SCIENCE NEWS

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THE SEPARATION OF TWO FORMS OF KRYPTON

THE most astonishing news from Germany, since the start of the war, has just been received in Pasadena. German investigators can now separate Uranium 235 from Uranium 238 if the information contained in the newly arrived issue of the scientific magazine *Die Naturwissenschaften* is correct. This is of first importance because, for one thing, Uranium 235 can serve as a substitute for, and improvement over, coal and oil, in many ways.

The article from which these conclusions are drawn does not mention Uranium. It is about the separation of Krypton 84 and Krypton 86 from ordinary Krypton. The authors, K. Clusius and G. Dickel, of the University of Munich, are the leading German workers in this field and they are responsible for the most powerful methods so far achieved for separations of this sort.

The mildly interesting but purely scientific experiments on Krypton become wildly exciting when it is realized that the separation of Krypton 83 and Krypton 84 is essentially the same in difficulty as the separation of Uranium 235 and Uranium 238. Both pairs differ by about one per cent. in weight. Heretofore similar results have been obtained only with lighter elements such as Neon 20 and Neon 22 or Chlorine 35 and Chlorine 37 where at least a 5 per cent. difference exists between the forms to be separated.

Actually the first Uranium separation was accomplished in the United States about a year ago but the quantities involved were so small that only a scientific interest applied to the work. At the rate of production of the American workers it would have taken centuries to produce enough Uranium 235 to weigh even on a chemical balance.

Judging from the results on Krypton the German workers, by last October, could have produced about one gram of separated Uranium 235. This would have been smaller than a pea but it could supply as much energy as several hundred gallons of gasoline. Moreover the apparatus, while 150 feet high, is not bulky or expensive and could be reproduced quickly.

The achievement involved in this work is so surprising that it must not be accepted without considering the possibility that something is wrong about it. It would, for example, be a perfect propaganda hoax to produce the feeling of invincibility of Germany. However the eminence of the authors and the established reputation of the magazine would be sufficient, in normal times, to warrant the reliability of the announcement.—R. M. LANGER.

ULTRAVIOLET RAYS AND REPRODUCTION

THAT ultra-violet radiation, usually considered inimical to life, proves a stimulant to reproduction in primitive one-celled green water plants when applied in less than lethal doses, is demonstrated by the experiments of Mrs. Florence Meier Chase, of the Smithsonian Institution.

Ultra-violet rays of certain specific wave-lengths are now widely used in hospitals and elsewhere to rid the air of bacteria. Earlier researches by Mrs. Chase showed that the invisible rays had similarly deadly effects on her primitive green plant cells. But when the same kind of plants are exposed to the same ultra-violet wave-lengths for about two thirds of the time necessary to kill them, instead of dying they multiply at greatly increased rates.

Increased reproduction rates differed according to specific wave-lengths. Mrs. Chase found four wave-lengths biologically effective: 2352, 2483, 2652 and 2967 Ångstrom units, respectively. Each of these wave-lengths increased the cell-division rate in a quite definite ratio.

Green cells exposed to the stimulating dose of the 2352-Ångstrom rays multiplied 4.7 times faster than a control culture of unirradiated cells of the same kind. The 2483-Ångstrom wave-length rays stimulated cell multiplication to 3.9 times the normal rate, and the 2652-Ångstrom wave-length rays produced a stimulation to 4.65 times normal. Least stimulation was brought about by the longest (2967-Ångstrom) wave-length: 1.62 times normal.

Although the green cells increased their numbers thus rapidly under the influence of ultra-violet radiation, the size of the individual cells in the stimulated cultures became much smaller than normal, as if the cells could not take time to grow up before they were hurried into reproduction.

A NEW COMET

THE third comet of January, 1941, already of the second magnitude and easily seen in the southeastern morning sky from countries south of the equator, may soon be visible from northern countries. An exact prediction of its future path, however, will be possible only with calculations that can not be made until more observations are available.

According to Dr. Harlow Shapley, director of the Harvard College Observatory, it was discovered by Dr. John S. Paraskevopoulos, Greek-born astronomer in charge of the Harvard southern hemisphere station near Bloemfontein, South Africa.

A report has been received from Dr. Enrique Gaviola, director of the Cordoba Observatory in Argentina, that two members of his staff, F. J. Bobone and M. Dartayet, determined its position in the early morning hours of January 24. Then it was in the constellation of Ara, the altar, a group never visible from most parts of the United States. It was of the second magnitude, easily visible without a telescope, and had a tail longer than a degree, which is twice the apparent diameter of the full moon.

The comet was moving, with speed enough to take it ten times the moon's diameter each day, to the northeast, which is towards the sun. Since these bodies are brightest when nearest the sun, Paraskevopoulos' comet will presumably become even more brilliant than it is now. Possibly, after it has passed the sun, it will come into view from the northern hemisphere.

