BIOMEDICINE

Scrapie agent may be tiny virus

Scrapie was first noted as a disease of sheep—a strange, long-incubating illness which, in addition to nervous-system degeneration, caused the animals to scrape or rub their skins. It has since been recognized as a member of a group of related diseases, including two human brain degenerative diseases, juru and Creutzfeldt-Jakob disease. An even broader connection is suspected; the same starchy plaque deposits seen in the brains of test animals with scrapie are seen widely in aged humans.

The interest in scrapie diseases has lead to much work—and controversy. The causative agents have not yet been isolated, making study of the diseases difficult, but speculations about possible agents abound. Some, for example, feel the agents must be some kind of tiny viruses; others think they may be small nucleic-acid sequences attached to membranes. A report in the Oct. 23 NATURE adds new information to the controversy.

Hyun J. Cho and A.S. Greig, both with Canada's Animal Diseases Research Institute, report isolating tiny, virus-like particles from mouse brain infected with scrapie. The particles are only 14 nanometers across. If they turn out to be a virus, they will be the smallest ever reported. And if they turn out to be the scrapie agent, they will enable researchers to use standard virology techniques to study scrapie diseases.

Laser light for cancer detection

Lasers are being used more and more frequently in clinical medicine. Retina repair, birthmark removal and surgical incisions are just three such applications. A new laser diagnostic technique is proving useful for the early detection of cervical cancer cells and may be as accurate as the Pap test.

Gary Salzman and co-workers from Los Alamos Scientific Laboratory reported the technique to the recent meeting of the Optical Society of America in Boston. When laser light shines through cells, Salzman says, it is scattered according to certain of the cell's physical and chemical characteristics. The scattering patterns form cell "signatures" which can be cataloged in a computer and used for comparison and identification.

Salzman's group has applied the laser technique to the detection of cervical and vaginal cancers. Cell samples are suspended in saline and passed through a flow chamber. Each cell is struck by low-power laser light, and its scatter pattern converted to an electrical signal and stored by computer for comparison with similar cell types (both benign and malignant). The accuracy of the laser computer test is comparable to that of the Pap test, Salzman says, and could be valuable as an automatic prescreen followed by microscopic examination of suspect cells by a technician. Development could take about two years, he says.

Vinyl chloride and birth defects

Vinyl chloride, the gas used extensively in the production of polyvinyl chloride plastic (PVC), is being linked to more than isolated liver cancers in industrial workers. Joseph Wagoner, director of field studies for the National Institute of Occupational Safety and Health, testified last week before the California State Senate that geographical proximity to polyvinyl chloride manufacture might be linked to increased chances of birth defects and to brain tumors in adults. He cited a recent study by Peter F. Infante, now a NIOSH researcher in Cincinnati, showing increased likelihood of birth defects among children born in three Ohio towns where polyvinyl chloride is manufactured. Adults in the towns also had three times the normal levels of brain tumors, and the wives of PVC workers were found more likely to miscarry. The findings, Wagoner emphasizes, are preliminary ones and based on statistical analysis.

SPACE SCIENCES

Of more and older asteroids

An increasing number of researchers are ascribing to the theory that the present asteroid belt between Mars and Jupiter is merely the remains of a larger population that was depleted by mutual collisions, which ground many of the early objects into dust. Clark R. Chapman and Donald R. Davis of the Planetary Science Institute in Tucson, Ariz., now suggest that the initial population may have been much larger indeed—roughly 300, and perhaps as many as 3,000 times the present amount.

"The asteroid zone," they report in the Nov. 7 SCIENCE, "did not necessarily have an anomalously low density of solar nebular condensates from the earliest epochs, but probably contained enough material . . . to comprise at least a small planet." In fact, they argue, so long as most of the early objects were smaller than about 500 kilometers, "the present belt could be the remnant of any population ranging from one modestly larger than the present population to one vastly larger."

The authors' estimate of the original population size is based in part on spectrophotometry of the stony-iron class of asteroids. Comprising about 10 percent of the number of larger asteroids, the stony-iron ones seem to be the relatively intact cores of about 50 geochemically differentiated early objects whose dominantly rocky mantles have been fragmented away. Only one such asteroid—Vesta—seems to remain with its mantle intact, which suggests that the stony-iron proto-objects must have been bombarded by an initial asteroid population some 300 times more abundant than it is today. If the extra material came from a planet-to-be that never made it, "presumably such a planet was accreting until collisional fragmentation interrupted the process, probably due to nearby Jupiter's influence." In fact, they maintain, "the meteorites that are still falling on the earth today are probably pieces of these same objects, which may have had such a disproportionate influence in shaping the surfaces of all the terrestrial planets during the first half-billion years of solar system history."

Rocket-borne materials processing

The first in a series of sounding rockets planned to continue the materials processing experiments that began aboard Apollo and Skylab is now scheduled for early December. The purpose of the series is to maintain momentum in the research and to enable the best use to be made from subsequent experiments aboard the space shuttle in the 1980's.

About 16 flights are planned, to be conducted at a rate of three per year through 1980, under what is known as the Space Processing Applications Rocket (SPAR) project. Each flight, to be launched from White Sands Missile Range in New Mexico, will carry about 300 pounds of payload and offer about 5.5 minutes of near-weightlessness (0.0001 times earth's gravity). The payloads will be recovered by parachute.

The first flight will carry nine experiments selected from among 62 proposals: dendrite remelting and macrosegregation; liquid mixing; lead-antimony eutectic; foams from sputter-deposited metals; thoria-dispersed magnesium; particle-interface interactions; bubble behavior in melts, and contained polycrystalline solidification (all from U.S. researchers) and dispersion-strengthened lead-silver alloys (from West Germany). Each flight will be launched by a small Black Brant VC sounding rocket, aimed to reach a maximum altitude of about 225 kilometers in a sub-orbital, ballistic trajectory, and will cover a horizontal distance of about 80 kilometers.

The SPAR project is being managed at the National Aeronautics and Space Administration's Marshall Space Flight Center in Huntsville, Ala., by team head Brian Montgomery.