

SCIENCE NEWS

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*Telegraphic reports of the Washington Meeting
by Dr. Edwin E. Slosson*

DEATH-DEALING rays of soundless sound waves were demonstrated before the academy by R. W. Wood and Alfred L. Loomis, of Johns Hopkins. Professor Wood is famous for his success in dealing with light waves beyond the reach of the human eye, and such ultra-violet rays have proved useful alike in detecting false gems, imitation paintings and camouflaged batteries. Now he has turned his attention to sound waves beyond the range of the human ear, and nobody can foretell what will come of such discoveries. The new waves are generated in air or water by a plate cut from a quartz crystal and set into vibration by a powerful alternating electric current. These waves have a frequency ranging from one hundred thousand to four hundred thousand vibrations a second, and therefore lie two or three octaves above the highest note that can be heard by humans. What they would sound like if we could hear them we can not even imagine, but they make their presence perceived in various strange ways. In water these silent sound waves are less than half an inch long and travel much faster than in air. They heat the water as they pass through and their shock is sufficient to kill small fishes, worms and microscopic marine animals in less than a minute. The surface of the water is heaped up in a mound when a beam of these frequency waves is directed toward it. When a hand is thrust into the path of the rays in water the flesh tingles and the blood circulates more swiftly. This stimulating effect may be found useful in the treatment of certain diseases such as gout.

THE hardest blow that Einstein's theory has yet received has come from Professor Dayton C. Miller, of the Case School, Cleveland, who has repeated the famous experiment made by Michelson in 1887 on which the theory of relativity was based. Michelson was unable then to detect any drift in the ether due to the movement of the earth through space, but Miller's recent experiments with an improved apparatus on Mount Wilson shows evidence of ether-drift such as would be produced by a movement of the solar system in the direction of the Dragon constellation amounting to 124,200 miles a second.

Is our standard of time fixed? Does the length of the day vary? Does the earth expand and contract? These questions were raised by Ernest W. Brown, of Yale. Hitherto astronomers have blamed the inconstant moon for her failure to come to time on eclipses according to their calculations, but according to Professor Brown the moon has made her regular rounds on time, but the astronomers have been to blame for the discrepancies because their clocks have not kept correct time. Their clocks, like all time pieces, are set by the length of the day and this is determined by the rotation of the earth,

which is assumed to be unvarying. But the speaker pointed out that if the earth swells and shrinks from five inches to twelve feet in a period of years it would account for failure of the calculated path of the moon to agree with her actual movements. Such a rising and falling of the earth's crust might be due to the same causes as produce earthquakes, mountain-building and similar disturbances.

ANOTHER failure to make artificial gold was reported. Professor W. D. Harkins, of the University of Chicago, has been bombarding mercury with streams of electrons from an X-ray tube at 140,000 volts. If any one of these particles of negative electricity should become embedded in the nucleus of an atom of mercury, this would be transformed into an atom of gold. No trace of gold was found after long bombardment although the test was delicate enough to detect one part of gold in a million of mercury. Professor Miethe, of Berlin, and Professor Nagaoka, of Tokyo, claim to have made gold from mercury by a similar method but no American chemist has confirmed their result. But that the transmutation of other elements is possible was demonstrated by Professor Harkins who showed photographs of the collision of the nucleus of a helium atom, traveling twelve thousand miles an hour, with a nitrogen atom. A fluorine atom is probably first formed but this breaks down instantly into an oxygen atom.

FEMINISM scores another point in the demonstration that the female sex is superior in chemical activity. The demonstration is visible to every visitor to the exhibition rooms of the National Academy of Sciences in the form of a series of test tubes containing colored liquids, in which the feminine sample shows up stronger than the masculine. The test, which was invented by a Russian investigator, Manilov, can be applied to plants as well as animals and a few drops of blood or sap is sufficient, showing that sexuality pervades the entire living organism. In experiments carried on by A. F. Blakeslee and Sophia Satina at the Station for Experimental Evolution as part of Research on Sex Problems of the National Research Council, it has been found possible to get the sex directly more than nine times out of ten by the Manilov test. It was explained that the test could be used to determine the sex of the fungi of bread molds, which are so simple and similar in structure that it has never hitherto been possible to tell which was male and female.

A DIET that will accelerate growth most amazingly has been worked out by Thomas B. Osborne and Lafayette B. Mendel, of New Haven. White rats used for experiments in dietetics for a dozen years have been bred from the same stock, and they have shown a noticeable increase in the rate of growth. In 1912 a male rat required on the average 94 days to reach full weight, while in 1925

the time had been reduced to 67 days. This gain in growth came about unconsciously through the continuous selection of the more vigorous animals. But now the experimenters have found it possible to reduce the growing period to less than 25 days by putting the young rats on a special diet. This ration contains an unusually liberal allowance of protein and a variety of such food materials as lettuce, liver and yeast. These experiments point to the possibility of speeding up the growing process in animals by the double method of developing the hereditary tendency through eugenics and of furnishing such food as will stimulate rapid development. Whether such a forcing process has any deleterious effects on the individual or his progeny remains to be determined. If it would affect children the same as rats, we may expect to see six-footers of six years old. This reminds one of the fantastic romance of H. G. Wells, "The Food of the Gods."

