PHYSICS

Test Cheap H-Bomb Power

➤ THE "ASTRON," a device to test the production of power by taming the hydrogen bomb's fiery reactions, has been described for the first time.

Nicholas C. Christofilos, physicist at the University of California's Radiation Laboratory, Livermore, told the American Physical Society meeting in Vancouver that a model of the Astron is now being built. Designed ultimately to yield cheap energy from the controlled fusion of hydrogen nuclei, the concept is considered sufficiently promising that costs of operating a full-scale machine have been investigated.

Preliminary results of the economic study indicate operation of a power producing thermonuclear reactor based on the Astron idea might be economically competitive with conventional power sources.

Key to the Astron approach is a cylindrical sheet of high-energy electrons, the negatively charged bits of matter that carry electrical currents.

This electron sheet, called the E-layer, would be responsible, in principle, both for providing the magnetic confinement of the plasma and for heating it to thermonuclear temperatures, on the order of 100,000,000 degrees centigrade.

The Astron will be composed of a long vacuum cylinder through which a magnetic field will be established by means of external coils, the direction of the field being parallel to the axis of the cylinder. When electrons of several million electron volts are injected into the vessel, the magnetic field will make them travel in corkscrew, or helical, paths. This is the electron sheet, or E-layer.

The rotating electrons of the E-layer are expected to constitute a current, with the E-layer acting like a solenoid. The solenoid should create within itself a magnetic field of opposite direction that would modify the field initially present.

When the current in the layer reaches a high enough value, the net magnetic field in the central region creates a pattern of magnetic lines closing onto themselves inside the vacuum vessel. The closed magnetic lines thus form a "magnetic bottle" wherein plasma can be trapped.

At this time, a mixture of deuterium and tritium gas at room temperature would be admitted into the chamber. It would be immediately ionized by the electron layer and the resultant plasma, now trapped by the magnetic field, would begin to gain energy from successive collisions with the high-energy electrons in the E-layer.

In this way it should be possible to increase the temperature of the plasma to values of thermonuclear interest. The model now being built will be used to test the theoretical principles and is not expected to produce power.

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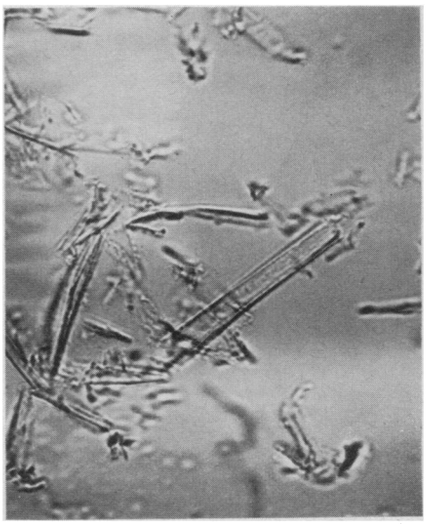

CRYSTALLIZED HORMONE— These crystals of growth hormone were prepared from human pituitary glands. Quantities are being made available to extend exploratory clinical research in this field. Success in causing growth of pituitary dwarfs by human growth hormone has recently been reported.

PUBLIC HEALTH

Fallout Will Continue

➤ THE END of nuclear weapons testing will not mean the end of fallout. Radioactive debris will continue silently to shower the earth for years to come.

Just how many years, however, is at present an uncertainty. A by-product of a nuclear test ban, ironically, could resolve the unknown about fallout. Currently, scientists are unsure of how much fallout is overhead, the rate it is falling to earth and how long it will take for the fallout depot in the stratosphere to dissipate. With no more debris being dumped skyward scientists will better be able to improve their estimates of these factors.

The fallout that will continue to rain on man, his land and oceans is known as stratospheric fallout and it is made up principally of the dangerous strontium-90. It has been estimated by scientists that one-half of the reservoir of the stratospheric fallout will come to earth within the next five to ten years. Some of it will never come down, but will decay and be dissipated in the stratosphere.

If testing comes to a halt, the strontium-90 locked "upstairs," as the scientists refer to the depot of radioactive debris hanging over the earth, is not enough to cause ground levels of strontium-90 to rise significantly when it falls to earth.

In the recent United Nations report on the Effects of Atomic Radiation, the UN Scientific Committee had this to say about continuing fallout:

"Analysis of fallout material has shown that strontium-90 can remain in the stratosphere for many years before being deposited on the earth. The depletion mechanism of the stratospheric reservoir is not yet adequately known. It has been estimated from measurement of fallout rate and stratospheric content that the annual strontium-90 fallout is about 12% of the stratospheric content. . . . The concept of a constant fractional removal per year of the stratospheric content is inconsistent with meteorological principle. However, nothing better can be offered at present."

Perhaps, as one scientist has suggested, the cessation of nuclear weapons testing will resolve many of these unknowns.

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MEDICINE

Linking Diseases to Blood Types Questioned

➤ A SWISS PHYSICIAN is questioning the validity of studies showing a relationship between blood types and susceptibility to certain diseases.

Stomach cancer, duodenal and gastric ulcer, diabetes mellitus, pernicious anemia, bronchopneumonia, toxemia of pregnancy and other diseases among blood types A, B and O have been studied both in Europe and the United States, Dr. Alexander Manuila of the Institute of Anthropology at the University of Geneva reports in the *Journal of the American Medical Association* (Aug. 23).

Most of these investigations have led to contradictory results and are open to objection on methodological grounds. For instance, one study indicated that stomach cancer was more common among group A than other blood types. Another comparable study indicated contradictory results.

Dr. Manuila suggests that statistical and technical pitfalls may be partially responsible for the inconsistency of the various results. A study of the original blood grouping of 2,050 men of the U. S. Armed Forces and Air Force revealed that typing was 8.8% in error. Another study revealed that as many as 10% of infants with blood group AB are sometimes wrongly classified as group B.

In addition, caution must be exercised to insure that samples for study are reasonably comparable in ethnic make-up. It is only the anthropologist who seems to be constantly aware of the differences that exist even within populations in a relatively small area.

Valid data can only be obtained if more regard is paid to sound methodology. This includes assurance that samples are reasonably comparable ethnically, awareness of the margin of error in this type of research, and complete rejection of the tendency to combine several small series into one large sample since there is no comparable control series for such a combination.

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