SCIENCE NEWS

TELEGRAPHIC REPORTS TO THE DAILY PRESS ON THE CINCINNATI MEETING

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The energetic and systematic attacks of the Fundamentalists on the teaching of evolution throughout the country have at last aroused the scientists to make their position plain to the public. An emphatic declaration on the question was made by the retiring president of the American Association for the Advancement of Science, Prof. J. Playfair McMurrich, of the University of Toronto, in his address at the University of Cincinnati. In his survey of the work of the association during the seventy-five years of its life he showed how much biological research owed to Darwin, but he explained that the idea of evolution did not originate with Darwin nor is it limited to his doctrine that natural selection is the main causal factor in the transmutation of species.

"The biological world of to-day does not ascribe to that factor the importance that Darwin gave it," Professor McMurrich said. "Its action can not be denied, it is self-evident to any observer of Nature's ways who finds 'that of fifty seeds she often brings but one to bear.' It plays an important rôle in the suppression of the unfit rather than in the survival of the fittest, but it can act only on variations sufficiently pronounced to determine life or death. It has been shown in several cases that what seem trivial variations may, under certain conditions, lead to fatal results, but even admitting these, it is difficult to believe that many of the minute differences that distinguish species have selective values. Natural selection acts effectively in the perpetuation of species, but it does not originate them and to that extent the modern biologist may depart from Darwin's standpoint. Darwin was looking for the origin of species, the modern biologist goes a step further and is looking for the origin of variations and the mechanism of heredity, problems far beyond Darwin's times. But he stands on the foundation built by Darwin, since the whole structure of modern philosophy rests on that foundation."

The new knowledge of the carriers of inheritance and the still newer knowledge of the influence of the secretions of the internal glands on bodily structure and processes have opened the possibility of getting at the causes of variation and even controlling them in a way that Darwin could not have conceived of.

At the conclusion of his address the University of Cincinnati conferred the honorary degree of LL.D. upon Professor McMurrich for his services to science and education.

Dr. Herman L. Fairchild, the veteran geologist of the University of Rochester, also protests against the attitude and action of the Fundamentalists in the following unmistakable terms:

"The object of the association is to bring forth truth and to set forth the truth—to discover and to proclaim the phenomena of the cosmos. The educational function, the advancement of science by the diffusion of knowledgs, has not been undertaken in an active and systematic way. And the need is pressing for popular and general scientific education. Not only are many millions of people in this land of education ignorant of elementary science, and being served with sensation instead of fact, but to the multitudes the theories and truths of science are repugnant. Millions in America are kept in mental thraldom by ignorance and superstition. Old Hebrew folk-lore and a cosmogony borrowed from ancient Chaldea are reverenced as divine revelation, and many of its devotees assume that the Lord dictated to Moses in the English language. The same spirit of bigotry and intolerance that burned Giordano Bruno and persecuted Copernicus and Galileo is yet with us here in America, and seeks to dominate instruction and legislation. The truth has great need of fearless champions and forceful leaders. And as the spokesman for organized science in America the American Association should assume leadership in a crusade against the foes of knowledge."

Why is it that people who live in countries having much the same natural advantages in the way of climate and resources differ so widely in character and achievements This is the question which Professor Ellsworth Huntington, of Yale, undertook to solve in his presidential address before the Association of American Geographers in session on December 28.

He found the answer in the principle which Darwin made the basis of his theory of evolution, that is, natural selection.

"Such selection is obviously taking place to-day," he said, "and through its agency the character of a people appears sometimes to change so rapidly that racial character seems to be plastic rather than fixed as is so often supposed."

Professor Huntington found abundant evidence in support of his view during his recent travels in Australia and Asia. The Australians are remarkably homogeneous, extremely prosperous and enjoy phenomenally good health. The death rate is lower than in any other country except New Zealand. Even in semi-tropical Queensland the British stock thrives. This he attributes to the fact that the country was settled by immigrants who in health, industry, initiative and optimism were superior to the average Englishman.

New England is another example of such selective emigration. The Puritans were people of exceptional independence and courage and then the rigors of the voyage and pioneering period weeded out the weaklings.

"It was this inheritance," Professor Huntington said, "which made New England the birthplace of the modern form of democracy, of universal education and of many other new ideas, and which to-day causes people of old New England descent to occupy positions of influence far out of proportion to their numbers."

Another phase of man's social evolution was discussed by Professor Hervey W. Shimer, of the Massachusetts Institute of Technology. He traced human instincts back through the geological ages for millions of years. The three primary impulses, those for self-preservation, nutrition and reproduction, man shares with all creatures, even the lowest, such as the worm and the jelly fish. The parental instinct must have appeared in the Mesozoic era or earlier, say some twenty million years ago, for many fishes and reptiles manifest care for their offspring.

