SCIENCE NEWS

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THE PLANET PLUTO

DEFINITE proof that Pluto, the planetary object recently discovered by Lowell Observatory astronomers, is really a planet revolving beyond the orbit of Neptune has been obtained by astronomers at the Mount Wilson Observatory, as announced by Dr. Harlow Shapley, director of the Harvard College Observatory, which acts as the national clearing-house for news of astronomical discovery.

Because of the slow motion of the planet, all the observations made of it since discovery have not been sufficient to permit an accurate calculation of its orbit. Discovery of several photographic plates taken in 1919 on which the planet was recorded has given the Mount Wilson astronomers the material for a much more precise determination of the planet's path.

Dr. Seth B. Nicholson and N. U. Mayall have calculated the orbit and find that Pluto revolves around the sun once in a year equal to 251.8 of ours. The eccentricity of its orbit is .25, which means that it is an ellipse not very far from circular. A preliminary orbit calculated by the Lowell astronomers indicated that it was an extremely elongated ellipse, while still other astronomers believed that it was still longer and that the planet would take many thousands of years to make a circuit of the sun.

According to the Mount Wilson calculations, Pluto is approaching the sun and will be closest on June 5, 1988. Then it will be 2,700,000,000 miles away from the sun, about the same distance as that of Neptune, farthest known planet until Pluto's discovery.

"This orbit indicates definitely that the object belongs to the solar system, and is a small trans-Neptunian planet, rather than a comet," said Dr. Shapley. "The new orbit satisfactorily represents all known observations of the planet, including a photograph made in Brussels in 1927."

PROFESSOR EINSTEIN ON SPACE AND REALITY

"SPACE will finally survive as the sole carrier of reality," according to a prediction made by Professor Albert Einstein in an address made before the Second World Power Conference which is being attended by engineers and scientists from many countries.

Professor Einstein was introduced to the audience of two thousand which assembled to hear the address, which was the first general feature of the conference program, by Dr. Oskar von Miller, president, as "the Newton of the present day."

He traced the evolution of man's ideas of the constitution of the universe from the days of the old Euclidean geometry which gave a notion of space based on the relations of bodies in connection with each other.

Descartes was the first to introduce space as the general container of the universe. The picture of space as seen by Newton did suffice to describe physical relations until Maxwell introduced his field theory of electromagnetic waves upon which the whole of modern electrical development has been based.

The fact that electromagnetism acts at a distance made the conception and notion of an ether necessary. But, Professor Einstein explained:

"By means of the relativity theory space loses its generality and its structure must be regarded as changeable. There is analogously to Reimann's geometry a mathematical space structure possible wherein metric continuity and direction are united in a four-dimensional reality."

Space was originally derived from physical bodies. This space has annihilated the ether and time. Professor Einstein is now engaged in the formulation of newly developed generalizations which promise to annihilate fields of force, corpuscles and material particles in such a way that the fundamental stuff of the universe will prove to be, not matter as previously supposed, but space itself.

THE ARRANGEMENT OF ELECTRONS IN ATOMS

FROM revealing to the eye the arrangement of the bones in our bodies, X-rays now show how the electrons are placed in the atoms of which all matter is made. For many years physicists have been able to study the arrangement of the atoms in larger aggregations by the use of X-rays, but further studies in the last few years have brought out new facts about the structure of the atoms themselves, Professor Arthur H. Compton, of the University of Chicago, told the American Physical Society meeting at Ithaca.

"Several weeks ago I noticed a beautiful halo around the moon," he said, in explaining the method. "Half an hour later the halo was visibly smaller in diameter, and it was no surprise when a few hours later rain began to fall.

"The interpretation of such haloes, as due to the diffraction of the moonlight by droplets of water suspended in the air, is well known. The larger the droplets the smaller the angle of diffraction necessary for the appropriate phase difference between the rays coming from the two sides of the drop. So by observing the diameter of the halo, we can estimate the size of the water drops which cause it. A shrinking halo means a growing drop, and hence probable rain.

"In a very similar manner it is possible to find the size of molecules and atoms in a gas, by observing the diffraction haloes produced when they are traversed by a beam of X-rays. For many years it has been possible by this method to make rough estimates of the sizes of the atoms, but only very recently has the theory of the process become well understood, and the experimental technique become sufficiently developed to give us precise information regarding the electron distributions in atoms.

