metabolite of DEHP could be detected. It was found that unlike the first plasticizer, DEHP was not metabolized, but rather it was accumulated entirely in the liver in an unmetabolized form.

This led the two scientists to further studies on the ability of various fluids to extract plasticizers from plastic materials. They found that simple salt solutions did extract plasticizers, while a 4 percent solution of bovine serum albumin was able to extract measurable amounts of DEHP.

Release Into Stored Blood

More significant, however, was the finding that whole human blood, stored in polyvinyl chloride blood bags, could also extract the plasticizer DEHP. It was found that at the end of the maximum storage period of 21 days, blood stored in polyvinyl chloride bags contained 5 to 7 milligrams of DEHP per 100 milliliters of blood (50 to 70 ppm). Dr. Rubin has calculated² that under these conditions

It is now known that certain plasticizers, once thought to be inert, can escape from numerous plastic products into fluids or into the air.

DSW 588290