

THE SCIENCE NEWS-LETTER

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EDITED BY WATSON DAVIS

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LAW OF EVOLUTION CANNOT BE REPEALED

"Evolution cannot be killed by legislative enactment," declared the retiring president of the American Association for the Advancement of Science, Prof. J. Playfair McMurrich of the University of Toronto in a notable address which opened the program of the seven day meeting of the association in Cincinnati. Professor McMurrich reviewed the progress in scientific thought in the 75 years since the association was founded and stated that the doctrine of evolution was the guiding clue through the flood of new knowledge, the stimulating idea without which much of scientific progress would never have been conceived. Doubts of its validity could only be based on ignorance or prejudice, he said.

Professor McMurrich continued: "In the popular mind the doctrine of evolution is so completely involved in Darwin's exposition of it that it has come to be regarded as the product of his brain. Consequently any acknowledgment that some of Darwin's views may require modification is assumed to imply that the foundations of Evolution are shaken. It seems trite to repeat once more the true relation of Darwin's theory to the doctrine of evolution, but there seems to be need for its repetition.

"Evolution as a theory long antedates Darwin's time; Laplace, to go on farther back, found it in the history of the heavenly bodies, Lyell demonstrated it in the history of the Earth, and Goethe, Buffon and Lamarck saw it in the history of terrestrial organisms. What Darwin did was to give a plausible and convincing explanation of how organic evolution might have occurred, but whether that explanation is or is not the correct one matters not so far as the doctrine of evolution is concerned; that stands unshaken even though Darwin's explanation of how it was brought about be discarded. The evidence in its favor today is many times stronger than it was in Darwin's time, and it seems incredible that man as a reasoning animal should presume to doubt its validity."

The retiring president urged upon the association the duty of putting the results of researches into popular language for the benefit of those who have not had scientific training.

"These form a not inconsiderable and important portion of our membership", he said, "they come to our meetings to hear something of the latest achievements of science and they listen to addresses largely in an unknown tongue. They ask for bread and are given a stone and profit little from such a monolithic repast. Yet these are the persons that we should endeavor to interest if we are truly and fully pledged to promote the advancement of science. Esoteric science may lead

from discovery to discovery, but until the significance of its discoveries is made intelligible to what are termed the men in the street it fails to secure popular support. The unintelligible is mysterious and mystery awakens either ridicule or dread.

"Much has been spoken and written concerning the need for a popularization of science and something has been done towards its accomplishment, notably the establishment of Science Service, so ably edited by Dr. Slosson. But is not this very thing a prime duty of this association, devoted as it is to the advancement of science, and does the association live up to the full measure of its responsibilities in this matter?"

Revolutionary changes in popular beliefs brought about by science are now looked upon without alarm, and this altered attitude was, in the opinion of the speaker, due to the many practical applications of science.

"The distrust of seventy years ago has given way to trust and the world accepts with tranquillity the shattering of many old beliefs, providing that the necessity for their destruction is vouched for by competent scientific opinion. The theory of relativity, whether or not its full significance is understood, is swallowed without a spasm, even though it may displace the theory of gravitation from what seemed to be its unassailable position; and that the atom, supposed to be the ultimate, indivisible abstraction of human thought, is in reality a more or less complex system of electrons revolving planet-like about a central nucleus, even this idea is accepted without a tremor.

"This change of attitude is undoubtedly largely due to an increased appreciation of the value of science as shown by its practical applications. This may not have been the only factor but it is a potent one. It is impossible to consider the multitudinous and marvellous facilities that have become parts of our daily life without realizing that they are but the practical applications of scientific principles to the control or utilization of natural forces and materials, without, in other words, perceiving that it is to scientific investigation that we are indebted for these advantages. The men who have made these practical applications become known and respected, their names become household words, they are the representatives and high-priests of science and their glory is reflected upon even the most abstruse fields of scientific investigation. The attitude assumed may be expressed thus: 'See what great benefits science has conferred! It promises others and therefore it is to be encouraged.'

