SCIENCE NEWS

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PAPERS PRESENTED AT THE INTERNATIONAL SPECTROSCOPY CONFERENCE AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PROFESSOR J. STUART FOSTER, of McGill University, and Professor Jacob Cholak, of the University of Cincinnati, in a report made before the Second International Spectroscopy Conference held at the Massachusetts Institute of Technology, pointed out that lead may be detected in the human body in a tenth the usual time for such a test by means of the spectroscope. The spectroscope is a fine optical instrument for examining matter by studying the light given off when electrons are hurled into the atoms of which it is composed. While qualitative determination has been possible for some time, exact qualitative measurement has been exceptional without the use of the spectroscope. Both investigators also pointed out that chemical analysis heretofore used requires anywhere from 10 to 14 days while the spectroscopic analysis is possible in a period varying from 24 to 48 hours. This method also requires less tissue for the test. Professor Foster explained that the tests are made by a comparison of the intensity of the lead spectra with that of magnesium in the same sample being tested, in this case, an amount of spinal fluid. Using known lead concentrations to add to the spinal fluid and establishing a relation between the above ratio and the lead concentration, it is possible to detect one hundred millionth gram of lead per cubic centimeter. Professor Foster hopes to apply this method to the study of lead as a possible cause of multiple sclerosis.

FORECASTING death by means of spectroscopic investigation of the blood of patients was reported by P. and P. Lecomte du Noüy, of the Pasteur Institute, who did not attend, but communicated their report to Professor George R. Harrison, of the Massachusetts Institute of Technology, chairman of the conference. Analyzing over 8,000 samples of the blood of men, horses and sheep, it was found that curves plotted by a spectroscopic examination of the serum and white plasma of the blood show remarkable constancy, "so great that they can be really superimposed on each other." When departures from this general curve are noted, it is stated, it can be safely interpreted as an indication of pathological disturbances. Such alterations are rare and seem to correspond to fatal cases. "Alterations in the curves," according to the report, "must correspond to very deep chemical modifications affecting the chromophoric (color) elements which belong to very stable chemical groups. A man's death, which followed in 24 hours, was predicted. He was partly paralyzed, owing to a malignant tumor of the spine, with metastases in the lower jaw, and urinary infection. He was expected to live, however, for many months.

CURIOUS facts about the germination of lettuce seed were reported by Lewis H. Flint, of the Bureau of Plant Industry, U. S. Department of Agriculture. Comparing the sensitivity to light of the lettuce seed to that of the average photographic film, he said that red, yellow or orange light accelerates the germination process while a blue or green light tends to inhibit this. Only four seconds' exposure to light is necessary to start germination, but light is essential to the process.

A NEW kind of porphyrin, the basic substance in the red coloring matter of blood and also of chlorophyll, the green coloring matter of plants, is leading to the conclusion that plants and animals may have sprung from the same ancestor in the beginning of evolution. Dr. Calvin R. Coulter, of Columbia University, described his investigations of porphyrin with a spectroscope. Porphyrin was extracted from cytochrome, a substance found in nearly every living thing dependent on oxygen. Combining porphyrin with various metals, Dr. Coulter was able to produce light spectra which he could analyze in his spectroscope. By reducing the temperature to that of liquid air, however, over 300 degrees below zero Fahrenheit, more detailed and clearer spectra were obtained. Dr. Coulter pointed out that the spectroscope is now useful for studying living matter almost as easily as it has previously been possible to study inanimate things like metals, gases and liquids.

WHY do some bees turn into queen bees and others into workers? The reason may be that the body of the queen bee contains the element manganese and no sodium while the worker bees have plenty of sodium. This is the report of Professor Ramon Ricard, of the Faculté Catholique des Sciences, France. Dr. Ricard used the spectroscope to analyze the light given off by different kinds of bees when their bodies are ignited and so discovered the chemical elements in their composition. An interesting aspect of his work lies in its similarity to that carried on at the Johns Hopkins University where it was found that the removal of manganese from the diet of mother rats resulted in a decrease in the interest shown by the rats for their young.

NEW dyes, resistant to fading by light and washing, are being developed by studies of the colors which they absorb when light is passed through them, according to Professor Wallace R. Brode, of the Ohio State University. By analyzing the light absorption of dyes, Professor Brode is investigating the causes which make them decompose. He believes that it is a photo-chemical reaction, and he hopes to be able to predict from the absorption spectrum of a dye its exact structure. In that case we should be able to synthesize dyes and make exactly what we wish.

L. G. S. BROOKER, of the Eastman Kodak Co., described the technical methods of creating photographic plates sensitive to all colors of the visible spectrum and parts of the infra-red region also. In an illustrated lecture he

showed the difference in the final picture obtained with color-sensitized plates and the kind now in ordinary use.

