

BIOMEDICINE

Sperm test for dangerous chemicals

There is a need for rapid methods for screening chemicals that cause mutations, birth defects and cancer in mammals. Present methods require research with large numbers of test animals over a long period. Although rapid bacterial methods are available for testing suspect chemicals, it's risky extrapolating results from these assays to mammals.

A.J. Wyrobek and W.R. Bruce of the Ontario Cancer Institute in Toronto were aware that the number of abnormal sperm in mice is increased considerably when the mice are exposed to low doses of X-rays. So they thought that mammalian sperm might provide a quick, accurate test for chemicals that are dangerous to mammals. They exposed mice to different chemicals well known to trigger mutations, birth defects or cancer. Then they examined the mice's sperm for abnormalities. Sure enough, abnormalities were induced by the chemicals.

So sperm may well "provide a simply assay for deleterious chemical agents," they conclude in the November PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

Continued battle over leaded gas

If any trace element has been indicted as a danger to human health, it has to be lead (SN: 7/21/73, p. 44; 12/8/73, p. 361; 2/15/75, p. 104; 4/5/75, p. 222; 11/15/75, p. 313). Other studies have suggested that a major source of lead pollution is lead fumes from automobile emissions. Consequently the Environmental Protection Agency ruled in 1973 that lead content be reduced in gasoline.

The makers of lead additives then went to court. Last January, a three-member Court of Appeals ruled that the EPA decision was "arbitrary and capricious," because the case had not been made that leaded gas is hazardous. Currently the full nine-member Court of Appeals has the case, with a decision expected shortly.

The issue raises the question not only about citizens' rights to clean air, but also of how much scientific evidence officials need before they can step in and say "no more."

How antipsychotic drugs work

Drugs used to treat schizophrenics and individuals with other mental illnesses have been thought to act by blocking brain receptors for the neurotransmitter dopamine. But the evidence has been indirect. For instance, these drugs are known to increase the firing of nerves that release dopamine.

Now the first direct evidence that these drugs compete with dopamine for specific binding sites in the brain is reported in the November PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, by P. Seeman and his pharmacology team at the University of Toronto.

A molecular approach to cancer therapy

A molecular approach to cancer therapy is being taken by Leo A. Phillips and Roy H.L. Pang at the National Cancer Institute. They hope to eventually attack, with a drug, those nucleotide sequences that are especially rich in cancer viruses. To do so, however, they have to know the sequences.

They now report in the Nov. 17 BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS that oncornaviruses contain multiple units of the nucleotides adenyllic acid, cytidylic acid and guanylic acid. There are no chains of the nucleotide uridylic acid. Oncornaviruses belong to the C-type RNA virus class. They may cause human leukemia, lung cancer and sarcomas.

ASTRONOMY

From our reporter at the meeting of the American Astronomical Society in Chicago

Taking the measure of a dwarf

An astronomer who has spent several decades studying white dwarf stars once remarked that he began in the business when there were only seven dwarfs. A good deal more of these condensed stars, which are believed to be one of the possible end points of stellar evolution, are now catalogued, but such a basic datum as an accurate size determination, which has a strong bearing on theories of white-dwarf composition, has heretofore been lacking.

One is now presented for the white dwarf Sirius B, a member of the multiple-star system associated with the famous Dog Star (by M.P. Savedoff, H.M. Van Horn and F. Wesemael of the University of Rochester, L.H. Auer of Yale and T.P. Snow and D.G. York of Princeton University), as a result of obtaining the first ultraviolet spectrum of a star of this class.

The work was done with the satellite Copernicus. Although Sirius A dominates the data over part of the range, a series of subtractions and comparisons of data allowed the spectrum of Sirius B to be extracted. The radius, according to Savedoff, comes out to 0.006 of the sun's radius (about 4,200 kilometers, smaller than the earth). This indicates, he says, that the theory that "white dwarfs are degenerate stars with a composition of helium and hydrogen is probably correct."

A catalogue of nonstars

Many of the objects visible in the night sky are not, strictly speaking, stars. These include associations of stars, such as galaxies, clusters of galaxies, star clusters and other associations of stars, along with somewhat odder things, nebulae, supernovas and their remnants, quasistellar objects and blue stellar objects.

R.S. Dixon of Ohio State University announced the compilation of a list of all such optical objects. It contains 200,000 entries and is the first such compendium completed since 1908. Each object is described by its name(s), type, 1950 position, angular diameter and magnitude. References to the literature on each are included.

The compilation has four purposes: to provide a means of searching for optical counterparts of objects discovered by observation in other ranges of the spectrum; to provide a means of intercomparison of selective catalogues and of showing up "unexpected" associations of objects of a different sort; to combine available optical catalogues in a computer-readable form, with all positions referred to the same year, and to serve as a literature guide for detailed surveys of a part of the sky or a class of object.

The number of names subscribed to requests for further information posted around the meeting place indicate interest in the new catalogue is quite high.

Interstellar formyl

To the three dozen or so molecular species known to be in the interstellar clouds, now add the formyl radical (HCO). It was detected by J.M. Hollis of the University of Virginia, L.E. Snyder of the University of Illinois and B.L. Ulich of the National Radio Astronomy Observatory. Formyl was found in the clouds NGC 2024, W 51 and K3-50, after earlier searches of Sagittarius B2 and Orion A had failed. This seems to indicate that a moderately high cloud density is necessary to balance formation and dissociation mechanisms and maintain a steady presence of formyl.