"For the present we must perhaps be satisfied with this. For several centuries science was under the ban, dogma was supreme and science, which necessarily found itself in contest with this, was impious and heretical. Truth was standardized and complete, and to question that accepted truth was to undermine the foundations of belief. The human mind is conservative in its reactions; habits of thought are as difficult of modification as habits of action, and the change from the dogmatic to the scientific habit has been slow; indeed, it is far from complete even now. The utilitarian appeal of science has done much to emancipate it from its thralldom to dogma, but it is not yet universally recognized that the utility of science depends absolutely upon its success in discovering Truth. It is only by getting at the true facts and the true principles involved in any problem that the results of science become useful. The scientist is a searcher after Truth, and it is for that reason that he is able to confer benefits on humanity; it is for that reason that he deserves recognition. Surely he should feel no necessity for an apology for his existence."

PLANTS PHOTOGRAPHED IN COLORS EMITTED BY THEM

Color photographs of microscopic plants, taken by the light emitted by the plants themselves after stimulation by a strong beam of light were shown before the American Association for the Advancement of Science at its recent Cincinnati meeting, by Prof. Francis E. Lloyd of McGill University. The photographs were the first ever taken by this method which is expected to be of great value in studies of the purpose of pigments in living organisms.

"Plants contain," said Professor Lloyd, "a considerable number of pigments which have the property of fluorescence, a property due to the ability of the pigment to change the wave length of the blue-white part of the spectrum into the longer wave lengths, green, orange, and red. In the case of green pigments, the result of this property is to produce red light even though no red light is supplied.

"The attempt has often been made by various workers to see fluorescence in living microscopic plants by means of the microscope, making use of a special optical arrangement known as the dark field illuminator. The lack of success following these attempts led to the conclusion this was not possible. Indeed, the only way in which fluorescence has been seen microscopically in the living organism is by means of a very special optical arrangement known as the fluorescence microscope, or one in which only ultra-violet light is permitted as an illuminant. Since the visibility is low, no structures can be seen, nor can high magnification be successfully used."

Professor Lloyd then described a method of his invention whereby the dark-field illuminator can be so adjusted as to project a strong beam of light upon microscopic-organisms in such a way as to bring out a brilliant fluorescence, and also reveal their structure. When viewed by this method microscopic plants were seen to glow in brilliant hues of red, orange, or yellow. Preparations of living plants were exhibited in which this was visible to the audience. Color photographs were also shown.

"The importance of this discovery," said Prof. Lloyd, "lies in the fact that it affords a new method of studying in plants the pigments which are connected with the process of photosynthesis, or the building up of tissue from the carbon, hydrogen, and oxygen of air and water through the action of light. Evidence is increasing that other pigments beside the green chlorophyll are of importance in this way. Already structural relations have been demonstrated which were previously not understood.

NEW SLANT TO EVOLUTION GIVEN BY FOSSIL BONES

Scientists who had the notion that Asia is the one and only original cradle of the human race were given a jolt recently. Dr. Ales Hrdlicka of the Smithsonian Institution in a special address to the American Association for the Advancement of Science gave the results of his recent study of early European cave man, which indicate that those primitive people probably spent the babyhood of their race in Europe. The fossil apes of that region need investigating, he said. Some of the conclusions about the number of human races are premature. Anthropology is far from a solution on a lot of the problems of man's evolution, he declared.

SUGGESTS METRIC SYSTEM FOR GOVERNMENT BUSINESS

Dr. Harvey W. Wiley, in an address to the Metric Association at Cincinnati urged that efforts be made to secure a law requiring all government business to be transacted in the metric system. This, he said, would pave the way for the speedy education of our people and lead almost automatically to the gradual extension of the metric system into all forms of business. The metric system of weights and measures would greatly simplify teaching in schools and promote honesty in trade, he claimed.