INVESTIGATIONS OF CANCER

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WITHIN seemingly normal cells of human bodies, there is always a virus capable of causing cancer. Whether or not the disease develops depends upon whether a physiological "trigger," in the form of mechanical or chemical irritation, sets free the virus. This new theory of cancer with evidence for its support is presented by Dr. C. H. Andrewes, of Great Britain's Medical Research Council.

Dr. Andrewes's report to the Royal College of Surgeons appearing in the *Lancet* is commended by the editor as "by far the most comprehensive survey" of the subject yet presented.

When irritants initiate malignancy, Dr. Andrewes believes, no virus enters the body. It has always been there, dormant, pending the trigger mechanism which sets off the malignant process. Such mechanical balance would explain the gradations from benignancy to extreme malignancy which are seen in tumors.

The development of cancer is seen as somewhat analogous to the formation of fever blisters. A mere rise in body temperature, such as caused by a fever, is enough to cause fever blisters in about every other person so afflicted. The herpes simplex virus seems to be liberated by the heat and causes the face eruption.

Dr. Andrewes's theory, according to the editorial, confirms the fact that cancer is not infectious in the conventional sense. In other words, although caused by a filtrable virus it is not infectious like infantile paralysis, for example, which is also caused by a filtrable virus.

Many cancer students have thought that mammalian cancers are an apparently different class of tumors from the filtrable fowl tumors, but Dr. Andrewes does not agree. He thinks the two kinds are really alike. The only way in which filtrable tumors of birds differ from cancers of men and other mammals lies in the fact that the causative agent of the fowl tumors can be demonstrated apart from the cells it normally inhabits, he concluded from his investigations.

The causative agents of cancer have properties so like those of the known viruses that excluding them from the virus group is unjustified, in Dr. Andrewes's opinion. The natural history of other viruses readily explains the production of tumor growth phenomena, he stated. Many viruses multiply within the cells of the body and once they have got into these cells they can not be neutralized by external antibodies.

A POSSIBLE NEGATIVE PROTON

To explain why the central nucleus of many kinds of atoms sometimes spins one way and sometimes the other, a new kind of entity within the atom has been postulated, tentatively called a negative proton.

The negative proton is still unfound but physicists all over the world are on the lookout for it. It would have the same mass as the cores of hydrogen atoms—the protons—but would have a negative charge of electricity upon it instead of the customary positive charge.

The existence of such a particle is suggested by Dr. S. Tolansky, of the Imperial College of Science, London, in a report to *Nature*.

Only a few weeks ago Professor George Gamow, from the Polytechnical Institute, Leningrad, U. S. S. R., suggested to members of the American Physical Society, meeting in Ann Arbor, that a negative proton would be most helpful in explaining many of the difficulties regarding the stability of certain atoms like beryllium, which are now made to undergo artificial radioactivity.

The original prediction of the negative proton can be credited to Dr. Carl Anderson, of the California Institute of Technology, who in March, 1933, suggested that the emission of positrons from an atom struck by high-energy radiation might be due to the break-up of a neutron by the impact. In the collision a positron would come off and a negative proton should remain within the atom. If an electron came off when a neutron broke up an ordinary positively-charged proton should remain inside.

Basically the negative proton enters atomic physics because there is a growing suspicion that the neutron may be composed of two different arrangements of parts which are externally indistinguishable. The neutron is the so-called non-electrical particle because whatever charges it contains are so closely bound that there is no observable external field.

It seems now as though a neutron may be composed of a close union of a proton and an electron whose charges equalize one another; or it may be composed of a negative proton and a positive electron where again the opposite charges neutralize each other. Both these neutrons would have the same weight and the same lack of external charge. They would be hard to tell apart unless they were split apart, but after such a break-up the original composition would, of course, no longer exist.

DINOSAUR REMAINS IN WYOMING

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EIGHT gigantic prehistoric animals, dinosaurs that roamed lakes and swamps of 125,000,000 years ago, have been discovered by Dr. Barnum Brown, curator of fossil reptiles of the American Museum of Natural History, New York, some 25 miles east of Greybull, Wyoming, in the foothills of the Big Horn Mountains. Enough bones have been uncovered to cause Dr. Brown to feel that "we have stumbled upon one of the greatest fossil mines in the paleontological history of America."

At present the dinosaur remains are simply a large pile of loose bones, but when assembled eventually as museum exhibits their skeletons will probably show that the sauropod dinosaurs, believed to belong to a hitherto unknown species, ranged in size from 25 to 40 feet in length and from 10 to 14 feet in height. They were salamander-like creatures.

Dr. Brown, as head of the American Museum-Sinclair dinosaur expedition, has been excavating in the vicinity of Keyhole Canyon since the early part of June and these excavations are now producing dramatic and surprising results. For Dr. Brown had only expected to find two sauropods instead of eight.