Senors Bobone and Dartayet found the new comet only a few days after they had made some of the first southern observations of Cunningham's comet. This was the one, also discovered by a Harvard astronomer, that reached naked-eye brightness in the western evening sky about Christmas, though it did not become as conspicuous as astronomers had hoped. It has passed the sun, and is now in southern skies, so residents of southern lands now have the unusual privilege of two naked-eye comets at once.

First comet of 1941 was the Friend-Reese object, independently discovered by two amateur astronomers, one in California, the other in Pennsylvania. Dr. George Van Biesbroeck, of the Yerkes Observatory, found the second, when he picked up Encke's periodic comet on one of its return visits.

ASTROLOGY

ASTROLOGY, the tenets of which hold that the stars and planets exert an influence on human events by which predictions may be made in advance, is denounced as lacking every conceivable scientific foundation as well as being psychologically harmful, in a report issued by the Boston and Cambridge Branch of the American Association of Scientific Workers.

It was prepared by a committee of which Dr. Bart J. Bok, associate professor of astronomy, Harvard University, is chairman, and Mrs. Margaret W. Mayall, research associate, is secretary. Methods and claims of the astrologers are briefly summarized, and reasons given why they are not accepted by scientists. The complete report will be published in an early issue of *The Scientific Monthly*, organ of the American Association for the Advancement of Science.

"An interpretation of the rules laid down by astrologers demands the existence of an unimaginable mechanism of action," it is stated. "Astrologers have not provided us with as much as a sound hypothesis that might serve as a basis for their speculations. Astrologers attempt to offset this lack of a sound working hypothesis by the introduction of terms and concepts that are unknown to physicists and astronomers. No one, with a high-school training in physics, should be fooled into accepting an explanation of the laws of astrology in which the term 'cosmic vibration' figures prominently.

"Scientists would feel justified in considering astrology as a legitimate field of scientific inquiry if astrologers could claim that its basic rules had been established through a rigorous study of correlations. This is not the case. The rules by which astrologers interpret their horoscopes have not been derived from any known experiments or observations. Astrologers frequently claim the observational basis to be in the experience of forgotten generations far back in antiquity, but pure superstition can claim as sound a basis. In the cases of planets discovered in our times (Uranus, Neptune and Pluto) the evidence is conclusive that their influences on men were ascribed by the astrologers before preliminary observational tests of the influences could have been made, and even before accurate orbits could be assigned to the planets."

The committee quotes a statement prepared by the Society for the Psychological Study of Social Issues. In this, it is said, "Faith in astrology or in any other occult practice is harmful in so far as it encourages an unwholesome flight from the persistent problems of real life. . . . It is against public interests for astrologers to spread their counsels of flight from reality."

Though no careful, extended, statistical study of the success or failure of astrological predictions, which might prove a decisive test, is known ever to have been made, statistical tests of the supposed broad influences of the planets and zodiacal signs have failed to verify these claims.

Until such correlations are established, the report concludes, scientists can not accept the precepts of astrology. They can do a valuable service to society by pointing out publicly that the predictions lack any conceivable scientific foundation.

DIET IN SULFANILAMIDE TREATMENT

THE kind of food eaten by patients being treated with sulfanilamide may have an important bearing on the results of the treatment, whether or not the sulfanilamide causes toxic effects, it appears from research by Dr. M. I. Smith, Dr. R. D. Lillie and Dr. E. F. Stohlman, of the U. S. Public Health Service and National Institute of Health.

If the patients get too little protein food, such as meat, eggs and milk, they may be more likely to experience toxic effects from the drug, but the drug may be more effective because of reaching higher concentrations in the blood when the dietary protein is low, it appears.

Rats were the patients in the National Institute of Health studies. A low protein diet (7 per cent. protein) increased their susceptibility to sulfanilamide "by increasing the mortality rate and the incidence of anemia as compared with similarly treated rats on a diet containing 30 per cent. protein."

The concentration of the drug in the blood was somewhat higher in the rats on the low protein diet which, the investigators say, "may possibly account for the greater toxicity. This also raises the interesting question as to whether this might not be more than offset by the obvious advantages of higher concentrations of blood sulfanilamide in the therapeutic (remedial) application of the drug."

ELECTRIC ARCS ON HIGH VOLTAGE POWER LINES

LESS than a hundredth of a second is the time taken to put out accidental arcs on high voltage electric power lines provided with new switching devices described at the Philadelphia meeting of the American Institute of Electrical Engineers, by George A. Matthews, of the Detroit Edison Company.

These devices, it is expected, will greatly reduce the number of cases in which arcs, started by lightning, wind storms, and other uncontrollable conditions, burn the wires in two and allow them to fall to the ground. The high-speed devices will also eliminate the unintended blowing of high-tension fuses but will cause them to blow when the nature of the trouble warrants it.

