the committee on child development of the National Research Council, has found.

Dr. Hicks believes that other factors such as the physical maturing of the child and general physical training may contribute just as much to the learning of special skills as does special drill. His conclusions are reported in the current issue of *Child Development.*

Science News Letter, March 28, 1931

PHYSICS

Physicists Now Sure Vibrations Occur in Heart of Atom

Firing Alpha Rays Into Nucleus of Aluminum Atom Causes Ejection of Protons When Heart Is In Tune With Rays

VIBRATIONS within the innermost core of the atom have been proved to exist by firing high speed alpha rays into aluminum atoms, scientists of the Physical Institute of the University of Halle report.

The capture of a helium bullet by the excessively small heart or nucleus of an aluminum atom has been used in this work by Dr. H. Pose and Prof. G. Hoffman to probe the last great secret of the structure of matter. For this collision of the alpha particle with the aluminum atom is the signal for the ejection from the aluminum nucleus of a still faster kind of rays, the proton rays.

Those protons have been successfully cross-questioned by Dr. Pose and made to tell the story of the aluminum nuclei they have so suddenly left. Actually they are the cores of hydrogen atoms in rapid motion.

Four to five million volts would be required to give the hydrogen cores their high speeds by artificial means.

The speeds of those protons and of the particular alpha ray projectiles which start them on their way, give the new evidence of vibrations in the target atoms of the aluminum. At least Dr. Pose calls them vibrations.

Nothing material vibrates, however. Only a mathematical function with a highly complicated formula and the Greek name Psi. Physicists have been wary of making concrete pictures of the inside of the atom recently since the arrival of the new quantum theory.

The Psi vibrations are found in tune with oscillations which accompany certain of the alpha rays on their journey, called the De Broglie waves, another of the conceptions of the new physics. A proton is ejected when these two kinds of oscillations get into step, just as an organist by playing the right note may wreck a building.

Distances traveled by the hydrogen particles before coming to rest in the air are used to measure their starting speeds. Dr. Pose found that three groups of hydrogens of differing speeds were sent out by the aluminum atoms.

The two faster groups which pass through 20 and 24 inches of air before stopping, appear only when special speeds of alpha-helium rays are present in the projectile atoms. The speed of the alpha rays determines the frequency of the accompanying De Broglie waves.

Dr. R. W. Gurney, working at the Institute of Physical and Chemical Research, Tokio, Japan, had previously suggested that resonance phenomena might be found in the nucleus similar to that observed in the outer layers of the atom. Dr. Pose believes that his own experiments show this. Slower projectiles with a voltage equivalent of 10 to 20 volts, for instance, cause the emission of colored light from the target atom when their speeds reach a very definite value.

Recent experiments of Drs. J. C. Chadwick, J. E. R. Constable and E. C. Pollard at the University of Cambridge, England, however, show that "alpha particles which are not in resonance with the nucleus are nevertheless able to cause a detectable amount of disintegration."

The alpha rays used by the German investigators are helium atom kernels given out by polonium, a radioactive substance similar to radium.

Science News Letter, March 28, 1931

CHEMISTRY

Chemists Hail Methyl Freed for Tenth of Second

METHYL, the atomic grouping found in poisonous wood alcohol as well as in a great many other natural and synthetic organic substances, has been isolated as a free compound. But it remains uncombined for only a tenth of a second.

By heating in a quartz tube a stream of the vapor of lead tetra-methyl, a substance similar to the anti-knock substance of ethyl gas, Drs. F. Paneth and W. Hofeditz of the University of Königsberg, have, for the first time, obtained the free radical or parent group of the methyl series of compounds. They have thus solved a problem that baffled the great chemists of the last century.

The substance triphenyl-methyl, first prepared in 1900 by Prof. Moses Gomberg of the University of Michigan, is the closest relation to the free methyl radical. Methyl contains one carbon atom united to three hydrogen atoms whereas in all other compounds, carbon has four bonds joining it to other atoms or groups of atoms.

Dr. Gomberg's compound and the new methyl radical of Drs. Paneth and Hofeditz are like political radicals in breaking the rules of the game. But they are broken only for a short time. The methyl radical very quickly decomposes or it combines with lead or zinc and forms normal compounds in which the carbon has its usual combining power of four.

The combinations of atoms like methyl or ethyl, which chemists call radicals, are found in compounds with other atoms. Thus methyl forms methyl chloride, CH_3CL, a substance used as an anesthetic and refrigerant, and methyl hydroxide CH_3OH, which is wood alcohol, just as the metal sodium forms chloride, which is common salt, and sodium hydroxide which is caustic soda.

Methyl has the chemical formula CH_3.

Science News Letter, March 23, 1931