SCIENCE NEWS

Science Service, Washington, D. C.

THE SEPARATION OF ISOTOPES

HYDROGEN cyanide, HCN to chemists, is perhaps the deadliest chemical known. Yet this poison is being used by Dr. Harold C. Urey, of Columbia University, in his latest separation of varieties of elements, called isotopes. By demonstrating that there actually existed a kind of hydrogen double in mass the ordinary sort, by producing heavy water whose hydrogen was of this deuterium of mass 2, Professor Urey won the Nobel prize. Then high concentrations of heavy oxygen were obtained. Later he separated heavy nitrogen of mass 15 from the ordinary nitrogen of mass 14.

Now he is accomplishing a separation of heavy carbon of mass 13 from the much more abundant and common carbon of mass 12, using a complex apparatus of glass through which, night and day, large amounts of hydrogen cyanide are flowing. Tall columns of chemicals, totaling 65 feet in length, worked upon by vacuum pumps, make possible the separation, which depends upon the fact that the cyanide gas contains more of the heavier carbon than the sodium cyanide in water solution.

Thus it is possible to obtain sodium cyanide, a white powder, a quarter of the carbon atoms of which are mass 13. A mere pinch, a tenth of a gram, a three hundredth of an ounce, is manufactured each 24 hours, but Professor Urey's stock of the precious stuff is growing steadily until now he can display about 10 grams.

This unusual sort of carbon may very well unlock some of the secrets of life and industry. Carbon is one of the universal elements of all living things, all fuels, and almost everything else, ranking with hydrogen and oxygen. In carbon of mass 13 Professor Urey has carbon atoms that are effectively tagged or labeled. They can be distinguished from the ordinary kind. That is why they are precious.

Some of the heavy carbon will be used to discover important facts about how food is utilized in the human body. Other tagged heavy carbon atoms may be used to trace the part they play in puzzling combustion effects. This chemical pioneering promises to pay handsomely in new knowledge.—WATSON DAVIS.

TESTING TELESCOPE MIRRORS

A NEW way of testing the accuracy of grinding for giant telescope mirrors, that saves two thirds of the cost, labor and time necessary for this vital operation, has been developed by Dr. Enrique Gaviola, astrophysicist of the National Observatory at Cordoba, Argentina. The discovery, believed one of the most important in the century in the construction of telescope mirrors, allows a parabolic surface to be ground on a great glass disk directly and tested continually during the grinding. For years astronomers have been grinding parabolic mirrors in a three-stage, tedious and costly process. From their original flat disk, as made in a glass works, they grind a spherical concave surface. Next they take another piece of glass and grind it to an optically flat surface. And finally they use the "flat" to test the spherical surface as they slowly grind and figure it into the desired parabola.

"The amount of work, time and money necessary for this three-stage operation," says Dr. Gaviola, "is about three times the amount demanded by the parabolic mirror itself. All three surfaces have to be figured, tested and corrected independently, and the optical flat has to be ground more accurately than the accuracy expected in the final parabolic mirror."

Dr. Gaviola, in a recent visit to the laboratories of the Mount Palomar Observatory, where the great 200-inch diameter mirror has been in the process of grinding since 1936, explained the methods to astronomers there. They appreciated its ingenuity but explained that they are so far advanced in their grinding, by time-tried methods, that they will continue to construct their mirror along the routine lines. At the most optimistic estimate it may be completed next year. If the method had been available and proved successful five years ago, the Mount Palomar mirror might now be in service, and the giant telescope could have been constructed at a much lower cost.

Dr. Gaviola was led to the discovery of the new method, which uses a fine wire instead of a knife edge for testing, by sheer necessity. In 1936, while at La Plata Observatory in Argentina, he set to work to correct noticeable errors in the 82-centimeter Cassegrain mirror at the observatory. "As we had no plane mirror of that size and no possibility of making either a flat or a Hindle spherical of 82-centimeter (over 2.7 feet) diameter it became necessary to find a new, simple method of testing the Cassegrain, using only the available equipment. After some experiments a satisfactory method was devised," Dr. Gaviola explains.

As described in a joint report with Ricardo Platzeck, of La Plata Observatory, to the *Journal* of the Optical Society of America, Dr. Gaviola says the new testing method works on the basic idea that to test an optical surface an arrangement is needed that will form an image of some kind. If the image is good, a study of it tells the quality of the optical surface.

If the image is not good, as it naturally will not be in a new mirror just being ground, it is subdivided into a number of good images by decomposing the main optical surface into sufficiently small parts or zones by the use of screens. The image is usually a so-called "artificial star," a bright point of light, or light from a narrow slit.

The common method is to observe the diffraction of light reflected off the telescope mirror as it passes by a sharp knife edge. The new method uses a fine wire as the diffracting object and the diffraction pattern is symmetrical on each side of it. The diffraction pattern from the various zones of the telescope mirror (secured by suitable screens with carefully cut holes in them) are observed. From these observations the curve of the mirror

surface can be calculated and the "high" or "low" spots, lying outside permissible accuracy, can be ascertained.

