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CORONAL LINES IN OPHIUCHI

DISCOVERY of green and red light spectral lines in the exploding "new star" in Ophiuchi that heretofore have been found only in the sun's corona, invisible except during the rare few minutes of total solar eclipse, promises to solve the most conspicuous riddle in astronomical spectroscopy.

Dr. W. S. Adams, director, and Dr. Alfred H. Joy, astronomer, of Mount Wilson Observatory, California, have announced to the astronomical world, through a telegram to Harvard Observatory, that in a spectrogram of the nova R. S. Ophiuchi taken on October 2 they found the green corona line 5303 strong and the strong red line at 6374 shifted from position of the ionized silicon line previously observed. The present line, they reported, is almost certainly due to corona. These lines have appeared within the past three weeks. The Mount Wilson astronomers find that the structure of the green line is very similar to line 4686 of ionized helium.

"The high significance of this discovery," Dr. Harlow Shapley, director of Harvard Observatory, commented in interpretation, "lies in its direct bearing on the problem of the nature of the sun's corona as well as its relation to the interpretation of novae. These two bright lines have heretofore been found only in spectra of the solar corona, never in stars, and their interpretation has so far baffled astrophysicists.

"The element that gives rise to them is unknown though oxygen has been suspected. Since the unraveling of most of the nebulium mysteries and the identification of the strongest auroral radiations with oxygen, the coronal lines have remained as our most conspicuous riddle in astronomical spectroscopy.

"Finding the lines in recent spectrograms of the exploding atmosphere of the remarkable nova R. S. Ophiuchi may give us important hints as to their source. Their changing behavior as the light of the nova fades compared with the behavior of lines of known origin will help to identify the element and resolve the mystery of the corona."

The so-called "new star" R. S. Ophiuchi was originally discovered as a peculiar variable star identified by Harvard observers. It was later identified through spectral studies as a nova, a star that suddenly increases greatly in brilliance. In August this nova again flared up in typical nova fashion, the first news of this outburst being reported by L. C. Peltier, amateur astronomer of Delphos, Ohio. Immediately astronomers began careful analysis of the nova's fading light and spectrograms taken in green and red light at Mount Wilson Observatory revealed these brightest corona lines. From the Mount Wilson report it is evident that the red line is almost certainly not the well-known line of ionized silicon which is in nearly the same position in stellar spectra.

Since nova spectra change rapidly as the explosion of the star progresses, the Harvard Observatory has notified European and American astronomers telegraphically of the Mount Wilson Observatory observation.

AN UNPREDICTED METEOR SHOWER

A GREAT unpredicted meteor shower, seen from Europe on Monday night (October 9), has been identified with a minor periodic comet that otherwise made no stir in the astronomical world.

In Poland and Belgium astronomers saw the display of "shooting stars" and immediately cabled the news to Harvard Observatory, which is this continent's central station for astronomical telegrams. Dr. Harlow Shapley, director, relayed the news to all observatories and the public, asking cooperation in observing the reported shower.

Dr. W. J. Fisher, Harvard astronomer, checking possible causes of the shower, found that the Giacobini-Zinner comet, a periodic visitor to the sun's neighborhood, was in such a position as to be associated with it. Meteors have been seen but sparsely only a few times in the past in association with this comet. The theory is that the meteors are stray fragments of the comet that plunge into the upper atmosphere of the earth and burn with brilliance that gives the popular name "shooting star." The annual meteor displays of August and November are believed to be due to disintegrated comets, whose fragments travel in the old cometary orbits.

European astronomers who reported the shower were Professor Felix de Roy, of Belgium, and Professor Banachiewicz, of Krakow, Poland. The Poznan Observatory found that the meteors seemed to come from the direction of the constellation of Draco, which is in the northern skies.

The Giacobini-Zinner comet was seen this year in April from Hamburg Observatory on its regular visit to this part of the solar system. It was very faint, within sight of only large telescopes. It was discovered in 1900, rediscovered in 1913 and was observed again in 1926.

A sharp watch will be kept by amateur and professional astronomers all over the world for the next few nights in the hope that the Monday night shower will be repeated.

EFFECTS OF THORIUM DIOXIDE ON THE BODY ORGANS

THORIUM dioxide—a substance injected into the blood to make the spleen and liver radiopaque so that x-ray pictures may be taken of them—produces such definite changes in the liver and bone marrow that its use should be restricted to incurable cases, two University of Wisconsin investigators told members of the American Congress of Radiology. These were Dr. Ernst A. Pohle, professor of radiology, and Dr. Gordon Ritchie, assistant professor of pathology, who based their opinion on the results of two years of research on the effects of the substance on the body organs.

The knowledge of the function of the spleen is not

complete, but it is known that this organ acts as a sort of filter for the blood, taking out foreign substances, and that it has some connection with the formation of the life-giving blood cells of the body.

