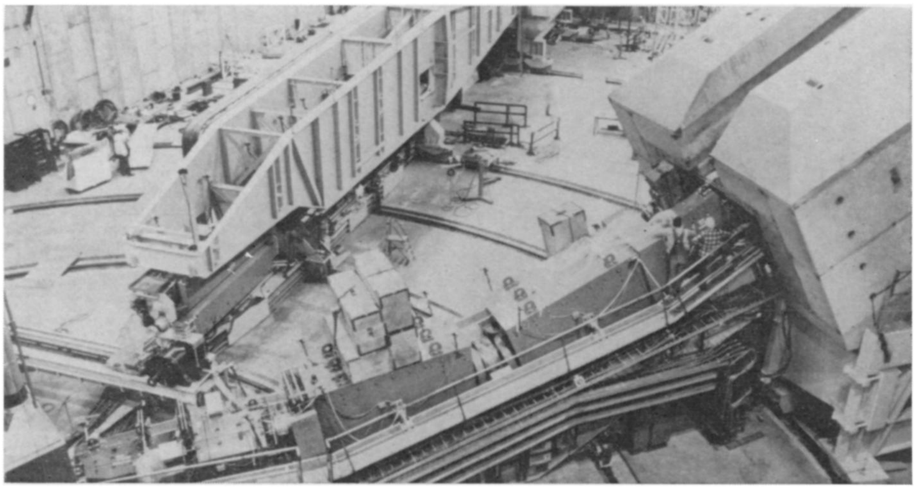
Passing the Senate with a unanimous vote, it lacked any provision for education, prevention and rehabilitation. As finally amended by joint Senate-House conference committee and passed by Congress last week, the act allots $115 million for these purposes, setting up a three-year program to be carried out by community health centers. But it retains the Administration provision for "no knock" warrants to search for illegal drugs.

But the physician-scientist lobby, led by Boston lawyer Neil Chayet, lost on the most fought-over provision. The act classifies drugs now controlled into five schedules, according to their potential for abuse and addiction. The Attorney General is given power to classify new compounds as these appear, and to conduct research for purposes of classification. The opposition lobby had sought to vest the classification and research powers in the Secretary of Health, Education and Welfare and to base classification schedules on degree of danger to the individual from illicit use. For example, the act puts both marijuana and heroin in Schedule I, although danger to the user differs sharply. The HEW Secretary can veto the Attorney General's future classifications but has no more right than any other citizen to appeal classification of drugs named in the bill.

Sen. Thomas J. Dodd (D-Conn.) said he was shocked by the last-minute removal of Valium and Librium—both widely used tranquilizers—as controlled drugs. He said he would introduce an amendment to add these Hoffmann-LaRoche prescription drugs, which, he charged, have been used in several thousand suicide attempts. □

SUBNUCLEAR PARTICLES

Evidence for partons



Stanford Univ.

Searching for partons, spectrometers at SLAC record scattered electrons.

In attempts to determine the internal structure of protons and neutrons, physicists bombard them with electrons. The electrons, being smaller particles than the protons and neutrons, penetrate into them and emerge with information about the internal structure.

The higher the energy of the electrons the deeper they will penetrate into the target and the more they reveal about the structure. Over the last two years, a series of experiments have been done at the Stanford Linear Accelerator Center, in which first protons and most recently neutrons have been bombarded by electrons of 20.5 billion electron-volts energy.

Among the several ideas of what the inside of a proton or neutron might look like, the results are most consistent with a model that sees protons and neutrons as composed of several subentities, called partons, a word coined by Dr. Richard P. Feynman of California Institute of Technology.

There exists a ready-made theory in which protons, neutrons and most other particles are viewed as consisting of several subparticles, the so-called quarks. The quark theory was evolved to explain certain patterns that appear among the properties of groups of elementary particles, but a generally accepted discovery of a free quark has not yet been made, so their existence is considered hypothetical only.

For that reason, and because the characteristics of the experimentally observed parts of neutrons and protons are imperfectly known, the term parton was invented to avoid a too-hasty identification with quarks.

The simplest way to view a neutron or proton is as a simple undifferentiated blob of matter. If it is that, then high-energy electrons should find it relatively transparent, and the probability that the collision will scatter them at angles to their original path should be small.

The proton experiments, however, showed a higher probability of scattering the electrons than this simple view called for. The experimental probabilities were found to depend on the momentum and energy transferred from the electron to the proton in such a way as to bring two other possible models to prime consideration.

The first of these is a so-called diffraction model, in which the proton remains undifferentiated but the manner of the collision is changed: The electron does not strike the proton directly but interacts with it by means of a third particle, a rho meson, which bounces back and forth between them. The second picture is the parton model, in which the proton is seen as an assemblage of a number of subparticles, and the electron bounces off one of them.

The way to decide between these two models is to use neutrons as targets. The diffraction model predicts that the scattering probabilities will be the same for neutrons as for protons. The parton model predicts lower scattering probabilities for the neutron, says Dr. Richard Taylor of SLAC.

The neutron experiments were done by 18 physicists from SLAC and the Massachusetts Institute of Technology. Senior members of the group were Drs. Jerome I. Friedman and H. W. Kendall of MIT and Dr. Taylor and Dr. Herbert DeStaebler of SLAC. To measure the electron scattering from neutrons, they bombarded deuterium nuclei (which contain one proton and one neutron) with electrons and subtracted the known data for protons. The scattering probabilities for neutrons came out less than those for the protons.

Another experiment consistent with partons is the first completed at the Adone storage ring in Frascati, Italy. The experiment collided a beam of electrons with one of positrons. When an electron and a positron come together, they annihilate each other and form a gamma ray. The gamma rays sometimes turn into pi mesons. The Italian experiment found that the probability of producing pi mesons was much higher than expected. The size of the probability is consistent with the suggestion that a parton appears as an intermediate step between the gamma ray and the pi meson.

Results so far are thus consistent with the parton model, but says Dr. Taylor, "It is possible to build models of similar character without partons." Nevertheless, he says, "The parton model has been correct in a qualitative way from the beginning. Other theories, when able to predict, have usually predicted something different." □