Pointing out the tendency to fraud fostered by the present use of many weights and measures, he said:

"A short time ago a grocer in the city of Washington was arrested for selling short-weighted articles. In his defense he said that he had always understood that twelve ounces made a pound. It is possible his father was a druggist, and he had thus inherited a propensity which proved extremely profitable in his business. I doubt if any court would have been able to convict this party of fraud, unless the particular law applying to such cases should have defined the pound as 'avoirdupois'. Even the term 'avoirdupois' might have been subjected to legal possibilities. It means, 'to have some weight', and a troy pound also has weight.

"Any system of weights and measures which is variable, indefinite, unscientific, unrelated, and which is differently defined in laws of the different states and municipalities gives an opulent opportunity for deception and fraud.

"If there are two or three kinds of tons - and there are three kinds - unless some agreement is made, the buyer will want to get the biggest ton and the seller will want to sell the smallest ton. There are more different gallons than there are different tons, and when it comes to barrels the variation is even greater."

In Washington, Dr. Wiley said, where the law requires a long ton of coal, coke is always sold by the short ton. The buyer naturally thinks he gets a long ton of coke. But coke is not mentioned in the act.

SEEK BOLL-WEEVILS' FAVORITE PERFUME

The cotton boll weevil will be lured to his death by the fragrant odor of a "square" meal if investigations now being conducted by the Bureau of Entomology and the Bureau of Chemistry of the U.S. Department of Agriculture are successful. Dr. N. E. McIndoo of the former bureau, speaking before the Entomological Society of America in Cincinnati Christmas week told of the distillation of quantities of cotton plants in the effort to isolate the odor which is apparently the greatest attraction in life for the weevil.

Boll weevils in captivity are difficult to manage, Dr. McIndoo stated, and are not given to showing preferences, but it has been found that nothing attracts them as does the bud of a cotton flower, called a "square". For it they will forsake sirup and honey, or even cotton leaves. Young weevils, just hatched

will head straight for the nearest cotton field though it may be several miles away.

Working on the theory that the weevil is able to smell some odor exhaled by the cotton bud which is too faint for human perception, the entomologists called in the aid of Dr. F. B. Power and V. K. Chesnut of the Bureau of Chemistry who recently isolated the substances responsible for the peculiar aroma of the apple. They have distilled very large quantities of the fresh cotton plants, and are at present engaged in a study of the substances contained in the distillate. Because of the complexity of the problem, no results are expected for several months.

If a substance or group of substances attractive to weevils are isolated from the distillate of the cotton plant, an effort will be made to produce it in quantities large enough to be used as a bait to lure the insects to some wholesale method of execution.

SUN-SPOTS SHOW STRANGE REVERSAL OF MAGNETIC POLES

New sun-spots now appearing on the sun's disc are opposite in magnetic polarity to those that were seen during the last cycle. This discovery by Dr. George E. Hale of the Mount Wilson Observatory of the Carnegie Institution at Pasadena, California, is the result of over a decade of astronomical observations.

The new observations are declared to be revolutionary, and the findings to be unexplained.

The spots, known to be centers of magnetic fields, travel across the disc of the sun two by two, each of a pair being of different magnetic sign. Before the time of minimum sun-spottedness which occurred only a few months ago, the pairs had exactly the opposite arrangement of polarity as exhibited by the new spots now appearing on the sun.

This is taken to mean that the true cycle of sun-spots is just double the 11-1/8 years now assumed and that the spots pass through two minima and maxima before a similar condition is repeated.

Just what effect this has on matters here on earth is yet to be determined although sun-spots are known to affect both the magnetism of the earth and the solar constant of radiation.

It is believed that the peculiar rotation of the sun which is faster at the equator than at the pole is related to the new sun-spot phenomenon.

READING REFERENCE - Abbot, Charles G. The Sun. New York, D. Appleton and Company, 1911.

There are over four million horsepower available from the water power resources of New Zealand.

INDIAN RECENT IMMIGRANT SAYS SMITHSONIAN EXPERT

The original inhabitants of America were immigrants who reached this country from Asia not more than 10,000 years ago according to evidence presented to the American Association for the Advancement of Science by Dr. Ales Hrdlicka of the Smithsonian Institution in an address at Cincinnati recently. Claims of the discovery of geologically ancient human remains on this continent during the last 25 years have invariably proved to be without foundation in fact, he declared.