Later in time some mammals began to associate themselves in packs and herds for the betterment of protection, food supply and care for their young. This involved even in its primitive forms obedience to leadership and subordination of individual impulses that do not conform to the common will.

"Any decided originality in conduct," said Professor Shimer, "would be obliterated since it would tend to expose not only the individual, but the entire herd to danger. All members of the herd would thus develop the same fixed mental reactions to all ordinary happenings. In man we recognize the herd instinct in many characteristic reactions. Decided originality in conduct is looked upon with suspicion. What the majority say or do is right. He has fixed ideas, that is, his mental reactions are governed by what those individuals he most associates with, or the literature read by him, say is proper. The herd is his normal environment, that is, he is fearful of solitude, physical or mental. He is remarkably susceptible to leadership. He is subject to the passions of the pack, as is seen in mob violence and heresy spasms. He is more sensitive to the voice of the herd than to any other influence; it can inhibit or stimulate conduct, courage, energy, endurance."

"The results of my investigations of the high altitude rocket make reasonably certain the opening of a new field of scientific endeavor, namely, the investigation of space," said Professor R. H. Goddard, of Clark University, on December 28.

Some five years ago the reading public was interested in rumors of a project for a rocket which might pass from the earth to the moon. Little has been heard of the idea since, but Professor Goddard has been quietly continuing his researches, and now he tells that "there is but one more step to be made before I can prepare a model for flight and this step does not involve any unknown factors."

A speed of six miles a second would be sufficient to free a projectile from the attraction of the earth, and, once free, it might go on until it struck the moon or something else. The highest velocity yet attained by a cannon ball is about a mile a second, but a rocket would have the advantage over a projectile in that it would get lighter as it rose from the loss of the explosive that propels it.

By loading his rocket with smokeless powder, Professor Goddard is able to give with the stream of hot gases expelled from the rear a velocity of one and a half miles per second. When the rocket got above the atmosphere it would find traveling easier and the downward force of gravitation would continuously lessen. So to reach any height does not seem impractical.

Many years ago Jules Verne told of a hollow cannon ball that carried passengers from the earth to the moon, and recently Professor H. Oberth, of Roumania, suggested the possibility of a passenger-carrying rocket. But Professor Goddard is more modest and talks only of the advantages of taking photographs and making meteorological records at altitudes hitherto beyond the reach of man.

While electronic physicists from all over the country were reporting new complexities in the behavior of atoms, John Mills, of the Western Electric Company, was telling the engineers attending the American Association for the Advancement of Science about the marvelous simplification which has resulted from modern physical research. The basic facts are known, he said, and the advances in our knowledge promise to lead to important industrial applications.

Knowing the atom is like knowing your own automobile. You know its main features and its functions, but you can learn something new about it each trip you make, particularly if you have been acquainted with it for a long time. That is the way the physicists are getting along with their atom which they started running about 1897.

They know its main features—a tiny central nucleus of specks of electricity, protons and electrons. And about that nucleus a few electrons move with incredible speed in orbits like planets about a sun. All the present excitement among physicists has to do with the behavior of these planetary electrons. Something is always deranging their orbits.

Ever since Bohr, in Denmark, advanced the theory that some of these orbits were more natural or stable than others the physicists have been busy deranging the orbits, throwing the atom out of gear and seeing what happens. And they can see very well, because the atom tries to return to normalcy. Every time it does, or every time it comes a little nearer, it shoots out a quantum of energy—and whatever is struck by that quantum knows it, for it sees the light. Physicists photograph the light, and then think up the explanation of what happened inside the atom when the electrons tried to get back to their normal orbits.

We are just beginning to get acquainted with such newcomers as "electrons" and "protons," and now we are introduced to another minute member of the same family, the "etherion," which Professor A. P. Mathews, of the University of Cincinnati, says is the ultimate unit of light and electricity. He rejects the prevailing theory that light consists of waves in a jellylike substance called the ether. Light, he holds, is not radiated in waves, but in rays. The ether he conceives as made up of minute spheres—etherions—which are revolving at such high speed that their surfaces have a velocity of 186,000 miles a second. When one etherion gains energy of rotation it becomes an electron of positive electricity, and the neighboring etherion that has been robbed of this energy becomes a negative electron.

Professor Matthews said: "An electron is therefore simply a wave of light too small for transmission and going round and round in one place. Light is then the basis of matter, since the electrons out of which all matter is made are simply imprisoned light."

Motion picture photographs of the tracks of the nucleus of the helium atom traveling at a rate fifteen thousand times greater than that of the fastest rifle bullet were exhibited on December 29 to the American Association for the Advancement of Science by Professor W. D. Harkins, of the University of Chicago.

