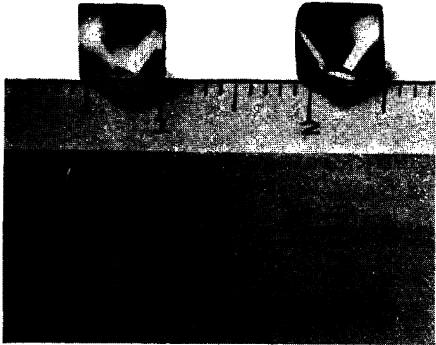


monds, even when heated for lengthy periods, merely turn a deep yellowish-brown which shows no sign of dissipating.

He believes this to be further proof

that while the effects of the cyclotron are very similar to those of natural radioactivity, they are far more intensive.

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COMPARISON

A white diamond, and one that has been made green with the cyclotron, shown against a centimeter scale. One centimeter equals .39 inches.

PHYSICS

Atom-Smasher Turns White Diamond to Green Variety

SCIENCE is using one of its favorite atom-smashers, the cyclotron, in a new role—to make those highly-prized gems, beautiful green diamonds.

The technique is simple: put an ordinary white diamond in a cyclotron and bombard it with high-speed atomic particles for an hour and—presto—it becomes a gorgeous dark green gem. Studies show such cyclotron-treated diamonds to be virtually identical with naturally occurring green diamonds which are given their tint by long-term exposure to radioactive substances. The cyclotron bombardment, because it is considerably more intensive than that from radioactive substances, simply acts to speed up the process.

Prof. Harry Berman, curator of the Harvard Mineralogical Museum, who announced the new method of making these highly-prized gems after a series of experiments with Harvard's cyclotron, said the research might also throw some light on the little-understood problem of the effects of atomic bombardment, as well as that of crystal coloration.

The major difference between cyclotron-green diamonds and radium-green diamonds, Prof. Berman has found, is that the latter lose their color upon heating for half an hour at 650 degrees, Centigrade, whereas the cyclotron-green dia-

PSYCHOLOGY

Intelligence Can't Be Isolated As Chemical Elements Can

Only a Probability That Person Possessing It Will Act in Certain Way; Must Be Related To Study of Brain

INTELLIGENCE is only a probability that the person possessing it will act in a certain way under certain conditions. It is not an inner essence or a faculty or power that can be isolated and measured as the chemist can measure the elements.

This modern view of mental abilities was expressed before the American Philosophical Society by the eminent educational psychologist, Dr. Edward L. Thorndike, of Teachers College, Columbia University.

"Three or four hours testing of a person with suitable intelligence tests or meters," Dr. Thorndike said, "gives a score which is highly indicative of how well he will do in school, how likely he is to escape confinement in an institution for the feeble-minded, and how well he will understand the sermons he hears, the policies for which he votes, and the like. It is usefully indicative of his fitness to make wise decisions as a parent, neighbor, and citizen.

"Such a score obtained at age eight to eighteen is equal or superior in value to a careful physical examination at that age by an expert physician."

Psychologists would like to be able to isolate each individual mental ability, as the chemist does his elements, and measure all of it and nothing but it. But, unfortunately for science and perhaps fortunately for man, mental abilities do not occur in pure form in any person. Each score that the psychologist can obtain from his measures is contaminated by the influence of other abilities—it is a mixture.

By the mathematical procedures known as factor analysis, components or factors have been isolated that would be pure if we could get measurements of them in real people, but psychologists vary widely in their opinion of the result, Dr. Thorndike said.

"Some expect," he said, "that the factors discovered will inaugurate great advances in knowledge about, and control of, human abilities. Some think that these factors are unrealizable abstractions, like an animal defined as 40% man, 30% turtle, 20% shark and 10% earthworm."

Psychology will not be satisfied, Dr. Thorndike declared, until it succeeds in relating mental abilities to their causes, bases, parallels or counterparts in the brain and nervous system.

Not much is known along this line at present, although some former errors have been eliminated.

"We now know," Dr. Thorndike explained, "that a brain is not much like a system of factories and storehouses interconnected by railroad tracks.

"It is more like a telephone and telegraph system with the added feature of more or less permanent modification by all the connections made and messages sent. It may include an elaborate system of resonators. What corresponds to an ability is more like a system of connections and modifications involving all army or navy activities, than like a regiment of cell-bodies. The cell-bodies indeed may only nourish and care for the conducting parts of the neurones. What the pattern of the neurones' actions is may often be more important than which particular neurones they are."