"It is well known that wherever ancient man existed in Europe, western Asia, or northern Africa," Dr. Hrdlicka said, "he left behind him archaeological remains and refuse in many places and often in great quantities. In America there is nothing of this nature and it would be hard to explain how man could have lived here for any length of time in the far past without leaving evidences of his presence similar to those he has left in other countries.

"Wherever man's skeletal and other remains of ancient date are found in the Old World, they show marked differences from those that are more recent, and that generally in the direction of progressively greater simplicity and primitiveness. In America there has never yet been found a type of prehistoric skeleton or implement, even though some of the implements may be crude, different from those of the Indians.

"As to the positive evidence of the lack of great antiquity of man in America are the facts of the fundamental uniformity of the American aborigines, and their direct physical and mental relations to many still living remnants of the older yellow-brown stock of eastern and central Asia.

"The American aborigine was an immigrant, and as such could only have reached this country from northeastern Asia which alone presented a practicable route for him at his stage of culture; but he could not have reached the northeastern limits of Asia until after having peopled most of that continent, which could not possibly have been in far past times when man was still barely able to sustain himself in parts of Europe.

"It is safe to say," Dr. Hrdlicka said in conclusion, "that so far no older human remains of any kind have been found on this continent than those corresponding to some part of the Neolithic period in Europe and Asia; and there is but little probability that a man older than, at most, eight or ten thousand years will ever be discovered on this continent."

NOSES AND WEATHER

British scientists are nosing into the weather of the prehistoric past. In living people they find the widest noses associated with hot moist climate and the narrowest with cold dry climate. The differences are also detectable in skulls. Applying these findings to some of the prehistoric European cave-man skulls, it has been discovered that some of those which have been assigned to a period of cold climate must have lived in a warm period - if noses can be followed.

RIGHT HAND CAUSED HUMAN BRAIN GROWTH

Only by the use of one hand a little better than the other has it been possible to bring about the development of the human brain, according to Dr. N.W. Ingalls of Cleveland. Neither the hand nor the brain could have developed without the other, he said recently in presenting observations on the weight of bones of 100 male, white skeletons to members of the American Association for the Advancement of Science. The eyes complete the triumvirate that controls the development of the human body.

It has long been known that the right arm is bulkier and stronger, as well as more completely under control, than the left, in the majority of people. The weights showed that what we call right-handedness or left-handedness increases progressively from the trunk out to the hand. Close to the body the upper limbs are most alike in weight and development of bone. In the hand the difference is greatest.

This right-handedness and left-handedness also show in the lower limbs, but to a lesser extent. The foot has become specialized, while the hand is not specialized. In other words, the hand can do anything, and this, of course, has been its salvation.

HARD TIMES DEMAND BIG BRAIN CAPACITY

A pronounced relation between hard times and the size of the brain cavities of cadavers coming to the dissecting room in the city of Cleveland has been announced by Dr. Wingate Todd, director of the Aemann Museum, Western Reserve University. The harder the times, the larger the brain capacity of these social derelicts. He says:

"Upon the basis of recognized published work let us agree that a volume of 1150 cubic centimeters represents the dawn of male white intelligence, that 1480-1500 cubic centimeters gives a fairly accurate average value for moderate intelligence, and 1530 cubic centimeters indicates a high type of intelligence. Now let us note the average brain volume of the white males of our dissecting room population. From 1913 to 1917 inclusive it centers on 1400 cubic centimeters. On the average then it required more than 1400 cubic centimeters brain volume to make good in Cleveland during those years. In 1918 there was unprecedented prosperity and our average dissecting room brain volume sank to 1330 cubic centimeters. Thus all except the veriest fools could make a living during that year. Then came the armistice and the industrial depression of 1919, reflected in our population by an average rising to 1440 cubic centimeters. In 1920 conditions bettered and down goes the average to 1400 cubic centimeters once again. In 1921 the city was almost throttled by industrial distress and the average rose to 1470 cubic centimeters almost to the level of moderate intelligence. Fortunately in 1922 circumstances improved and the average brain volume again dwindled but not to pre-war levels.

