physical sciences

Intergalactic matter

An important cosmological question is whether there is unseen diffuse matter occupying the space between galaxies. If there is enough intergalactic matter, it could determine the curvature of the universe and whether that curvature is closed or open (SN: 3/18/72, p. 187).

One way to seek evidence of intergalactic matter is to look for a slowing of objects moving through intergalactic space. One class of such objects are the double radio sources associated with galaxies. Astronomers presume that these double sources began in outbursts of the galaxy they are associated with. Endowed with velocities by the outburst, they are gradually moving apart.

D. S. de Young of the National Radio Astronomy Observatory collected statistics on the separation of such sources. He reasoned that if there is intergalactic matter and if it is material expelled by galaxies, it will be thicker in the midst of clusters of galaxies than it will be in the neighborhood of isolated galaxies. In the April 1 ASTROPHYSICAL JOURNAL LETTERS he reports that the separations of double sources associated with cluster galaxies are on the average smaller than those of isolated galaxies. This could be taken as indication of slower motion and of the existence of interstellar matter.

A simple solution for quasars

The quasars or quasi-stellar objects are a standing mystery of astrophysics. The question is to imagine a mechanism that could generate such large energies in such a compact space.

Many suggestions have been put forth, and some of them are very exotic, like the one that says quasars are the boundaries between matter and antimatter in the universe. In the April 1 ASTROPHYSICAL JOURNAL LETTERS E. Daltabuit and D. Cox of the University of Wisconsin propose what they call a very simple mechanism: The collision of two dense high-velocity gas clouds would form shock fronts that could convert the kinetic energy of the clouds to the observed radiation. The necessary velocities are on the order of 2,000 kilometers per second. The idea, they say, is similar to one proposed by D. E. Osterbrock for Seyfert galaxies. Daltabuit and Cox suggest that such clouds may be generated in large numbers in the process of galaxy formation.

A class of high-temperature superconductors

A few weeks ago a group of physicists working at Bell Telephone Laboratories reported the discovery of superconductivity in lithium titanium sulfides at fairly high temperature—10 degrees K. and higher (SN: 3/11/72, p. 167). At the time they said the discovery was leading them on to a large class of three-element compounds with three-dimensional crystal structure that show superconductivity at similar temperatures.

In the March 31 SCIENCE, B. T. Matthias, M. Marezio, E. Corenzwit, A. S. Cooper and H. E. Barz specify some of those compounds. They are compounds of molybdenum and sulfur with copper, zinc, magnesium, silver, cadmium, tin or lead. Superconductivity appears at temperatures from 2.5 degrees K. for the cadmium compound to 13 degrees K. for the lead one.

environment

Three-dimensional air pollution

Obviously, air pollution exists in three dimensions. But monitoring usually has been only on one level. Now scientists from the University of California at Riverside and the National Aeronautics and Space Administration, have done three-dimensional sampling that indicates that air pollution is worse than earlier imagined.

The three-year UC-NASA study, which began in July 1971, already shows that nitrogen dioxide (NO_2) levels above ground in northern and southern California areas are as high as 6 parts per million, 10 times the allowed level. Levels of the acrid, brown NO_2 were so high over the Salinas Valley that researchers had to wear oxygen masks. Over Long Beach, the reading in January 1972 was 3 ppm.

The airborne testing shows, say UC's James N. Pitts and NASA's Ronald Reinisch, that "the presence of such high amounts of oxidants, mostly in the form of NO_2 and of more than one inversion layer, would substantially change mathematical models used by science to study smog." They added that more stringent pollution controls are needed.

Lo, the poor reptile

Reptiles are not very popular beasts with humans. But the facts, as any herpetologist knows, are that few reptiles are harmful to man, and that reptiles play key roles in ecosystem management.

Paul Dow Dawson of the University of Cincinnati says that although reptiles are becoming more popular, especially with conservationists, endangered reptilian species still are not getting the protection they need.

The plight of the alligator is well known. Once it ranged all over the Southeast, as far as Oklahoma, but now its U.S. habitat is mainly restricted to southern Florida. (The American crocodile's range is even more circumscribed.) Less well-known endangered reptiles include, he says, the colorful San Francisco garter snake which has been endangered by the great influx of people into California. Never very abundant, the bog or Muhlenburg's turtle, which ranged from New York through North Carolina, is now found only in scattered colonies —due mainly, once again, to the bulldozer and other human encroachment, Dawson says.

Plant life and man

It is so obvious that plant life is essential to man's survival, not just as food and fiber, that it seems superfluous to produce a study proving it. But the National Oceanic and Atmospheric Administration has done so in case there are any doubts.

"Temperature and noise pollution, two major factors bearing on satisfactory urban living, are related directly to the degree of cover provided by trees retained in developing suburbs," says the report. "Plant cover also helps control wind and water erosion and runoff, provides shade, conserves moisture and contributes to esthetics and recreation."

Evaporational cooling and sound dampening by trees provide the temperature and noise benefits, says the study, which recommends its findings to "public officials, architects, suburban developers, horticulturists and foresters."