Arcs between wires of overhead electric distribution lines result from several different causes, he explained. Lightning, high winds causing the wires to swing together, boys throwing baling wire and metal coat hangers across the lines, radio antennas and broken tree branches are examples. Where the line conductors consist of bare wires, arcs are readily started. If the wires have the so-called weather-proof covering on them, the likelihood of an arc is somewhat less under some of these conditions; but, if the covering is old and chafed, or when it is rain-soaked, the probability of an arc in the covered wires is practically the same as on bare wires.

A small wire like a radio antenna that falls across the line also results in a transient fault because the foreign wire is immediately destroyed by the arc. If, however, the cause of the arc does not disappear at once, the fault is persistent. Examples of this type are tree limbs that do not burn away immediately, heavy metal objects that can not be destroyed promptly by the arc, or conditions where the line wires become firmly wrapped around each other. Operating records show that well over half the faults that occur on overhead lines are of the transient type.

Ordinary switches do not work fast enough to prevent damage, but the new ones, which can be hung on the poles, take as little as 1.120 seconds to operate. One type is a complete automatic switch in itself, automatically performing all the operations necessary when dealing with faults of different varieties and serving to reclose the circuit when the trouble has passed.

DEMONSTRATION OF TELEVISION BY THE RCA

TELEVISION pictures projected on a theater screen 15 by 20 feet, from a projector in the balcony sixty feet away, were demonstrated by RCA engineers to show the Federal Communications Commission the latest advances in this field.

In order to use the greatest possible amount of light, a projector is used which is really an astronomical camera of the Schmidt type in reverse. The seven-inch face of the high voltage kinescope, on which the picture is formed, faces away from the screen, towards a 30-inch concave mirror. This reflects the image through a glass plate to correct certain faults or aberrations, then to the screen. By the method used for rating camera lenses, the system has a speed of F. 0.7.

The commission was also shown a home television receiver in which the pictures were projected to a screen 13½ by 18 inches. This used a conventional type of high-speed lens, treated, however, with non-reflecting films, to reduce light losses.

Some of the views witnessed were transmitted from the RCA mobile television unit, stationed at Camp Upton on Long Island, 68 miles away. Automatic relays, at Hauppauge and Bellmore, picked up the short range signals and passed them along. A new horn type antenna was used to receive them, in the relay towers and finally in a window on the sixty-second floor of the RCA building.

Radio facsimile, by which a newspaper complete with illustrations can automatically be printed in a home receiver, reproducing the original in the broadcasting station, can be combined with simultaneous broadcasts, on the same wave-length, was also shown.

The facsimile was broadcast with ordinary "amplitude modulation," in which the waves are the same distance apart, but vary in their height. The same carrier was given frequency modulation, by which the distance between the waves is changed in step with the sound vibrations. At the receiving end, the two were sorted out, and each used to operate the proper receiver.

ITEMS

To topsy-turvy developments in world turmoil, add the vote of American archeologists to send $2,000 to help the Greeks hide from bombs treasured antiquities, which archeologists were busily digging up before outbreak of the war. The American School of Classical Antiquities, in Athens, the donor, has practically abandoned digging. Members of the school still in Athens are studying in comparatively peaceful libraries and making discoveries—such as forgotten letters by the famous Heinrich Schliemann who opened the ruins of Troy. Greek officials, who have already stored much statuary and other ancient art in caves, vaults and other hideouts, have a trebly hard task. Funds are limited. Greece is so rich in antiquities that only Egypt and Italy could claim to rival it. And the limestone on which Athens and other Greek cities are built does not encourage tunneling of deep subways or other underground shelters. The limestone does provide caves, and they are useful.

AN instrument for making movies of stars has been built by Dr. Robert R. McMath, director of the McMath-Hulburt Observatory of the University of Michigan. In a report to the American Astronomical Society he told of the newest telescope for these pictures. They will show sunrise and sunset on the moon, the spinning of Jupiter and the movement of his moons around him and other heavenly motions. The new telescope is a memorial to his father, the late Francis C. McMath, who helped establish the observatory as an amateur institution more than a decade ago. With a smaller instrument, they first made such pictures. Later, however, they became particularly interested in motion pictures of the sun, from which remarkable new facts have been learned. Now Dr. McMath has announced that for educational purposes they will make such pictures again, retaking many earlier subjects with the new and more powerful equipment.

COLCHICINE, the drug that speeds up evolutionary processes in plants by doubling chromosome numbers, may be dangerous if not handled with proper precautions, according to Dr. Haig Dermen, of the U. S. Department of Agriculture. Animal tissue is much more sensitive than plant, to the effects of colchicine. A minute quantity of the solution, of the concentrations used on plants, might cause blindness, or might produce skin irritation. Up to the present at least, colchicine has had no scientifically valuable effects when used in attempts at producing new varieties of animals.