It is possible to obtain accuracy only 1/100 the wavelength of light by the method, which is not only applicable to parabolic mirrors but to optical surfaces which depart considerably from a spherical shape.—ROBERT D. POTTER.

SULFANILAMIDE AND MALARIA

HUMAN subjects as well as monkeys have been used in tests of the possible malaria-curing power of the widely used new chemical remedy, sulfanilamile, reported by Dr. L. T. Coggeshall, of the Rockefeller Foundation's International Health Division, to the American Society of Tropical Medicine meeting in Memphis.

These subjects were suffering from paresis, or general paralysis of the insane. Malaria is given such sufferers from the results of syphilis and frequently the malaria checks the mental deterioration. Some of these patients were resistant to one kind of malaria germ or parasite, *Plasmodium vivax*, but they volunteered for doses of another malaria parasite, called *Plasmodium knowlesi*, following which they were given sulfanilamide. They promptly got well of the malaria, just as did monkeys infected with the same kind of malaria parasites. This, however, apparently does not mean that sulfanilamide is a good remedy for malaria. In fact, Dr. Coggeshall stated that "when this drug was tried as a therapeutic agent against human malaria, there was no apparent effect."

The studies showed, however, that in testing any anti-malaria drug, the oxygen consumption and metabolism of the malaria germ should be taken into account. Sulfanilamide, both in monkey malaria and in test-tube experiments, was more effective against one kind of malaria parasite than against another less virulent one. The drug cured the *knowlesi* malaria in monkeys but had no effect on *Plasmodium inui* malaria. In the test-tube, similarly, it had no effect on *inui*, but markedly paralyzed the respiration or breathing of the *knowlesi* parasites.

No anti-malaria drug should be discarded, said Dr. Coggeshall, on the basis of its failure to cure one kind of malaria, but neither should the fact that it cures one kind of malaria lead to its being proclaimed as a universal remedy in malaria.

PROBLEMS OF FOREST OWNERSHIP

AMERICA'S forest lands: should they be publicly or privately owned; should there be much or little governmental regulation? These and other questions of forest policy were discussed at the opening meeting of the Society of American Foresters in San Francisco, and diverse solutions were proposed by well-known speakers.

Outright government ownership of all forest lands, excepting only farm woodlots, was advocated by George M. Peterson, associate economist of the Giannini Foundation. Upon the initial premise that a healthy and stable nation is most surely built on distributism, that is, the private ownership of a little property by every person, Mr. Peterson developed nineteen reasons for government ownership of all large timberland areas.

Ownership of vast forest holdings by wealthy individuals or large corporations is contrary to good public policy, he stated, because such ownership does not get full value out of the forests in either felled timber, grazing, recreational uses, wildlife protection and soil conservation. Large-scale private ownership, he argued further, commonly does not give adequate fire protection and is too apt to dodge taxes and indulge in unsound financing. Better to cut this Gordian knot and go all the way for public ownership and management.

Admitting the existence of many evils in American forest economy, C. S. Martin, forester of the Western Pine Association of Portland, Ore., traced them to other causes and proposed a less drastic remedial procedure. Lack of a well-developed forest policy embracing both private and public lands is a prime cause of present troubles, Mr. Martin held, and he pointed out that even the relatively limited steps toward industrial self-regulation that have been taken in recent years have produced encouraging results, especially in fire control, reforestation, selective cutting and the adoption of sustained yield programs.

Voluntary cooperation, resulting in part from consistent education of public and industry, was seen as a potent remedy by Stephen N. Wyckoff, director of the Pacific Northwest Forest and Range Experiment Station. The viewpoints to be reconciled are the public feeling that great social values are involved in the forest policy, and the private owners' resistance to any changes that would infringe upon traditional right to do as they please with what is their own.

Mr. Wyckoff set up five premises, acceptance of which he held to be necessary if a workable "middle way" is to be found. He called for simultaneous recognition of social values and the need for profits, for management to protect these social values, for private ownership on a sustained-yield basis wherever practicable, for public payments to defray extra costs of safeguarding social values, and finally for contractual guarantees from private owners whenever they receive public aid in management of their lands. Lands that can not yield a money profit and yet have intangible values to the public, Mr. Wyckoff concluded, should be publicly owned.

REGISTER OF SCIENTIFIC MEN BY THE ROYAL SOCIETY

BRITISH scientists have been indexed and classified, but not regimented.

A voluntary register, containing upward of 80,000 names, has been prepared, giving qualifications and type of work for which the specialists are best fitted. This register was begun by the Royal Society and by various scientific and technical associations and has now been taken over and amplified by the National Service Department of the Ministry of Labor. It is available to the War Department who notify their requirements for trained personnel to appropriate committees in charge of the register. Industrialists in need of specially trained men can also apply.