When the thorium dioxide solution is injected into a vein it mixes with the blood without causing blockage. This substance, however, when once injected does not leave the human system. Instead, it becomes deposited in a special type of cell that is present in the liver, the spleen and the bone marrow, and it remains there. Such injections result in injury to the liver and spleen similar to that sometimes found in acute infections. This damage is followed in both of these organs by moderate scarring, while the bone marrow is stimulated to overactivity and later becomes exhausted.

It is recommended, therefore, "to restrict the intravenous injection of thorium dioxide for diagnostic purposes to incurable cases until evidence to the contrary is presented based on studies in the human that demonstrate without doubt that the changes observed in animals are not significant."

In presenting their conclusions, which are based on the study of results of injections into more than 80 rabbits and the analysis of more than 1,000 x-ray pictures, Drs. Pohle and Ritchie pointed out that they were guided in their work by the assumption that a diagnostic method must not subject the patient to any undue risk or uncontrollable after-effect.

The radiopacity, brought about by the injection of the thorium dioxide, manifests itself from 30 minutes to one hour after the injection, and it lasts in the spleen for as long as 493 days without noticeable reduction in density.

SORTING OF FOODS BY A PHOTOELECTRIC TUBE

SORTING of foods by means of their light reflections will soon be a regular commercial practise, is predicted as the result of the perfection of a device that sorts white pea beans by means of an "electric eye" or photoelectric tube.

Adaptations of the apparatus now in use at a Lowell, Michigan, bean elevator, will make the device applicable to sorting of peanuts, coffee, almonds and other foods in which color is a factor in determining selection. David Clarke Cox, electrical engineer, explained that with a slightly different electrical circuit, it will be possible to sort red kidney beans, green peas and other food crops as easily as white beans are now sorted.

Operating with uncanny precision, a battery of 100 photoelectric cells in the Lowell elevator sorts beans so slightly discolored as to be hardly discernible to the human eye. The machine operates on the assumption that bad beans are discolored. Each bean is brought before a photoelectric cell. If it is spotted or black, an electrical impulse sets into motion a hammer which knocks it away. White beans are passed with approval by the device and no electrical disturbance is set up if the bean is clean.

Hardly larger than a table radio, the individual machine used now consists of a drum with a series of small holes in the rim. As the drum sweeps through a hopper of unculled beans a vacuum from inside the hollow drum sucks a single bean tightly against each hole. The rotating of the drum then presents each bean in review to a photoelectric cell which accurately measures the light reflected. If the bean is discolored, or if a foreign object is presented, a change in the light intensity takes place in the photoelectric tube. This impulse is transmitted to a thyratron tube which permits sufficient current to pass to operate an electromagnet with a trigger-like hammer on one end. Cull beans are dislodged from the vacuum drum by the hammer, while good beans (white) are permitted to pass into a hopper. A dial on the amplifier unit enables a reduction in the sensitivity of the amplifier so that slightly discolored beans may pass undisturbed. This is done at times to serve a certain trade which desires a cheaper product.

The entire operation takes place in a fraction of a second, 13 beans passing the photoelectric tube each second. The machines can do as much work as six girls hand-picking beans and in addition insures uniformity in quality. The machines maintain the same rate of speed whether culls run 2 or 25 per cent.

Possibility that buttons and other colored objects may be sorted by the machine is not far distant, engineers say. The device now in use was among the first combinations of a photoelectric tube and a thyratron tube.

MINING SULFUR UNDER WATER

THE successful mining of sulfur under water has just been reported as one of the outstanding chemical achievements of the year. This comes as welcome news in the face of information that many ideal deposits of sulfur are on the way to exhaustion. Credit for the practical application of the so-called Frasch process, invented a number of years ago, to vast deposits of sulfur under lakes and swamps in Louisiana goes to Lawrence O'Donnell, chemical engineer, and his associates.

Bravely begun during the depression, the project had to overcome economic as well as chemical engineering problems. The yields of sulfur have far exceeded the expectations of the engineers in charge of development and operation. Whereas a plant was built with the expectation of turning out perhaps 300 long tons per day it has reached a production of 1,400 tons and regularly produces 1,200.

The mining is carried out by sinking a shaft 700 feet below the bottom of a lake where a stratum of sulfur 200 feet thick lies. Pipes leading to the plant on the shore are sunk and the sulfur, liquefied by superheated water, is forced out by means of compressed air. To date 200,000 tons of sulfur of 99.92 per cent. purity have been taken from the wells.

Lake Peigneur, where the mining is being carried out, contains half a dozen small islands formed by the pressure of plugs of salt originating five miles down in the earth. The great pressure there causes the salt to become plastic and it forces its way through faults and fissures to a point below where the sulfur is found. Hence salt is likewise very profitably mined in this locality. In fact it is these "salt domes" that force the

sulfur nearer the surface of the earth. Oil is also found in the capping rock and on the sides of the domes. The Gulf States are of course noted for their oil deposits.

