SCIENCE NEWS

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CONCENTRATION OF NEUTRON BEAMS

PRELIMINARY tests indicating that neutron beams can be concentrated by use of paraffin lenses reported in the current issue of *The Physical Review* by Professor Gilbert N. Lewis, of the University of California, in collaboration with Philip W. Schutz, will be, if confirmed, of great significance to physical, chemical and medical radiation research. The importance of the announcement lies in the fact that neutrons are the latest and in many ways the most effective "bullets" with which the nuclear cores of atoms can be probed and in which new knowledge of this hidden physical world can be obtained. Moreover, it has recently been found that neutrons are much more efficient in creating ionization in living tissues than are x-rays or gamma rays from radium. Thus the possibility of using neutron beams for treating cancer has been a motive behind much of the recent research. If Professor Lewis's findings, that the use of a paraffin lens will gather and collect neutrons and can increase the concentration of these non-electrical particles in a beam, turns out to be correct, then laboratories throughout the world will take up the technique.

More and more potent beams of neutrons are being sought in all laboratories. Either "howitzers" of paraffin are used which contain a mixture of beryllium and radium, or else giant accelerating apparatus like the cyclotron is employed for creating neutrons. The high price of radium is a handicap in pursuing neutron research. The large accelerating apparatus, too, is costly. Concentrating neutron beams with lenses of paraffin thus would be a major aid to research, for weak sources could be used with an effectiveness now attainable only in a few favored laboratories.

The evidence reported by Professor Lewis and Mr. Schutz indicates that neutrons are bent, or refracted, as they pass through paraffin. Professor Lewis points out that although neutrons are considered to be of a particle or corpuscular nature the new finding can not be interpreted by present theory. He says: "We have been unable to conceive of any purely corpuscular explanation of this remarkable phenomenon." If it is assumed, however, that each neutron is accompanied by a train of waves an interpretation consistent with the facts appears possible which is closely akin to the phenomenon of refracting, or bending by the passage through the paraffin.

A NEW METHOD OF SMOKE-PARTICLE PRECIPITATION

THE U. S. Bureau of Mines recently demonstrated a method of ridding chimneys of dust and smoke particles by the use of sound waves. The development, because of its cheapness, strikes at one of the most potent sources of industrial smoke—the small factory.

Developed by H. W. St. Clair, from the laboratories in Minneapolis, Minn., the precipitation of chimney smoke by sound truly works a seeming miracle. In his recent demonstration Mr. St. Clair filled a five-inch diameter glass tube with thick white smoke. Then he turned into the tube the sound waves of a high pitched note of 7,000 vibrations a second. And at once the smoke particles began to cluster in striated levels down the length of the tube and wandered off to the walls and fell to the bottom.

The idea behind the method, for which patents have been applied (to be turned over free for the benefit of the public), is the simple experiment which every one who has ever taken a course in physics must have performed. In that experiment, standing waves of sound were generated that bounced back and forth in a tube from one end to the other and created regions where there was a maximum amplitude of sound wave vibration called anti-nodes and then, alternately, regions where there was a minimum of vibration, called nodes. The experiment showed that dust was kicked out of the anti-node areas and deposited in the nodal region.

The St. Clair experiment with smoke precipitation uses this long known phenomena except that the standing sound waves run vertically up and down the smoke stack, instead of horizontally. In actual practice the smoke and flue gases would be run in at the bottom on the side of the chimney and come out at the top, also on the side. And all the while the sound waves bounce up and down in the stack to precipitate out the particles.

Mr. St. Clair's method of smoke particle precipitation is completely in the experimental stage in America, but small pilot plant operations have been tried out in Germany in the past year or two.

The first question which any one acquainted with the field of smoke stack flue particle recovery is, "How does it compare in effectiveness with the Cottrell electric method and also in cost of installation and maintenance?"

The answer to this question on the relative merits of the Cottrell and St. Clair methods is that one has to know something about the cheapness of a real installation and not merely a laboratory, demonstration model. It seems as if the St. Clair method might be cheaper but no one yet really knows.

PLANT NUTRITION

SOME plants, like some children, have finicky appetites. Professor Lyman G. Schermerhorn, of the New Jersey Agricultural Experiment Station, blames just such a cause for hitherto unexplainable failures of certain vegetable varieties to produce their best crops under orthodox cultural methods. Nutritional requirements of plants are just as various as those of animals, he observes in reporting that plant feeding experiments undertaken a year ago have already supplied many clues to solve the mystery of reduced yields. Each variety of a vegetable group requires different feeding, and we'll have to learn how to feed them as varieties, catering to their whims regarding fertilizer performances and the exact time when a given variety of plant seems to want and need nutrition.

For example, he makes clear that plant feeding tests have already determined that large applications of nitrogen to different varieties of lima beans did not perceptibly increase the yields of the small varieties, but

greatly increased the production of large-seeded limas. Tried on tomatoes, one popular variety was found to respond best to heavy doses of fertilizer early in the season, while another variety produced best only when fertilized after its fruit started to set. Growers have always fed both varieties alike.