"When we review the many atomic theories that have been proposed and discarded, it may perhaps appear too bold to say that the particular theory now in vogue has any finality. One by one the vortex ring atom of Kelvin, the positively charged jelly of Thomson, the minute solar systems of Rutherford, Bohr and Sommerfeld, as well as the tiny atoms of Crehore, the ring electron atoms of Parson and the cubic atom of Lewis and Langmuir have given way to more promising successors. We replace even Schrödinger's diffuse cloud of negative electricity by a probability cloud of electrons after the manner of Heisenberg. It now appears, however, that the only one of these many proposals which can account for the observed X-ray diffraction haloes is that of Heisenberg."

After giving details of the methods used in interpreting these X-ray experiments, Dr. Compton concluded:

"We may say with some confidence that the aspect of the problem of atomic structure which is concerned with the distribution of the electrons in atoms is finding a satisfactory solution. It is a relief to note that a theory is at hand which affords a reasonable interpretation of the electron distributions which the experiments show.

"In a bulletin of the National Research Council, published in 1922, having experiments of this character in mind, I had the temerity to predict that within ten years the electron positions in the lighter atoms would probably be known as reliably as were the positions of the atoms in certain crystals. I believe that prediction is now verified. For this information regarding electron positions in atoms is based upon precisely the same principles as is for example our information regarding the position of the oxygen atoms in a calcite crystal.

"I suppose it would be fair to say that experiments such as these come the closest of any yet performed to showing us 'what the atom looks like.' For after all is not seeing an object a diffraction phenomenon similar to those under discussion? And when we thus 'look' at the atom we find it composed of electrons diffusely distributed."

CANCER DIAGNOSIS

PHYSICIANS who took part recently in an informal test showed increased ability to diagnose cancer when compared with physicians who took practically the same test fifteen years ago. The test was held as a part of the three-day conference of pathologists held at the surgical pathological laboratories and the Garvan experimental laboratory of the Johns Hopkins Hospital and University.

The physicians recently did not agree on a single borderline case in their diagnoses of the sections of tumors given them by Dr. Joseph Colt Bloodgood, neither did the physicians who examined similar and in some cases the same sections fifteen years ago. This shows the great need for a stain which will differentiate the cancer cell from other cells, so that it will not be possible to miss it in examining sections from suspected tumors.

The majority of pathologists in 1930 apparently made the correct diagnosis while the majority in 1915 did not. This shows the improvement in physicians' ability to diagnose this disease from microscopic sections. At this conference all the doctors agreed on every definite case of cancer, and all agreed on every definite benign tumor. The disagreement was entirely on the borderline cases. This means great security to the patient facing operation for possible cancer. If he really has cancer and there is a good pathologist in the operating room to make a rapid examination of a section of the tumor, the patient will not get incomplete treatment for cancer.

Occasionally the tumor may be diagnosed cancer when it is not cancer, and the patient will get the operation for cancer when he does not need it. This is the safest mistake that can be made and need not be feared. The dangerous thing is the incomplete operation when cancer really is present. Even the safe mistake, the operation for cancer when cancer is not present, can be prevented if a differential stain for cancer can be developed.

INCREASE IN MENINGITIS

A PROGRESSIVE increase in the number of cases of meningococcus meningitis has taken place in this country during the last five years, Dr. R. C. Williams, of the U. S. Public Health Service, told the state, provincial and territorial health officers assembled in Washington for the recent joint meetings of the Annual Conference of State and Territorial Health Officers with the U. S. Public Health Service and the Annual Conference of State and Provincial Health Authorities of North America.

"It is true that the actual number of cases is not large when compared with the total population," Dr. Williams said. "It is significant, however, that each year there has been an increase over the preceding year and that this rise has continued for five years." No comparable increase has been reported from Europe. The total number of cases reported throughout the United States for the past five years is as follows: 1925, 1,859 cases; 1926, 2,226 cases; 1927, 3,204 cases; 1928, 5,781 cases; 1929, 9,660 cases. During the first twenty-two weeks of 1930, forty-seven states reported 5,400 cases.

The control of this disease is extremely difficult, Dr. Williams said. Studies conducted in various parts of the country have failed to produce any new methods of importance. The most important preventive and control methods now known are: prompt recognition of cases of the disease, prompt reporting to the health authorities; avoidance of overcrowding, maintenance of high standards of bodily vigor, sterilization of dishes and eating utensils, optimum of fresh air and sunshine for carriers and convalescents.

At an earlier session, Dr. Williams told of a survey which the Public Health Service has conducted in cooperation with state health authorities with a view to establishing a morbidity registration area similar to the birth and death registration area now in existence. The advantage of the morbidity area would be that for the states in the area all cases of communicable diseases would have to be reported. This would make the matter of control and prevention of epidemics much better. Several state health officers described the favorable results of the survey in their territory and it was decided to continue it during the coming year.

