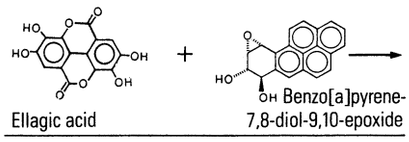
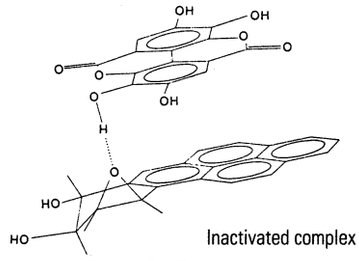
Chemistry

Exhaust pollutant 'neutralized'





Ellagic acid — a compound that belongs to a naturally occurring chemical class found in a variety of sources including coffee, nuts and grapes — has been shown to "neutralize" the cancer-causing form of the environmental pollutant benzo[a]pyrene. This phenomenon, which is described by Jane M. Sayer of the National Institutes of Health in Bethesda, Md., Alexander W. Wood of Hoffmann-La Roche Inc., in Nutley, N.J., and colleagues in the Oct. 6 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, thus far has been confirmed only in laboratory tests. Nonetheless, it is hoped that further research on ellagic acid's apparent ability to conquer the dangerous form of benzo[a]pyrene may lead to a new class of cancer-preventing drugs.

Benzo[a]pyrene is a ubiquitous pollutant formed from the incomplete burning of fossil fuels. The chemical is found, for example, in automotive exhaust and industrial smokestack emissions. When the chemical enters the body, enzymes can convert it to benzo[a]pyrene-7,8-diol-9,10-epoxide, a potent mutagen and carcinogen.

Sayer and associates have found that when ellagic acid is added to a solution of this potent form of benzo[a]pyrene, the two compounds first join to form an inactive complex (refer to the diagram). Eventually, the addition of ellagic acid causes the carcinogen to split into non-cancer-causing, non-mutagenic components.

Now, Sayer is conducting experiments to determine whether ellagic acid protects animals from getting tumors after exposure to benzo[a]pyrene.

Exhaust pollutant studied in breast cells

Human breast epithelial cells grown in culture readily take up benzo[a]pyrene, the byproduct of fossil-fuel burning, and convert it to its carcinogenic form, Jack Bartley and Martha Stampfer of Lawrence Berkeley Laboratory in Berkeley, Calif., recently reported. This finding does not necessarily mean that exposure to benzo[a]pyrene alone can cause breast cancer, a disease that is estimated to develop during the lifetime of one in every 11 women; rather, it suggests that such exposure could play a role. And, says Bartley, more research is needed to define just what that role might be.

Larrea bush: Plant healing power

From the stems and leaves of the desert Larrea bush comes a sticky liquid that Indians and early settlers in the Southwest once used to treat a variety of maladies such as arthritis and open cuts. Now, E. C. Mora and John Zamora of Auburn University in Alabama report that extracts from this liquid are active against laboratory cultures of bacteria, yeasts, viruses, fungi and cancer cells. In addition, the researchers reported at the recent American Chemical Society Southeast Regional Meeting in Birmingham, the plant extract produces no noticeable side effects when administered intravenously to small animals. Mora and Zamora now are testing whether the Larrea substance can fight the protozoa microorganisms that kill millions of dollars worth of chickens annually.

Science & Society

Ethics for gene splicers

Though widespread doubts about the safety of recombinant DNA research may have subsided, concern remains great over possible future attempts to genetically alter or improve human beings. Now a government panel is calling for the creation of a new oversight body to monitor any such "human genetic engineering" efforts.

The recommendation came from a presidential commission on scientific research ethics, which recently completed a two-year study examining the long-range moral and social questions posed by the rapid progress being made in gene-splicing techniques. While these techniques "are already demonstrating their great potential value for human well-being ... especially close scrutiny is appropriate for any procedures that would create inherited genetic changes or that are aimed at enhancing 'normal' people," the commission said in a written statement. "The process of scrutiny should be a varied and heterogeneous one involving many participants — not only the Congress and executive branch agencies but also scientific and academic associations, industrial and commercial groups, ethicists, lawyers, religious and educational leaders, and members of the general public."

A proposal "similar in general scope," and intended for legislation, will probably be made in the coming months by the House science and technology oversight subcommittee, according to staff member Steve Owens. The subcommittee recently wound up three days of hearings on the implications of genetic engineering.

The one governmental body currently overseeing gene-splicing work is the National Institutes of Health Recombinant DNA Advisory Committee. But its guidelines apply only to NIH-funded research and address only such immediate issues as laboratory safety, whereas the panel likely to be recommended by the subcommittee would "look at the broader human questions, the ethical problems," says Owens.

The proposal may face less opposition from scientists than have previous attempts at governmental regulation of DNA research, Owens believes. He reports that scientists testifying during the subcommittee's hearings "were mainly very positive." A notable exception was Martin Cline, the University of California at Los Angeles scientist whose 1980 violation of NIH gene-splicing guidelines resulted in reprimands and a cut-off of federal funding for his research (SN: 6/6/81, p. 357; 12/12/81, p. 375). "Despite any number of regulations and restraints imposed by contemporary society, man will eventually alter his own heredity and thereby increase his control over his environment and his destiny," Cline told the subcommittee.

Landmark waste settlement

In the largest toxic waste settlement to date, the Velsicol Chemical Co. has agreed to provide the state of Michigan with $38.5 million in funds, services and materials for the cleanup of several chemical dumpsites. The four sites are all in the central part of the state and are contaminated with such suspected carcinogens as tris, benzene and polybrominated biphenyls (PBBs). Included in the cleanup is the former Michigan Chemical Corp. plant site where PBBs were accidentally mixed with cattle feed in 1973. The chemical eventually wound up in meat and dairy products, and now exists in varying amounts in nearly all long-time Michigan residents (SN: 4/24/82, p. 276).

Michael Shore, Michigan's assistant attorney general in charge of environmental protection, says that the state got "all it asked for" in the out-of-court settlement with Velsicol. He also expressed pleasure over the speed of the negotiations, which he says will enable the state to proceed quickly in removing wastes that were threatening to contaminate a major river and ultimately the Great Lakes. Soil will be removed from the dumpsites and buried nearby in special leakage-resistant clay.