

SCIENCE NEWS

PUBLIC HEALTH IN THE UNITED STATES

PROGRESS in public health in the United States which has lengthened the average life by fifteen years since 1870 and has greatly reduced the amount of infant mortality, tuberculosis, typhoid, small-pox, etc., while being unable so far to prevent an increase in the degenerative diseases of later life, was reviewed by Dr. Livingston Farrand, president of Cornell University, in the annual Sigma Xi lecture given at a joint meeting with the American Association for the Advancement of Science at Boston on December 27.

In discussing the world problem of re-establishment of social, economic and political order, Dr. Farrand emphasized the importance of human vitality as a fundamental factor in the process. The undermining of vitality in Europe as a result of the war and particularly of the child population has served to draw attention as never before to the problem of public health. It is now possible to review the situation in the United States and the survey offers certain striking figures. The observations of the 1920 census show that the average length of life in this country is now fifty-six years, said Dr. Farrand. This shows an increase of $3\frac{1}{4}$ years in the expectation of life since 1910, and had it not been for the influenza epidemics of 1919 and 1920 the increase would doubtless have been greater. The best available figures indicate a lengthening of the average life in this country by 15 years since 1870 and is eloquent testimony to the value of the researches of Pasteur and his successors to which this result is largely due.

Dr. Farrand also cited figures from the leading countries of Europe showing that America now compares favorably with the older nations. The highest figures available for any country are those of New Zealand, where the average life is about 60 years. This is contrasted with civilization like that of India, where no advance has been shown during recent decades and the average remains only about 24 years.

The speaker quoted with approval the resolution of the American Public Health Association at its recent annual meeting in which it stated the conviction that with no further additions to our knowledge of the causes and prevention of disease it will be possible during the next half century to add at least 20 years to the span of life.

Dr. Farrand also cited the reduction in the general death rate in the original registration states (New England and adjoining states) from

17 in 1900 to 14 in 1920. He pointed out that applied to the country this means the saving of approximately 400,000 lives for the year 1920 alone.

The leading causes of death were then reviewed by Dr. Farrand. He showed where great progress in prevention has been made and the chief problems which remain to be solved.

In the encouraging group he mentioned infant mortality, tuberculosis, typhoid, the infectious diseases of childhood and small-pox. He showed that in the last twenty years infant mortality has been reduced over one third; the tuberculosis death rate cut in half; typhoid deaths have been lowered by 80 per cent.; diphtheria, scarlet fever and measles have been greatly reduced and small-pox practically eliminated.

The unconquered diseases on the other hand offer a more disquieting picture. The death rate from cancer has steadily increased during the last twenty years. In 1900 it was 63 per cent. per 100,000 population; in 1920 it had risen to 83.4 per cent.

Similar increases are shown in diseases of the heart and kidneys. Heart diseases now cause more deaths than any other disease in the United States, the rate being 186.2 in 1920 as compared with 128.1 in 1900. It was pointed out that with the control of the communicable diseases of early life an increase in the degenerative diseases of later life is inevitable and that field is now an outstanding public health problem.

Dr. Farrand then outlined the organized movements in this country for the improvement of the public health and mentioned as particularly notable the Framingham demonstration under the auspices of the National Tuberculosis Association and the proposed demonstration of the Milbank and Commonwealth Funds of New York in the fields of tuberculosis and child health.

THE DIAMETER OF ATOMS

PROFESSOR THEODORE W. RICHARDS, of Harvard University, speaking at a symposium on the progress of chemistry at the Boston meetings, explained an entirely new method of estimating the diameters of atoms.

After showing several lantern slides which depicted the relative sizes of atoms, magnified two hundred million diameters, Professor Richards drew attention to the fact that a given atom has not always the same bulk in different substances.

Much interest now attaches to the reason for this change of bulk. In Professor Richards's

opinion, the chief reason is the fact that under different conditions atoms are subject to very different pressures from the several mutual affinities which bind them together. Hence the bulk depends upon the properties: compressibility and internal pressure. After calling attention to his earlier estimates of atomic diameters, which were avowedly only first approximations, he proceeded to explain an entirely new and far more satisfactory method, which depends upon the actual compressibilities of the elements as determined partly by Professor P. W. Bridgman and partly by himself. After showing that sodium conforms to almost exactly the same law of compression as does potassium, except for the fact that sodium is (in its ordinary state) under much the greater internal pressure, he was able to infer the volumes which potassium would occupy under far greater pressures. With these values as his numerical basis, and with similar reasoning concerning chlorine and bromine, he was able to infer, with small likelihood of error, how the contraction which occurs during the formation of common salt (for example) is distributed between the sodium and chlorine. The results throw much light also on the mechanism of chemical combination, the magnitude of the internal pressures involved and many allied phenomena. They furnish a remarkable mathematical confirmation of his theory of compressible atoms. This theory has rested heretofore mainly upon argument, which, although comprehensive and incontrovertible, was chiefly of a statistical rather than of a mathematical nature.

ELECTRIC AND HEAT WAVES

PHYSICISTS have finally succeeded in bridging the gap between the electric wave and heat-wave spectra by obtaining electric waves as short as the longest heat waves, and by detecting heat waves with electric wave receivers.

