tumors," she says.

One of the next research steps, she says, will be to see how much repair levels differ in normal persons. "A person who gets skin cancer after sunbathing for 40 years may have a less efficient repair mechanism than those who don't." Until more research is completed, she says, "we can only make guesses." □

EPA to study tap water carcinogens

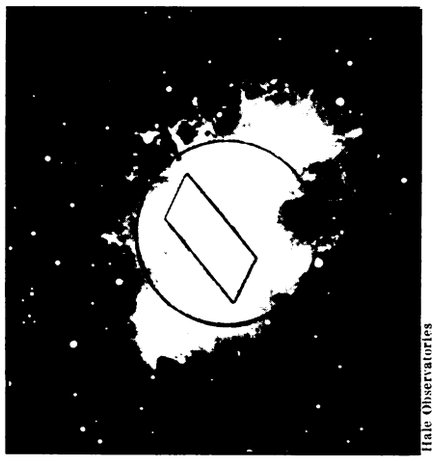
This seems to be the year of the chemical assault on human health. Researchers are forging links between human cancers and a host of environmental pollutants and industrial compounds, including vinyl chloride and other plastics components, arsenic, asbestos, ozone and aerosol propellants. Now, there is evidence that clean drinking water in some localities may contain carcinogenic compounds. Many of the compounds detected contain chlorine and some scientists think chlorine added to purify the water may be combining with organic substances not removed during filtration to form the dangerous substances. In the wake of the reports, the Environmental Protection Agency is organizing a nationwide study to determine the sources and extent of the contamination.

EPA Administrator Russell Train last week announced the three to five-month study and released the results of earlier studies conducted in New Orleans and Cincinnati in which concentrations of the carcinogens chloroform and carbon tetrachloride in the parts per billion range were detected in municipal drinking water. A total of 66 compounds were found in the New Orleans drinking water, many of them chlorinated organics, including pesticides and industrial by-products of the inorganic, organic and petrochemical industries. Gordon G. Robeck, director of the EPA water supply research laboratory in Cincinnati, told SCIENCE NEWS that EPA officials would meet this week to determine how the nationwide study will be conducted and who will participate.

Robert Harris, a consulting environmental scientist for the Washington-based Environmental Defense Fund, is highly critical of the proposed EPA study. EDF released its own study last week comparing cancer mortality among white males in Louisiana parishes (counties) that draw most of their drinking water from the Mississippi with mortality of white males in parishes that draw from local ground water. They found "a significant relationship . . . between total cancer mortality, mortality from cancer of the urinary organs, and mortality from cancer of the gastrointestinal tract with drinking water from the Mississippi River." Harris calls the EPA "irresponsible" for not acting immediately to remove suspected carcinogens. "There is already enough presumptive evidence, including our study, to warrant getting these substances out. Saying 'Let's study the situation for five years' is like saying 'Let's continue dosing the public with carcinogens for five years.' The people of New Orleans can't very well drink a nationwide study."

Harris advocates the use of activated carbon instead of sand in water purification filters to remove organic contaminants and the use of ozone instead of chlorine to purify the water. Robeck agrees that activated carbon is "one of the more practical and immediate" solutions for removing many contaminants, but thinks both activated carbon and ozone must be studied thoroughly before the EPA can make a general statement to that effect. "There could be other by-products entering the water from the contact with activated carbon and ozone that we don't know about yet. This will be the focus of some of our research." □

Crabbin' in the sky—with X-rays



Hale Observatories

Crab's X-ray-emitting areas are small.

On July 4, 1054, Chinese astronomers noted the appearance of what they called a "guest star." Today we would call it a supernova. The remnant of that 1054 supernova is still with us. We call it the Crab nebula, and for astronomers it is one of the most interesting objects in our galaxy.

The Crab contains one of the first pulsars found, one which, unlike almost all others, pulses in light as well as radio, and it is an important source of X-rays. Thus it unites three ranges of the spectrum, and these emanations and their interrelations should yield important information about the physics of supernova remnants.

The Crab's X-ray emissions are now the subject of an international series of observations, and the first results out already show distinct surprises.

One of the main things to try to find out with an extended body like the Crab is exactly what part of it different signals come from. Optical and radio telescopes can pick out the tiny pulsar that bleeps away in the middle of the nebulosity, but the resolving power of X-ray telescopes is sadly below that capability at present.

Recourse is had to the technique of lunar occultation. Periodically the moon passes in front of the Crab. The moon's lack of an atmosphere gives it a very sharp edge, and its position is precisely known. To know where any part of the X-ray signal comes from, astronomers note the moment it shuts off and then look to see where the moon's edge was at that moment. The occultations occur once a month for 20 months, but the series comes only once every 11 years.

For the occultation of Aug. 13 a telescope designed by a group from the Massachusetts Institute of Technology, led by Walter H. G. Lewin and including George R. Ricker Jr. and Anton Scheepmaker, was flown by balloon from Saskatchewan. The group believes it is the most sensitive instrument of its kind.

Early results of that flight now confound some expectations. Astrophysicists had thought that the X-rays came either from a large part of the nebula or from the neighborhood of the pulsar. The MIT flight found that the Crab's high-energy X-rays come from a region near the pulsar where for 50 years optical astronomers have noted what they call "wisps." One of the theories about the wisps is that they are regions where energetic electrons spiral in magnetic fields, producing synchrotron radiation. The association of the X-rays with the wisps may help elucidate how the wisps help transmit energy from the pulsar to the nebula.

In visible light the Crab is elongated. So it is in X-rays, but the X-ray region is narrowest in the direction in which the optical region is widest. The X-ray region is only one-twentieth as big as the optical, indicating, Lewin says, that the pulsar is the source of high-energy electrons that cannot travel far before losing their energy.

For each occultation date through next spring and possibly beyond, someone somewhere will be taking a look at the Crab's X-rays. Together the efforts should yield quite an encyclopedia of Crab data. □