their genetic information (RNA) into DNA? Then might the DNA copies of the viral genes be inserted into the DNA of host cells? And might the viral DNA make the cells cancerous?

But research compiled during the past year or two somewhat deflates that hope, or at least makes it harder to document. This fact was brought home last week at a meeting of the American Chemical Society in Chicago.

The reverse transcriptase enzyme, which appeared to be a unique product of RNA tumor viruses, has now been found in noncancer viruses as well. It has also been found in noncancerous cells. It now becomes clear, says Temin, that the enzyme does not always correlate with cancer.

In fact, even RNA tumor viruses may not necessarily lead to cancer. DNA copies of viral RNA are now known to incorporate themselves into the DNA of host cells. But even when this happens, cells do not necessarily become cancerous. "Integration of viral-specific DNA in itself is not the cause of cancer," reports Harold E. Varmus of the University of California at San Francisco.

Have investigators given up hope, then, that RNA-directed DNA synthesis might provide a key to the cancer process? Not really. RNA virus-produced reverse transcriptase does not always turn cells into cancer cells. But transformation of cells by RNA tumor viruses is always accompanied—as far as P. K. Vogt of the University of California at Los Angeles can tell—by viral DNA. The viral DNA has presumably been made by the reverse transcriptase enzyme. So the reverse transcriptase enzyme is necessary, if not sufficient, to cause cancer.

The implication of reverse transcriptase in the cancer process, then, has been amply demonstrated. But what the implication means will only become fully evident when scientists get at the basic genes of viral RNA and identify which genes might transform cells into cancer cells. □

Joan Arehart-Treichel

Temin: It's not a cancer exclusive.

Mesons on the mesa: First from the factory

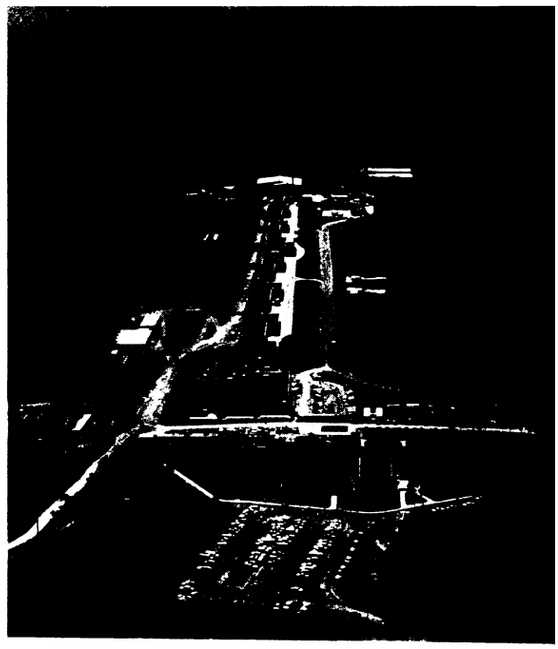
About 10 years ago physicists began to seek the construction of the so-called meson factories. These are machines that would accelerate beams of protons and drive them against targets so as to produce copious beams of mesons, particularly pi mesons. Pi mesons are useful as probes of the atomic nucleus, and nuclear physics stands to benefit greatly from meson factories. So would medicine: Pi mesons have a potential use in the destruction of certain kinds of tumors.

The Clinton B. Anderson Los Alamos Meson Physics Facility (LAMPF) located on top of a mesa at Los Alamos, N.M., is the one project to provide such a meson factory in the United States. Last week it produced its first pi mesons. The event climaxed five years of design, engineering and construction.

The pi mesons were produced in beam area "A," one of three beam areas at the end of the protons' 1,800-foot flight. The area had been declared ready on Aug. 25 and received its first proton beam, of 447 million electron-volts (MeV) energy on Aug. 26. The first pi mesons were produced on Aug. 27. The ultimate plan is to use protons of 800 MeV energy.