Experiments being conducted at the U. S. Hygienic Laboratory in the hope of improving still further the

present method of immunizing susceptible persons against scarlet fever were reported by Dr. M. V. Veldee. At present, from 96 to 100 per cent. of susceptible persons can be successfully immunized if they are given adequate treatment with the scarlet fever toxin already developed by various scientists. The immunity has been proved both by skin tests for susceptibility and also by the fact that children so immunized came through scarlet fever epidemics without acquiring the disease. How long the immunity lasts is not known, but it is thought to last three or four years.

GOVERNMENT REWARDS FOR DISTINGUISHED SERVICE IN SCIENCE

A BILL shortly to be reported out from the committee on the library of the House of Representatives will allow the President to decorate men and women who, while in the employ of the federal government, have "made outstanding contributions to the advancement of scientific knowledge or the application of its truths in a practical way for the welfare of the human race and to citizens who, while in the employ of the federal government, have rendered conspicuous service to humanity at the voluntary risk of life or health over and above the ordinary risks of duty."

There will be two medals. For the investigator who has made a specific contribution to the knowledge of the world, there will be the Thomas Jefferson Medal of Honor for Distinguished Work in Science. This medal is named after the President of the United States who was an early patron of science, who engaged in some scientific work and who sent Lewis and Clark on their famous explorations.

The Jesse W. Lazear Medal of Honor for Distinguished Self-Sacrifice for Humanity will be the medal which would be awarded to those who risk life and health bravely that the cause of science may be advanced. This medal is named after the physician who, as a member of the famous Yellow Fever Commission, allowed an infected mosquito to bite him and give him a fatal case of the disease which was conquered through the information that this and similar heroic sacrifices gave to medical science.

Only three medals in each class will be awarded each year by the terms of this bill, and the National Academy of Sciences will pass on names recommended to it by heads of departments and independent offices of the government.

It is conceivable that one person might be awarded both medals, either in one year, or in different years. The honored persons receiving these medals and decorations would, in addition, receive $1,000 each.

It is said that the bill will probably pass at the next session of the Seventy-first Congress, beginning in December.

ITEMS

THE photoelectric cell, that has made possible both talking movies and television, is slowed up when infra-red light, consisting of waves too long to be noticed by the eye, falls on it. At the meeting of the American Physical Society, Dr. A. R. Olpin, of the Bell Telephone Laboratories, announced results of recent experiments. The active part of the cell is a layer of metallic sodium or potassium. When visible light falls on this layer, electrons are emitted, and give rise to the photoelectric current, which varies in strength with the intensity of illumination. Dr. Olpin explained that when a cell is operating, by excitation with visible light, the current may be reduced as much as fifty per cent. when infra-red light falls on the cell.

RESULTS of a seven-year fight to check deafness in children and adults were described by Dr. Harold M. Hays, chairman of a special committee on the hard-of-hearing child and the adult deaf, at the meeting of the American Medical Association. In 1923 when this committee was formed there was little interest in the conservation of hearing in children of school age. Now in almost every state some action is going on to interest health and school authorities in this vital subject. The group audiometer, which was comparatively unknown five years ago, now makes it possible to test the hearing of forty children at a time. Dr. Hays described the work that is being done among the 3,000,000 deafened school children in the United States.

A POPULAR course on mental diseases should be part of a well-rounded college education, in the opinion of Professor Jean Piltz, of the University of Cracow, in Poland. Professor Piltz, who has been visiting this country, has found that when university students take such a course, they not only learn to recognize unhealthy mental and nervous states in other people, but they also are aroused to improve their own mental health. Courses on mental diseases of children, given for school teachers and school physicians at the University of Cracow, have shown the value of careful popularization of this subject.

COMPLETELY equipped for the taking and finishing of "talkie" films, a new sound picture laboratory of the Bell Telephone Laboratories is now in use. By duplicating the conditions met with in actual practice, it is expected that further improvements in sound motion picture technique will be made. The sound stage provides a floor space of 70 by 49 feet, and is fully connected for lights, microphones, camera motors and all the other necessary accessories. At one end is a monitoring booth, where the operator can regulate the sound from each of the microphones. This is on a balcony, and opens into a large monitoring room, where full-sized loud speakers reproduce the sounds as they are recorded, and also provide for the "play-back" from one of the records immediately after it is recorded, for the benefit of the director and actors. A projection booth at one end of the sound stage, just below the monitoring booth, provides for recording a musical or sound accompaniment to silent pictures. Full equipment is provided for recording on either wax records or film, and for developing and printing the film after exposure. A projection room with standard projection and reproducing equipment permits viewing of the films. Air-conditioning equipment makes the best atmospheric conditions in all rooms.