Professor Schermerhorn predicted that "after the farmer learns to recognize that he can't feed all vegetable varieties alike, a great deal of confusion that now exists in the seed trade will be eliminated because the number of varieties will have to be reduced." Improper plant feeding may even be so far-reaching as to cause the germination disorders in beans and other seeds which perplex both farmers and seedsmen. Plants which are vigorous and healthy as the result of proper nutrition are more resistant to disease and frost.

COLORED LIGHT AND FOOD MANUFACTURE IN PLANTS

RED light doesn't mean "stop" to plants in the food-manufacturing business; it means "go ahead." Green light comes nearer to signifying "stop" to such plants. Blue is another "go-ahead" light. These facts were developed in a research project by W. H. Hoover, of the Smithsonian Institution. He placed young wheat plants in a glass vessel, through which air could flow at a controlled rate. He passed the light received by the plants through filters that took out all but certain chosen wave-lengths, all maintained at the same level of energy-intensity.

The ingoing amount of carbon dioxide, out of which green plants manufacture primary foods, was definitely known. Analysis of the outgoing air showed how much of it had been removed by the plant in the food-manufacturing process. The less carbon dioxide coming out while a given color of light was on, the more efficient that light as an energy source for the plant's work. Most efficient of all wave-lengths tested was found to be in the red, close to the border of orange, at a wave-length of 6,550 Ångstrom units. Low efficiency was reached at about 5,500 Ångstroms, in the green. A second peak of efficiency came in the light blue end of the spectrum, at a wave-length of 4,400 Ångstroms. Dull red light at less than 7,500 Ångstroms was of no use to the plants in Mr. Hoover's experiments, but they could still manufacture at least a little food under the invisible radiation in the lower ultra-violet region, up to about 3,650 Ångstroms. The limit of visible violet light is about 3,900 Ångstroms.

PRONTOSIL AND PRONTYLIN IN THE TREATMENT OF PNEUMONIA

A NEW victory in the fight against pneumonia has been reported by Dr. Ralph R. Mellon, director of the Western Pennsylvania Hospital Institute of Pathology, Pittsburgh. Prontosil and its close relative, Prontylin, chemical compounds already used in cases of deadly streptococcus infections, are proving effective remedies for Type III pneumonia. Serum treatment has not been satisfactory in this pneumonia although Types I and II pneumonias can be cured by use of the proper serum. Reports of patients treated with these chemicals were given by Dr. Mellon before an audience at the University of California and at the meeting in Pasadena of the western branch of the Society of American Bacteriologists.

Of 9 Type III pneumonia patients treated with the chemicals, 7 recovered and 2 died. These figures are exactly the reverse of those for a group of 9 patients who were not given the chemical treatment. In this group, 7 died and only 2 recovered. The number of patients treated is not large, but studies of the chemical treatment for pneumonia in mice and rats adds to the evidence for the value of the new remedy. These studies have been going on at a number of institutions since the value of Prontosil for streptococcus infection, such as childbed fever, septic sore throat, scarlet fever and erysipelas, was first announced.

Dr. Mellon and associates studied the effect of Prontosil and Prontylin on pneumonia in rats rather than mice because pneumonia in rats is more like the human disease. In a group of 14 rats infected with Type III pneumonia, the deathrate was 85 per cent. These rats had not had any prontosil treatment. In another group of 13 rats with Type III pneumonia, Prontosil treatment brought the deathrate down to 23 per cent. Chemical treatment of pneumonia is not new. Many years ago, Dr. Lloyd Felton, of the Harvard Medical School, studied the action of various chemicals, including sulfanilamide, the active part of Prontosil, in pneumonia. When a successful serum treatment for Type I pneumonia was developed, however, the idea of chemical treatment of the pneumonias was abandoned. Investigators have since been trying to develop equally successful serums for all the 32 pneumonias, especially the first four types. Successful serums for Type I and Type II are now available.

BACTERIA, MOLDS AND YEASTS IN THE SOLUTION OF FARM PROBLEMS

BACTERIA, molds and yeasts, more noted now as disease-bringers and spoilers of things than for their useful activities, were considered as potential factors in the solution of America's agricultural problems by Professor Ellis I. Fulmer, of the Iowa State College, in an address made, on March 10, before the Midwestern Conference of Agriculture, Industry and Science, at Omaha. Farming is essentially a chemical manufacturing process. The farmer is foreman in a chemical factory, wherein his crop plants are living machines using the energy of sunlight to make carbohydrates, fats and proteins out of raw materials from air and earth. In the process, energy is woven into the things that come out as end-products.

Formerly the farmer used the release of a large part of that stored energy by feeding crop products to his work animals. Now he uses tractors and power machinery instead of horses and mules. So the products pile up, creating economic crises which can be only temporarily solved by crop limitation methods. A considerable part of the answer can be found in turning over the job of digesting carbohydrates to bacteria, molds and yeasts. These use up part of the energy in their life processes, but they turn back to the chemical industrialist a great variety of liquid fuels, solvents, ingredients for explosives, etc. Professor Fulmer displayed a list of

more than forty products that can be obtained from the microorganic fermentation of carbohydrates, only a few of which have present economic uses.