BOTANISTS used to be content to collect and classify what plants they could find, but now they are experimenting on the production of new forms of growth. Dr. Erwin F. Smith, of the U. S. Department of Agriculture, has found that he can get strange shapes of sunflowers by inoculating the young flower buds with crown gall bacteria, or by simply pricking them with a needle. This irritation of the growing tissue may produce such abnormalities as ray flowers in the wrong places, rootlets where flowers should be, and cavities lined with hairs in the pith of the plant. The formation of such cysts reminds one of cancer growths, which likewise may be caused in some cases by local irritation of the skin and spread through the system.

THE chemistry of cat fright was explained by Dr. W. B. Cannon, of Harvard University. What sets the cat's heart to beating when a dog barks at her is an increased secretion of the adrenal glands. When a cat that has been lying down gets on its feet her pulse increases ten or fifteen beats a minute. Hearing the bark of a dog raises the pulse rate twenty. But when the cat gets thoroughly frightened or fighting mad, the heart is accelerated by seventy or eighty beats. The excitement may not die down for twenty minutes. The hair raising, the ear lowering, the hissing and the snarling are but the outward and visible signs of an inward and chemical change in the composition of the blood, namely an increase in the percentage of adrenin. As small an amount as one part in a million of this chemical compound will perceptibly stimulate the circulation of a denervated heart.

THE management of mobilization during the late war was sharply criticized by Dr. Victor C. Vaughan. Dr. Vaughan was for thirty years the head of the Medical School of the University of Michigan and is an authority on the cause and prevention of epidemics. He pointed out that "The procedure followed in the mobilization of our soldiers brought into every cantonment every infection then existent in the areas from which the men came. Each one brought samples of the bacteria then abounding

in his own neighborhood." Every troop train coming into Camp Wheeler, Macon, Georgia, in 1917, brought cases of measles in the eruptive stage. All susceptible individuals came down practically on the same day or two, thus overwhelming the hospital facilities and predisposing to pneumonia. Twelve times as many young men died of pneumonia in the camps as would normally be expected in a civilian group of the same sort. Cerebrospinal meningitis was brought from places where it was known to be endemic and spread in Camp Funston, Kansas, and Camp Jackson, South Carolina. When the military authorities were warned of what would happen they replied: "The purpose of mobilization is to convert civilians into trained soldiers as quickly as possible and not to make a demonstration in preventive medicine." Dr. Vaughan adds: "The most insane procedure carried out in 1918, from the viewpoint of an epidemiologist, was the sudden and complete mobilization of the students in our universities in the Students' Training Corps. How many lives this procedure sacrificed I can not estimate."

"CALCIUM, when utilized, is pep," was the slogan of Dr. Weston A. Price, of Cleveland. He showed photographs of chickens suffering from Cleveland smoke which shut off the sunshine which facilitates the assimilation of lime in the blood and bones. In case of a shortage of sunshine its place may be supplied by doses of cod liver oil, which is especially active if it has been exposed to the direct rays of the sun for half an hour. The activating factor in light is the ultra-violet rays. These have too short a wave length to be visible or to pass through glass, so no glass must intervene when the chickens, children or oils are exposed to sunlight. Dr. Price finds that merely rubbing the activated olive oil on the neck of a chicken will raise the calcium content of the blood and improve the physical condition. There is no calcium in the oil, but somehow such of the oil as was absorbed brought more blood into the circulation from the food. The same treatment has proved beneficial to humans. Rubbing raw or activated cod liver oil on inflamed joints is reported to have improved conditions in cases of lime deficiency. In babies such deficiency shows itself in the weak and bended bones of rickets, in children and expectant mothers in rapidly decaying teeth. Such cases have been improved by the administration of calcium lactate to supply the lime, and cod liver oil or sunbaths, to promote its assimilation. The old rule for mothers of "a tooth for every child" need no longer hold.

THE AMERICAN GEOPHYSICAL UNION

THAT the waters of the ocean, and the air around the earth, came out of the rocks, is the idea suggested to the American Geophysical Union, in session at Washington on April 30, by Dr. W. J. Humphreys, of the U. S. Weather Bureau. Dr. Humphreys bases his suggestion on the theory, now widely held, that the earth was originally part of the sun and that it was pulled out of it by the passage of a larger star close by, due to gravitational attraction. In this case, he says, the hydrogen, nitrogen and oxygen to form the ocean and the atmosphere of the earth were pulled from the outer layer of the sun, as

well as the heavier elements. "Presumably," he says, "most of the mass of the earth collected into a liquid nucleus great enough to retain by gravity all the elements of the air, including water vapor, except hydrogen and helium. In a comparatively short time this nucleus cooled sufficiently to form a more or less stable crust, after which it soon became cool enough to permit the greater part of the water vapor, if it existed in large quantity, to condense. At this lower temperature the earth could also retain both hydrogen and helium. The thickening of the crust must have been accompanied with innumerable eruptions and lava flows, all giving off then, as they do to-day, water vapor, hydrogen, nitrogen, oxygen and carbon dioxide, previously absorbed by the rocky material when liquid or gaseous. In this way the primordial water vapor and the fixed gases of the air, however great or small in amount, were supplemented from within the earth until an atmosphere substantially as now exists was formed, and the oceans covered most of the earth."