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Nazis Have Taken Lead

THE LEAD in military psychology has passed from America to the Nazis, Dr. Robert M. Yerkes, of Yale University, warned the American Philosophical Society.

In the World War, American psychologists pioneered by making their methods serve the Army and the Navy, Dr. Yerkes said.

Dr. Yerkes is himself distinguished for the services he rendered the nation at that time, particularly in development of the psychological testing and classification system which has been used successfully in industry ever since.

But after the war, Dr. Yerkes said, America neglected the field of psychology applied to the service of the state, while Germany took the initiative and leadership. Research and training centers were established in Germany and hundreds of men were trained for psychological service to the state.

Now the Nazis have an unparalleled organization to deal with problems of propaganda, morale, personnel and like matters of human engineering. The United States has no comparable organization, few military psychologists, and

no training schools in Army or Navy to meet prospective needs, he said.

Psychology has other than military values for defense, Dr. Yerkes declared.

"In the interest of social progress it would seem incomparably more important," he said, "to improve human nature and increase the ability and usefulness of the individual, than, in accordance with our current concentration of effort, to prolong life into senility."

Dr. Yerkes urged the establishment of professional schools of psychology, similar in principle to those of medicine and engineering, with courses leading to the degree of Doctor of Psychology. For those who wish to practice their profession, licensing under federal and state laws should be provided.

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barometer is 2 centimeters of mercury," he said, "the number of mesotrons is at least as great as the number of incoming cosmic ray particles as estimated by Millikan and his collaborators."

Another experiment described, made by G. Herzog and W. Bostick, made use of a cloud chamber between the poles of a powerful magnet. The chamber shows, by a fine line of water droplets, the passage of one of the various particles. With it, said Dr. Compton, there were found many slow mesotrons, which are exceedingly rare at ground level. The production of positive and negative pairs of slow electrons was also noticed.

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Diphtheria Antitoxin

PRODUCTION of diphtheria antitoxin in crystalline form was announced before the meeting by Dr. John H. Northrop of the Rockefeller Institute for Medical Research laboratories at Princeton, N. J.

First step was the formation of a precipitate, by mixing diphtheria toxin with serum from a horse which had been immunized against the toxin. This precipitate, said Dr. Northrop, is a mixture of toxin and antitoxin. The toxin was digested away with trypsin, one of the digestive enzymes, leaving the antitoxin in solution. Further treated with ammonium sulfate, the solution yielded a more highly purified, unstable, crystalline protein in the form of small plates. This protein has anti-toxic properties, which remained unchanged after three re-crystallizations.

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PHYSICS

Cosmic Rays Seem to Consist Mostly of Heavy Protons

Measurements in Airplanes Far Above Earth Show Particles Can Penetrate Seven Inches of Lead

THE COSMIC rays that continually bombard the earth from outer space seem to be mostly of protons, the heavy parts of atoms, rather than electrons. New evidence in favor of this theory is contained in experiments reported by Dr. Arthur H. Compton, University of Chicago's Nobel prizeman in physics, to the American Philosophical Society.

He told of various measurements made of the cosmic rays far above the surface of the earth, from airplanes and balloons. Some of these measured the number of particles that came in which were capable of penetrating thick blocks of lead. It was found that most of the particles which could get through an inch and a half of the metal were able to traverse some seven inches.

Many electrons are stopped by the magnetic field of the earth. Those with enough energy to penetrate this field, and so to reach the lead blocks, should be stopped by only four inches of lead, explained Dr. Compton. On the other hand, he said, the observations fit in with the idea that protons, with positive electrical charges, are the primary cosmic rays. When these strike the nuclei of atoms in the air, they produce mesotrons, which constitute an important part of the cosmic radiation observed on the earth's surface.

He also reported observations by V. C. Wilson, W. P. Jesse, M. Schein and E. O. Wollan, using detector tubes carried aloft in airplanes and balloons. These showed that an inappreciable number of mesotrons are produced below $3\frac{3}{4}$ miles altitude. At about 5 miles the production becomes strong, and increases up to at least $12\frac{1}{2}$ miles.

"At the highest altitude, where the