"Now the people who usually and in pre-war times composed our population, those who made a failure of life, were simply human pawns, but with the industrial disturbances higher types appeared, men who could think, who could persuade, who could agitate. In 1921 Cleveland was within shouting distance of social tur-

moil; intelligence was no longer the valuable asset it had once been; people who, in normal circumstances, could hold up their heads against the stream of life were swirled down to death in the maelstrom of post-war industrial depression. The relief figures of the Associated Charities keep step with the brain volume curve of our population."

STRANGE STAR UPSETS ASTRONOMICAL THEORIES

The recent discovery of a very faint companion to the well-known variable star, Omicron Ceti, called Mira, or the "Strange Star", is baffling astronomers and may necessitate a revision of present theories of the size and distribution of the stars.

In 1596 the Dutch clergyman, David Fabricius, noticed a strange star in the constellation the Whale, which he had never seen before. Later observations showed that the star was not constant but varied in light and was only visible for a short time every year. For this reason the star was given the name Mira, the "Strange Star". After more than three hundred years of observations astronomers thought that they had come a little closer to the solution of the mystery of this star.

It was found that the star varies from the second magnitude at maximum to the ninth magnitude at minimum when it is sixteen times too faint to be visible to the naked eye. The time in which these light changes take place has been determined to be a period of eleven months, or exactly 330 days. Examined in the spectroscope the star shows a spectrum which the astronomers at the Harvard Observatory call of class M which means that it is a red star. In contrast to the majority of red stars which are not variable, however, Mira shows bright lines due to hydrogen in its spectrum.

That is in short all the knowledge we had about this peculiar star until a few years ago.

It was then discovered at Mt. Wilson by Dr. A. H. Joy that when the star was at its feeblest the spectrum had a certain peculiar aspect which up to that time had only been ascribed to blue stars. It was therefore concluded that a blue star might be very close to the red star, but a search for this blue companion with the great telescope of the Yerkes Observatory yielded no results.

Repeating the spectrum tests, the blue star still seemed to be there and again the star was examined for duplicity, this time by Professor R.G. Aitken of the Lick Observatory. In the clear sky of California he succeeded in seeing a tiny little star close to the variable. The angular distance as measured in the telescope was only a second of arc, or equal to the angle spanned by an inch at a distance of three and a half miles. The little star was about half a magnitude or one and one half times fainter than the variable which at that time was of the ninth magnitude.

This discovery has baffled astronomers a good deal. They must choose between two alternatives; That the blue star and the variable are physically connected, or that they simply by mere chance seem to be together in the sky and may really be at entirely different distances from us. In the first case, since

we know the distance of the larger variable approximately we can tell that the blue star is in reality ten times fainter than the sun or ten thousand times fainter than any other blue star of that type. If, on the other hand, the stars are not physically connected and the blue star is of ordinary brightness, it must be 8000 light years off and that lands it in a region of space where we know no other star of this kind. Observations in the near future will enable us to decide which of the two is the right conclusion, for the variable star itself has a motion in the sky which will decrease the distance between the two stars seven-tenths of its value in three years.

When that time comes it may be found necessary to form a new and third hypothesis to account for its existence and peculiar behavior.

----- PIGEON'S CHANGE OF SEX UPSETS HEREDITY THEORY

Complete transformation of an adult female pigeon into a fully developed male bird, indicating that all man's inherited bodily and mental characteristics may be considered as subject to change and control, was announced by Dr. Oscar Riddle of the research staff of the Carnegie Institution to members of the American Society of Zoologists meeting in Cincinnati recently. The scientific importance of this remarkable reversal of sex can scarcely be exaggerated, Dr. Riddle declared.

The bird was a female blond ring dove, he said, and at the beginning it was a normal female like thousands of other doves and pigeons which have been studied at the Institution's Station for Experimental Evolution at Cold Spring Harbor, Long Island, during the past 13 years. She laid eleven eggs between January 27 and April 15, 1914. These eggs were carefully examined and details concerning them recorded. A few months later, the bird began to act like a male. Still later, the former female took on weight and developed the crow of the cock pigeon.