Dr. Ernest Fox Nichols, director of pure science at the Nela Research Laboratories at Cleveland, and Dr. J. D. Tear, assistant physicist at the same laboratories, announced in a paper presented to the American Physical Society meeting last week in Boston that by the aid of newly designed and more sensitive instruments and improved methods of experimentation they have succeeded in generating, receiving and measuring electric waves half a millimeter or one fiftieth of an inch in length. For comparison the ordinary radio transmission is by electric waves of the order of half a mile long.

Rubens and Von Baeyer in 1911 obtained heat waves one third of a millimeter long from a

quartz mercury arc. The shortest electric waves just obtained are, therefore, of about the same length as the longest waves sent out by hot bodies.

As a latest proof of the identical character of light, heat and electric waves, Dr. Nichols and Dr. Tear have succeeded in using two different types of electric wave receivers to detect and remeasure Rubens' and Von Baeyer's long heat waves.

As a by-product of the investigation, the long wave emission from the quartz mercury arc has been found partially polarized, a fact which throws new light on the activity of the ions which emit this long wave radiation. Dr. Nichols and Dr. Tear have also found that the radiation can be isolated from the complex total emission of the mercury arc by simply sifting it through two thicknesses of black paper, thus avoiding the elaborate focal isolation method and apparatus previously thought necessary to accomplish this separation.

Dr. Nichols was president of the Massachusetts Institute of Technology from March to November, 1921.

THE TRACKS OF ATOMS

DR. R. W. RYAN and Dr. W. D. Harkins, of the University of Chicago, presented a paper before the American Physical Society at Boston in which they announced that they had obtained ten thousand photographs showing the tracks produced by atoms shooting through air at a speed thirty thousand times faster than that of the swiftest rifle bullet.

"It is of interest," said the paper, "that the atoms of helium usually shoot *directly through* half a million atoms of the air without hitting the central part of the atom which alone is heavy enough to deflect the helium atom from its path. Thus it is clear that atoms instead of being incapable of penetration, as was taught twenty years ago, are highly penetrable to other atoms if they shoot fast enough.

"The most interesting feature of the present photographs may be made clear by describing the most interesting of all the thirty or forty thousand atom tracks photographed. In this a helium atom moves about an inch straight through about an inch of air and directly through about 100 thousand atoms, then by accident it hits the center or nucleus of an atom of nitrogen. The helium atom rebounds almost directly backward at a velocity of about 20,000 times that of a rifle bullet, while the nitrogen atom is knocked directly forward at about two thirds of

this speed.

"Thus not only is the track of a single atom made visible, but also the effects of the collision with another atom is also plainly photographed. Several different types of atom collision have been found in the photographs. The chief interest in the problem is that by taking enough photographs it may be possible to photograph the disintegration of an atom produced by the high-speed collision.

"When an atom passes through other atoms it electrifies them, or, technically speaking, ionizes them. These ions and the electrons thus produced attract water molecules and thus water drops are formed, just as in a rain cloud, except that these water drops lie exactly in the track upon which the atom has passed. By eliminating the train of water drops by a brilliant light, a bright line of light is observed and may be photographed by the use of high-speed lens.

"The present work was done by the use of a universal moving picture camera, and illustrates a new use for moving picture machines. The tracks may be easily shown in the moving picture theaters."

WAR ON INSECTS RAGES; MAN WINS SLOWLY

Science Service

WARFARE against insect pests grows in intensity, and despite the efforts of scientists, the damage mounts as new kinds of these enemies multiply and spread throughout the country, according to the annual report of the secretary of agriculture. Although the direct insect attack on crops has not been stopped, great progress has been made in the control of the indirect attacks made by these pests in carrying infectious diseases from plant to plant.

"Much of the failure in controlling some of the physiological diseases of potatoes and other cultivated crops," the report of Secretary Wallace says, "is now known to be due to failure to recognize the fact that plants might be infected and capable of transmitting the diseases without showing external symptoms. Researches have now thrown much light on a field in which scientific workers were previously almost helpless."

The direct attacks by the corn borer, the Japanese beetle, the cotton boll weevil and the pink bollworm have not been combatted with such success, the report revealed. The corn borer holds the ground previously gained, although a benevolent parasite has been introduced from France

which laboratory studies indicate may prove of immense value in destroying various species of borers.

The Japanese beetle continues to spread at the rate of five miles a year and larger jumps may be made any time. It is expected that it will spread throughout the United States despite control measures. Using the airplane to spread poisons is a method that gives promise in the fight against the boll weevil.

But the pink boll worm which has gained a foothold in Texas, Louisiana and New Mexico is regarded as an even more serious pest. In all probability it would have won the fight but for the vigilance of a Baltimore inspector of the department. A passenger from Brazil landed with fifty packages of Brazilian cotton seed which he intended to take to the cotton section of Mississippi for planting. The Baltimore official, however, discovered these seed and found that living pink boll worms infested every package. If they had been let loose in Mississippi, officials believe that they would have quickly covered the portion of the cotton-belt.