ANIMAL LIFE IN THE NATIONAL PARKS

As the tourist season ends in the national parks of the West, a general check-up shows that the wild animals given protection therein generally are facing the winter in good condition, after a favorable summer. One or two situations, however, are causing concern.

The superintendent of Yellowstone National Park has informed the national parks office that the forage available for the northern herd of Yellowstone elk is not adequate and that a serious situation may arise should the coming winter be a severe one. Contributing causes are a series of dry years that have resulted in a poor forage crop, and over-grazing caused by heavy concentration of elk just inside the northern park line at Gardiner, Montana, and in the Lamar River district of the park at the junction of the Lamar and Yellowstone Rivers. As a matter of fact, both the northern and southern elk herds have increased to the point where there is a serious problem of furnishing sufficient winter feed.

Commenting on this situation, Dr. Harold C. Bryant, whose supervision of research and educational activities in the national parks includes wild-life problems, states that national park authorities are determined upon a policy of reducing the amount of artificial feeding, with particular reference to cottonseed cake. It is their purpose to get the elk, particularly the northern herd, back on a self-reliant basis so as to present typical wild elk herds to visitors and not animals semi-domesticated through feeding. This they hope to achieve through the acquisition of additional natural feeding grounds and the control in numbers that will result from normal winter kills when artificial feeding is stopped.

An interesting observation from Mount McKinley National Park, Alaska, where an increase this year of all park animals was reported, is that the caribou, mountain sheep and moose fare better in extremely cold weather with a light snowfall than in moderate winters with heavy snows. Last winter the caribou remained in the park for the first time in many seasons.

Animal life in Glacier National Park did well on the whole during the past season. Nevertheless on the east side a problem faces park authorities to determine the cause of the scarcity of wild life in that section.

Moose are greatly on the increase in Yellowstone, Glacier and Grand Teton National Parks and are seen more and more by visitors. Mountain sheep and mountain goats in the parks, while they show no great increase, seem to be in excellent condition.

The special protection given trumpeter swans in Yellowstone National Park for the past several seasons resulted last summer in the return of these great birds to Swan Lake, a body of water that they have neglected for many years. Since the lake has little cover for birds, their use of it indicates an increase in number and a resultant spreading to less desirable locations.

ITEMS

UNUSUAL precautions are being taken by Lieutenant-Commander T. G. W. Settle in preparations for his second attempt to reach the stratosphere from Chicago. He is expected to make another ascension in a few days, using the balloon and gondola that were forced to earth by a leaking valve at the time of the first take-off. Although the preparations are largely secret, it is known that the "Century of Progress" gondola, punctured and dented by the forced landing in a railroad yard, has a complete new bottom, and has been tested with air pressures up to forty-five pounds per square inch, three times the pressure it will have to withstand in the stratosphere flight.

THE Federal Emergency Administration of Public Works is laying special emphasis on getting men and jobs together in the North, where a lockout of most forms of outdoor labor is enforced by the weather. Secretary Harold L. Ickes, in his capacity as Federal Public Works Administrator, has had a special work-weather map compiled for the guidance of federal officials and members of the various State Advisory Boards. The weather embargo on out-of-door work begins as early as November 1 in northern Minnesota and North Dakota, the map indicates. By December 1 the no-work line has moved down until it crosses central Nebraska and Iowa, southern Wisconsin and central Michigan, and northern New York and New England. By the end of the year the freeze-out is complete above central Kansas and Missouri and the southern ends of the Ohio Valley states. All-winter work is possible in Dixie, the Philadelphia area and most of New Jersey. In the West, Arizona, California and the coast and valley areas of Washington and Oregon are similarly favored.

A SERIES of experiments which throw further light on the cause and cure of pernicious anemia and confirm some of the latest results of American research workers, has been made by Drs. John F. Wilkinson and Louis Klein, of the Department of Clinical Investigations and Research of the Royal Infirmary, Manchester. They have found that the blood-producing factor in hog's stomach, which is now used as an alternative for liver in checking the disease, will yield a substance resembling the blood-producing factor in liver if it is incubated with beef muscle in the laboratory. Because of the chemical differences between the blood-producing substances in liver and in stomach their similar curative actions in anemia have previously puzzled scientists.

MANKIND is by no means alone in being subject to the affliction of tumors and other cancerous growths. A study of tumors occurring in animals of the Philadelphia Zoological Gardens has been reported to the *American Journal of Cancer* by Dr. Herbert L. Ratcliffe, of the University of Pennsylvania. A review of more than 5,000 animal autopsy records shows the occurrence of these afflictions in about two per cent. of all the animals dying in the gardens. Mammals were much more frequently affected with tumorous growths than were birds, although there were more birds than mammals on record in the series of autopsies. Malignant growths were found among the lowly opossums and other marsupials as well as among the dominating carnivores and the primates. Dr. Ratcliffe notes, however, that among all the orders of mammalia, the primates showed the lowest incidence of tumors.