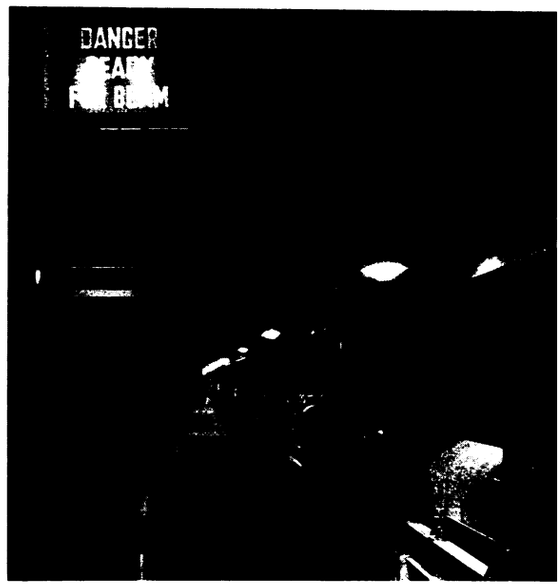
Participants in the meson production include Don Cochran, Robert Macek, Robert Burman, Don Hagerman and Mahlon Wilson of Los Alamos Scientific Laboratory and Mark Jakobson of the University of Montana, chairman of the LAMPF Users Group.

The first pi mesons were the signal to begin an effort that includes tuning the main and secondary beam lines and preparing the secondary lines, where the mesons will appear, for experiments. It is expected to take several months. □



LASL

LAMPF, meson factory on the mesa.



LASL

Inside the tunnel ready for the beam.

Are the outer planets 'failed' stars?

The planets of the solar system can be divided broadly into two classes: the terrestrial (Mercury, Venus, Earth and Mars) and the Jovian (Jupiter, Saturn, Uranus and Neptune). (Pluto is left out because too little is known about it.) The terrestrial planets are small, compact bodies with densities greater than about 4 grams per cubic centimeter. The Jovians are large and diffuse with densities less than 2.25 grams per cubic centimeter. The terrestrials all lie within 1.52 astronomical units of the sun. (One astronomical unit is the radius of the earth's orbit.) The Jovians only begin after a sizable gap: Jupiter, the nearest Jovian to the sun, is 5.20 astronomical units away from the sun.

These differences have excited much speculation among astronomers, and the suggestion has been made several times that Jupiter looks more like a small star than a planet. Now comes D. McNally of the University of London Observatory, who argues that all four of the Jovians are "failed" stars. Specifically, he suggests "that the terrestrial planets formed in a high-density shell surrounding the proto-Sun and that the Jovian planets are the remnants of other attempts to form stars contemporaneously with the Sun."

If Jupiter, Saturn, Uranus and Neptune are all indeed failed stars, they failed almost at the point of becoming stars. What inhibited their final collapse into the stellar state? Clearly it was not proximity to the sun: Binary stars are

known with separations less than 0.05 a.u. The usual theory of star formation, which considers the collapse of a spherically symmetric gas cloud, doesn't really indicate any possible inhibiting factors. McNally attacks the theory as too simplistic. His numerical calculations, which include gravity and the effects of rotation, show that a combination of many different internal factors could frustrate star formation. The cloud out of which the sun collapsed, he says, would have contained several density fluctuations around which stellar collapse began. But only the sun made it. "The other density fluctuations must have become inhibited and are now observed as the Jovian planets." □

Europeans to build space laboratory

The Europeans have decided—at long last—to build a space laboratory that can be taken into earth orbit in the space shuttle, now being developed by NASA. (NASA has been wooing the Europeans for five years. Specific discussions about the space laboratory have been going on for over a year.) A formal signing will take place Sept. 21 in Washington.

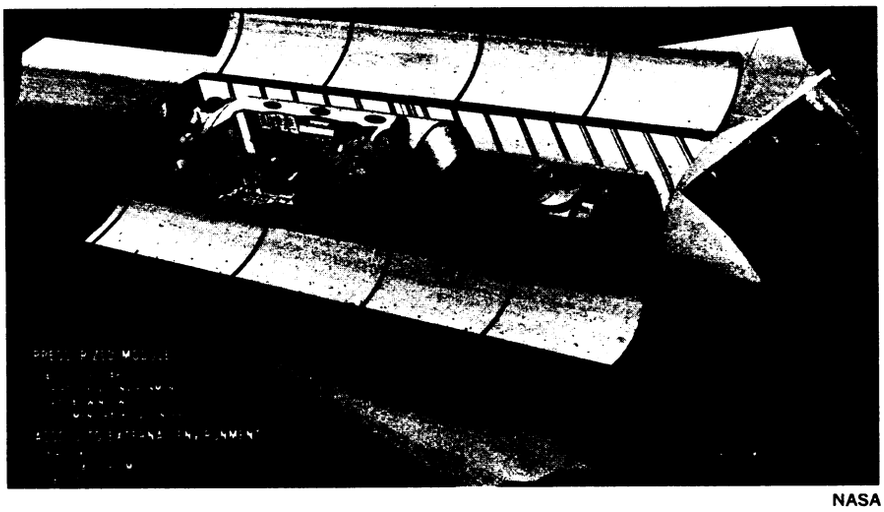
A memorandum of understanding between the European Space Research Organization (ESRO) and NASA has been signed by representatives from Belgium, Germany, France, the Netherlands, Switzerland, the United Kingdom and the United States. Spain and Italy are expected to sign sometime this month.