"British science is in a very much stronger position now than in 1914, especially as regards the number of trained men," according to Professor J. C. Philip, acting head of the Imperial College of Science and Technology of the University of London and chairman of the Industrial Chemistry Section of the Central Register of Scientists.

Although there is a surplus over present requirements, nevertheless the government has decided not to repeat the mistake of 1914 when brilliant young scientists were allowed to join the fighting forces indiscriminately. Physicists still remember with regret the loss of Moseley, whose brilliant career in x-ray research was cut short at Gallipoli.

Scientists and research workers are considered to be in reserved occupations and those not engaged in war work may continue their usual activities. At the same time, while full freedom is allowed to the individual, steps have been taken to inform research workers of the type of urgent problems that await solution. Some of these are of long duration, others have arisen since the war.

The "blackout" has called for scientific development. For instance, more effective phosphorescent substances were needed for use in underground shelters. Suitable "light filters" that would allow daylight in while preventing artificial light from passing outwards are being sought. Similarly gasoline restrictions make important devices for increasing miles per gallon, and alternative types of fuel are being exploited.

The Chemical Society has formed an advisory Research Council under the chairmanship of Sir Robert Robinson, to advise research workers in universities and other research institutions concerning general war problems needing investigation.

Another set of problems, which for the time being are left to the initiative of unofficial groups like Political and Economic Planning and the Engineers' Study Group, are those likely to arise at the end of the war. Large surplus capacity for the production of light metals, explosives, etc., will exist at the end of the war, and this, as well as the workers engaged in those industries, will have to find other utilization if industrial dislocation is to be prevented.

British industry has at present a considerable reserve of trained personnel in the Germans, Austrians and Czechs who have sought refuge in Great Britain. They have so far been employed in their particular lines of work only to a slight extent. During the last war it was a "non-Aryan" chemist, Dr. Fritz Haber, who enabled Germany to fight a prolonged war by his development of a synthetic process for the manufacturing of ammonia and nitrates, essential in the manufacture of explosives. Haber died in Switzerland, an exile from Nazi Germany.

Have scientists any surprises in store in the present war? Faced with this question, Professor Philip smiled and replied: "It is not a question that I could very well answer; however, this much I can say: during the last war it was the chemist who produced some of the most unpleasant innovations, such as the use of the poisonous gases. It may be the physicists' turn now."—VICTOR COFFMAN.

ITEMS

A NOTE on the supply of vanadium, printed under Science News in the issue of SCIENCE for October 27 describes the operations of the United States Vanadium Corporation at Uruvan, Colorado, but it is referred to as property belonging to "Vanadium Corporation of America, a subsidiary of Union Carbide and Carbon Corporation." As a matter of fact, the United States Vanadium Corporation is a unit of the Union Carbide and Carbon Corporation, and a competitor of the Vanadium Corporation of America, whose vanadium resources are in Peru.

THE number of fatal pneumonia cases in the Civilian Conservation Corps, whose members have been given anti-pneumonia vaccine, dropped this year to a rate one third that of the preceding five years. How much of this and of the reduction in total number of pneumonia cases is due to use of the vaccine can not yet be stated with certainty, according to Robert Fechner, director of the corps.

CHEMISTS of Egypt have been studying explosions which have been occurring in earthen molasses storage basins. The explosions turn the molasses into a hard carbonaceous material that makes a good fuel with properties somewhat like coke. The explosions occur between June and November when the dark-colored molasses is exposed to the hot tropical sun. Spontaneous combustion is believed to be the cause.

A TURKEY-LIKE bird with a three-inch horn growing out of its forehead, which was discovered in the jungles of Bolivia, has been announced by James Bond and Rodolphe Meyer de Schauensee, curators of birds of the Academy of Natural Sciences of Philadelphia. They call it the unicorn bird, *Pauxi unicornis* to the scientist. The bird resembles the new stream-lined Thanksgiving bird which was recently developed by the Department of Agriculture, in its size, which is about eight to ten pounds in weight. The horn which suggested its name is grayish-blue, while the feathers on the nape of the neck and back of the head are tightly curled and shiny. The new species was discovered by a collector for the academy, Mr. de Schauensee.

A MASS of bones, believed to be remains of nearly a hundred of Chief Powhatan's tribesmen, has been unearthed in an ossuary—ceremonial burial pit—beside the York River near West Point, Va. Dr. T. D. Stewart, of the Smithsonian Institution, was sent to investigate and excavate the bones, when residents notified the Smithsonian that high water had washed away the river bank, exposing human bones. The village of Chief Powhatan, father of Pocahontas, was presumably a short distance away, but Dr. Stewart reported finding no trace of it. A good deal of the shore has washed away. The burials, he said, represent an Algonquin Indian custom of digging up individual burials at stated times and re-burying them in mass, with ceremonies. Jesuit priests in Canada told of witnessing such ceremonies. Archeologists have previously found ossuaries as far south as the Potomac, but Powhatan's neighborhood represents a new southward limit for discovery of the custom.