gested that there might be a similar difference in effect on various types of tissue such as animal tumors.

The neutron is a newcomer among the minute particles that compose matter. It was discovered in 1932 by Dr. J. Chadwick of Cavendish Laboratory, Cambridge, England, and the discovery was recognized by the award of the Nobel prize to Dr. Chadwick. It is considered to be one of the fundamental building blocks of atoms and it is notable because of its electrical neutrality, a quality that may have something to do with its seeming ability to penetrate more effectively into the center of atoms and living cells. In size it is far, far beyond the limit of visibility, as are all atoms. Its mass is approximately that of the lightest of atoms, hydrogen. Some scientists have suggested that it consists of an electron and a proton, the more familiar electrically charged particles, clinging together.

The neutron ray is therefore a stream of particles. The X-ray, on the other hand, is a radiation like radio waves and light, only with a frequency much higher, or to say the same thing, a wavelength much, much shorter.

Science News Letter, May 9, 1936

PHYSICS

Scientists Describe Design of Fortress for Atom Study

Half-buried Chamber, 60 Feet in Diameter, and Research Rooms Are Only Part of Elaborate Plans

See Front Cover

A VERITABLE fortress of science, that will have more than a passing resemblance to the famed "ring of steel" forts which France has built along its eastern border, is planned for early construction by the scientists of the Carnegie Institution of Washington.

A giant atom-smashing machine of the electrostatic type which will produce bombarding "bullets" of at least 10,000,000 volts energy will be built by Dr. M. A. Tuve of the Carnegie's Department of Terrestrial Magnetism, it was announced at the meeting of the American Physical Society in Washington. The construction of the new atom "fort" is comparable, in its field of atomic study, with the construction, 25 years ago, of the great 100-inch telescope which brought world-wide fame to Mt. Wilson Observatory of the Carnegie Institution.

A striking feature of the new design, said the report of Dr. Tuve and his colleagues, Drs. L. R. Hafstad and Odd Dahl, will be the use of earth, concrete and underground water-tanks to shield the delicate measuring equipment and the observing scientists from the potent, dangerous high-energy rays that the apparatus will produce.

A great high-pressure sphere, 60 feet in diameter, will be half-buried in the side of a hill with the high-voltage vacuum tube device inside. The underground target can be flooded with water for some experiments with piercing neutron beams. Scientists and their sensitive equipment will be located in yet another subterranean vault where they will watch what happens as the high-energy projectiles from the "fortress" strike atoms.

For the past few years the Carnegie scientists have been testing and experimenting with the predecessor of the proposed "fortress." With their machine, creating particles of energy 1,200,000 electron volts, they have demonstrated the feasibility of the new device which will yield particles with a minimum energy of 10,000,000 volts and perhaps even 15,000,000 volts.

The "bullets" from the atom fortress will be used to break through the "armor plate" of electric force which effectively—up to the last few years—has locked the secrets of atomic constitution within the nuclei of atoms. Only high-energy particles, the atomic "bullets," can pierce through the protective electric force and get inside the atomic cores.

The Carnegie Institution apparatus is a variation of the original atomic electrostatic generator devised by youthful Prof. Robert Van de Graaff of Massachusetts Institute of Technology. Prof. Van de Graaff at the same meeting announced that his device at Round Hill, Mass., can now generate potentials of 5,100,000 volts.

Prof. E. O. Lawrence earlier told the National Academy of Sciences that his atom-smashing apparatus—of quite a different type of construction since it whirls the particles round and round and gradually accelerates them—has just produced a particle beam with 11,000,000 volts energy. (*See SNL*, May 2.)

Thus on many fronts the battle of physicists, to wrest the secrets bound up in the cores of atoms, progresses.

The Carnegie Institution's proposed "fortress" is the latest of several types of equipment which are all directed to the same goal.

Science News Letter, May 9, 1936

GENERAL SCIENCE

No Danger of Suppression of Science in America

NO PRESENT danger exists that scientific discovery and thought will be underestimated or suppressed here in America, in the opinion of Dr. Frank R. Lillie, president of the National Academy of Sciences, expressed in his annual message to that "senate" of American science.

"This condition should heighten our sense of responsibility to see that its power and authority are not exaggerated," he told the academicians.

The Academy remains "firmly founded on the bedrock of scientific research, and serene in confidence in orderly thought, whether for the understanding or control of the processes in nature and in man."

As to the future, Dr. Lillie declared that the true friends of science recognize that limitations are set in nature and in the mind itself to scientific progress. Its rate, direction or extent for any considerable period of time can not be predicted.

"Yet I think," said Dr. Lillie, "that experience should give us confidence to claim that the conquering spirit of science is one of the strongest components of ideal social processes; and always will be."

Dr. F. F. Russell, former director of