THE center of the earth is composed of very heavy materials, possibly metallic iron, Dr. Paul R. Heyl, of the U. S. Bureau of Standards, told the American Geophysical Union. He bases his conclusions upon determinations which he has been making of the density of the earth, which he finds to be about five and a half times that of water. As the average density of the rocks in the earth's crust is only two and a half times that of water, the center must be of much greater density. This view was supported by the statements of Robert B. Sosman, of the Geophysical Laboratory of the Carnegie Institution of Washington. Mr. Sosman has studied the passage of waves from earthquakes through the earth. These studies have established with reasonable certainty, he said, "that the earth is a solid object without any very extensive liquid layers within it. It contains a core about 2,200 miles in radius. This core reflects and refracts as if it had a clearly marked surface, and is capable of transmitting elastic waves, but at a speed which is much less than the speed in the overlying material."

THE ALEUTIAN ISLANDS, a string of thirty or more volcanic peaks rising above the surface of the sea and forming a chain of stepping stones between Alaska and the northeastern corner of Siberia, are at last to be systematically explored by scientists. Hitherto they have remained almost as unknown as they were when the United States purchased Alaska from Russia, but at the annual meeting of the American Geophysical Union preliminary steps were decided upon that are expected to unlock their secrets. Many scientific agencies are interested in the Aleutians: the U. S. Geological Survey and the Geophysical Laboratory of the Carnegie Institution of Washington in the volcanoes; the U. S. Department of Agriculture in climate, soils, forests and wild animals; the Coast and Geodetic Survey in the accurate charting and mapping of the land and water areas; the Army and Navy in their relation to the national defense. These and other institutions expect to cooperate for a considerable number of years to come in obtaining and making available accurate information about this little-known territory.

ITEMS

THE number and behavior of the white blood cells are now studied to detect the presence of contagious diseases in their early stages. The white cells, or leucocytes, are the body's natural means of protection against the toxins of disease and infection. For that reason elementary physiologies used to call them "soldier cells." Dr. C. H. Bunting and E. Thewlis give an account in a forthcoming number of *The Archives of Pathology* of the observations they have made at the student infirmary at the University of Wisconsin in studying the blood counts of students suffering from smallpox and several of the childish diseases. They have found that there is a general similarity in the behavior of the leucocytes in measles, mumps, chicken pox and smallpox. There is a decided falling off in the number produced at first with a gradual return to normal, followed in the case of smallpox by a marked increase which lasts during the active stage of the disease. Scarlet fever varies from the others by displaying an abnormally large number at the very beginning.

DAIRY cows can live and thrive without vitamin C in their ration, according to Professors L. M. Thurston, C. H. Eckles and L. S. Palmer, of the University of Minnesota. It is definitely known that man requires a certain amount of a substance known as vitamin C or the anti-scorbutic vitamin; and unless the required amount is supplied by food the disease known as scurvy develops. This same fact is known to apply to certain animals also, among which are the guinea pig and the monkey. Two outbreaks of a scurvy-like disease among cattle have been reported, one from England and one from Australia, apparently caused by faulty nutrition. Since this disease had all the symptoms of scurvy which is due to a lack of vitamin C in the diet, experiments were made to determine the rôle of this vitamin in the nutrition of cattle. Two calves were fed on a diet extremely deficient in vitamin C for a period of 350 days. With the exception of this vitamin deficiency the diet was well balanced and varied. The animals grew normally in every respect and showed no symptoms of scurvy. Guinea pigs on the same ration die of scurvy in thirty days.

"Hot soap suds and water," the good old-fashioned remedy for all cleansing purposes, has real germicidal properties, according to experiments carried on at the Army and Navy General Hospital at Hot Springs, Ark., by Dr. J. E. Walker. In a forthcoming issue of *The Journal of Infectious Diseases*, Dr. Walker says that any ordinary soap used with a reasonable degree of care will kill several kinds of bacteria, notably those that cause pneumonia, gonorrhea, diphtheria and several of the pus-forming organisms. The dysentery and typhoid bacilli die harder. Strong soaps made of what is known as saturated fatty acids are necessary to annihilate these tough ones. A salt-water soap, prepared exclusively from coconut oil, is the most readily available efficient soap to rid the hands of possible typhoid bacilli. Unfortunately an all round coconut-oil soap is too irritating to the skin for ordinary use.