MERE MAN AMONG THE TUAREGS

National Geographic Society News Bulletin

AMONGST the Tuaregs, found in the vilayet of Tripoli, it is man the brute who by all the laws of the country has to obey the women. Descent is traced through the mother; woman shows her proud face to all the world, while the man goes veiled. In the presence of a woman of noble birth, men cover their faces and heads altogether. The women give the children what little instruction they have and train them to respect and obey them.

Bullied and worried by his women-folk, the Tuareg has no liberty at all. All the goods, tents, camels and clothes are the women's property. The stick he carries and the great wooden box into which he puts what his wife suffers him to have are all the man possesses and all he retains if for some reason his wife chooses to divorce him.

In Ghat, when a man goes out after sunset he is usually followed by a negro servant, sent by his wife to dog his steps, and woe to him if he forgets himself or comes home too late! He will find the door shut and must count himself lucky if he is not put onto the street altogether.

The young man who, in spite of all this, wants to marry must pay a heavy sum for the bride, to obtain which he is obliged to look for other means than his usual work of rearing camels or carrying goods for the Arab trader. Thus he is forced into taking part in one of the annual razzias.

The ladies decide when the right moment has come, and the men sally forth against some luckless caravan or to the rich highlands of Tibesti. These senseless raids have destroyed many a fertile oasis, and have accelerated the final disappearance of trans-Saharan trade.

EXPEDITION STUDYING SOUTH SEA BIRDS

Science Service

ABOUT 3,300 species of birds, including some heretofore believed extinct and some hitherto unknown to science have been secured by the Whitney South Sea Expedition of the American Museum of Natural History, according to Dr. Robert Cushman Murphy. Dr. Murphy is associated with Drs. Leonard C. Sanford and Frank M. Chapman in the administration of this expedition, which, through a contribution of \$100,000 by Harry Payne Whitney, is the most elaborate expedition ever equipped primarily for bird study.

Much light has been thrown on the geographical distribution of many sea birds, as well as many insular land flyers. The collections show that birds of the tropical tradewind belt in the South Pacific are for the most part of a different race from those inhabiting the latitudes of calm farther south.

It has also been discovered that in some cases every inlet within a single group of islands has a well-marked geographic race. The range of some of these is no more than a few acres.

Although the expedition is primarily out to study birds, it is losing no opportunity to obtain material valuable to other branches of science. In some of the Polynesian islands the native people and animals are dying out or changing with changing conditions. Information in regard to these is being collected in cooperation with other scientific organizations.

In order to avoid duplication of work, it has been decided to leave the bird investigations in the Hawaiian Islands and certain neighboring groups, such as Midway, Johnston, Palmyra and Washington Islands, to the Bishop Museum of Honolulu.

The expedition is equipped with the most complete compilation of data known covering the notes on extinct, doubtful and mythical species of animals described by the early sailors of the South Pacific.

The collecting work of this expedition has hardly begun, but already many birds and bird stomachs preserved in alcohol have been received. The contents of all of these stomachs will be analyzed and reported on by the United States Department of Agriculture.

Photographs are being taken not only of the birds and wild animals of the places visited, but

interesting features of the life and appearance of the people and the islands are being captured at points where civilization has touched but little.

ITEMS

Science Service

ELKS will have to quit wearing elks' teeth or elks will be no more. This was the gist of an illustrated address by Representative Albert H. Johnson, of Washington, before the Ninth National Game Conference in Washington on December 12. He made a strong plea that in order to save from extinction the animal for which their lodge is named, the B. P. O. E. pass resolutions condemning the wearing of elks' teeth by their members. He told very vividly of the damage done by poachers who kill bull elk in the spring of the year simply to extract their teeth which have a commercial value, in that members of the Elks' Lodge buy them for watch charms, cuffs buttons and other decorative uses. As long as these teeth command a fancy price, men will be found who will take any risk to procure them, he said, and this means the ultimate extermination of the elk.

OVER a half million self-supporting farm homes can be created from the 30,000,000 acres of suitable land in this country which have already been examined, F. H. Newell, consulting engineer of the U. S. Reclamation Service, told the American Association for the Advancement of Science. Twenty million of these fertile acres have too much water and the other ten million have too little water. All engineering obstacles to their reclamation have already been overcome, he said, and the Reclamation Act should be extended to permit the taking up of more lands in a systematic, orderly manner.

THE undersurface of whales is sometimes infested with barnacles as are the bottoms of ships; but not with the same kind of barnacle.

SIAMESE rice growers of the interior fear to convert their rice into money because bandits prefer cash.

A RADIO wedding was recently performed at Pittsburgh and 500,000 persons are estimated to have "attended" the ceremony by ear.

DIAMONDS represent 94.3 per cent. of the \$80,696,000 worth of rough gems which the world produces annually in normal years.

TESTS to determine a practical standard of illumination to make auto license tags readable at night at a reasonable distance are being conducted by the U. S. Bureau of Standards.

AN international committee appointed by the League of Nations is working to standardize serums for the treatment of pneumonia, meningitis, diphtheria and other diseases.