"To date we have uncovered enough bones spread

over a seventy- by sixty-foot site," stated Dr. Brown, "to feel satisfied that we have at least eight sauropod remains before us. Others may be buried under this layer of bone or near it. The bones are not articulated, hardly even associated, but they are so unusually well preserved that the task of reconstructing them will be quite easy. For one thing, they are entirely free from the iron and crystal deposits which frequently make the matter of cleaning and restoring fossil bones a herculean and almost impossible task. While I have nothing definite to base this statement on, I somehow feel that we have only scratched the surface yet and that we have stumbled upon one of the greatest fossil mines in the paleontological history of America. We have at least 50,000 pounds of fossil bones in sight and one of the things that worries us is to preserve them from the elements long enough to get them out of the ground and carted to Greybull, which includes a ten-mile journey over narrow and rough mountain trails.

Owing to the important nature of Dr. Brown's discovery, he has, for the time being, sidetracked previous plans to continue this summer his search for further fragments of the "bantam dinosaur" he discovered near Harlowton, Montana, last summer.

ITEMS

AN expedition of twelve scientific men mostly from eastern universities, and headed by Professor Leslie Spier, of Yale, have arrived in southern Oregon to study the picturesque Modoc Indians. Professor Spier is already known for his researches and published works on the Indians of this region. The Modocs are historically famous for their frequent conflicts with white immigrants in earlier decades, in which many atrocities were reported on both sides. After the Modocs ceded their territory, and moved to the Klamath reservation, they still were restive for their old homes, and their determined efforts to return there led to the Modoc War of 1872. Professor Spier's study of the manners and customs of this independent-minded people is to be sponsored by the Rockefeller Foundation, and is directly under the Laboratory of Anthropology at Santa Fé.

BEFORE engineers pour in water to create an artificial lake at the great Bonneville dam on the Columbia River, an archeologist will make the last attempt to explore the dry land for signs of prehistoric Indian life. Herbert W. Kreiger, of the Smithsonian Institution, Washington, D. C., has come West to make the search for Indian remains. The region is of particular interest in ancient American events because the Columbia River Valley was one of the natural highways along which migrating groups of people of Asiatic origin would presumably have pushed their way down into the United States.

ZINC is a necessary part of animal diet Drs. Gabriel Bertrand and R. C. Bhattacherjee have reported to the Paris Academy of Sciences. Their conclusion is based on studies of mice. Baby mice as soon as they could be separated from their mothers were divided into two groups. To one group was given food entirely free from zinc, to the other the same food to which a minute quantity of zinc had been added, one part in fifty thousand. The first group did not thrive from the start. They became thin, emaciated, lost their hair, and died from various ailments after an average life of 17 days. The second group survived for an average life of 64 days. Post-mortem examinations of this group showed that about a fifth of the zinc administered had been incorporated in the body tissues. All the mice had the proper amount of vitamins. But without zinc they quickly died.

INSECTS, like other classes of animals, are fatally affected by prolonged exposure to temperatures over 104 degrees, and the Mediterranean fruit-fly, erstwhile menace to Florida agriculture, is no exception, according to Drs. Hugh H. Darby and E. M. Kapp, formerly entomologists with the U. S. Department of Agriculture. All stages of the fly are adversely affected by that temperature, they say, with adults and young pupae being all killed in less than seven hours and the old pupae and larvae in 13 and 17 hours, respectively. The other extreme is also fatal, the young pupae dying in 15 days at 40 degrees and in about 30 days at 50 degrees. The temperature of 104 degrees is critical for many types of animals with the lethal effect of the heat being more pronounced as the temperature advances. At 112 degrees, they found that no larvae were still alive in mango pulp that had been exposed to that temperature for four hours.

IRREGULARITIES on a polished metal surface are now transformed into sound by a needle and amplifying apparatus similar to a victrola, according to a report in *Metals and Alloys*. When the needle passes over the surface it encounters minute hills and valleys which set up vibrations on a diaphragm. A very smooth surface would emit a very high note as the ridges are small and close together, while a coarse surface would give out a bass note. A method for determining the same thing was developed several years ago in France. This made use of the photoelectric cell and is considered by Dr. P. R. Heyl, of the National Bureau of Standards, to be a slightly more accurate gage of smoothness, but the apparatus involved is somewhat more complex. Light was focused on a surface and its reflection directed on a photoelectric cell. Variations in the resulting current indicated the ridges and hollows.

AT temperatures of red and yellow heat that come to within a few hundred degrees of their melting points, carbons and tool steels are now being studied microscopically. A special furnace-like apparatus, developed at Harvard University by Dr. B. A. Rogers, now research associate at the National Bureau of Standards, is being applied by M. Vacher, of the bureau, in looking at the austenitic grains, which determine the hardness of carbon steels, while the metal is at a temperature of about 1,700 degrees Fahrenheit. Carbon dissolved in steel at high temperatures forms particles of materials which are somewhat different from the matrix surrounding them. These substances were first discovered by Sir Roberts-Austen and received his name. Since then others have been found.