Dr. Norman F. Kennedy, of the Corn Industries Research Foundation, told the conference of a number of less familiar but very important uses of the two principal industrial products of corn, starch and syrup. Starch is used in enormous quantities in the manufacture of textiles, long before they are cut and sewed into shirts or sheets. It plays an important rôle in the production of paper, twine, burlap bagging, and many kinds of adhesives. Syrup from corn also has its uses in the textile and paper industries, and in such diverse industries as tobacco manufacturing and the tanning of leather.

NEANDERTHAL REFUGE

WISENT, wild horses, reindeer and other game animals that Neanderthal Man hunted for food are now at home in a special game preserve in the famous Neanderthal, the valley of the little river Neander where the bones of the beetle-browed race were first found in 1856. Dr. Richard Rein, of Dusseldorf, who has long agitated the project, had the satisfaction recently of seeing the first wisent released in the enclosed area.

The animals now in the preserve include several wisent, or European bison, herds of fallow deer, red deer and reindeer, and a small herd of wild horses. The latter animals, similar in size and shape and color to the wild horses pictured on cave walls in France and Spain, are from the herd kept by the Duke of Croy-Dulmen, in Westphalia. It is proposed also to introduce moose, chamois and ibex, all of which were included in the meat menu of cavemen. No artificial shelter is provided, but the animals appear to thrive perfectly well in all weathers, taking advantage of natural shelter in the woods.

Of special interest is the effort to increase the number of wisent. Pure-blooded animals of this species now number less than 100 head in all Europe, and efforts are being made to increase the stock by breeding. At the same time a type of cross-breeding known as "Verdrangungszucht," or elimination breeding, is being carried on with American bison cows. A wisent bull is bred to the bison cow. Only female calves are saved. These hybrids are again bred back to pure-bred wisent bulls. Thus each generation will have less bison and more wisent blood, and in the end the animals will be practically pure-blood wisent. This method, in use elsewhere in Germany, is also being followed at the Neanderthal preserve.

ITEMS

THREE months were required to construct and install the telephone system of the new Department of Interior building in Washington. An additional month was needed to perfect plans for the cutover from the old system, and only 80 seconds were needed for the actual transfer. The switchboard is so large that 3,700 calls can be handled at once.

PALEONTOLOGISTS of the Smithsonian Institution have identified as belonging to camels some of the bones found by a Smithsonian expedition at the only known dwelling site of Folsom Man, in northern Colorado. Importance of the camel bones is that the camel survived the Ice Age in North America only for a short time, if at all. That Folsom hunters ate camel, therefore, is good evidence that human beings had already arrived near the end of the Ice Age—a point much debated among America's prehistorians.

GALLSTONES apparently can form and survive only by "staying on the alkaline side," it appears from the report of researches by Dr. Maurice Feldman and associates of the University of Maryland School of Medicine. They implanted human gallstones in the gallbladders of dogs. The stones dissolved, apparently because dog bile is more acid than that found in the human gallbladder. Gallstones similarly implanted in guinea-pigs, which have alkaline bile, failed to dissolve.

VACCINATION against influenza has succeeded in actual practice. A group of men and boys at New Jersey State Colony were protected against this disease during an epidemic by vaccination with active human influenza virus. Drs. Joseph Stokes, Jr., Alice D. Chenoweth, Arthur D. Waltz, Ralph G. Gladen and Dorothy Shaw, of the University of Pennsylvania and Children's Hospital, Philadelphia, report that the vaccine was given at the outbreak of the influenza epidemic in and around Philadelphia in February and March last year. In the vaccinated group of 110 men and boys, 3 had typical influenza with fever. In an unvaccinated group of 550 at the same institution, 12.5 per cent. developed influenza with fever. Scientific details of the vaccinations and interpretation of the results appear in the current issue of *The Journal of Clinical Investigation.*

DENMARK has begun to vaccinate all its children against whooping cough, hoping to add this disease to smallpox and diphtheria as ills from which little children need not die. This news was brought to America by Dr. Thorvald Madsen, director of the Serum Institute, Copenhagen, and president of the Health Section of the League of Nations. Whooping cough is the most serious disease of children in Denmark. It ranks ahead of diphtheria and scarlet fever. In a group of 1,000 unvaccinated children this disease killed twenty-six. In a group of 3,900 vaccinated, there were only six deaths. Such figures have convinced health authorities of the desirability of vaccination. The vaccine will be given as early as possible in cases of whooping cough which may develop. It has been found to lessen the severity and shorten the course of the disease.

A COMPLETE fossil specimen of a long-spined Dimetrodon, one of the earliest reptiles and apparently the commonest animal on earth about 225 million years ago, has recently been brought to Harvard University by Robert Witter, of the Museum of Comparative Zoology. It was found in the "red beds" of northwestern Texas, which have previously yielded numerous skeletons of the early Permian period, of which the Dimetrodon was characteristic. This flesh-eating creature had its day and ceased to be, long before the rise of the Kingdom of the Dinosaurs.