One of the forty thousand photographs taken in the course of his investigations showed the collision of the nucleus of a helium atom moving at this speed with the nucleus of an argon atom which is much heavier. The force of this blow was the most terrific ever recorded by any direct experimental means for the energy of this helium projectile on account of its immense velocity was some two hundred and twenty five million times that of a rifle bullet in proportion to its mass. Yet the argon nucleus was not broken up by the shock for its track beyond the site of the collision is not double but single. The nucleus is the central sun around which the planetary electrons revolve at high speed. Although the nucleus of an atom is so small that it would take a million times a million of them laid in a row to reach an inch, yet their motion can be made visible and photographed by passing them through damp air strongly lighted from the side. When the air is suddenly cooled by expansion, the flying atomic fragments leave luminous tracks of condensed water vapor. Ordinarily the path is straight, but some of the photographs show that the helium nucleus has been deflected or forced to rebound by contact with the nucleus of one of the atoms of the gas.

Equally spectacular experiments with atoms and electrons were exhibited by Dr. Willis Rodney Whitney, of the General Electric Company, in his lecture on "The Vacuum, There is Something in It." He laid a layer of thorium, one atom deep, on the surface of a tungsten wire in a lamp bulb and then drove it off by molecular bombardment, all in a few minutes before the audience. He showed how a stream of electrons, the atoms of electricity, could be retarded, deflected and then repulsed by the simple charging of a grid with the same sort of electricity by pointing at the tube with a resinous rod rubbed by his hand. He demonstrated the wireless transmission of electrical power through space. Although a lamp bulb is supposed to be exhausted to a vacuum, yet it still contains as many gas molecules as there are people in the world. He charged toy balloons with electricity by rubbing them on his hair, and then discharged them instantly by X-rays. The X-rays are now used not only for photographing our bones but also for detecting synthetic silk from natural fiber and for testing the strength of metals by revealing their crystal structure.

The new conception of the atom as mostly empty space with a positive nucleus and rapidly moving negative electrons seems at first to be a less stable foundation for the material universe than our old fashioned notion of the atoms as little hard and solid balls. Yet, as Professor Harkins showed, they can stand incredible blows and as Professor T. C. Chamberlin, of the University of Chicago, explained, in his lecture on the constitution of the earth, the rapid rotation of the electrons in the atom give the stability and elasticity of a gyroscopic top which is greater than any purely static and rigid structure could have. The intense revolutions of the atom create powerful electric and magnetic fields and their polarities afford points of attachment to other atoms and so make up solid bodies. The rotational energy embodied in the earth seems to be many hundreds of thousands of times as great as the vibration energy of the internal heat of the earth, Professor Chamberlin said, and this new view of the constitution of matter profoundly reverses the idea of their relative value hitherto held by geologists. Heat is a disintegrating force, while the revolving electrons on the contrary hold the world rigidly together.

Corn plants suffering from diabetes have been discovered and treated successfully with insulin, Dr. W. H. Eyster, of the University of Missouri, announced to the American Association for the Advancement of Science during a symposium on internal secretions. Several stalks after two or three days above ground gave off an excess of sugar—a condition exactly analogous to human diabetes mellitus—but they were able to utilize their excess of sweetness when they were fed insulin, the pancreatic extract, for the discovery of which Drs. F. G. Banting and J. J. R. Macleod, of Toronto, received the Nobel Prize.

Dr. Eyster and his coworker, Dr. M. M. Ellis, also discovered that insulin is composed of two substances, one of which when administered separately seems to cause rather than cure plant diabetes. The separation of insulin into two portions is effected by membranes such as those on roots and the second portion that does not pass through is a very active growth producer in some cases doubling the size of the corn plants. Dr. Macleod commented on this discovery and declared it to be of great importance.

Dr. Macleod told the story of how two young men, Banting and Best, working in his laboratory all summer solved the problem of extracting from the pancreas a remedy for diabetes. He was not yet ready to call insulin a "cure" for diabetes, but since the islets of Langerhans may be revived and regenerated when partially destroyed, he saw no reason why the temporary relief afforded them by insulin injections might not finally effect a cure. The pancreas has other functions than aiding in digestion and regulating the consumption of sugar, and Dr. Macleod suggested that insulin or some other hormone from this gland may control the migration and deposition of fat.

"It is startling to think that only three grains of thyroid gland extract a year stands between any of us and imbecility," said Professor R. G. Hoskins, of the Ohio State University. "A sluggish, sleepy, band-legged, pot-bellied cretin boy may be restored to normalcy, and his stature increased by several inches through feeding with extract of the thyroid gland."