The understanding sets forth the conditions under which ESRO will develop the laboratory. The work will eventually be turned over to the new European Space Agency (SN: 8/11/73, p. 87). Aerospace companies building the laboratory in Europe will work closely with those companies in the United States that are building the shuttle. The laboratory will cost the Europeans from $250 million to $300 million.

The lab will have two sections, a pressurized manned laboratory and an external unpressurized instrument platform. The pressurized section will house experimental apparatus, data processing equipment, electrical power equipment, an environmental control system and control stations. Up to six scientists and engineers will be able to work in the lab for a week to a month. The scientists will eat and sleep in the shuttle orbiter, which will remain attached to the lab while in earth orbit. They will have a shirt-sleeve environment to work in.

The pallet or platform will house large instruments such as telescopes and antennas that need wide viewing angles and exposure to space. The instruments will be remotely controlled from the laboratory.

The whole unit will be carried into space in the shuttle's cargo bay. At the end of each mission, the shuttle will return the lab to earth where it can be removed and prepared for another mission. It is envisioned that the lab and platform can be equipped with a variety of instruments for multidisciplinary research in fields such as biology, earth sciences, astronomy and physics. □



NASA

European scientists and astronauts will do research in space from the new lab.

Psychologists in a maze of social issues

Seventeen thousand psychologists showed up in Montreal last week and submitted themselves to an experiment in sensory overload. Montreal's center city, with its underground passageways and numerous hotels, shops and restaurants, was turned into a giant maze. Experimental conditions consisted of too many psychologists, too much heat and too many places to go and things to do. The occasion was the 81st annual meeting of the American Psychological Association, by far the largest in APA history. Results of the experiment are unclear, but from an examination of the population density at various points along the maze, it is apparent that many psychologists are getting into and becoming involved with humanistic and social issues—probably because of the lack of positive reinforcement in the form of Federal funding for basic research and experimental psychology.

At one overcrowded session, for instance, 700 delegates were told of a program in which 33 schizophrenic patients were successfully treated by psychotherapy—the implication being that schizophrenia is more of a cultural and environmental phenomenon than a physical or biological disease. Previous studies (especially one by Philip R. A. May in 1968) have concluded that medication is primarily responsible for any patient change and that psychotherapy produces no appreciable change. Bertram P. Karon of Michigan State University and Gary R. VandenBos of the Livingston Mental Health Center in Howell, Mich., presented evidence to the contrary. "This is the first study," they say, "to clearly show the benefits of psychotherapy for such patients. They found that 20 months of psychoanalytical psychotherapy with schizophrenics led to greater long-term change in the thought disorder, better overall adjustment and shorter overall hospitalization than medication alone. The experiment and the personality of the psychotherapist were important factors in the outcome. The best results, for instance, were obtained by therapists who had more than 10 years of experience in doing psychotherapy with schizophrenics. The most successful therapists were familiar with and had a commitment to patients who were primarily lower class, poor and black. This point, say the researchers, "cannot be overemphasized since poor patients are not typically popular with professionals."

Karon and VandenBos do not imply that medication should not be used with schizophrenics. Phenothiazines in particular, they note, were of value in controlling the behavior of patients. But, they say, medication "somewhat slowed change in the thought disorder as compared to psychotherapy alone."

Carl R. Rogers of the Center for Studies of the Person in La Jolla, Calif., was not surprised by these results. He spent more than 40 years making an empirical science and forming a rigorous theory of psychotherapy. Discussing his own work with schizophrenics, Rogers said they improve whenever they are treated like human beings. He noted that he was successful only when he cared about the patient, when he was real to the patient. "We are coming," he said, "to realize that a schizophrenic is not just a chemical or physiological freak. Schizophrenia is heavily psychological." □