After the last eggs were laid, the evidence indicates that tuberculosis began to destroy the female gland of this bird. The bodily condition which results from tuberculosis, Dr. Riddle said, is known to approach the condition which our earlier studies have shown to be typical or necessary for the development of the male sex and adverse to the development of the female sex.

Forty-four months after this bird laid her first egg she died. The autopsy showed advanced tuberculosis infection of the spleen, liver, and other organs. No female glands were found, but two well-formed male glands in their normal position were present.

Dr. Riddle presented complete records for the period of egg-laying and for all later periods to the time of death. Figures and curves showing the progressive change in the body weight of this bird during this same period were also presented and described.

"The result clearly indicates that the hereditary basis of no bodily or mental characteristics may be considered as irrevocably fixed and uncontrollable," Dr. Riddle said. As one of these characteristics known to be hereditary and normally to be controlled through the so-called "chromosomes" of the germ

cell, has been shown to be capable of a reversal to the alternate form, it becomes wholly probable that all hereditary characteristics of every human being and of every organism are capable of reversal and modification; and that the accomplishment of such modification and control is a matter which merely awaits the definitely directed efforts of investigators.

TABLOID BOOK REVIEW

In order to aid the teachers of courses in general science and the special sciences by providing authoritative reports of recent researches, Dr. Otis W. Caldwell, Director of the Lincoln School of Teachers College, Columbia University, and Dr. Edwin E. Slosson, Director of Science Service, have edited a volume called "Science Remaking the World", which contains the following contributions: "Achievements and Obligations of Modern Science" by Otis W. Caldwell, Ph.D.; "Gasoline as a World Power" and "The Influence of Coal-Tar on Civilization" by Edwin E. Slosson, Ph.D.; "Electrons and How We Use Them" by John Mills; "An Investigation on Epidemic Influenza" by Peter K. Olitsky, M.D., and Frederick L. Gates, M.D.; "Our Present Knowledge of Tuberculosis" by Linsly R. Williams, M.D., "Louis Pasteur, and Lengthened Human Life" by Otis W. Caldwell, Ph.D.; "International Public Health" by George E. Vincent, Ph.D.; "Educational Value of Modern Botanical Gardens" by George T. Moore, Ph.D.; "The Meaning of Evolution" by John M. Coulter, Ph.D.; "Our Fight Against Insects" by L.O. Howard, Ph.D.; "Insect Sociology" by Vernon Kellogg; "How the Forests Feed the Clouds" by Raphael Zon, F.E.; "The Modern Potato Problem" by Charles O. Appleman, Ph.D.; "Chemistry and Economy of Food" by Henry C. Sherman, Ph.D.; "Our Daily Bread and Vitamins" by Walter H. Eddy, Ph.D. The historical chart presenting in graphic form the outstanding scientific achievements of forty centuries will serve to interest students in the human side of science. This book is published by Doubleday, Page and Co., New York, at \$2.50, but in order to bring it to the attention of those who most need it a limited number of copies will be supplied free to libraries of high schools and normal schools which make application for them to Dr. Caldwell and pay postage, (11 cents). Application blanks are being sent to all subscribers of the Science News-Letter, but no copies will be given gratis except for school libraries.

NORTHWINDS WARMEST SEVEN MILES ALOFT

Northerly winds are warmer than southerly winds at a height above seven miles, Willis R. Gregg of the U.S. Weather Bureau told members of the American Meteorological Society at Cincinnati. This, he said, is because at that altitude, which is that of the part of the atmosphere known as the "strato-sphere", the air is warmer over the more northern latitudes than it is over the equator.

At lower levels the north winds are the coolest, the difference being the greatest at the height of from one-half a mile to a mile above the surface, since the temperature of the surface has effect on winds at lower elevations.

A report just issued by the United States Department of Agriculture shows nearly 5,000,000 cattle under supervision for the eradication of tuberculosis.