Dickens's fat boy is a classic example of a mild case

of thyroid deficiency. Dr. Hoskins gave some still more startling examples of the potency of glandular extracts that the modern physician has at his command. Adrenalin extracted from the adrenal glands, above the liver, can be detected by its physiological effects in a dilution of one part in one hundred million parts of water.

But this does not compare in power with pituitrin which Professor John J. Abel, of Johns Hopkins Medical School, has just extracted in purified form from the pituitary body in the base of the brain. This can be detected in a solution diluted to one part in a hundred billion parts of water. Such figures are inconceivable to the human mind unless expressed in concrete form. Suppose one ounce of Professor Abel's purified pituitrin were dissolved in so much water that it will no longer produce any effect on a strip of muscular tissue. It would require a six thousand two hundred and fifty mile long string of sprinkler carts, carrying 625 gallons each and traveling two hundred to the mile, to reduce the ounce to impotency. The biologists are now rivaling the astronomers in using numbers that baffle our minds and strain our imaginations.

The pineal gland was surmised by the old French philosopher Descartes to be the seat of the soul, because it was a solitary body in the middle of the brain. But this gland recedes after the age of seven which, as Professor Hoskins remarked, is not comparable with the theology of Descartes. The pineal gland is now held to be a vestige of the third eye of ancient reptiles. Its destruction in childhood results in excessive body growth and premature sexual development, but its latter function is obscure.

"Darwin and Lincoln were born on the same day. If the two infants had been exchanged there would have been no Darwin and no Lincoln. What a man can do is determined by his native equipment, what he does is determined by the circumstances of his life." This is the way Dr. J. McKeen Cattell, newly elected president of the American Association for the Advancement of Science, decided the old question of the conflicting claims of nature and nurture, heredity and environment.

Dr. Cattell was the pioneer in the field of mental tests now so diligently cultivated. In 1885 he made the first quantitative measurements of individual differences in intellectual processes and he now reveals the fact that John Dewey, then his fellow student and since famous as an educator and philosopher, stood highest in the group tested. In that early work on the variation of mental ability, Dr. Cattell used the term "alertness" tests and he still prefers that to the term "intelligence" tests now employed.

And he adds: "I have always held that psychology has to do with the conduct of an individual rather than with his consciousness. We are concerned with what a person does, rather than with what he thinks he thinks, feels he feels or imagines he imagines. It is usually no more necessary for the subject to be a psychologist than it is for a vivisected frog to be a psychologist."

"The proper interpretation of intelligence tests consists in learning what an individual will do in a given situation, what are the conditions leading him to act as he does, how well we can predict this. Our current tests foretell as accurately as an entrance examination or a high school record what a boy will do in college. That is practically important, for it gives a more nearly equal chance to those who have had varying opportunities in the past. Boys from private preparatory schools pass college entrance examinations more readily than those from public high schools, but they do not do so well in their studies afterwards. What is hopeful about the tests is that they predict what a boy can do even more accurately than what he will do."

Dr. Cattell explained that the tests predict that Irish children will not do as well as American children in bookkeeping and stenography, but they do not directly measure the probable success of the two groups in keeping saloons, running Tammany Hall, writing poetic drama or starting rows.

The common belief that children in the rural districts have a superior physical development is contradicted by the results of a three years investigation of children reported by Professor B. T. Baldwin, of the University of Iowa. Another popular fallacy, that children of unusual intelligence are apt to be weaklings and the strong ones stupid is upset by the physical and mental tests carried out in cooperation with Dr. Lewis Terman, of Stanford, in the laboratory schools of the University of Iowa on 640 children of ability forty per cent. or more above the average. The investigators found that "good physical growth and good mental growth go hand in hand, and that superior children mentally are as a rule superior physically."

As scientific consultant for the Cleveland schools, Dr. Baldwin has been able by means of mental and physical tests to cut down the percentage of retardation by half and to save in the last half year fifteen thousand school days for thirty-five hundred pupils, which means a saving of thousands of dollars for the school system.

PACIFIC trade winds will be used in an attempt to blow disease out of the Samoa Islands, according to plans of Dr. Patrick A. Buxton, leader of the expedition of the London School of Tropical Medicine which set sail for the South Seas on November 15. Tuberculosis and other diseases threaten the extinction of the natives of ceptibility may be due to a condition caused by a tiny the Samoa group of islands and it is thought their susparasite carried by the Stegomyia mosquito. This mosquito does not seem to be able to exist where the dense undergrowth is cut down. By cutting airways through the dense jungle so that the Pacific trade winds can blow through it, it is hoped that the insects will be blown away. An intensive attack, which will also include substituting modern cisterns for the hollowed coconut tree tanks, which furnish breeding places for the mosquitos, will be made first on one small island. This island will be an object lesson for the larger islands of the group. The expedition is expected to be in the tropics for two years.